Working Document to

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Preliminary cruise report of the International Ecosystem Summer Survey in the Nordic Seas (IESSNS) 29th June – 30th July 2026

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1 Executive summary

The International Ecosystem Summer Survey in the Nordic Seas (IESSNS) was undertaken between June 29th to July 30th in 2026 using five vessels from Norway (2), Iceland (1), Faroe Islands (1) and Denmark (1). The main objective is to provide an annual age-segregated abundance index (2010-2026), including an uncertainty estimate, for Northeast Atlantic (NEA) mackerel (*Scomber scombrus*) using a standardised pelagic swept area trawl method. Another aim is to estimate abundance indices for blue whiting (*Micromesistius poutassou*) and for Norwegian spring-spawning herring (NSSH) (*Clupea harengus*). These indices utilize standardized acoustic methods to estimate abundance in combination with trawling on acoustic registrations and biological data. The time series of abundance for blue whiting and NSSH are now extensive, consisting of 11 consecutive years from 2016 to 2026.

The overall geographical extent of the mackerel in the Nordic Seas in 2026 was similar to 2025. Nevertheless, the abundance or density of mackerel was higher in 2026 compared to 2025, which had the lowest abundance of mackerel measured during the entire time series. Highest abundance of adults was found to the east in the southern and central part of the Norwegian Sea (from 62° to 68° N) in 2026, whereas age 1 to age 3 mackerel had a significantly higher abundance in the North Sea in 2026 compared to previous years.

The swept-area mackerel index in 2026 in the Nordic Seas (excluding North Sea) was 1.8 million tonnes in biomass and 5.2 billion individuals in abundance. This is an increase of 10% and 36% compared to 2025, respectively. Thus, this represents an increase from the lowest abundance index measured last year during the entire time series. The uncertainty in the abundance index during 2026 was considerably lower than observed last year, with a CV= 0.17 in 2026 compared with CV = 0.28 in 2025. An increased sampling effort, applied in areas with high abundance in the last years, may be the reason for the reduction in the uncertainty of the survey estimates.

The most abundant mackerel year-classes were from 2024 (age 2) and 2020 (age 6) followed by 2023 (age 3) and 2019 (age 7). The internal consistency between cohorts improved with new data and a longer time series, and ranged from good to strong for all ages.

The ICES benchmark on NEA mackerel in March 2025 accepted a mackerel recruitment index for age 2, combining both the Nordic Seas and the North Sea from the IESSNS for the period since 2018, as the only recruitment time series to be included in future stock assessments. This recruitment index was highest in 2022 followed by a substantial decrease until 2024. Since then, recruitment has increased again, with 2026 being above the long term (2018-2026) average.

Norwegian spring spawning herring (NSSH) was distributed over the majority of the surveyed area, notabily not in the central part of the Norwegian Sea. The total biomass index of NSSH was 5.85 million tonnes, which is 28% higher biomass than in 2025. The 2016 year-class (10-year-olds) are still quite noticable in the stock and contributed 28% to the total biomass. However, in abundance, the 2021 and 2022 year-classes now account for 52% of the individuals.

Blue whiting had a wide distribution and was found all the way up to Svalbard. The total blue whiting biomass index increased by 14%, to 2.75 million tonnes in 2026 compared to 2.42 million tonnes in 2025. Estimated stock abundance for ages 1+ was 33.3 billion compared to 23.3 billion in 2025 (43% increase). Ages 1 and 2 respectively, dominated the estimate in 2026, as they contributed 41% and 16% in abundance and 35% and 22% in biomass, respectively. Interestingly, the 0-group contributed by 15% in abundance, mainly recorded in the southwestern survey area.

Other fish species such as lumpfish (*Cyclopterus lumpus*), capelin (*Mallotus villosus*), polar cod (B*oreogadus saida*), and Atlantic salmon (*Salmo salar*) were also monitored.

Satellite measurements of sea surface temperature (SST) were above long-time average (July 1990-2009) in most of the surveyed area, with the highest anomalies in the northernmost part of the survey area. However, the SST off the Norwegian coast was slightly below the long-time average.

The zooplankton biomass varied between areas with a patchy distribution throughout the area, with the highest concentrations east and northeast of Iceland and along the Jan-Mayen Ridge. In the eastern part of the survey area - where the highest concentrations of mackerel were observed – zooplankton biomasses were generally low. The average zooplankton weight for the whole survey was 6.7 g/m^2, which is a slightly below the long term average of 7.2 g/m^2.

Dedicated marine mammal observations were conducted onboard the two Norwegian vessels covering large areas of the Norwegian Sea and surrounding waters. In 2026, pods of killer whales overlapped with the mackerel distribution in the southern and central part of the Norwegian Sea. Large baleen whales, particularly fin whales and humpback whales, were mostly concentrated in hot spot areas from west of Svalbard (Bear Island) to the coast of Finnmark, and overlapped with schools of capelin and juvenile demersal and pelagic fish in the upper water column.

2 Introduction

During approximately four weeks of survey in 2026 (29th of June to 30th of July), five vessels: the M/V “Eros” and M/V “Vendla” from Norway, R/V “Jákup Sverri” from Faroe Islands, the R/V “Árni Friðriksson” from Iceland and M/V “Ceton“ operating in the North Sea by Danish scientists, participated in the International Ecosystem Summer Survey in the Nordic Seas (IESSNS).

The major aim of the coordinated IESSNS is to collect data on abundance, distribution, migration, and ecology of Northeast Atlantic (NEA) mackerel (*Scomber scombrus*) during its summer feeding migration phase in the Nordic Seas and surrounding coastal and offshore waters. The resulting abundance indices by age are used in the stock assessment of NEA mackerel at the annual meeting of ICES working group of widely distributed fish stocks (WGWIDE). The IESSNS mackerel index goes back to 2010. It was decided and concluded during the ICES benchmark meeting on NEA mackerel in March 2025 (ICES 2025), that the established time series surveying the North Sea annually from 2018 onwards, should be included for the first time as the new and only recruitment index for 2 years-old mackerel, together with the rest of the overall survey area, in future stock assessments. Since 2016, systematic acoustic abundance estimation of both Norwegian spring-spawning herring (*Clupea harengus*) and blue whiting (*Micromesistius poutassou*) have also been conducted. During the ICES benchmark meeting on Norwegian spring spawning herring (*Clupea harengus*) in March 2025 (ICES 2025) it was decided that the established acoustic time series for herring will not be used in future stock assessment at this stage. The major reason for not including the timeseries on NSS herring from IESSNS, was that this time series did not provide any additional information as input to the NSS herring stock assessment, compared to the results from the IESNS survey earlier in the season in May. Nevertheless, the time series from the acoustic recordings of NSS herring will be computed and continued in the future to be used for important ecological purposes. Furthermore, the systematic acoustic abundance estimation and time series on blue whiting between 2016-2026, will be evaluated for inclusion in the stock assessment during the upcoming benchmark in 2027. This is considered as potential input for stock assessment since the time series are sufficiently long. Furthermore, the IESSNS is a pelagic ecosystem survey collecting data on physical oceanography, plankton, and other fish species such as lumpfish, capelin, polar cod, and Atlantic salmon.

In 2025 and 2026 systematic whale observations applying one specific platform on the rooftop and four dedicated observers, were conducted by the two Norwegian vessels Eros and Vendla.

The methods have evolved over time since the survey was initiated by Norway in the Norwegian Sea in the beginning of the 1990s. The main elements of international standardization were conducted in 2010. Minor improvements have been implemented since 2010. Faroe Islands and Iceland have participated in the joint mackerel-ecosystem survey since 2009. Greenland participated between 2013-2020 and again in 2022, but not in recent years from 2023-2026 with their new research vessel R/V "Tarajoq" whereas Denmark has participated with annual mackerel surveys in the North Sea since 2018.

A wide range of scientific peer-review articles have been published, covering the wide geographical coverage, standardization of methods, sampling on many trophic levels and international cooperation around this large-scale international survey, which has facilitated multi-disciplinary research on the pelagic ecosystem in the Nordic Seas and beyond, see e.g. Nøttestad et al. (2016a, b), Jansen et al. (2016), Bachiller et al. (2018), Ólafsdottir et al. (2019), Nikolioudakis et al. (2019), Løviknes et al. (2021), dos Santos Schmidt et al. (2024), Ono et al. (2024) and Nøttestad et al. (2026).

3 Material and methods

Coordination of the IESSNS 2026 was done during the WGIPS meeting in January 2026, and by correspondence in December 2025 and during spring and summer 2026. The participating vessels together with their effective survey periods are listed in Table 1.

Five vessels participated in the survey and covered the IESSNS survey area in the Nordic Seas and the North Sea combined. Weather conditions in the Nordic Seas were generally moderate including periods of bad weather, which provided some unfavourable conditions for vessels to properly collect acoustic recordings, as well as conduct surface trawling, sample WP2-nets and CTDs at some predetermined stations. The two Norwegian vessels Eros and Vendla had some bad weather conditions during the last part of the survey in the northeastern part of the Norwegian Sea. The periods of bad weather conditions and fog, particularly in the northwestern part of the Norwegian Sea, hampered marine mammal observations, which were performed exclusively on the two Norwegian vessels. In the North Sea, weather conditions were moderate to good during the survey period.

The survey, which covered a total area of 2.5 million km^2 (including the North Sea) over a period of 31 days, was well synchronized in time (Figure 3). This aligns with the recommendations from the mackerel benchmark back in 2016, which suggested the survey period should be around four weeks with mid-point around 20th of July. The main argument for this time-period was to make the IESSNS survey as synoptic as possible in space and time, and at the same time be able to finalize data and report for inclusion in the assessment for the same year.

In 2026, survey coverage in stratum 4 (north of Iceland) was reduced northward due to limited presence of herring backscatter. In stratum 6 (south of Iceland), coverage in shelf areas was reduced because mackerel has now been absent from the area for several years. In the offshore part surface trawling was still done representing 63% of predetermined stations. In stratum 5 (west of Iceland) coverage was reduced to the west after a zero boundary for blue whiting was established. Two CTDs and WP2s stations were not sampled, and predetermined acoustic transects were shortened by 180 nmi. In the northeastern part of the Norwegian Sea, two CTD and WP2 stations were not taken due to full western storm at the start of second leg onboard Vendla and Eros. Eros managed to take the two fixed trawl stations at the end of the survey but did not have sufficient time to take those two CTDs and WP2s.
During the IESSNS, the special designed pelagic trawl, Multpelt 832, has been applied by all participating vessels since 2012. This trawl is a product of cooperation between participating institutes in designing and constructing a standardized sampling trawl for the IESSNS. The work was led by trawl gear scientist John

Willy Valdemarsen, Institute of Marine Research (IMR), Bergen, Norway (Valdemarsen et al. 2014). The design of the trawl was finalized during meetings of fishing gear experts and skippers at meetings in January and May 2011. Further discussions on modifications in standardization between the rigging and operation of Multpelt 832 was done during a trawl expert meeting in Copenhagen 17-18 August 2012, in parallel with the post-cruise meeting for the joint ecosystem survey, and then at the WKNAMMM workshop and tank experiments on a prototype (1:32) of the Multpelt 832 pelagic trawl, conducted as a sequence of trials in Hirtshals, Denmark from 26 to 28 February 2013 (ICES 2013a). The swept area methodology was presented and discussed during the WGISDAA workshop in Dublin, Ireland in May 2013 (ICES 2013b). The standardization and quantification of catchability from the Multpelt 832 pelagic trawl was further discussed during the mackerel benchmark in Copenhagen in February 2014. Recommendations and requests coming out of the mackerel benchmark in February 2014, were considered and implemented during the IESSNS survey in July-August 2014 and in the surveys thereafter. Furthermore, recommendations and requests resulting from the mackerel benchmark in January-February 2017 (ICES 2017), were carefully considered and implemented during the IESSNS survey in July-August 2017. In 2018, the Faroese and Icelandic vessels employed new, redesigned cod-ends with the capacity to hold 50 tonnes. This was done to avoid the cod-end from bursting during hauling of large catches as occurred at three stations in the 2017 IESSNS. During the last few years with significantly reduced spatial distribution, densities and abundance of NEA mackerel, such issues have not been present to any extent during the pelagic swept-area trawling.

Table 1. Survey effort by each of the five vessels during the IESSNS 2026. The number of predetermined ("fixed") trawl stations being part of the swept-area stations for mackerel in the IESSNS are shown after the total number of trawl stations.

Vessel	Effective survey period	Length of cruise track (nmi)	Total trawl stations/ Fixed stations	CTD stations	Plankton stations
Árni Friðriksson	7-30/7	4910	48/34	42	40
Jákup Sverri	3/7-19/7	3500	39/35	36	36
Ceton	4/7-14/7	1880	39/39	39	-
Vendla	29/6-26/7	5265	65/53	52	52
Eros	29/6-26/7	4791	65/54	53	53
Total	29/6-30/7	20346	256/215	223	182

3.1 Hydrography and Zooplankton

The hydrographical and plankton stations by all vessels combined are shown in Figure 1. Eros, Vendla, Árni Friðriksson and Jákup Sverri were all equipped with a SEABIRD CTD sensor and Árni Friðriksson and Jákup Sverri also had a water rosette. Ceton used a Seabird SeaCat offline CTD. The CTD-sensors were used for recording temperature, salinity, and pressure (depth) from the surface down to 500 m (North Sea down to 100 m) or to the bottom when at shallower depths.

Zooplankton was sampled with a WP2-net on 4 vessels, excluding Ceton which operated in the North Sea. Mesh sizes were either 180 µm (Eros and Vendla) or 200 µm (Árni Friðriksson and Jákup Sverri). The net was hauled vertically from a depth of 200 m (or bottom depth at shallower stations) to the surface at a speed of 0.5 m/s. The Icelandic vessel also sampled vertically from a depth of 50 m to the surface at the speed of 0.5 m/s. All samples were split in two, one half preserved for species identification and enumeration, and the other half dried and weighed. The zooplankton was sorted into three size categories (µm), > 2000, 1000–2000, 180/200–1000, on the Norwegian and Faroese vessels; and two size fractions (µm), > 1000 and 200–1000, on the Icelandic vessel. Detailed description of the zooplankton and CTD sampling is provided in the survey manual (ICES 2014a).

Four planned CTDs, five WP2-plankton stations, and four predetermined surface trawl stations were not sampled due to bad weather and sea ice. The number of stations taken by the different vessels is provided in Table 1.

3.2 Trawl sampling

All vessels used the standardized Multpelt 832 pelagic trawl (ICES 2013a; Valdemarsen et al. 2014; Nøttestad et al. 2016) for trawling in the upper water column, both for fixed surface stations and for trawling at greater depths to confirm acoustic registrations. Standardization of trawl deployment was emphasised during the survey as in previous years (ICES 2013a; ICES 2014b; ICES 2017). Sensors on the trawl doors, headrope and ground rope of the Multpelt 832 trawl recorded data, and allowed live monitoring of door spread, used with trawling speed to calculate effective trawl width, and trawl depth. The properties of the Multpelt 832 trawl and rigging on each vessel is reported in Table 2.

Trawl catch was sorted to the highest taxonomical level possible, usually to species level for fish, and total weight per species was recorded. The processing of trawl catch varied between nations. The Norwegian and Icelandic vessels sorted the whole catch to species whereas the Faroese vessel sub-sampled the catch before sorting if catches were more than 100 kg. Sub-sample size ranged from 60 kg (if it was clean catch of either herring or mackerel) to 200 kg (if it was a mixture of herring and mackerel); however, other species were mostly sorted out of the full catch.

The biological sampling protocol for trawl catch varied between nations in number of specimens sampled per station (Table 3).

The ICES mackerel benchmark conducted in March 2025 concluded that two age-segregated index time series from IESSNS should be used for stock assessment:
a) A time series for ages 3 and older, derived from IESSNS surface trawl data collected in the Nordic Seas.
b) A time series for age 2, derived from surface trawl data collected from both the Nordic Seas and the North Sea (ICES, 2025).

Genetics samples on herring from different regions spanning from the North Sea to Svalbard and west to Iceland were taken but have not been analyzed yet.

Table 2. Trawl settings and operation details during the international mackerel survey in the Nordic Seas from 29th June to 30th July 2026. The column for influence indicates observed differences between vessels likely to influence performance. Influence is categorized as 0 (no influence) and + (some influence). *Due to some discrepancies in the wire lengths of the bridles of Jakup Sverri, which became clear as the skippers handled the trawl during the survey, the setback length was adjusted in the middle of the survey. Before the adjustment, it deviated from the prescribed 6 m.

Properties	**Árni Friðriksson**	**Vendla**	**Eros**	**Ceton**	**Jákup Sverri**	**Influence**
Trawl producer	Ísfell	Egersund Trawl AS	Egersund Trawl AS	Egersund Trawl AS	Vónin (2024)	0
Warp in front of doors	Dynex-34 mm	Dynex -34 mm	Dynex-34 mm	Dynex	Dynex – 38 mm	+
Weight at the lower wing ends (kg)	2×400	2×400	2×400	2×400	2×400	0
Setback (m)	6	6	6	6	6*	+
Type of trawl door	Hampidjan Polyice Jupiter	Seaflex 7.5 m^2 adjustable hatches	Seaflex 7.5 m^2 adjustable hatches	Thybron type 15	Twister	0
Weight of trawl door (kg)	2200	1700	1700	1970	1650	+
Area trawl door (m^2)	7	7.5 with 25% hatches (effective 6.5)	7 with 50% hatches (effective 6.5)	7	4.5	+
Turn radius (degrees)	5-6 degree BB/SB turn	5-12 SB turn	5-8 SB turn	5-10	5 BB/SB turn	+
Fish lock front of cod-end	Yes	Yes	Yes	Yes	Yes	+
Float arrangements on the headline	Kite + 1 buoy on each wingtip	Kite with fender buoy +2 buoys on each wingtip	Kite + 2 buoy on each wingtip	Kite with fender buoy + 2 buoys on each wingtip	Kite + float array together with kites on each wingtip	+
Weighing of catch	All weighed	All weighted	All weighted	All weighed	All weighed	+

Table 3. Protocol of biological sampling during the IESSNS 2026. Numbers denote the maximum number of individuals sampled for each species for the different determinations by station.

	Species	Iceland	Norway	Denmark	Faroes
Length measurements	Mackerel	150	100	≥ 125	200/100*
	Herring	200	100	75	200/100*
	Blue whiting	100	100	75	200/100*
	Lumpfish	all	all	all	all
	Salmon	all	all	-	all
	Capelin	100	25-30	-	-
	Other fish sp.	50	25	As appropriate	20-50
Weight, sex and	Mackerel	50	25	***	15-50
maturity determination	Herring	50	25	0	15-50
	Blue whiting	100	25	0	15-50
	Lumpfish	1-5	25	0	20
	Salmon	0	25	0	20
	Capelin	50	25		20
	Other fish sp.	0-50	0	0	0-20
Otoliths/scales collected	Mackerel	50	25	***	15-25
	Herring	25	25	0	15-50
	Blue whiting	25	25	0	15-50
	Lumpfish	1-5	0	0	0
	Salmon	0	0	0	-
	Capelin	50			-
	Other fish sp.	0	0	0	0
Fat content	Mackerel	0	0	0	0
	Herring	0	0	0	0
	Blue whiting (liver)	10	0	0	0
Stomach sampling	Mackerel	10	10	0	5
	Herring	10	10	0	5
	Blue whiting	10	10	0	5
	Other fish sp.	0	10	0	0
Tissue for genotyping	Mackerel	0	0	0	0
	Herring	25	25	0	up to 25
	Blue whiting	10-25			up to 25

*Length measurements / weighed individuals
**Sampled at eight stations but not stations with herring present.
*** Up to one fish per cm-group < 25 cm, two fish 25 – 30 cm and three fish > 30 cm from each station was weighed and aged.

Underwater camera observations during trawling

Onboard M/V “Vendla” a stereo camera system (Mohn Technology AS) was used to collect image data from the entire cruise and include daytime hauls (~ 45, 30 min hauls). The camera system was positioned in the last part of the trawl, attached slightly ahead of the extension. The objective of this activity is to evaluate the feasibility for fish sizing and counting during the pelagic trawling. A system was set-up with ad-hoc software to process images from the camera and insert manual annotations of single fish. These annotations will be used as input to a machine learning algorithm for automatic species identification and fish sizing.

3.3 Marine mammals

Systematic observations of marine mammals using one specific platform at the rooftop of the bridge, involving four dedicated observers on each vessel, were conducted onboard M/V "Eros" and M/V "Vendla" from Norway during IESSNS 2026. Continuous observations were carried out from 05:00h to 23:00h, except during pre-defined stations including pelagic trawling. Opportunistic marine mammal observations from the bridge were also conducted onboard Vendla during second leg, including when continuous observations were not carried out during night time (23:00h to 05:00h). In northern waters up to Svalbard there are good visual conditions due to midnight sun during mid-summer in July.

3.4 Acoustics

Multifrequency echosounder

The acoustic equipment onboard Vendla and Eros was calibrated 29th of June 2026 for frequencies 18, 38, 70, 120 and 200 kHz. Árni Friðriksson was calibrated July 6, 2026 for frequencies 38, 70, 120, and 200 kHz. Jákup Sverri was calibrated on 28th of March 2026 for 38 kHz. Ceton did not conduct any acoustic data collection because no calibrated equipment was available, and acoustics are done in the same area and period of the year during the ICES coordinated North Sea herring acoustic survey (HERAS). All the other vessels used standard hydro-acoustic calibration procedure for each operating frequency (Foote 1987). CTD measurements were taken in order to get the correct sound velocity as input to the echosounder calibration settings.

Acoustic recordings were scrutinized to herring and blue whiting on daily basis using the post-processing software (LSSS, see Table 4 for details of the acoustic settings by vessel). Species were identified and partitioned using catch information, characteristic of the recordings, and frequency between integration on 38 kHz and on other frequencies by a scientist experienced in viewing echograms.

To estimate the abundance from the allocated NASC-values the following target strengths (TS) relationships were used.

Blue whiting: TS = 20 log(L) – 65.2 dB (rev. acc. ICES CM 2012/SSGESST:01)
Herring: TS = 20 log(L) – 71.9 dB (Foote, 1987)

Table 4. Acoustic instruments and settings for the primary frequency (38 kHz) during IESSNS 2026.

	R/V Árni Friðriksson	M/V Vendla	M/V Eros	R/V Jákup Sverri
Echo sounder	Simrad EK80	Simrad EK80	Simrad EK80	Simrad EK80
Frequency (kHz)	18, **38**, 70, 120, 200	18, **38**, 70, 120, 200	18, **38**, 70, 120, 200, 333	18, **38**, 70, 120, 200, 333
Primary transducer	ES38-7	ES38B	ES38B	ES38-7
Transducer installation	Drop keel	Drop keel	Drop keel	Drop keel
Transducer depth (m)	9.6	8.5	6-8	6-9
Upper integration limit (m)	15	15	15	15
Absorption coeff. (dB/km)	9.7	8.8	10.0	10.411394
Pulse length (ms)	1.024	1.024	1.024	1.024
Band width (kHz)	2.425	2.425	2.425	3.064
Transmitter power (W)	2000	2000	2000	2000
Angle sensitivity (dB)	18	21.9	21.9	21.9
2-way beam angle (dB)	-20.30	-20.7	-20.7	-20.4
TS Transducer gain (dB)	26.92	26.56	25.38	26.88
s_A correction (dB)	0.1	-0.62	-0.73	0.03
3 dB beam width alongship:	6.95	7.14	7.05	6.43
3 dB beam width athw. ship:	7.76	7.18	6.97	6.43
Maximum range (m)	500	21.9	500	500
Post processing software	LSSS 3.2.0	LSSS 3.0.0	LSSS 3.0.0	LSSS 3.2.0

M/V Ceton: No acoustic data collection because other survey in the same area in June/July (HERAS).

Multibeam sonar

Both M/V "Eros" and M/V "Vendla" were equipped with the Simrad fisheries sonar. Low frequency SU90 sonar (frequency range: 20-30 kHz) on M/V Eros and low frequency ST90 sonar (frequency range: 14-24 kHz) on M/V "Vendla" with a scientific output incorporated which allow the storing of the beam data for post-processing. Acoustic multibeam sonar data in netCDF data format was stored continuously onboard the two Norwegian vessels for the entire survey.

Cruise tracks

The five participating vessels followed predetermined survey lines with predetermined surface trawl stations (Figure 1). Calculations of the mackerel index are based on swept area approach with the survey area split into eight strata, of which five are permanent (1, 2, 3, 7, and 13) and three dynamic (4, 6 and 9) (Figure 2). In 2026, mackerel abundance was not measured in stratum 5 (west of Iceland). The stratum 5 inshore boundary was adapted to measure blue whiting abundance, see details in Appendix 1. CDTs and WP2 sampling was also done at predetermined locations in stratum 5. Distance between predetermined surface trawl stations is constant within a stratum but variable between strata and ranged from 45 to 72 nmi (Table 5). The survey design using different strata is done to allow the calculation of abundance indices with uncertainty estimates, both overall and from each stratum in the software program StoX (see Salthaug et al. 2017). Temporal survey progression by vessel along the cruise tracks in June-July 2026 is shown in Figure 3. The cruising speed was between 10-11 knots if the weather permitted, otherwise the cruising speed was adapted to the weather situation.

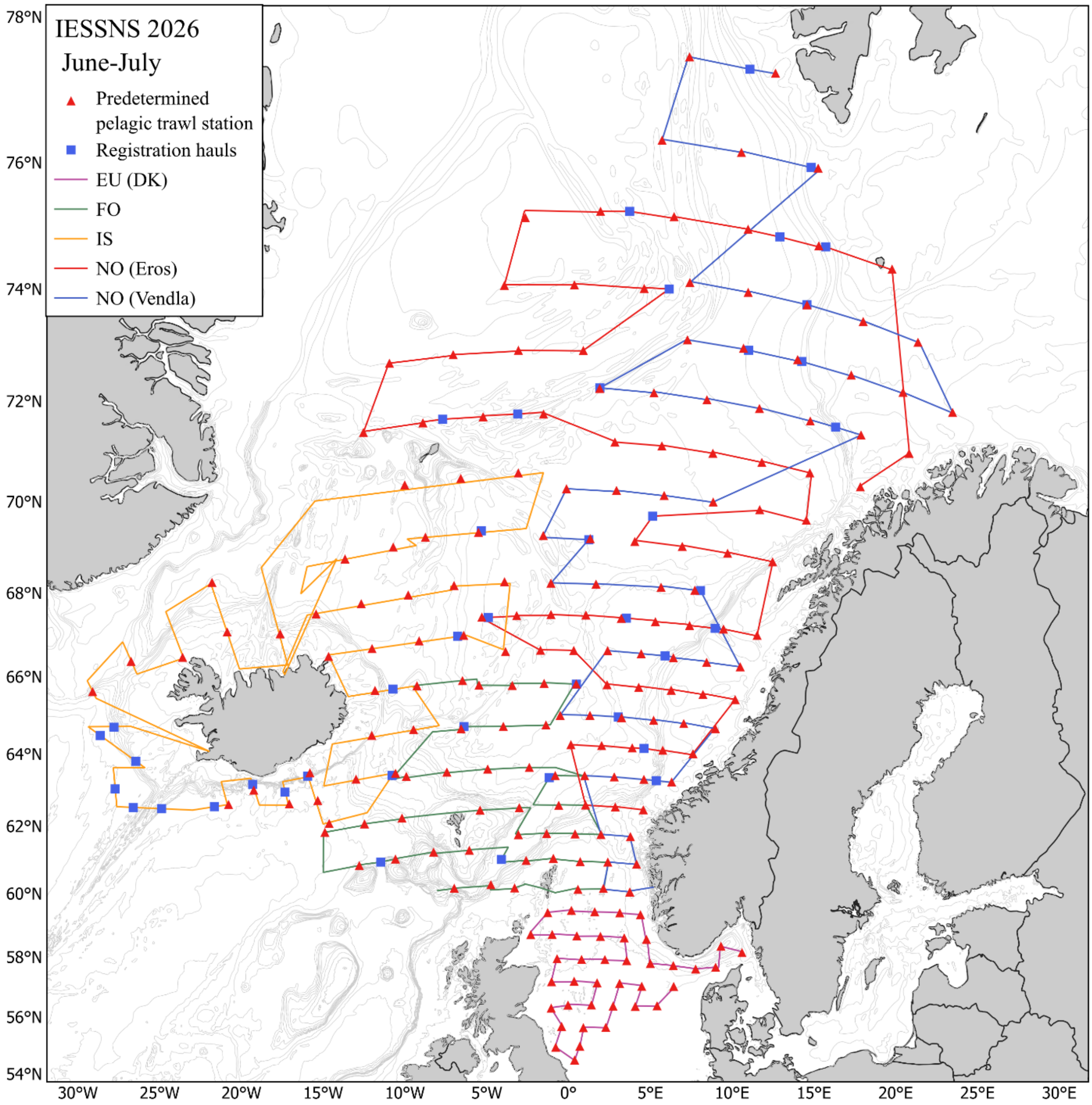


Figure 1 a. Fixed predetermined trawl stations and additional deep hauls included in the IESSNS from June 29th to July 30th, 2026. At each station a 30 min surface trawl haul was performed.

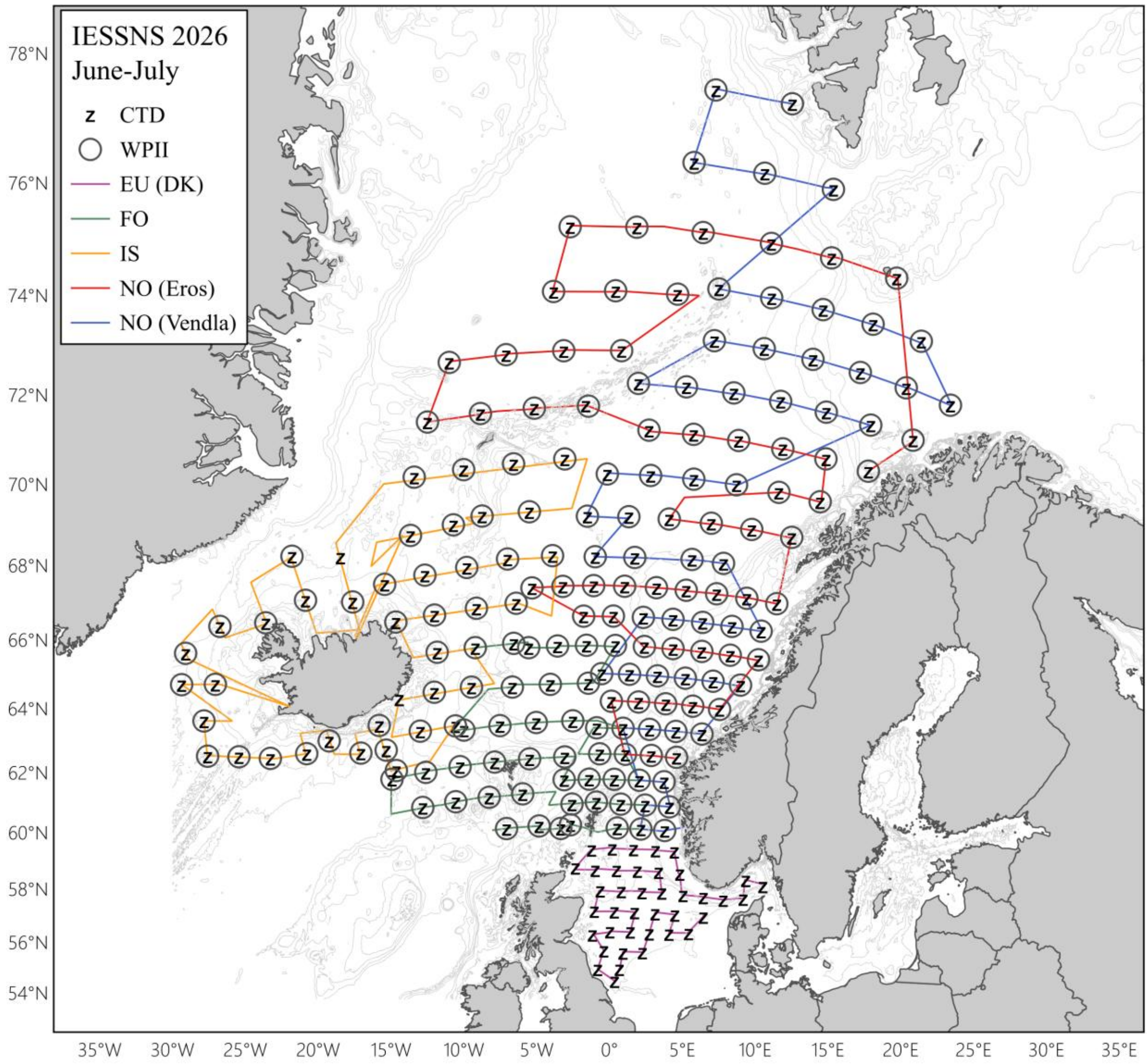


Figure 1 b. Fixed predetermined hydrographic stations (CTD and WP2) included in the IESSNS from June 29th to July 30th, 2026. CTD station (0-500 m, and 0-750 m for Iceland) and WP2 plankton net samples (0-200 m depth).

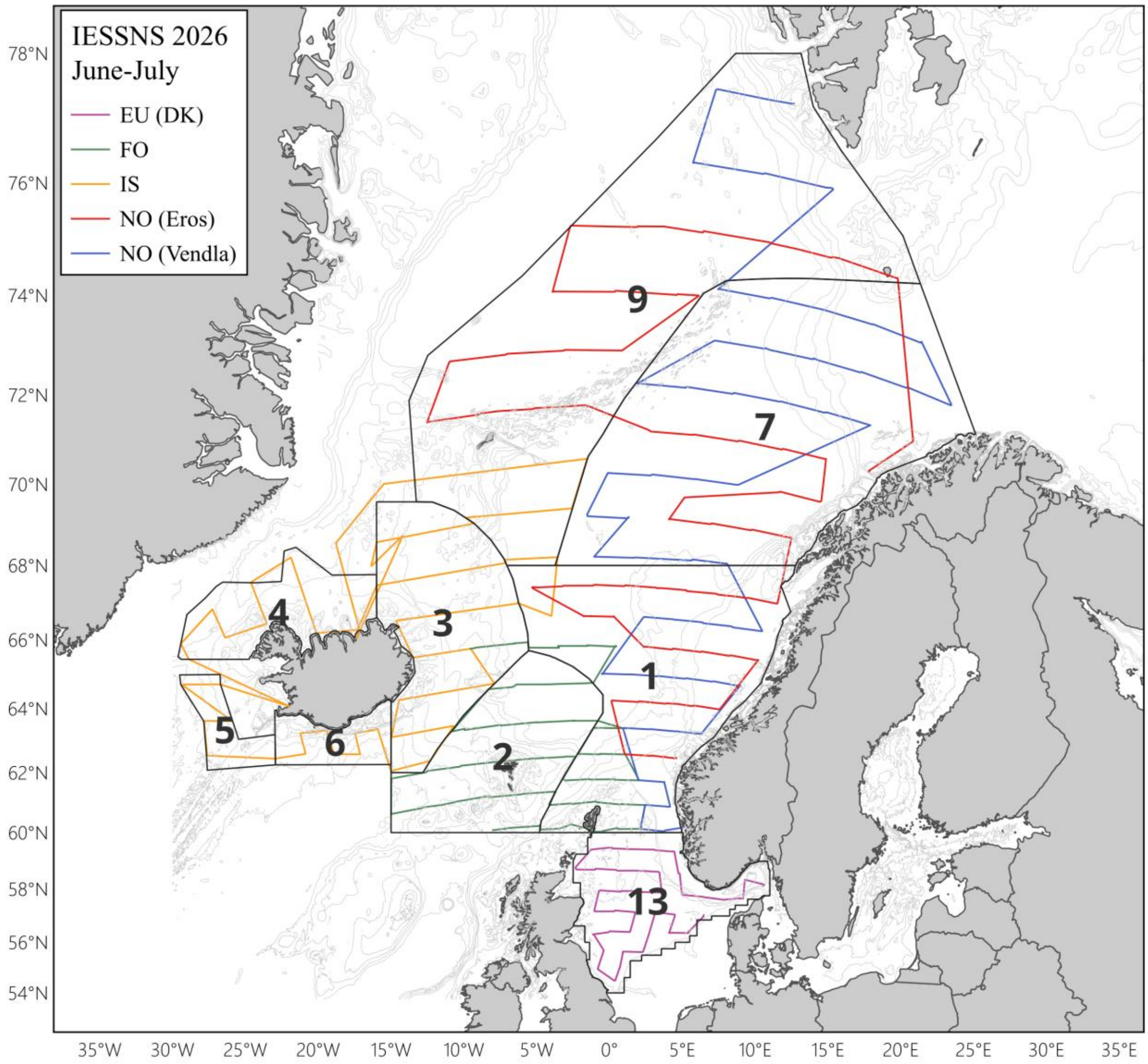


Figure 2. Permanent and dynamic strata used in StoX for IESSNS 2026. The survey area is split into 9 strata, of which 5 are permanent (1, 2, 3, 7 and 13) and four dynamic (4, 5, 6 and 9). The former stratum 8 (along the Norwegian coast) was merged into adjacent strata 1 and 7. Stratum 10 (northern Greenland waters) and 11 (southern Greenland waters) were not surveyed in 2025-2026 and are not displayed. The former stratum 12 (offshore south of Iceland) is not used any longer, since the southern boundaries of strata 5 and 6 have been converted to dynamic boundaries. For original strata boundaries see WGIPS manual (ICES 2014a). In 2023, stratum 2 was split in two strata, 2 and 14, as two predetermined surface trawl stations were not sampled on the western end of the 2nd transect from the south, see Figure 1a. Due to large variability in mackerel density within in stratum 2, the area around the skipped predetermined stations was defined as a separated stratum to reflect the mackerel density in the area. This was done to prevent inflation on mackerel abundance in the stratum 2 due to under sampling in a low-density part of stratum 2.

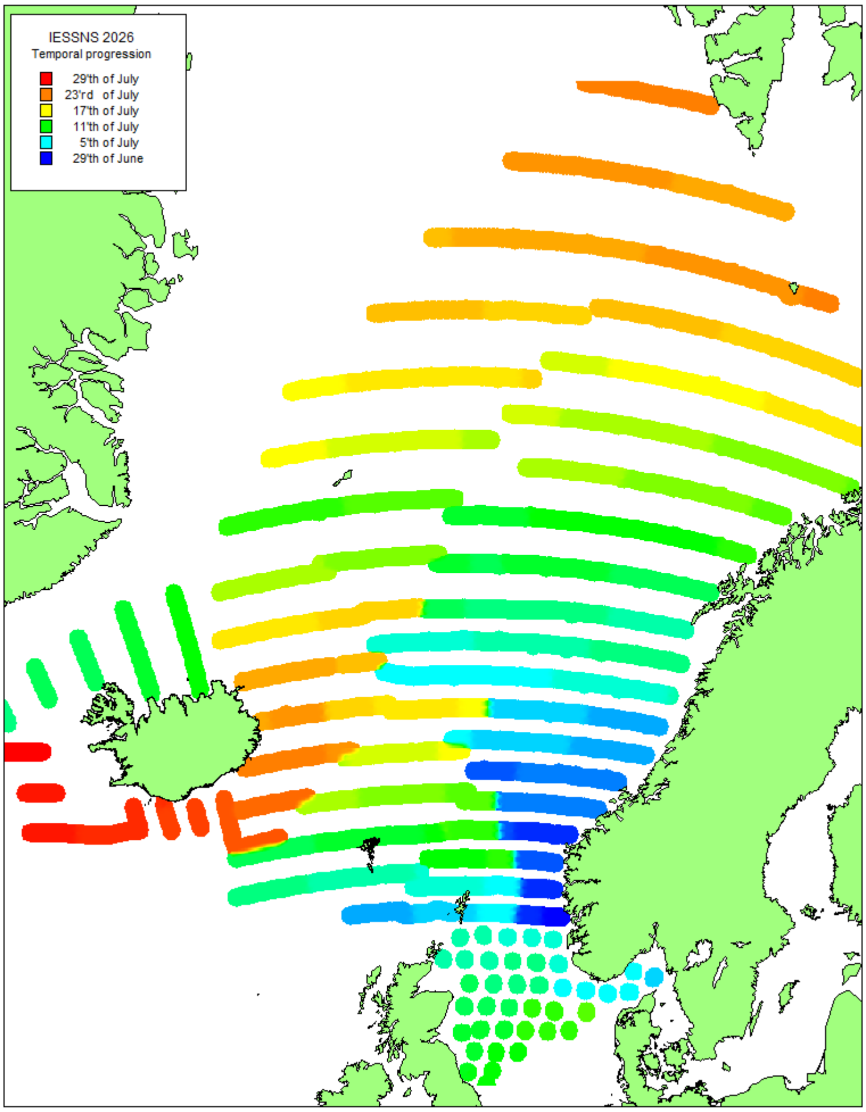


Figure 3. Temporal survey progression by vessel along the cruise tracks during IESSNS 2026: Blue represents effective survey start (29th of June) progressing to red, representing a five-week span (survey ended 30th of July). As Ceton did not submit acoustics, they have been represented by station positions.

3.5 StoX

The recorded acoustic and biological data were analysed using the StoX software package which has been used for many years now for WGIPS coordinated surveys. A description of StoX can be found in Johnsen et al. (2019) and here: www.imr.no/forskning/prosjekter/stox. Mackerel swept-area abundance indices were calculated using StoX version 4.2.1, for (1) the Norwegian Sea excluding the North Sea (used for ages 3-11 in the ICES stock assessment) and (2) the Norwegian Sea and the North Sea combined (used for age 2 in the ICES stock assessment). Also, herring and blue whiting acoustic abundance indices were calculated using StoX version 4.2.1.

During the recent benchmark workshop on Mackerel and Norwegian spring-spawning herring (ICES, 2025) it was decided that the input for the mackerel assessment model will be based in the results of the bootstrap process and not from the baseline as previously. Therefore, the results from age structure abundance and biomass of mackerel will be based in the bootstrap results like in 2025.

3.6 Swept area index and biomass estimation for mackerel

As in the last two years, the input data for the swept area calculations in 2026 were obtained from the ICES acoustic trawl surveys database.

The swept area age segregated index is calculated separately for each stratum for the Nordic Seas (Figure 2, Table 5 and Appendix 1). Stratum 5 was removed from the design as no mackerel have been found during the last 7 years. Northern border of stratum 4 and southwest border of stratum 6 were modified to correct the area of the stations that were not sampled due to ice coverage and bad weather. Individual stratum estimates are added together to get the total estimate for the Nordic Seas area which is approximately defined by the area between 60°N and 77°N and 40°W and 20°E. One additional stratum estimate is calculated, for the combined Nordic and North Sea (Table 5). The total area for the Nordic Seas was 2.2 million km^2, and the combined area was 2.5 million km^2.

During 2026, additional sampling effort was allocated to strata 1 and 7, resulting in a higher station density in these areas (Figure 2). The decision was based on the higher mackerel densities observed in the region during 2024 and 2025 (Table 5). The distance between stations in these two strata was reduced to 49 and 61 nmi, respectively, compared with 70 and 66 nmi in 2025. The aim of this change was to reduce the survey variance.

Due to ice coverage and adverse weather conditions, 7 stations were not completed during planned coverage. Three of these were completed later as survey time was available.

A new recruitment index for age 2, combining both the Nordic Seas and the North Sea from the IESSNS for the period from 2018 and onwards, was accepted as the only recruitment time series to be included in future stock assessments following the conclusions from the ICES benchmark on NEA mackerel in March 2025.

Table 5. Strata, distance between stations, along transect, per strata and area used for the mackerel swept area index calculated for the Nordic Seas, North Sea and combined Nordic and North Seas (Strata numbering is shown in Figure 2).

Stratum number	**Interstation distance (nmi)**	**Area** (nmi^2)
1	49	150763
2	67	84510
3	65	74282
4	72	33356
6	49	18694
7	61	144644
9	70	138479
13	45	83320

The density of mackerel on a trawl station is calculated by dividing the total number caught by the assumed area swept by the trawl. The area swept is calculated by multiplying the towed distance by the horizontal opening of the trawl. The horizontal opening of the trawl is vessel specific, and the average value across all hauls is calculated based on door spread (Table 6 and 7). An estimate of total number of mackerel in a stratum is obtained by taking the average density based on the trawl stations in the stratum and multiplying this with the area of the stratum.

Table 6. Detailed descriptive statistics for trawl operation for each vessel during IESSNS 2026 at predetermined surface trawl stations. The presented numbers indicate mean, standard deviation and min-max. *Horizontal trawl opening was calculated using average vessel values for trawl door spread and tow speed (details in Table 7).

Variable mean (st.dev., min-max)	RV Árni Friðriksson	Eros	Vendla	Ceton	Jákup Sverri
Trawl doors horizontal spread (m)	116 (3.7, 106-122)	134 (5.2, 119-134)	112 (4.5, 94-120)	121 (3.9, 110-128)	116 (4.3, 106-124)
Vertical trawl opening (m)	32 (4.0, 25-42)	25 (1.9, 23-35)	33 (2.5, 25-37)	26 (28, 19-34)	32 (6.9, 22-46)
Horizontal trawl opening (m)*	65.7	72.4	65.0	68.0	64.6
Speed (over ground, nmi)	4.9 (0.2, 4.4-5.3)	4.6 (0.2, 4.2-5.1)	4.5 (0.3, 3.9-5.3)	4.8 (0.3, 3.6-5.4)	4.6 (0.4, 3.6-5.5)
Trawl door depth, starb. (m)	11 (3.7, 4-21)	9 (1.8, 1-17)	10 (1.9, 7-16)	13 (2.9, 9-21)	8.9 (3.1, 5-21)
Trawl door depth, port (m)	14 (5.9, 6-35)	11 (3.6, 1-24)	11 (3.4, 7-20)	14 (4, 4-24)	8.6 (2.4, 6-17)
Headline depth (m)	0 (0, 0-0)	0 (0, 0-0)	0 (0, 0-0)	0 (0, 0-0)	0
Warp length during towing (m)	340 (14.1, 307-372)	341 (49.1, 300-400)	348 (8.0, 300-350)	339 (15, 255-350)	357 (6, 357-365)
Difference in warp length port/starboard (m)	5 - 10	5 - 10	2 - 10	5 - 10	0 – 10

Horizontal trawl opening was calculated using average vessel values for trawl door spread and tow speed (Table 7). The estimates in the formulae were based on flume tank simulations in 2013 (Hirtshals, Denmark) where formulas were developed from the horizontal trawl opening as a function of door spread, for two towing speeds, 4.5 and 5 knots:

$$\text{Towing speed 4.5 knots: Horizontal opening (m)} = 0.441 \times \text{Door spread (m)} + 13.094$$

$$\text{Towing speed 5.0 knots: Horizontal opening (m)} = 0.3959 \times \text{Door spread (m)} + 20.094$$

Table 7. Horizontal trawl opening as a function of trawl door spread and towing speed. Relationship based on simulations of horizontal opening of the Multpelt 832 trawl towed at 4.5 and 5 knots, representing the speed range in the 2014 survey, for various door spread. See text for details. In 2017, the towing speed range was extended from 5.0 to 5.2, in 2020 the door spread was extended to 122 m and in 2022 the towing speed range was extended down to 4.3 knots and up to 5.5 knots. The door spread was furthermore extended to 135 m in 2023. See also Appendix 3.

	Towing speed (knots)												
Door spread(m)	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5	5.1	5.2	5.3	5.4	5.5
100	56.5	56.9	57.2	57.7	58.2	58.7	59.2	59.7	60.2	60.7	61.2	61.7	62.2
101	56.9	57.3	57.6	58.1	58.6	59.1	59.6	60.1	60.6	61.1	61.5	62.0	62.5
102	57.3	57.7	58.1	58.6	59.0	59.5	60.0	60.5	60.9	61.4	61.9	62.4	62.9
103	57.7	58.1	58.5	59.0	59.5	59.9	60.4	60.9	61.3	61.8	62.3	62.8	63.2
104	58.1	58.5	59.0	59.4	59.9	60.3	60.8	61.3	61.7	62.2	62.7	63.1	63.6
105	58.6	59.0	59.4	59.9	60.3	60.8	61.2	61.7	62.1	62.6	63.0	63.5	63.9
106	59.0	59.4	59.8	60.3	60.7	61.2	61.6	62.1	62.5	62.9	63.4	63.8	64.3
107	59.5	59.9	60.3	60.7	61.2	61.6	62.0	62.5	62.9	63.3	63.8	64.2	64.6
108	59.9	60.3	60.7	61.1	61.6	62.0	62.4	62.9	63.3	63.7	64.1	64.6	65.0
109	60.4	60.8	61.2	61.6	62.0	62.4	62.8	63.2	63.7	64.1	64.5	64.9	65.3
110	60.9	61.2	61.6	62.0	62.4	62.8	63.2	63.6	64.1	64.5	64.9	65.3	65.6
111	61.3	61.7	62.0	62.4	62.8	63.2	63.6	64.0	64.4	64.8	65.2	65.6	66.0
112	61.8	62.1	62.5	62.9	63.3	63.7	64.0	64.4	64.8	65.2	65.6	66.0	66.3
113	62.2	62.6	62.9	63.3	63.7	64.1	64.4	64.8	65.2	65.6	66.0	66.3	66.7
114	62.7	63.0	63.4	63.7	64.1	64.5	64.9	65.2	65.6	66.0	66.3	66.7	67.0
115	63.1	63.5	63.8	64.2	64.5	64.9	65.3	65.6	66.0	66.3	66.7	67.0	67.3
116	63.6	63.9	64.3	64.6	65.0	65.3	65.7	66.0	66.4	66.7	67.0	67.4	67.7
117	64.0	64.4	64.7	65.0	65.4	65.7	66.1	66.4	66.8	67.1	67.4	67.7	68.0
118	64.5	64.8	65.1	65.5	65.8	66.1	66.5	66.8	67.2	67.5	67.8	68.1	68.4
119	64.9	65.3	65.6	65.9	66.2	66.6	66.9	67.2	67.6	67.9	68.1	68.4	68.7
120	65.4	65.7	66.0	66.3	66.6	67.0	67.3	67.6	67.9	68.2	68.5	68.8	69.1
121	65.8	66.1	66.5	66.8	67.1	67.4	67.7	68.0	68.3	68.6	68.9	69.1	69.4
122	66.3	66.6	66.9	67.2	67.5	67.8	68.1	68.4	68.7	69.0	69.2	69.5	69.8
123	66.7	67.0	67.3	67.6	67.9	68.2	68.5	68.8	69.1	69.3	69.6	69.9	70.1
124	67.2	67.5	67.8	68.0	68.3	68.6	68.9	69.2	69.5	69.7	70.0	70.2	70.4
125	67.6	67.9	68.2	68.5	68.8	69.0	69.3	69.6	69.8	70.1	70.3	70.6	70.8
126	68.1	68.4	68.7	68.9	69.2	69.5	69.7	70.0	70.2	70.5	70.7	70.9	71.1
127	68.6	68.8	69.1	69.4	69.6	69.9	70.1	70.4	70.6	70.9	71.1	71.3	71.5
128	69.0	69.3	69.5	69.8	70.0	70.3	70.5	70.8	71.0	71.2	71.4	71.6	71.8
129	69.5	69.7	70.0	70.2	70.5	70.7	71.0	71.2	71.4	71.6	71.8	72.0	72.1
130	69.9	70.2	70.4	70.7	70.9	71.1	71.4	71.6	71.8	72.0	72.2	72.3	72.5
131	70.4	70.6	70.9	71.1	71.3	71.6	71.8	72.0	72.2	72.3	72.5	72.7	72.8
132	70.8	71.1	71.3	71.5	71.8	72.0	72.2	72.4	72.5	72.7	72.9	73.0	73.1
133	71.3	71.5	71.7	72.0	72.2	72.4	72.6	72.7	72.9	73.1	73.2	73.3	73.4
134	71.7	71.9	72.2	72.4	72.6	72.8	72.9	73.1	73.3	73.4	73.5	73.6	73.7
135	72.1	72.4	72.6	72.8	73.0	73.1	73.3	73.5	73.6	73.7	73.8	73.9	74.0

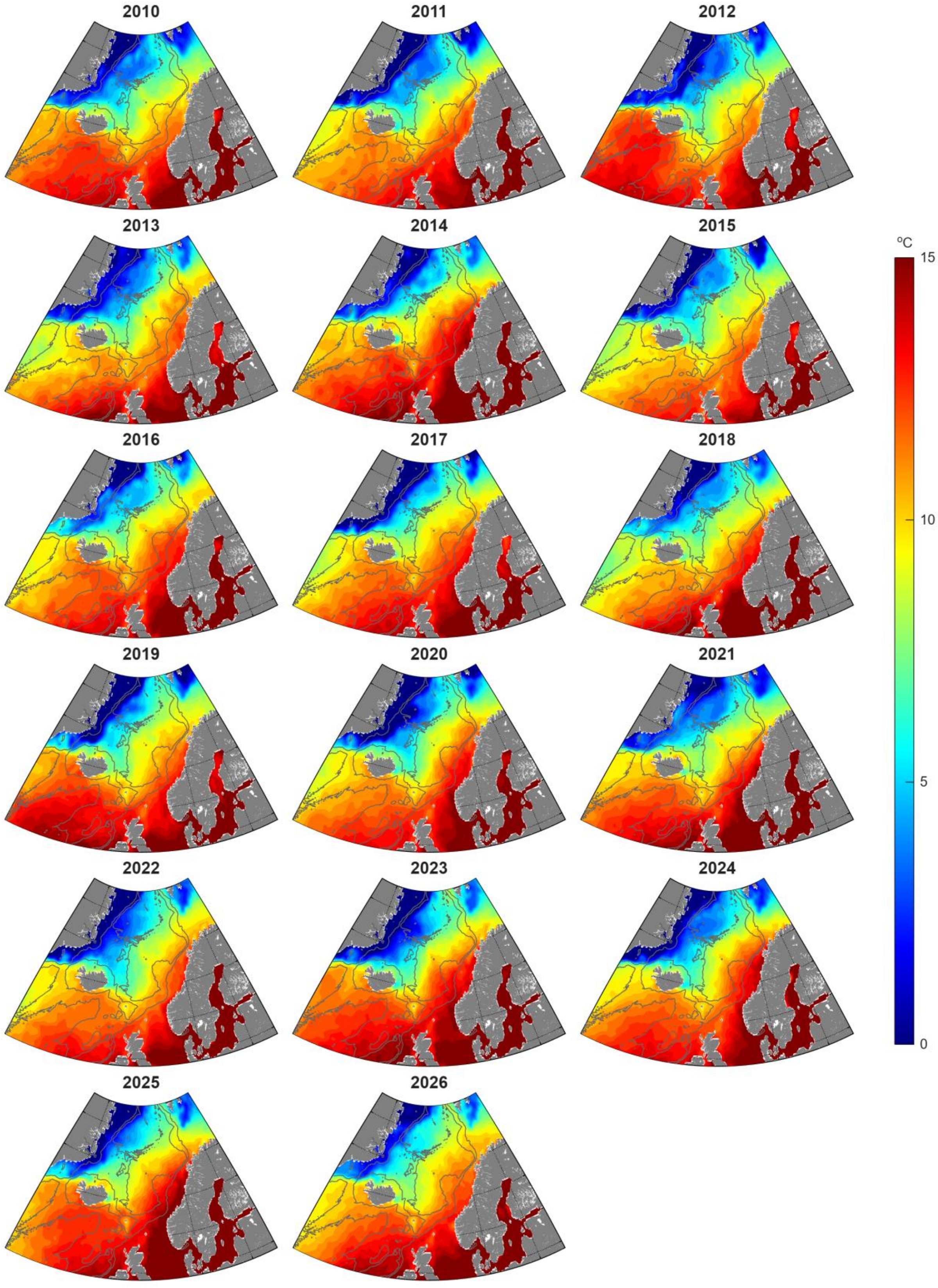
4 Results and discussion

4.1 Hydrography

Satellite measurements (NOAA OISST) of sea surface temperature in July 2026 (SST, Figure 4a) were above long-time average (July 1990-2009) in most of the surveyed area, with the highest anomalies in the northernmost part of the survey area. However, the SST off the Norwegian coast was slightly below the long-time average (Figure 4b).

It should be mentioned that the NOAA SST are sensitive to the weather conditions (i.e. wind and cloudiness) prior to and during the observations and do therefore not necessarily reflect the oceanographic condition of the water masses in the areas, as seen when comparing detailed in situ features of SSTs between years (Figure 4a-b and Figure 5). However, since the anomaly is based on the average for the whole month of July, it should give representative results of the surface temperature.

The temperature distribution at 10, 50, 100, and 400 m depths based on CTD casts is shown in Figure 5. At 10 m depth, the temperatures ranged from less than 5°C in the Greenland Sea to 14°C in the North Sea. Below the surface layer, there is a clear signal from the cold East Icelandic Current which carries cold and fresh water into the central and south-eastern part of the Norwegian Sea. Along the Norwegian Shelf and in the southernmost areas, the water masses are dominated by warmer waters of Atlantic origin. The CTD measurements at 50 m, 100 m and 400 m depths clearly showed the front between the colder east Greenlandic water and the warmer North Atlantic water.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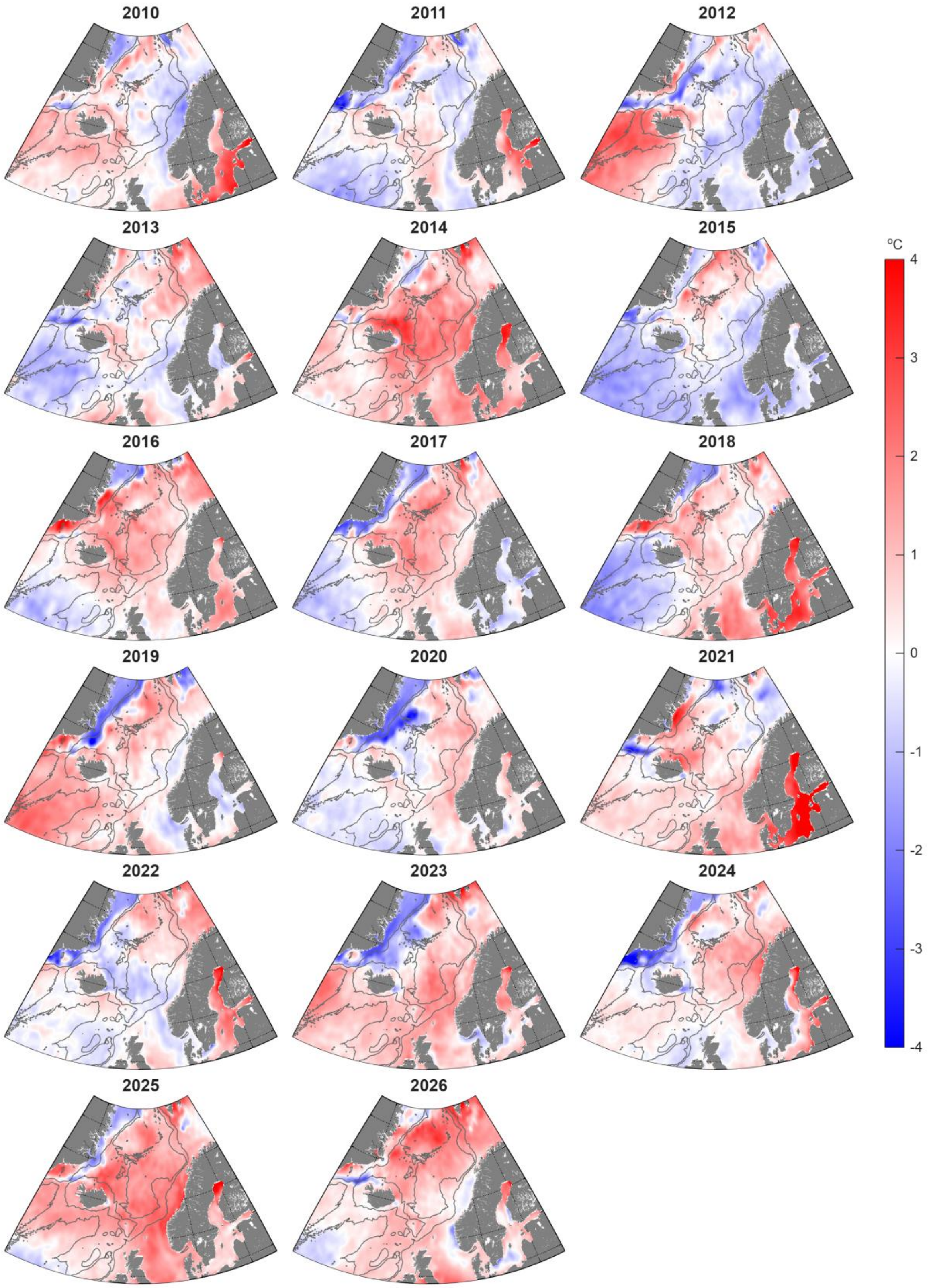


Figure 4. Annual sea surface temperature (a; top panel) and its anomaly (b; lower panel; -4 to +4°C) in Northeast Atlantic for the month of July from 2010 to 2026 showing warm and cold conditions in comparison to the average for July 1990-2009. Based on monthly averages of daily Optimum Interpolation Sea Surface Temperature (Ver. 2.1 NOAA OISST, AVHRR-only, Banzon et al. 2016, https://www.ncei.noaa.gov/products/optimum-interpolation-sst).

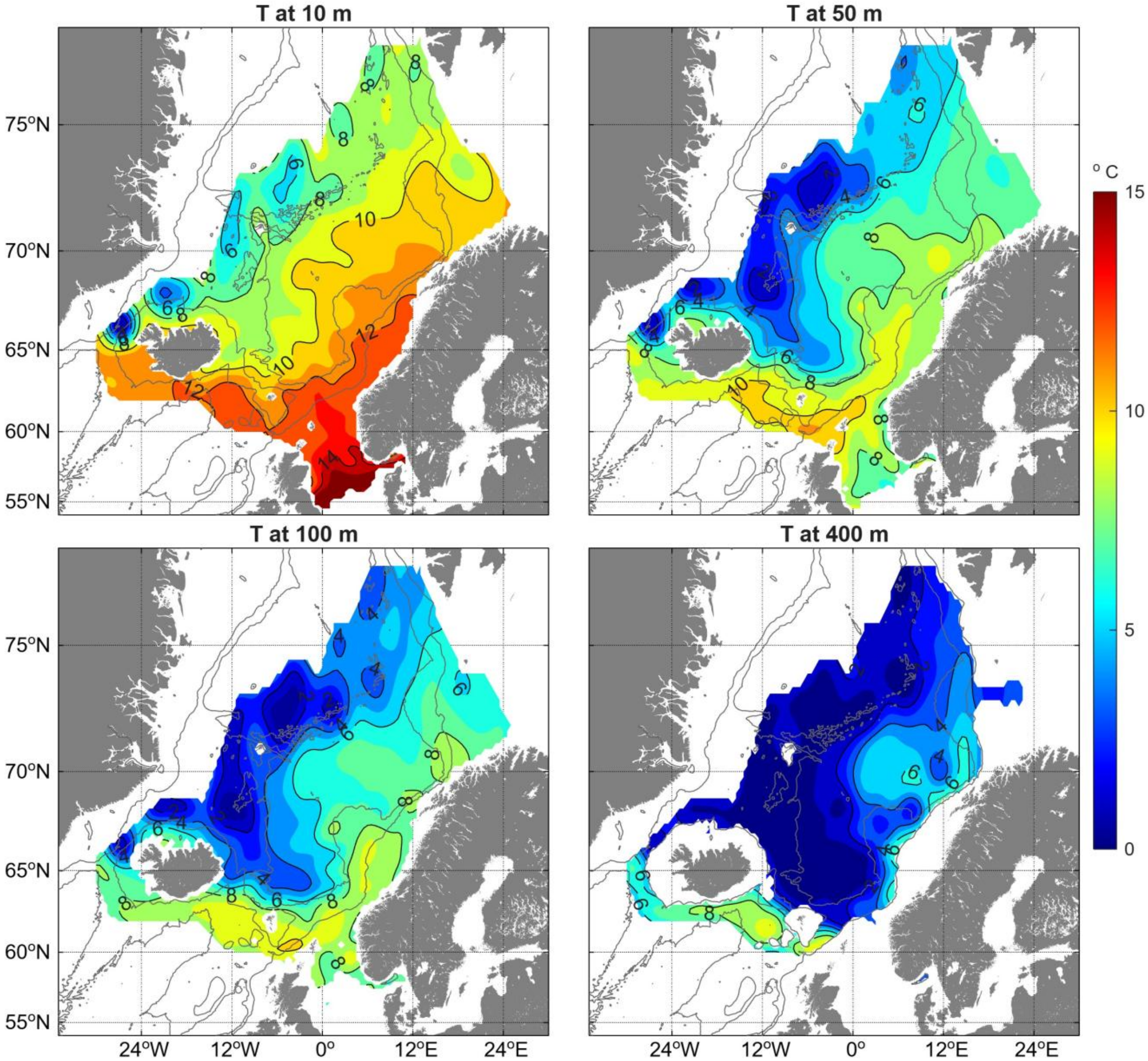


Figure 5. Interpolated temperatures (°C) at 10, 50, 100 and 400 m depth in Nordic Seas and the North Sea in July 2026. 500 m and 2000 m depth contours are shown in light grey.

4.2 Zooplankton

The zooplankton biomass varied between areas with a patchy distribution throughout the area, with the highest concentrations east and northeast of Iceland and along the Jan-Mayen Ridge (Figure 6). In the eastern part of the survey area - where highest concentrations of mackerel were observed- concentrations were generally low (below 7 g/m^2). The average zooplankton weight for the whole survey was 6.7 g/m^2, which is a slightly below the long term average of 7.2 g/m^2.

The time-series of zooplankton biomass has been averaged by three subareas: Greenland region (not covered since 2023), Iceland region, and the Norwegian Sea region (Figure 7a; see definitions in legend). Whereas the Icelandic region decreased to the lowest point since 2016, the Norwegian Sea had a slight increase compared to 2025 (Figure 7a). The lower variability over time in the Norwegian Sea might in part be explained by the more homogeneous oceanographic conditions in the area defined as Norwegian Sea.

To align with the work in the IESNS survey group (e.g. ICES. 2025. https://doi.org/10.17895/ices.pub.30233824 , WD8), zooplankton indices have also been calculated for several subareas in the survey area. In addition to the six subareas, used in the IESNS survey, averages have also been calculated for regions adjacent to the Norwegian Sea (Figure 7b). The zooplankton concentrations are generally highest in the arctic/polar water masses such as Greenland Sea, East Icelandic water, South Greenland and Iceland-Faroe Front, whereas the lowest concentrations are observed in the Atlantic water masses in the southern parts of the survey area .

These plankton indices should be treated with some caution as it is only a snapshot of the standing stock biomass, not of the actual production in the area, which complicates spatio-temporal comparisons.

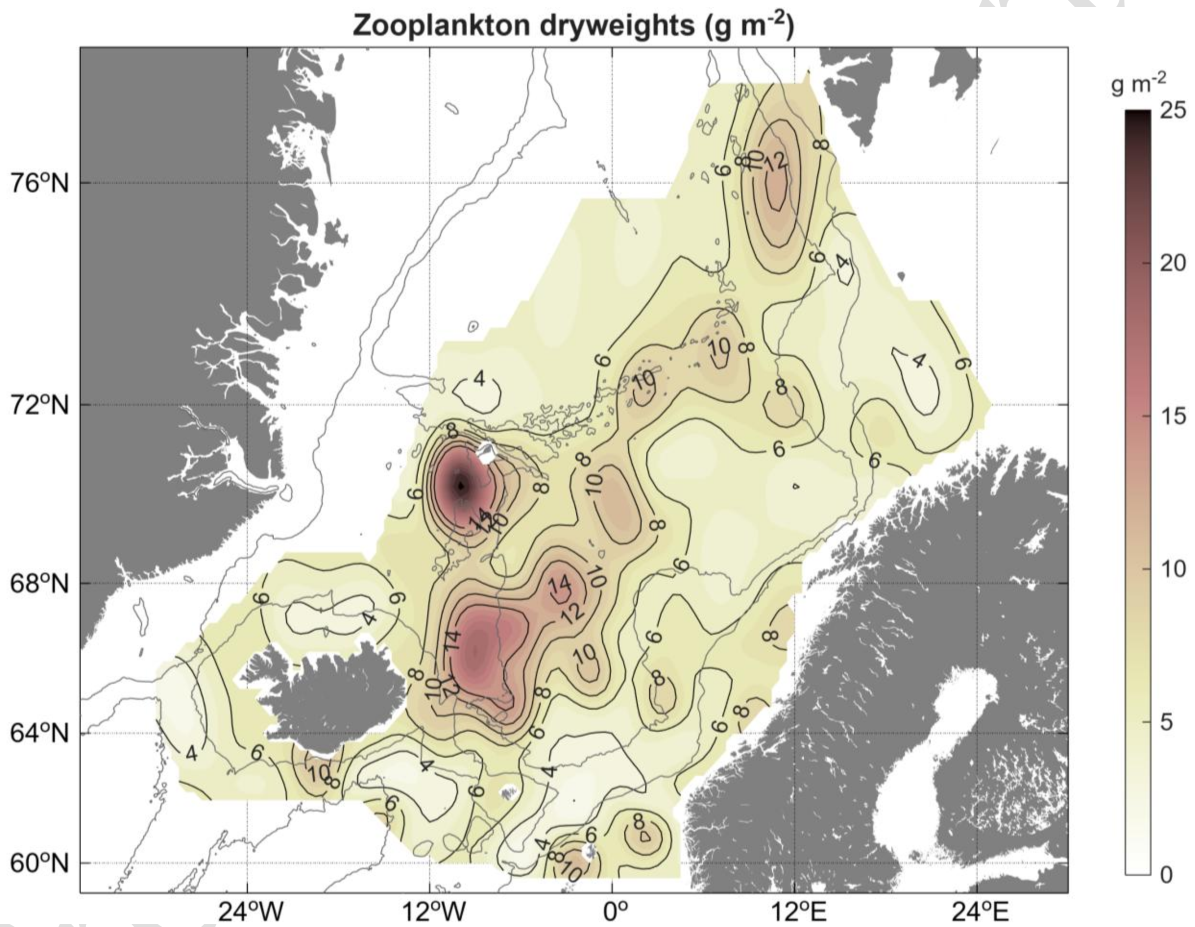


Figure 6. Interpolated zooplankton biomass (g dw/m², 0-200 m) in Nordic Seas in July-August 2026. 500 m and 2000 m depth contours are shown in light grey.

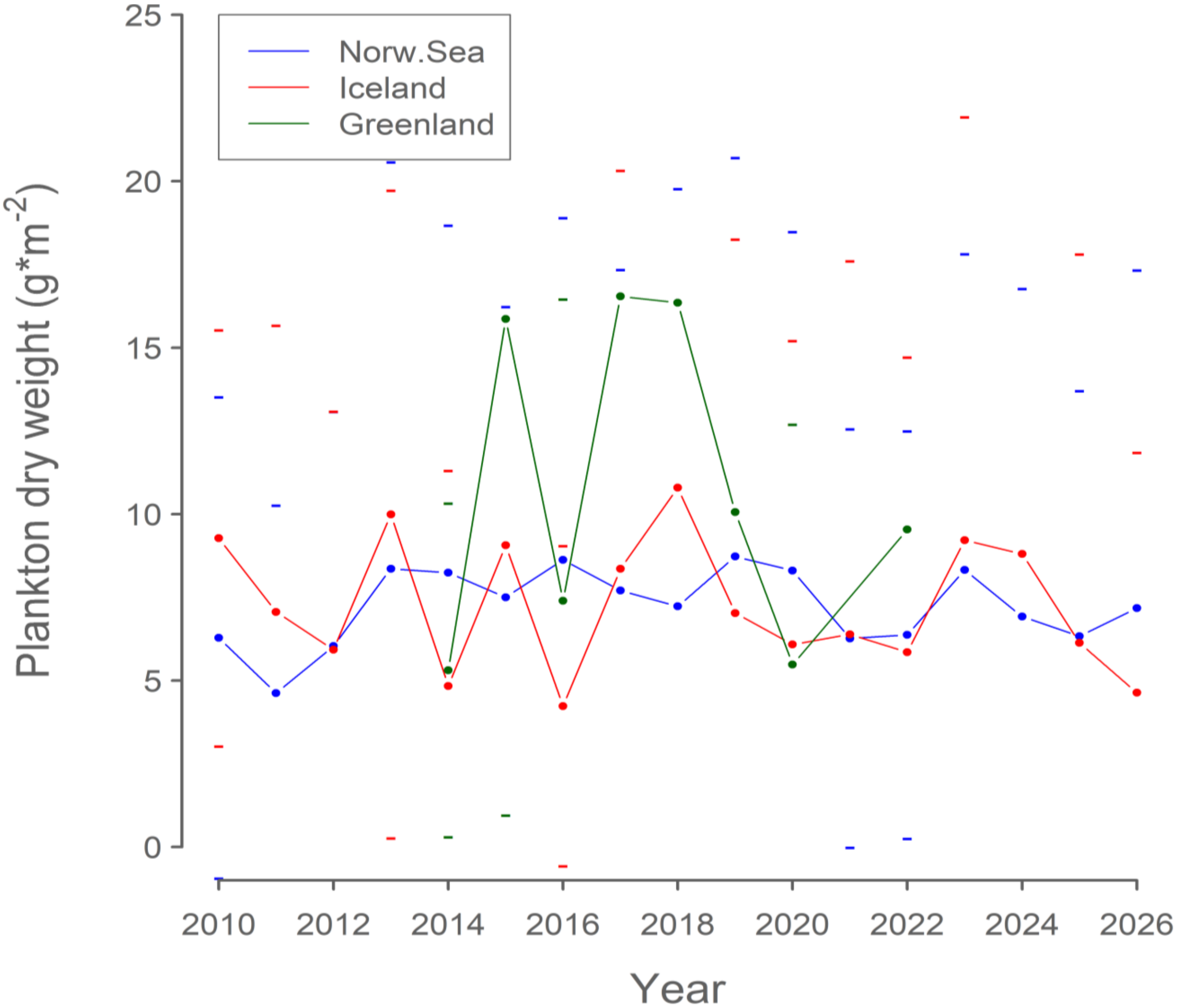


Figure 7a. Zooplankton biomass indices (g dw/m², 0-200 m). Time-series (2010-2026) of mean zooplankton biomass for three subareas within the survey range: Norwegian Sea (between 14°W-17°E & north of 61°N), Icelandic waters (14°W-30°W) and Greenlandic waters (2014-2022, west of 30°W).

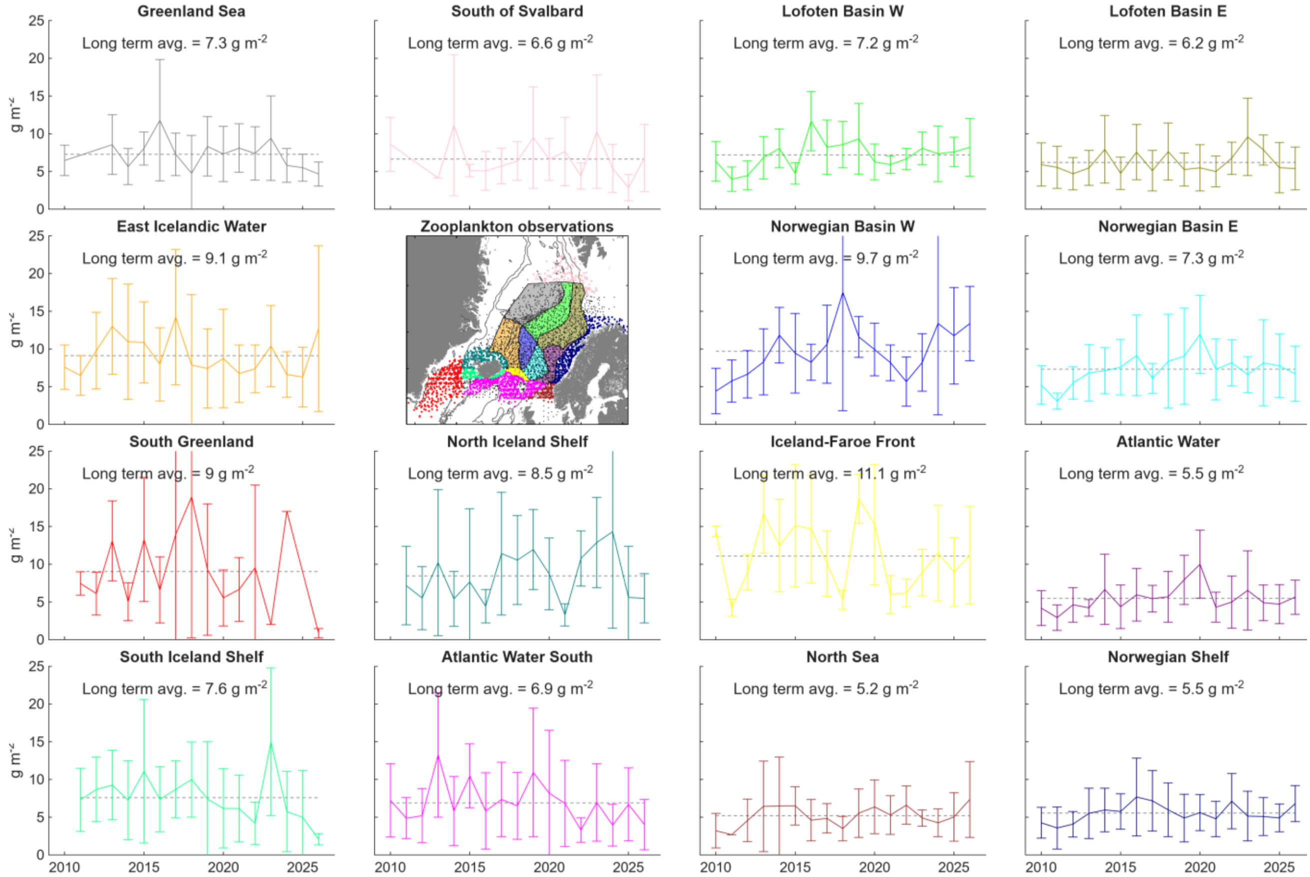


Figure 7b. Zooplankton biomass indices (g dw/m², 0-200 m), calculated for 15 subareas in the survey area. The colours in the map in the middle of the figure indicate which subarea each timeseries represents.

4.3 Mackerel

The geographical extent of the mackerel in the Nordic Seas in 2026 was similar to 2025 (Figure 8). Nevertheless, the overall abundance or density of mackerel was higher in 2026 compared to 2025 (Figures 9 to 10), which had the lowest abundance of NEA mackerel measured during the entire time series. Highest abundance of adults were found to the east in the southern and central part of the Norwegian Sea (from 62°N to 68°N) in 2026, whereas ages 1-3 mackerel had a significantly higher abundance in the North Sea in 2026 compared to previous years (Table 11 and national cruise report).

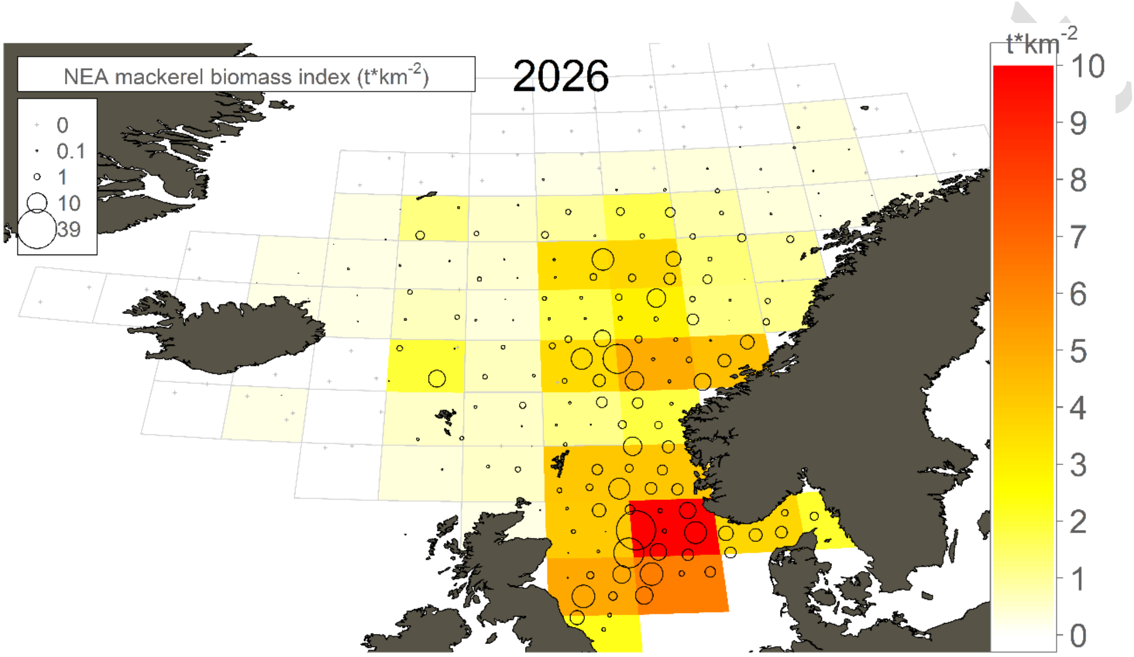


Figure 8. Mackerel catch rates by pelagic trawl haul at predetermined surface trawl stations (circle areas represent catch rates in kg/km2) overlaid on mean catch rates per standardized rectangles (2° lat. x 4° lon.) in Nordic Seas in June-July 2026.

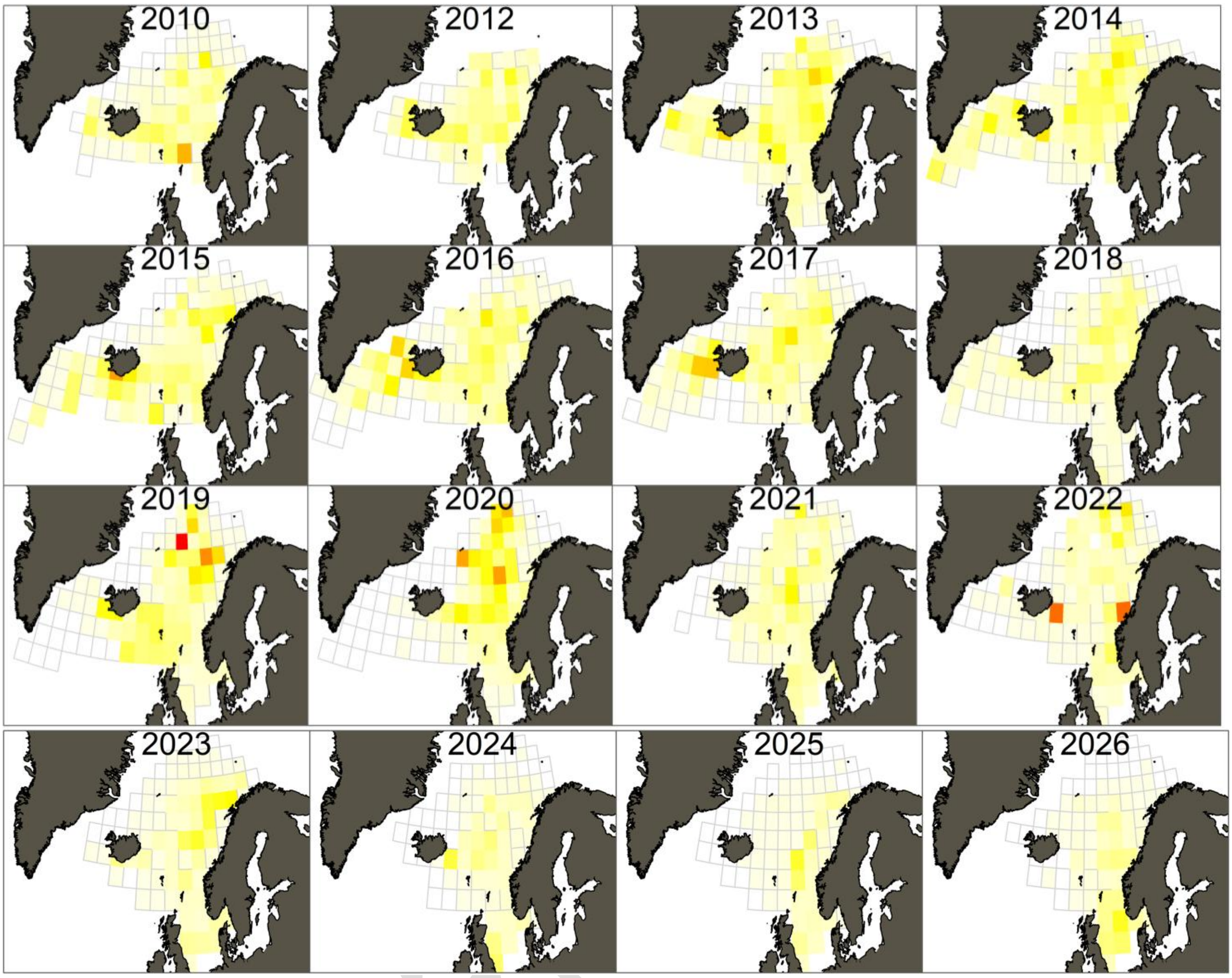


Figure 9. Annual distribution of mackerel proxied by the absolute distribution of mean mackerel catch rates per standardized rectangles (2° lat. x 4° lon.), from Multpelt 832 pelagic trawl hauls at predetermined surface trawl stations in Nordic Seas in June-August 2010-2026. Colour scale goes from white (= 0) to red (= maximum value for the highest year).

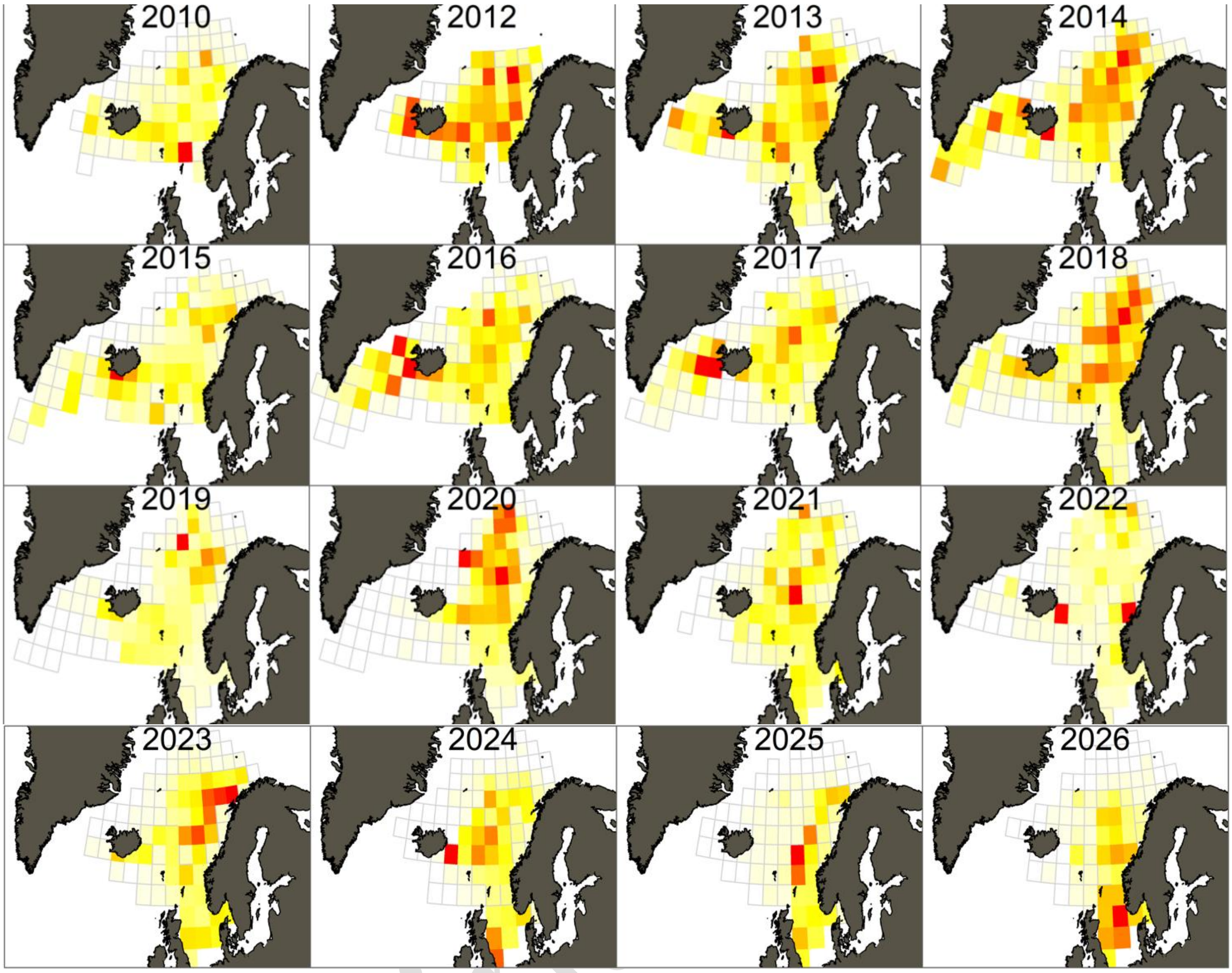


Figure 10. Annual distribution of mackerel proxied by the relative distribution of mean mackerel catch rates per standardized rectangles (2° lat. x 4° lon.), from Multpelt 832 pelagic trawl hauls at predetermined surface trawl stations stations in Nordic Seas in June-August 2010-2026. Colour scale goes from white (= 0) to red (= maximum value for the given year).

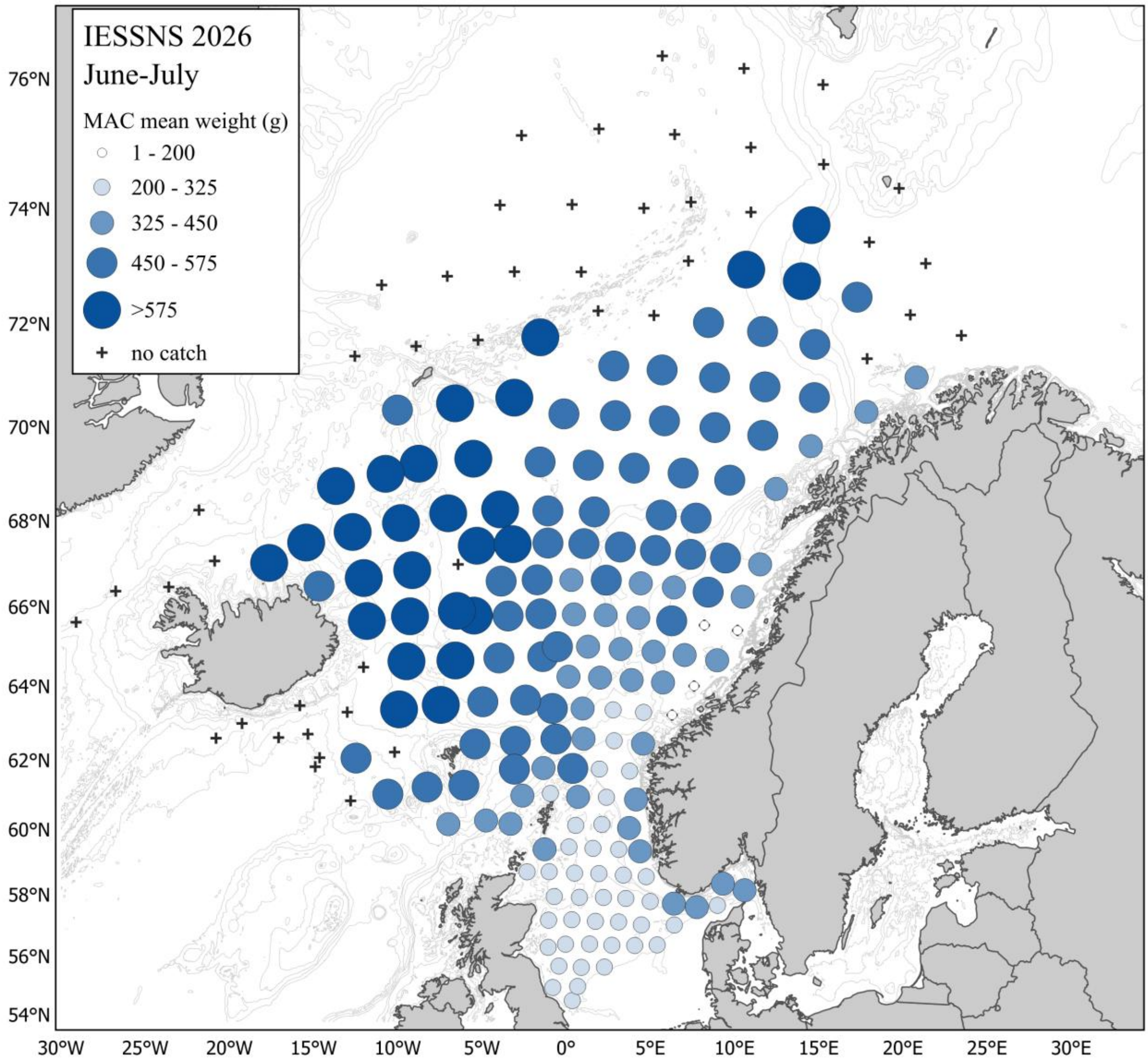


Figure 11. Average weight of mackerel at predetermined surface trawl stations during IESSNS 2026. The survey strata are shown in the map.

The mackerel weight varied between 1 to 1014 g with an average weight of 431 g. The length of mackerel caught in the pelagic trawl hauls onboard the five vessels varied from 3 to 47 cm, with an average of 35.6 cm. In total we measured 13034 mackerel. Mackerel size distribution followed the same overall pattern as previous years with increasing size from the central Norwegian Sea and the North Sea towards the westward and northward distribution boundaries (Figure 11). There is no pattern in changing size-at-age between years (Table 9).

The spatial distribution and overlap between the major pelagic fish species (mackerel, herring, and blue whiting) in 2026 according to surface trawl catches are shown in Figure 12. In 2026 there was generally low overlap between NEA mackerel and NSS herring, except for in the northern North Sea. Similar to previous years, herring are occupying larger areas of the Norwegian Sea compared to earlier period, including both juvenile and adult herring, where presence and density are highest in frontal areas. Mackerel, on the other hand, dominated in 2026 in southern and central areas with warmer Atlantic waters. The spatial contraction of the mackerel distribution in combination with the reduction in mackerel densities within the Nordic Seas shown up until 2025, seem to have slightly reversed from the bottom level documented in 2025.

In 2026, blue whiting had a large spatial distribution with the strongest acoustic registrations documented in the eastern and northeastern part of the Norwegian Sea.

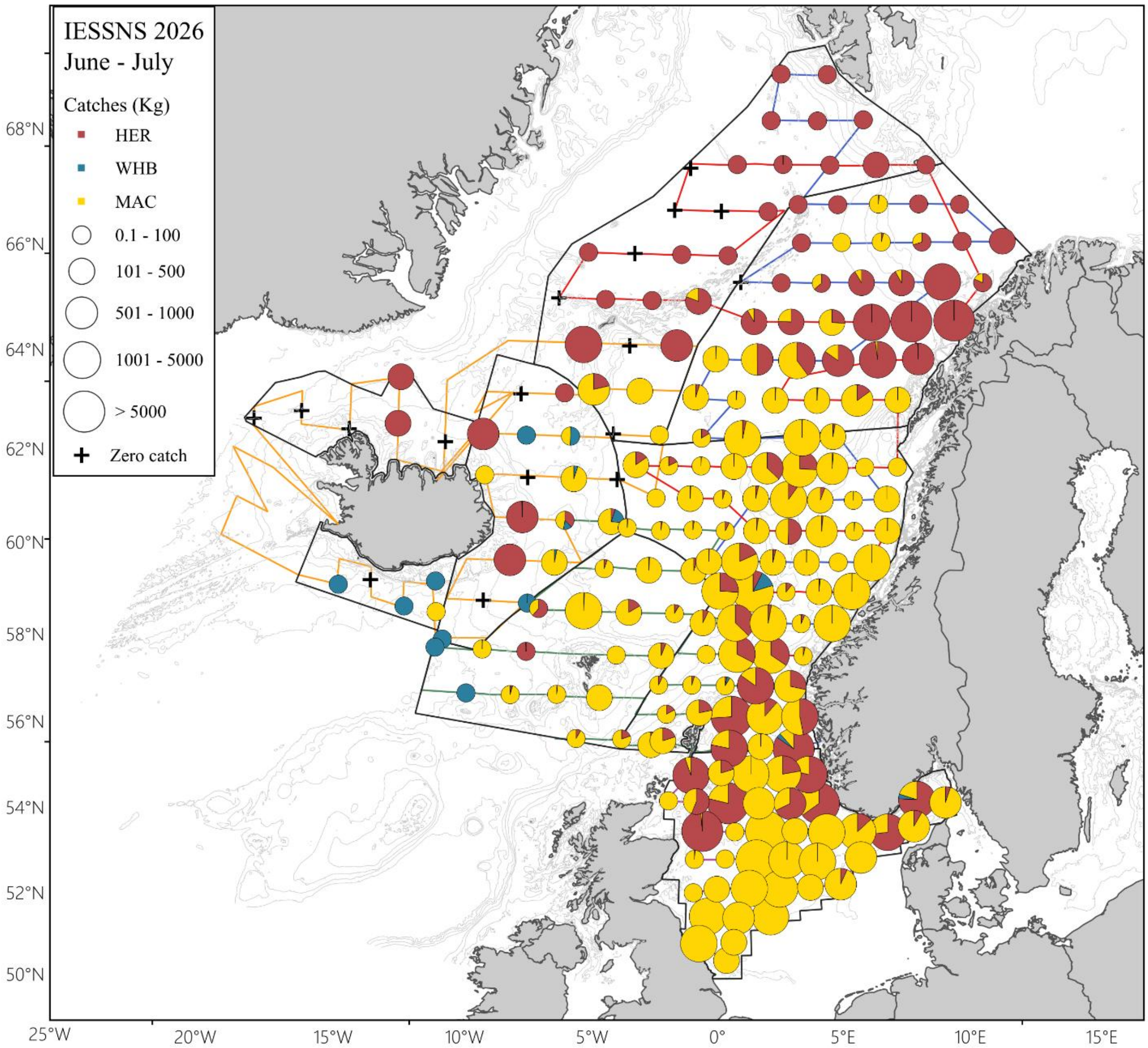


Figure 12. Distribution and spatial overlap between mackerel, herring, and blue whiting, at all surface trawl stations during IESSNS 2026. Predetermined surface trawl stations with no catch of the three species are displayed as +. The survey strata are shown in the map.

Swept area analyses of mackerel abundance in IESSNS

The total swept-area mackerel index in 2026 was 1.8 million tonnes in biomass and 5.2 billion individuals in abundance (Table 10a). This is an increase of 10% and 36%, respectively, compared to 2025. Thus, this represents an increase from the lowest abundance recorded in the entire time series, which was observed last year. The uncertainty in the abundance index during 2026 was considerably lower than observed last year, with a CV= 0.17 in 2026 compared with CV = 0.28 in 2025 (Figure 14c). An increased sampling effort, applied in areas with high abundance in the last years, may be the reason for the reduction in the uncertainty of the survey estimates.

The largest year-classes observed in 2026 was from fish ages 2, and the most abundant among the older fish, are fish age 6 (Figure 14a).

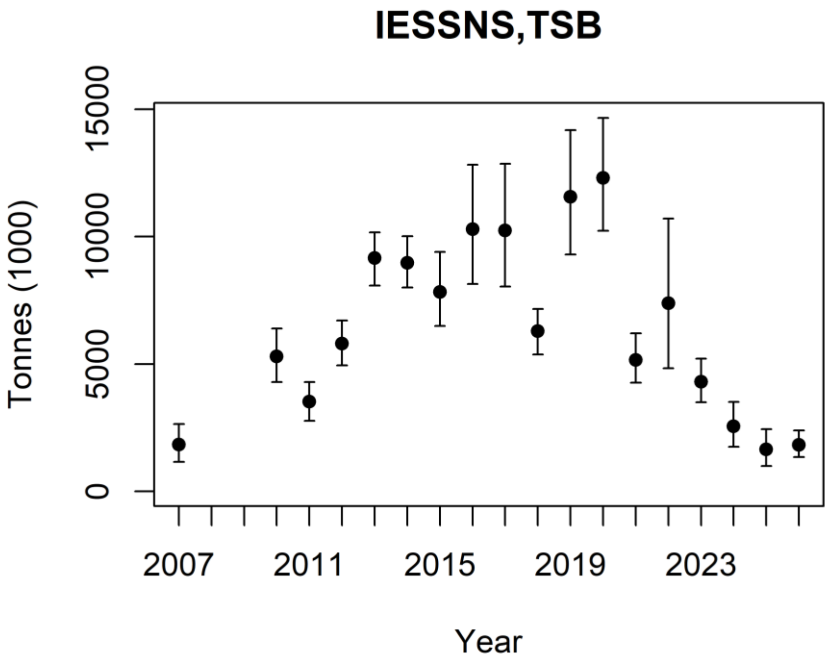
The NEA mackerel stock assessment in WGWIDE use two sets of data from the IESSNS (ICES WKBMACNSSH, 2025):

1. A recruit index consisting of number-at-age 2. The basis for this index includes the North Sea and starts in 2018 (Figure 15, Table 11).
2. Indices of number-at-age for ages 3-11. The basis for this indices excludes the North Sea and starts in 2010 (Table 8).

The recruitment index for age 2 was highest in 2022 (Figure 15). Thereafter, recruitment decreased substantially until 2024 and increased steadily again in the past three years. In 2026, the age 2 abundance 3.17 billion individuals, which is the 3rd highest value in the time series (Table 11) being above long-term average. In 2026, the contribution from stratum 13 (North Sea) coverage was 63 % of the total (Figure 15).

Mackerel of age 1 are not completely recruited to the survey as indicated by the catch curves (Figure 16). Therefore, information on recruitment before age 2 is uncertain.

The internal consistency between cohorts of the indices used in NEA mackerel stock assessment in WGWIDE, ranged from good to strong for all ages (Figure 17), and similar to last year ranging from 0.73 to 0.95 (Figure 17), with minor improvements for age 3-12+.



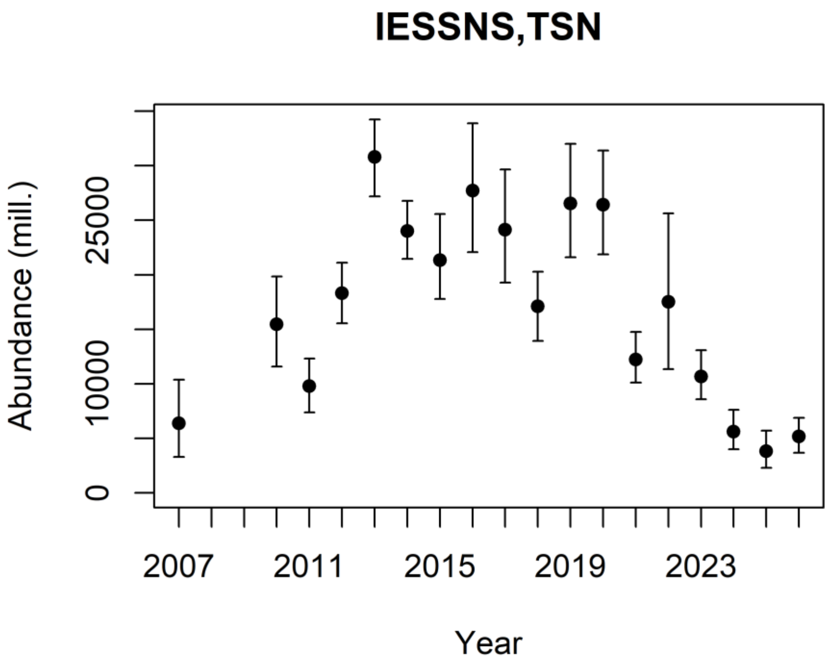
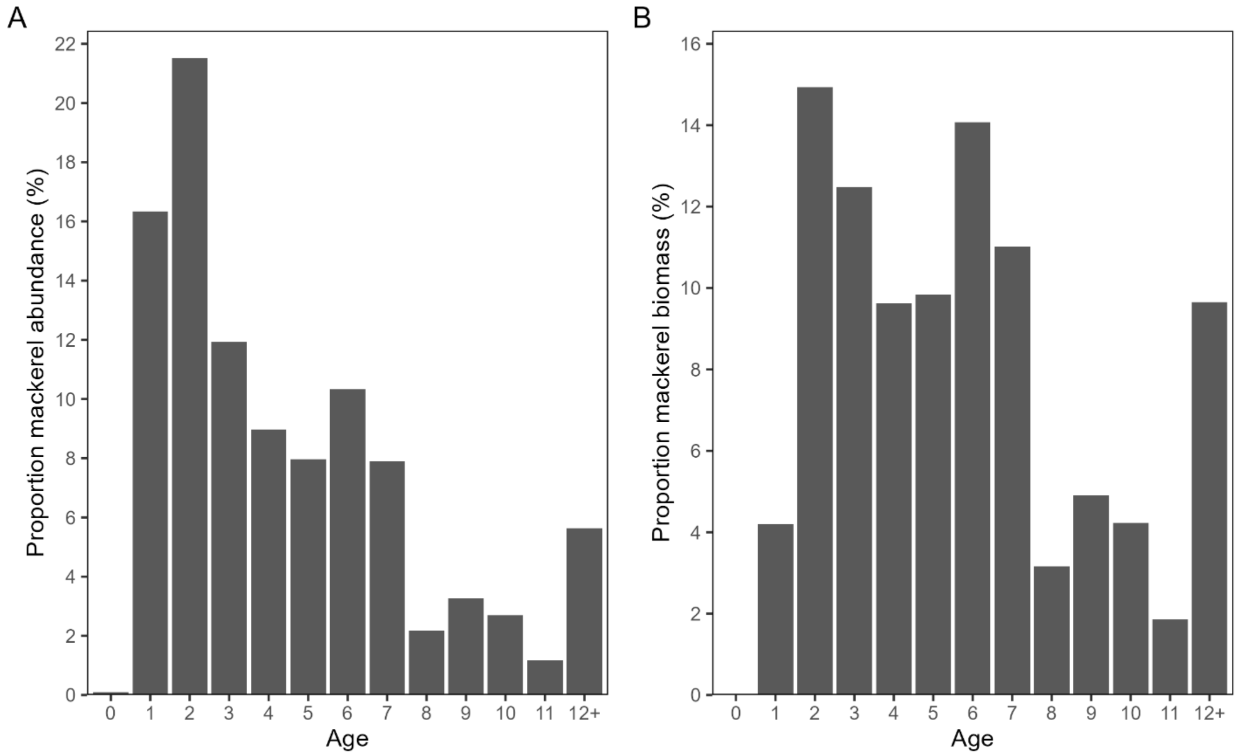
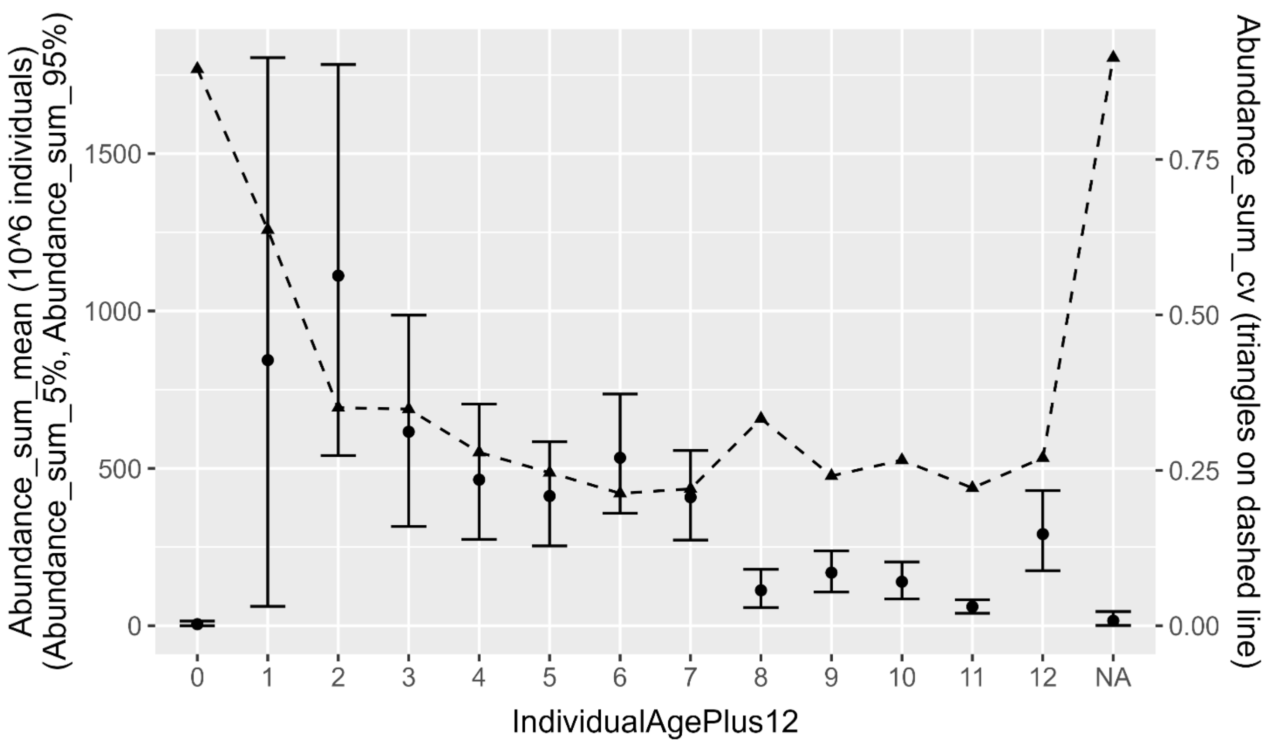


Figure 13. Estimated total stock biomass (upper panel) and total stock numbers (lower panel) of mackerel from StoX for the years 2007 and from 2010 to 2026 (excl. North Sea). The black dots are mean of 1000 bootstrap replicates while the error bars represent 90% confidence intervals based on the bootstrap. Note, in 2011 the northern part of the Norwegian was not surveyed, hence the index for that year is not representative of mackerel stock size. See IESSNS 2011 cruise report for details.


A
B
Proportion mackerel abundance (%)
Proportion mackerel biomass (%)
Age
0 1 2 3 4 5 6 7 8 9 10 11 12+

C


Abundance_sum_mean (10^6 individuals)
(Abundance_sum_5%, Abundance_sum_95%)
Abundance_sum_cv (triangles on dashed line)
IndividualAgePlus12
0 1 2 3 4 5 6 7 8 9 10 11 12 NA

D

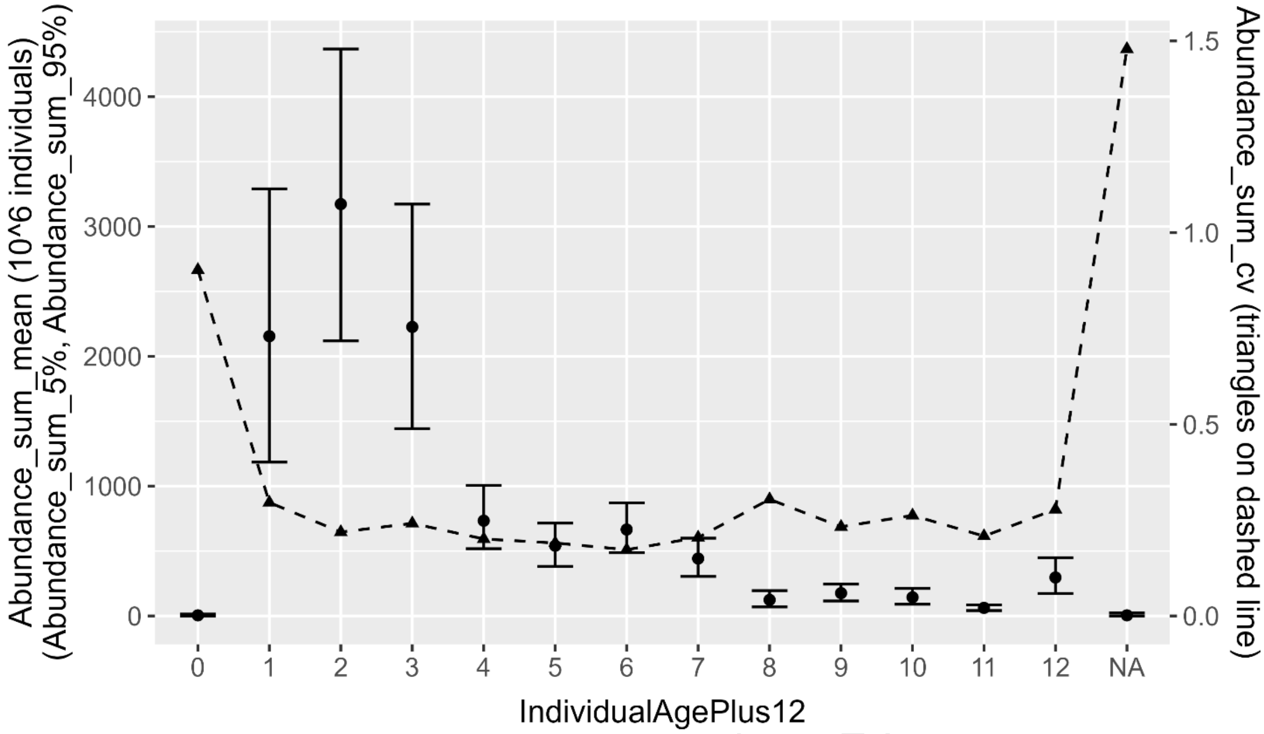


Figure 14. Age distribution of mackerel in 2026 (excl. North Sea). A) Relative abundance by age. B) Relative biomass by age. C) Absolute abundance by age (5% percentile, mean, 95% percentile) and relative standard error (CV) obtained by bootstrapping with 1000 replicates using the StoX software. D) Like figure 14c but including the North Sea.

Table 8. StoX bootstrap time series of the IESSNS (excluding the North Sea) showing age-disaggregated abundance indices of mackerel (billions) in 2007 and from 2010 to 2026. Values in the last column do not necessarily represent the sum of the values in the preceding columns.

Year/Age	1	2	3	4	5	6	7	8	9	10	11	12 (+)	Total
2007	1.34	2.29	1.04	0.30	1.06	0.16	0.06	0.04	0.03	0.02	0.01	0.01	6.35
2010	0.01	3.70	1.62	4.07	3.10	1.51	0.66	0.41	0.21	0.07	0.03	0.04	15.42
2011	0.50	0.80	1.93	1.38	2.29	1.34	0.69	0.28	0.19	0.13	0.02	0.03	9.60
2012	0.90	5.60	1.23	2.51	2.05	2.92	1.86	0.71	0.29	0.11	0.07	0.04	18.30
2013	0.07	7.71	9.78	2.41	3.15	3.21	2.56	1.14	0.38	0.16	0.14	0.07	30.77
2014	0.01	0.52	7.07	4.90	2.69	2.69	2.78	1.86	0.87	0.39	0.12	0.11	24.01
2015	0.89	0.85	2.42	6.54	4.84	1.87	1.61	1.22	0.71	0.27	0.06	0.05	21.33
2016	0.00	5.05	1.53	2.98	5.85	4.97	2.20	2.00	1.35	0.88	0.48	0.43	27.72
2017	0.88	0.10	3.50	1.90	3.19	4.45	4.56	1.83	2.05	0.86	0.54	0.25	24.11
2018	2.21	2.53	0.49	2.39	1.13	1.30	2.23	1.92	1.12	0.57	0.59	0.59	17.07
2019	0.07	1.31	3.85	1.16	2.95	2.90	1.89	3.97	4.08	1.41	1.29	1.66	26.54
2020	0.05	1.07	1.46	3.30	2.16	2.54	2.64	1.89	2.88	3.85	1.45	3.12	26.41
2021	0.08	2.14	0.68	1.26	1.53	0.34	1.34	0.74	1.03	1.03	0.95	1.09	12.22
2022	0.02	3.81	2.30	0.98	1.35	1.03	0.62	0.99	1.01	1.88	1.59	1.92	17.50
2023	0.20	0.68	3.54	1.73	0.53	0.44	0.83	0.34	0.48	0.37	0.43	1.11	10.67
2024	0.03	0.52	0.54	0.85	0.70	0.31	0.30	0.34	0.41	0.31	0.29	1.01	5.61
2025	0.15	0.41	0.37	0.49	0.79	0.60	0.12	0.26	0.17	0.08	0.09	0.31	3.82
2026	0.84	1.11	0.62	0.46	0.41	0.53	0.41	0.11	0.17	0.14	0.06	0.29	5.18

Table 9. StoX baseline (point estimate) time series of the IESSNS showing age-disaggregated mackerel mean weight (grams) per age in 2007 and from 2010 to 2026 (excl. North Sea). * Mean weight of ages 12+.

Year\Age	1	2	3	4	5	6	7	8	9	10	11	12	13+
2007	133	233	323	390	472	532	536	585	591	640	727	656	685
2010	133	212	290	353	388	438	512	527	548	580	645	683	665
2011	133	278	318	371	412	440	502	537	564	541	570	632	622
2012	112	188	286	347	397	414	437	458	488	523	514	615	509
2013	96	184	259	326	374	399	428	445	486	523	499	547	677
2014	228	275	288	335	402	433	459	477	488	533	603	544	537
2015	128	290	333	342	386	449	463	479	488	505	559	568	583
2016	95	231	324	360	371	394	440	458	479	488	494	523	511
2017	86	292	330	373	431	437	462	487	536	534	542	574	589
2018	67	229	330	390	420	449	458	477	486	515	534	543	575
2019	153	212	325	352	428	440	472	477	490	511	524	564	545
2020	99	213	315	369	394	468	483	507	520	529	539	567	575
2021	140	253	357	377	409	451	467	487	497	505	516	523	544
2022	125	263	330	408	438	431	462	508	525	519	531	531	549
2023	128	269	347	371	416	435	462	484	506	526	517	533	557
2024	192	268	343	400	424	461	447	480	536	555	554	584	549
2025	113	314	338	418	475	473	492	526	538	557	581	606*	
2026	91	244	368	377	436	480	490	506	533	546	560	599*	

Table 10a. Bootstrap estimates from StoX (based on 1000 replicates) of mackerel in 2026 (excl. North Sea). Numbers by age and total number (TSN) are in millions and total biomass (TSB) in million tonnes.

	Age	5th percentile	Median	95th percentile	Mean	SD	CV
	1	61.7	795.1	1804.9	843.9	537.5	0.64
	2	541.1	1082.4	1782.9	1112.1	390.0	0.35
	3	315.4	612.0	986.8	616.3	214.8	0.35
	4	274.6	443.8	704.1	464.0	129.4	0.28
	5	253.5	408.8	584.7	412.0	101.5	0.25
	6	357.4	525.1	736.2	533.6	113.6	0.21
	7	272.4	402.7	556.7	408.3	89.9	0.22
	8	57.8	110.7	178.9	112.5	37.5	0.33
	9	107.1	166.6	237.3	168.6	40.6	0.24
	10	84.7	137.6	202.7	139.7	37.2	0.27
	11	39.4	60.2	82.9	60.6	13.4	0.22
	12	174.8	286.4	429.6	291.2	78.6	0.27
TSN		3673.4	5125.4	6864.8	5183.6	964.9	0.19
TSB		1.3	1.8	2.4	1.8	0.3	0.17

Table 10b. Bootstrap estimates from StoX (based on 1000 replicates) of mackerel in 2026 (including North Sea). Numbers by age and total number (TSN) are in millions and total biomass (TSB) in million tonnes.

	Age	5th percentile	Median	95th percentile	Mean	SD	CV
	1	1185.3	2096.3	3290.4	2155.1	638.0	0.30
	2	2118.6	3123.7	4367.2	3172.6	694.5	0.22
	3	1442.8	2178.0	3173.0	2226.4	537.8	0.24
	4	518.5	715.9	1005.6	733.6	147.4	0.20
	5	382.7	538.3	715.0	540.9	103.0	0.19
	6	488.1	656.0	870.5	666.0	115.2	0.17
	7	304.8	438.8	598.9	442.4	90.5	0.20
	8	69.4	120.9	195.7	123.9	37.7	0.30
	9	115.3	173.2	245.2	175.9	40.9	0.23
	10	90.0	141.6	212.6	143.9	37.7	0.26
	11	41.5	62.1	84.9	62.4	13.0	0.21
	12	173.1	290.0	448.2	296.5	82.4	0.28
TSN		8293.7	10710.2	13457.6	10749.6	1606.4	0.15
TSB		2.6	3.2	4.1	3.3	0.5	0.14

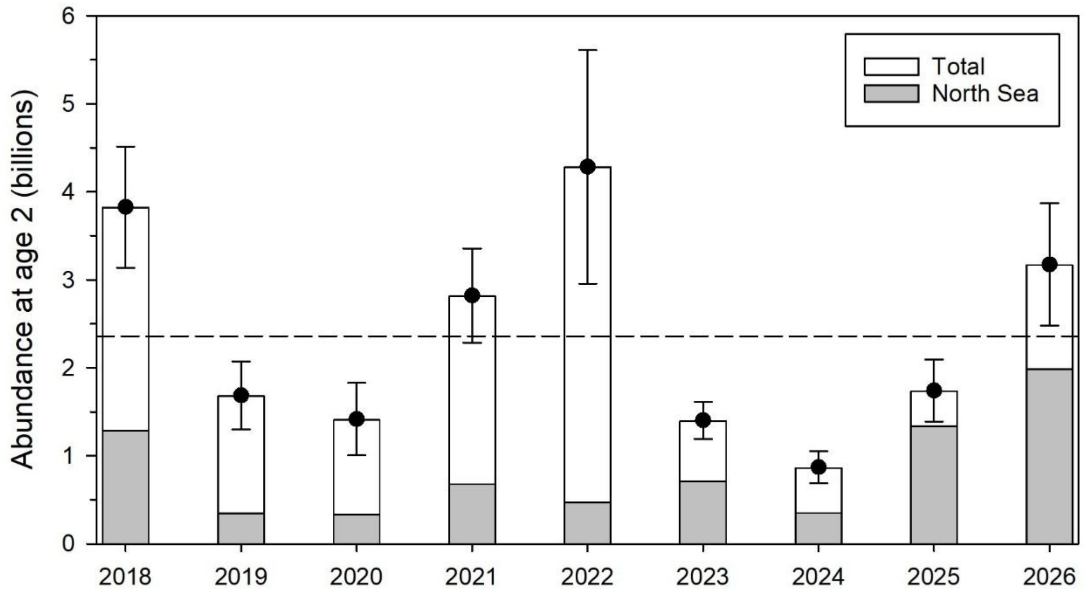


Figure 15. Annual mackerel recruitment index is shown as abundance at age 2 (billions) for the Nordic Seas and the North Sea combined (StoX bootstrap estimates of mean and standard error (SE), dashed line: average 2018-2026).

Table 11. StoX bootstrap (based on 1000 replicates) time series of the combined IESSNS (including the North Sea) showing age-disaggregated abundance indices of mackerel (billions) from 2018 to 2026.

Year/Age	1	2	3	4	5	6	7	8	9	10	11	12 (+)	Total
2018	3.36	3.83	0.75	2.45	1.19	1.33	2.24	1.93	1.12	0.58	0.60	0.60	19.97
2019	0.66	1.69	4.02	1.28	3.00	2.93	1.91	3.99	4.08	1.41	1.28	1.65	27.90
2020	1.51	1.42	1.58	3.34	2.22	2.55	2.62	1.91	2.87	3.81	1.43	3.08	28.35
2021	2.77	2.82	0.77	1.39	1.61	0.40	1.37	0.75	1.05	1.05	0.95	1.10	16.02
2022	1.24	4.28	2.39	1.01	1.36	1.05	0.63	0.99	1.00	1.83	1.56	1.88	19.23
2023	2.20	1.40	3.87	1.86	0.61	0.49	0.86	0.37	0.49	0.37	0.43	1.11	14.08
2024	1.42	0.87	0.69	0.97	0.75	0.34	0.34	0.36	0.42	0.31	0.29	1.01	7.76
2025	0.75	1.74	0.51	0.60	0.90	0.63	0.14	0.27	0.17	0.08	0.09	0.32	6.20
2026	2.16	3.17	2.23	0.73	0.54	0.67	0.44	0.12	0.18	0.14	0.06	0.30	10.74

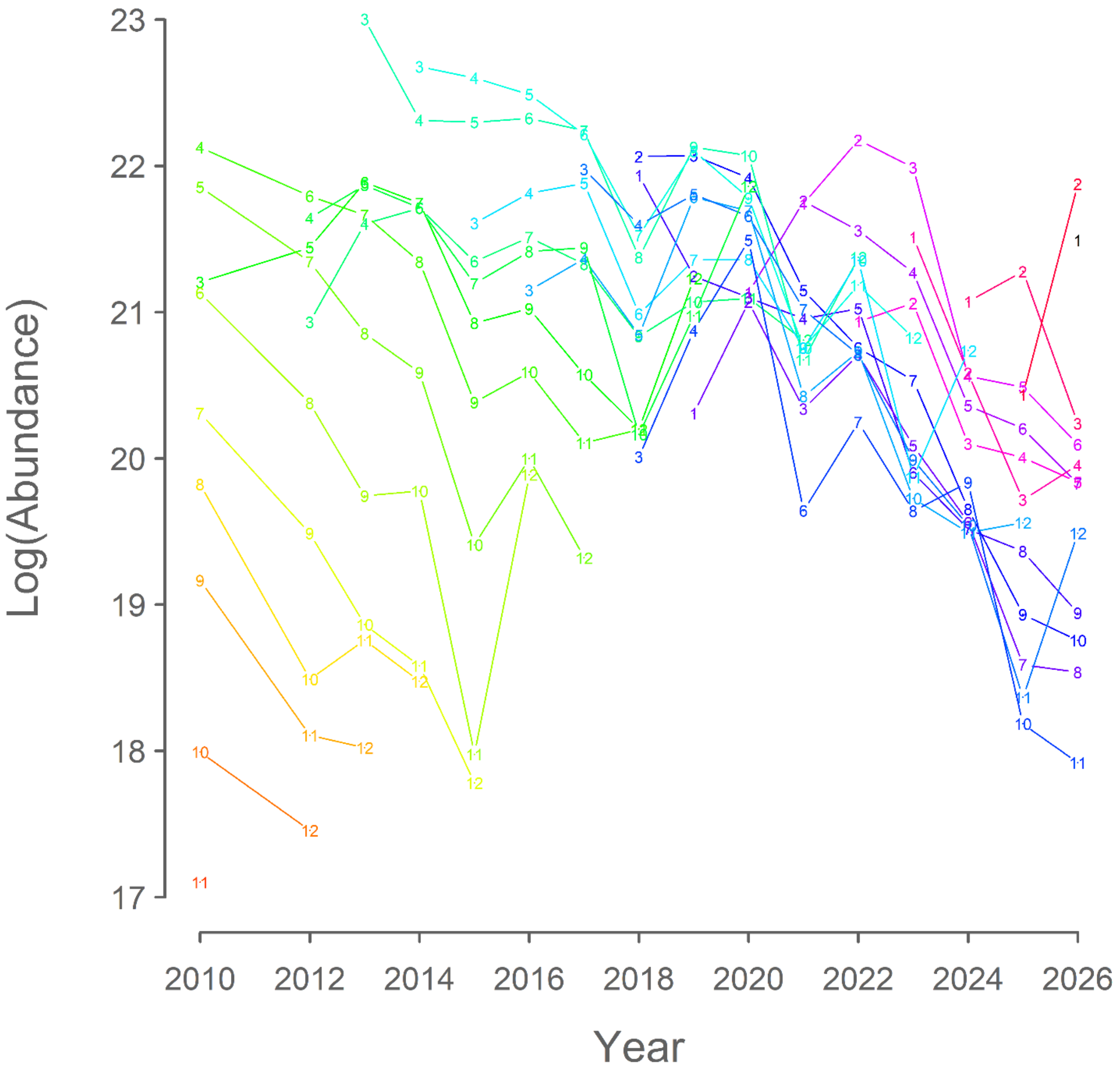


Figure 16. Catch curves of StoX estimates of mackerel density index in the Nordic Seas, incl. the North Sea for ages 1 and 2 only. This corresponds to the data used to assess the mackerel in ICES WGWIDE since the benchmark in 2025. Each cohort of mackerel is marked by a uniquely coloured line that connects the estimates indicated by the respective ages.

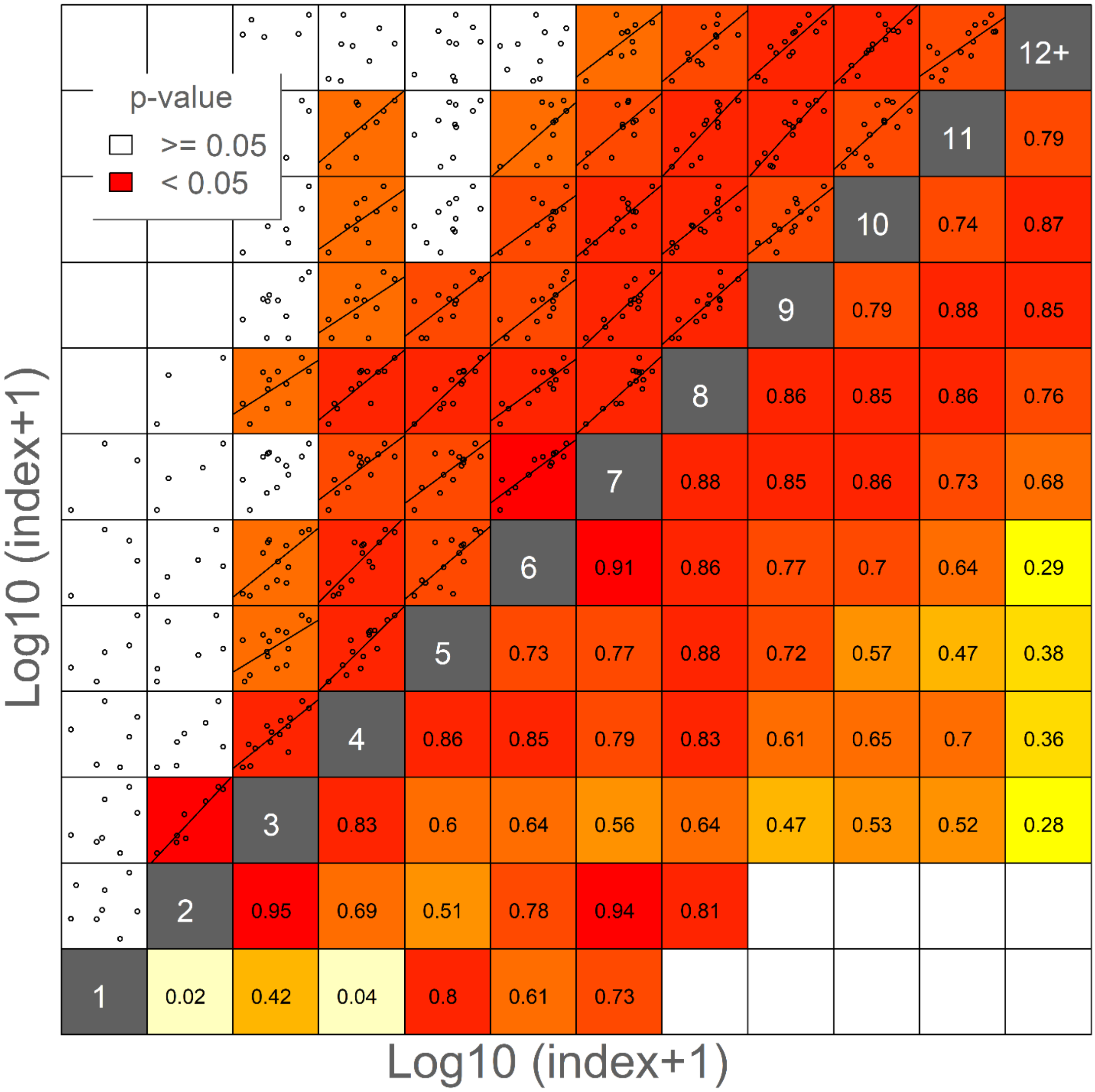


Figure 17. Internal consistency of StoX estimates of mackerel density index in the Nordic Seas, incl. the North Sea for ages 1 and 2 only. This corresponds to the data used to assess the mackerel in ICES WGWIDE since the benchmark in 2025. Ages indicated by white numbers in grey diagonal cells. Statistically significant positive correlations (*$p<0.05$*) are indicated by regression lines and red cells in upper left half. Correlation coefficients (r) are given in the lower right half.

The swept area method assumes that potential distribution of mackerel outside the survey area – both vertically and horizontally – is a constant percentage of the total biomass. In some years, this assumption may be violated, e.g. mackerel may be distributed below the footrope of the trawl or if the proportion of mackerel outside the survey coverage varies among years. In order to improve the precision of the swept area estimate it would be beneficial to extend the survey coverage further south, such that it covers the southwestern waters south of 60°N, e.g. UK waters.

The standard swept area method using the average horizontal trawl opening by each participating vessel (ranging 64.6 - 72.4 m; Table 6), assuming that a constant fraction of the mackerel inside the horizontal trawl opening are caught. Further, that if mackerel is distributed below the depth of the trawl (footrope), this fraction is assumed constant from year to year.

4.4 Norwegian spring-spawning herring

Norwegian spring-spawning herring (NSSH) was this year predominantly recorded in the northeastern part of the Norwegian Sea (Figure 18a, b). There was very little herring found in the central part of the Norwegian Sea. Herring south of 62° N in the eastern part was allocated to the North Sea herring stock, whereas the herring to the south and west in Icelandic waters (west of 14° W south of Iceland) was allocated to Icelandic summer-spawners. Herring from those areas were removed from the biomass estimation of NSSH.

The total biomass index of NSSH recorded during IESSNS 2026 was 5.85 million tonnes, which is 28% higher biomass than in 2025. The 2016 year-class (10-year-olds) are still quite noticeable in the stock and contributed 28% to the total biomass. However, in abundance, the 2021 and 2022 year-classes now account for 52% of the individuals (Figure 19 and Table 12). Bootstrap estimates of numbers by age are shown in Figure 19. The uncertainty (CV) around the age disaggregated abundance indices from the 2026 survey for year classes 5-13, excl. 11, was in the range of 0.28-0.36.

The internal consistency among year classes was generally very high for age classes 4 years and older, with the lowest correlation, for the youngest year classes, as expected since they are not fully recruited into the survey (Figure 20).

The zero-boundary of the distribution of the mature part of NSSH was reached in all directions (Figure 18a, b). The herring was mainly observed in the upper surface layer as relatively small schools. A shallow distribution of herring might have led to an unknown portion of herring being in the "blind zone" above the transducer depth of the vessels (i.e., shallower than 10-15 m, Table 4), and therefore not being registered by the vessels.

The group considered the acoustic biomass estimate of herring in 2026 to be of the similar quality as in the previous survey years.

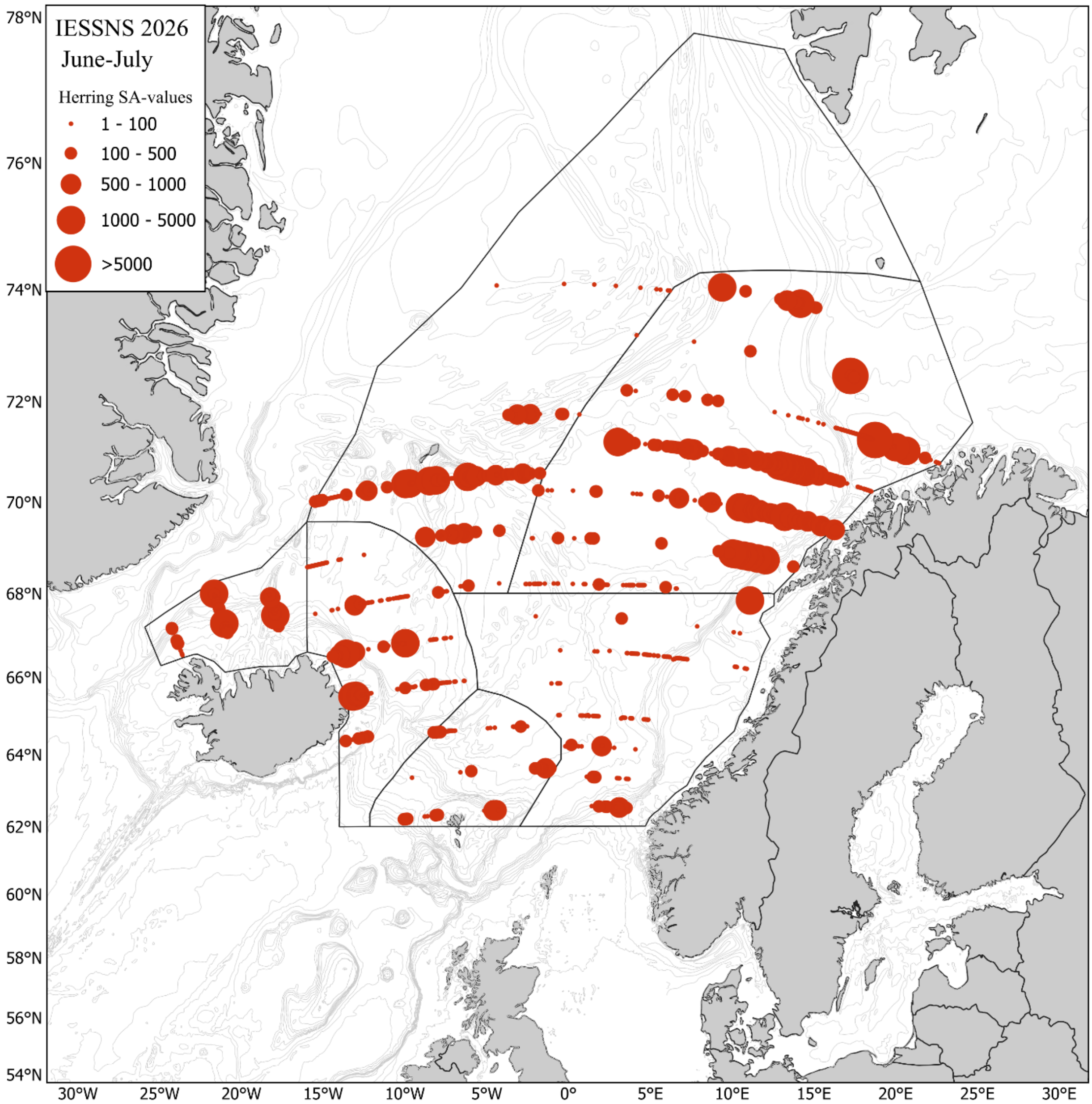


Figure 18a. The sA/Nautical Area Scattering Coefficient (NASC) values of herring along the cruise tracks in 2026 presented as contour lines. Values north of 62° N, east of 14° W to the south of Iceland, and all herring north of Iceland are considered to be Norwegian spring-spawning herring. South and west of this area the herring observed are other stocks, *i.e.* Icelandic summer spawners, Faroese autumn spawners and North Sea herring in the southeast; these have been omitted from the map.

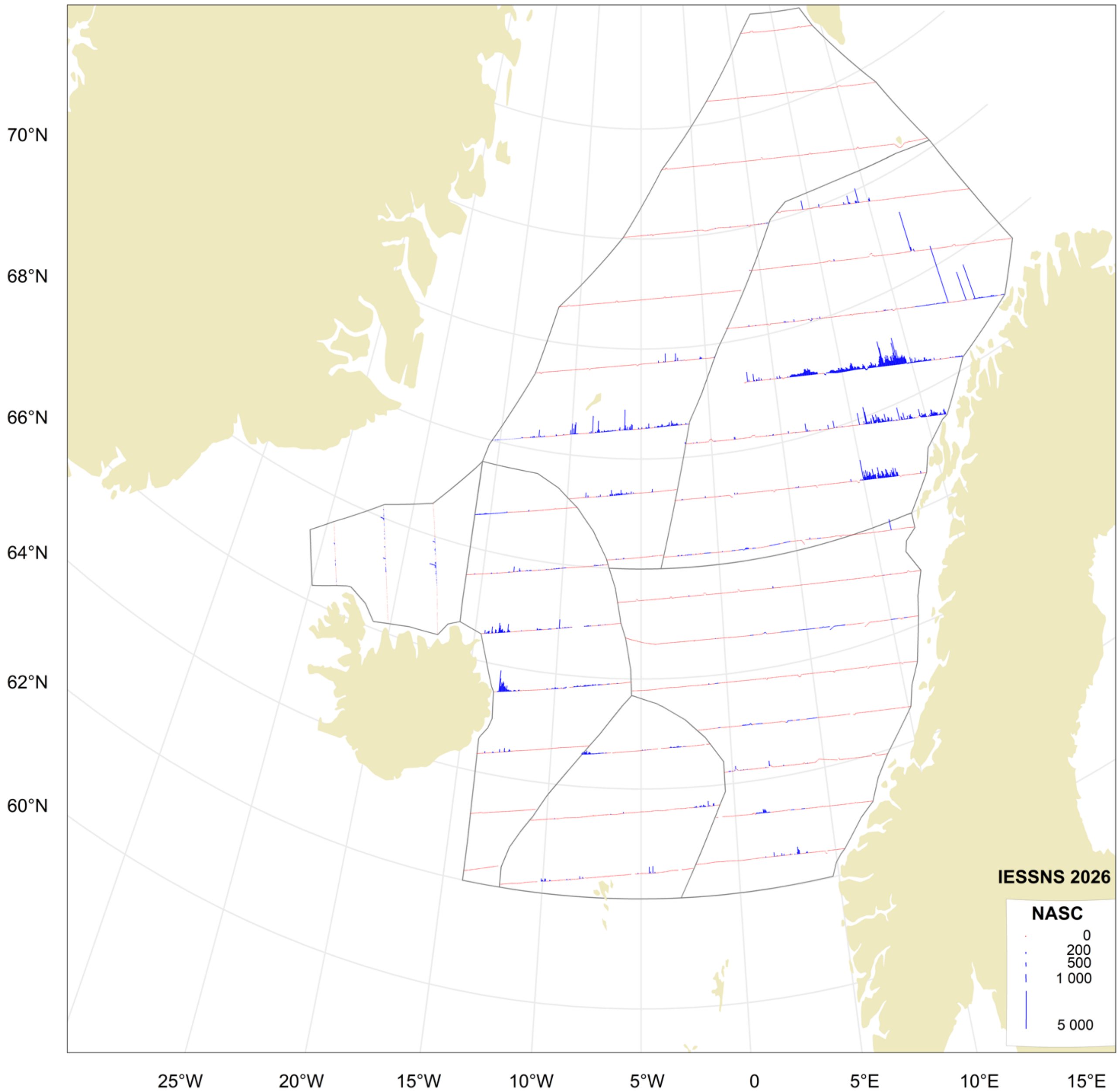


Figure 18b. The sA/Nautical Area Scattering Coefficient (NASC) values of Norwegian spring-spawning herring along the cruise tracks in 2026, presented as bar plot.

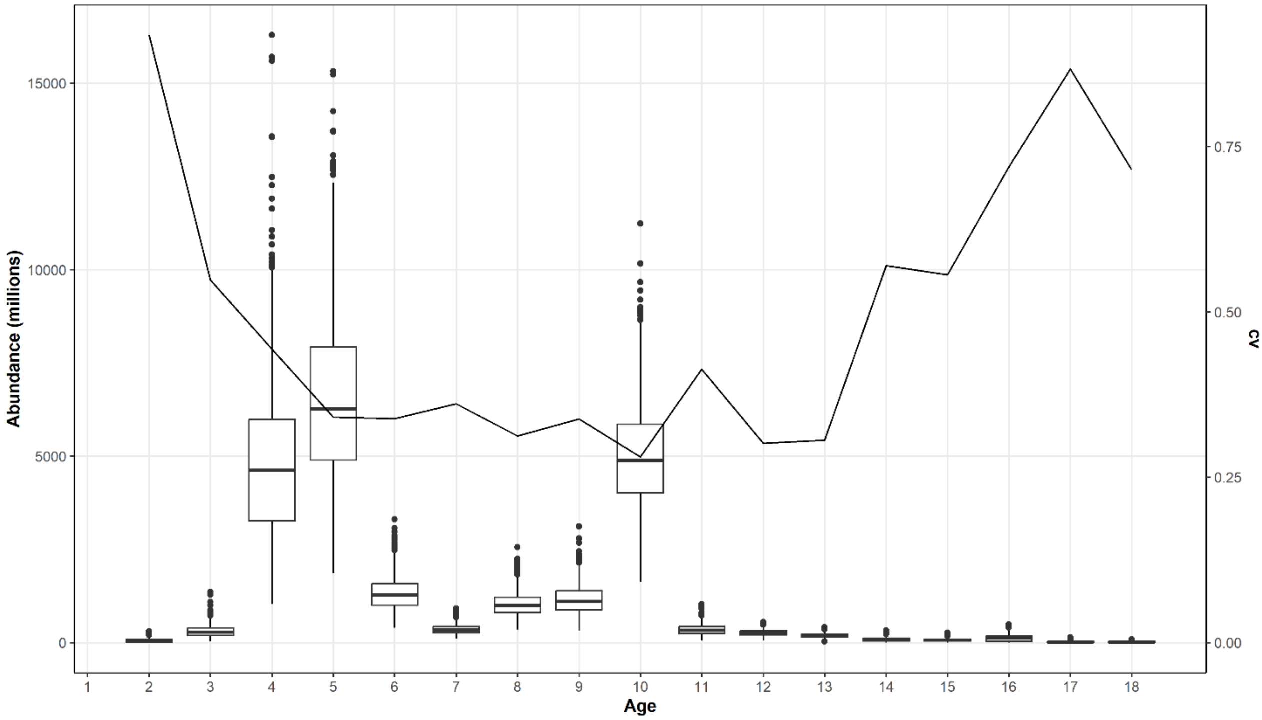


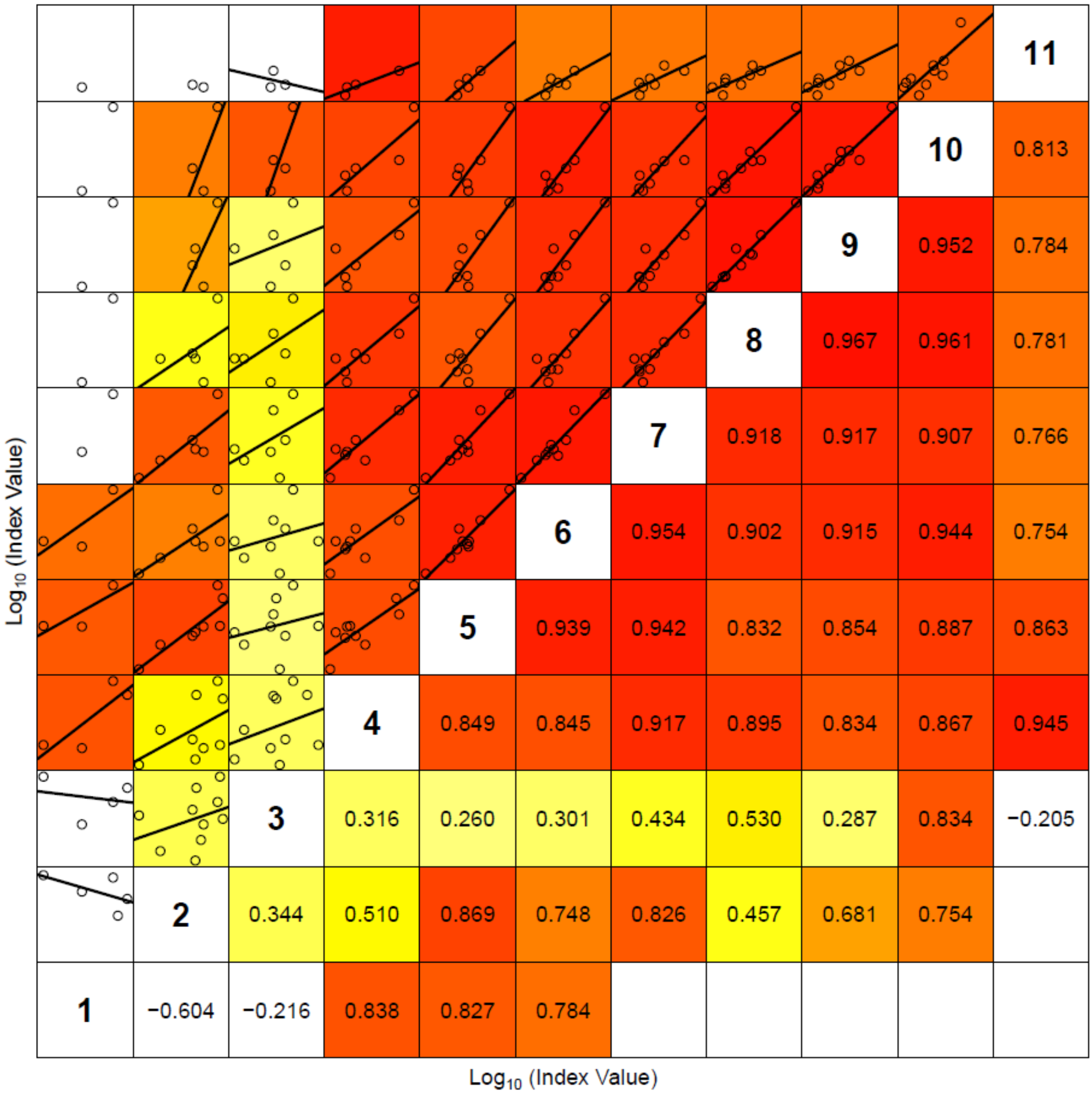
Figure 19. Abundance by age for Norwegian spring-spawning herring during IESSNS 2026. Boxplot of abundance and relative standard error (CV) obtained by bootstrapping with 1000 replicates using the StoX software.

Table 12. Estimates of abundance, mean weight and mean length of Norwegian spring-spawning herring based on calculation in StoX (bootstrap) for IESSNS 2026.

Length (cm)	Age in years (year class) 1 2025	2 2024	3 2023	4 2022	5 2021	6 2020	7 2019	8 2018	9 2017	10 2016	11 2015	12 2014	13 2013	14 2012	15 2011	16 2010	17 2009	18 2008	Number (10^6)	Biomass (10^6 kg)	Mean weight (g)
9-10																					
10-11																					
11-12																					
12-13																					
13-14																					
14-15																					
15-16																					
16-17																					
17-18																					
18-19																					
19-20																					
20-21																					
21-22																					
22-23																					
23-24																				1.5	107.0
24-25				99.1															99.1	17.6	130.1
25-26		33.2	54.9	616.0	2.3														706.4	99.4	142.7
26-27			135.7	1173.7	6.1	1.4													1 317.0	204.6	157.5
27-28		19.1	22.7	1120.1	318.7	5.9	1.9	3.9				1.9							1 494.2	262.6	180.9
28-29			73.4	661.0	542.4	3.1	7.1	14.2	1.7	1.9	0.6								1 305.5	260.7	208.2
29-30				340.8	911.2	43.5	7.2	7.1		6.5	2.8	3.9	6.3						1 329.3	298.7	230.3
30-31			10.4	457.5	1686.2	12.2	19.0	23.7	21.7	17.5	0.4	4.4	8.7	0.5	4.6				2 266.7	565.9	250.3
31-32			12.4	174.5	1359.7	91.8	1.7	48.4	33.3	0.8	4.0	13.0	8.3			0.5			1 748.3	470.0	267.6
32-33			4.2	144.1	1456.3	493.6	82.7	97.5	72.6	45.9		48.9	10.7		1.3				2 457.8	707.0	286.3
33-34				50.4	216.2	533.6	160.5	291.3	265.0	530.5			0.5						2 047.9	640.5	308.9
34-35					42.5	150.0	74.5	495.1	540.5	2094.1	10.0	13.1	9.7						3 429.5	1126.8	324.9
35-36						0.9	0.7	51.0	191.9	1763.8	200.1	4.9	13.0		12.0				2 238.4	756.7	332.5
36-37									27.6	512.6	134.8	135.2	50.3	16.4	27.5		13.5	13.2	930.9	320.3	340.3
37-38									8.2	20.5		41.6	85.2	42.0	10.8	52.9			261.2	86.2	329.3
38-39														24.4	16.7	36.0			77.1	23.1	315.3
39-40																34.8			34.8	11.7	335.8
40-41																					
41-42																					
42-43																					
TSN(mill)		52.4	313.6	4837.2	6541.5	1336.2	355.4	1032.2	1162.3	4994.2	352.6	266.9	192.7	83.3	72.9	124.2	13.5	13.2	21 744.2		
cv (TSN)		0.96	0.55	0.44	0.34	0.34	0.36	0.31	0.34	0.28	0.41	0.30	0.31	0.59	0.56	0.75	1.28	1.14	0.29		
TSB(1000 t)		8.1	53.5	900.3	1 648.3	399.9	105.8	324.8	378.4	1 657.5	126.6	80.4	65.7	23.2	25.0	39.6	4.5	4.9	5 846.5		
cv (TSB)		0.94	0.53	0.42	0.34	0.34	0.37	0.32	0.35	0.28	0.42	0.30	0.32	0.55	0.56	0.73	1.29	1.13	0.28		
Mean length(cm		26.3	27.3	27.9	30.5	32.0	31.6	32.5	33.8	34.3	35.0	34.4	35.7	36.5	35.6	37.1	36.0	36.0			
Mean weight(g)		171.8	182.9	198.8	256.9	290.9	276.7	296.4	321.2	326.3	351.5	293.6	343.7	285.1	343.5	333.1	336.1	375.8			

Table 13. IESSNS bootstrap time series from 2016 to 2026. StoX abundance estimates for ages 1-12+ and biomass estimates of Norwegian spring-spawning herring (millions).

Year	Age 1	2	3	4	5	6	7	8	9	10	11	12+	TSB(1000 t)
2016	38	119	747	577	1 622	1 636	1 967	1 588	1 274	2 001	2 164	6 245	6 676
2017	1 232	240	1 318	4 653	1 003	1 184	795	1 716	1 004	1 115	1 657	4 040	5 821
2018	0	587	656	864	3 054	924	1 172	746	971	1 078	663	2 704	4 379
2019	0	143	1 910	616	1 101	3 487	814	751	510	780	470	4 660	4 794
2020	0	15	117	8 280	1 710	2 367	4 087	696	520	305	594	1 827	5 991
2021	1	4	184	398	12 117	1 045	1 398	2 226	502	361	393	1 641	6 103
2022	0	681	1 008	1 251	1 301	14 135	914	1 211	1 734	477	433	1 325	7 143
2023	6 034	817	6 377	321	725	1 335	7 360	503	711	807	291	780	4 989
2024	0	152	853	696	225	623	1 005	6 543	380	610	523	783	3 779
2025	2 106	204	3 740	4 167	1 759	304	671	1 040	4 489	280	374	989	4 566
2026	0	52	314	4 837	6 541	1 336	355	1 032	1 162	4 994	353	767	5 847



Lower right panels show the Coefficient of Correlation (*r*)

Figure 20. Internal consistency for Norwegian spring-spawning herring within the IESSNS 2026. The upper left part of the plots shows the relationship between log index-at-age within a cohort. Linear regression line shows the best fit to the log-transformed indices. The lower-right part of the plots shows the correlation coefficient (r) for the two ages plotted in that panel. The background colour of each panel is determined by the r value, where red equates to r=1 and white to r<0.

4.5 Blue whiting

Blue whiting was distributed in parts of the survey area dominated by warm Atlantic waters and had a continuous distribution from the southern boundary of the survey area (60° N) to southwestern part of Svalbard (77.30° N) (Figure 21a, b). High blue whiting density (sA-values) was observed particularly in the southern part of the Norwegian Sea, along the Norwegian continental slope and to some extend around the Faroes Islands.

The 1-group (2025 year-class) dominated in terms of numbers, followed by the 2- group (2024 year-class) and 0-group (2026 year-class) (Figure 22, Table 15). Smaller numbers of older fish, particularly 2020-2023 year-classes, were also observed during the survey. As in previous years no blue whiting was registered in the cold East Icelandic Current, between Iceland and Jan Mayen. Nevertheless, blue whiting, both juvenile and adults, was recorded all the way north to southwest of Svalbard at 77.30°N.

The total blue whiting biomass index increased by 14%, to 2.75 million tonnes in 2026 compared to 2.42 million tonnes in 2025. Estimated stock abundance for ages 1+ was 33.3 billion compared to 23.3 billion in 2025 (43% increase). Ages 1 and 2 respectively, dominated the estimate in 2026, as they contributed 41% and 16% in abundance and 35% and 22% in biomass, respectively. Interestingly, the 0-group contributed by 15% in abundance, mainly recorded in the southwestern survey area (Tables 14-15).

Bootstrap estimates of numbers by age, with uncertainty estimates, for blue whiting during IESSNS 2026 are shown in Figure 22. Low CV values for ages 2-4 with values less than 0.25, whereas higher CV values were found for ages 0-1 and 5+. The internal consistency among year classes is shown in Figure 23 and indicates good to very good internal consistency for ages 1-5, moderate for age 6-7 and low for age 7+.

The group considered the acoustic biomass estimate of blue whiting to be of good quality for the IESSNS 2026 as in the previous survey years.

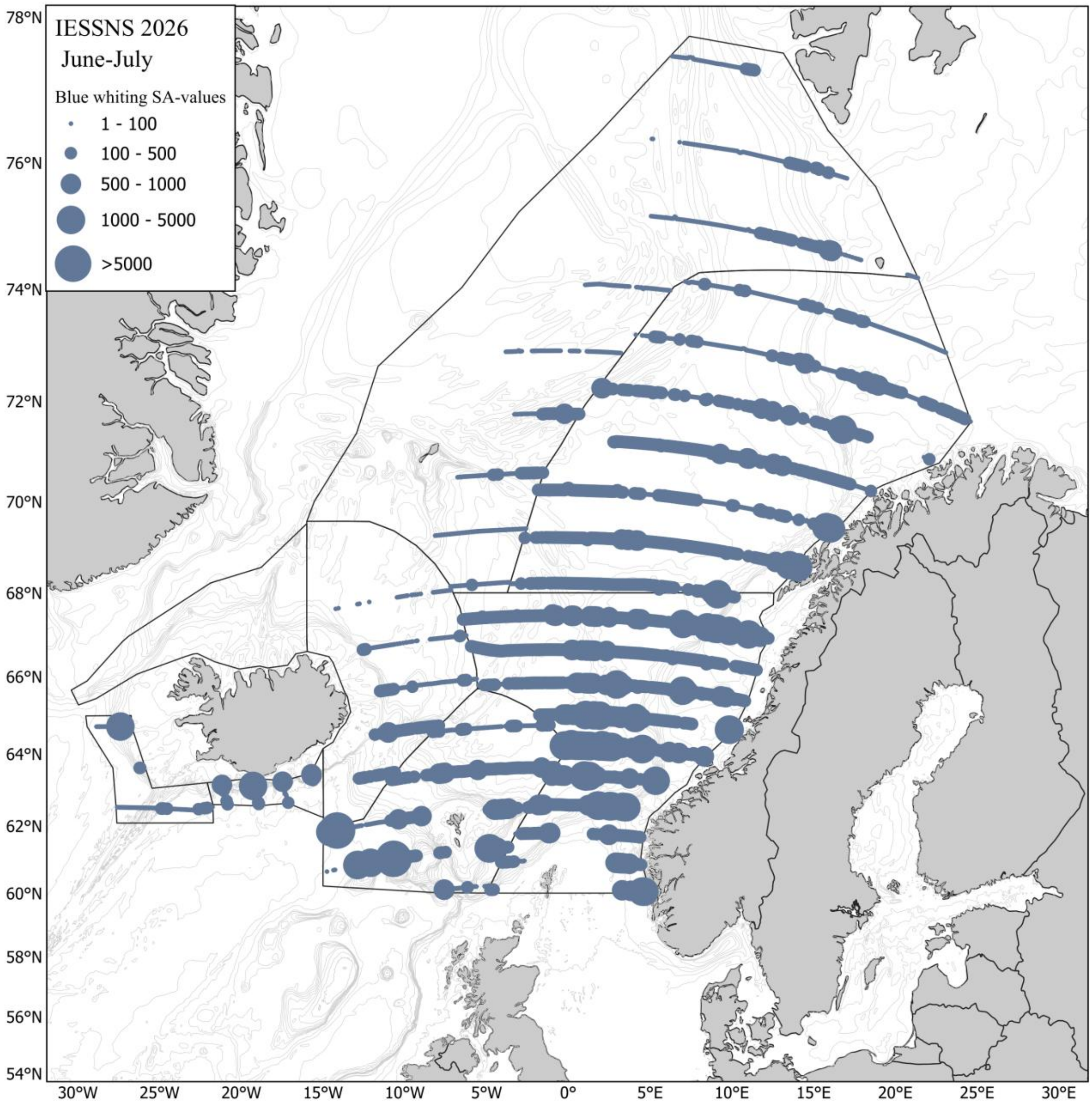


Figure 21a. The sA/Nautical Area Scattering Coefficient (NASC) values of blue whiting along the cruise tracks in IESSNS 2026.

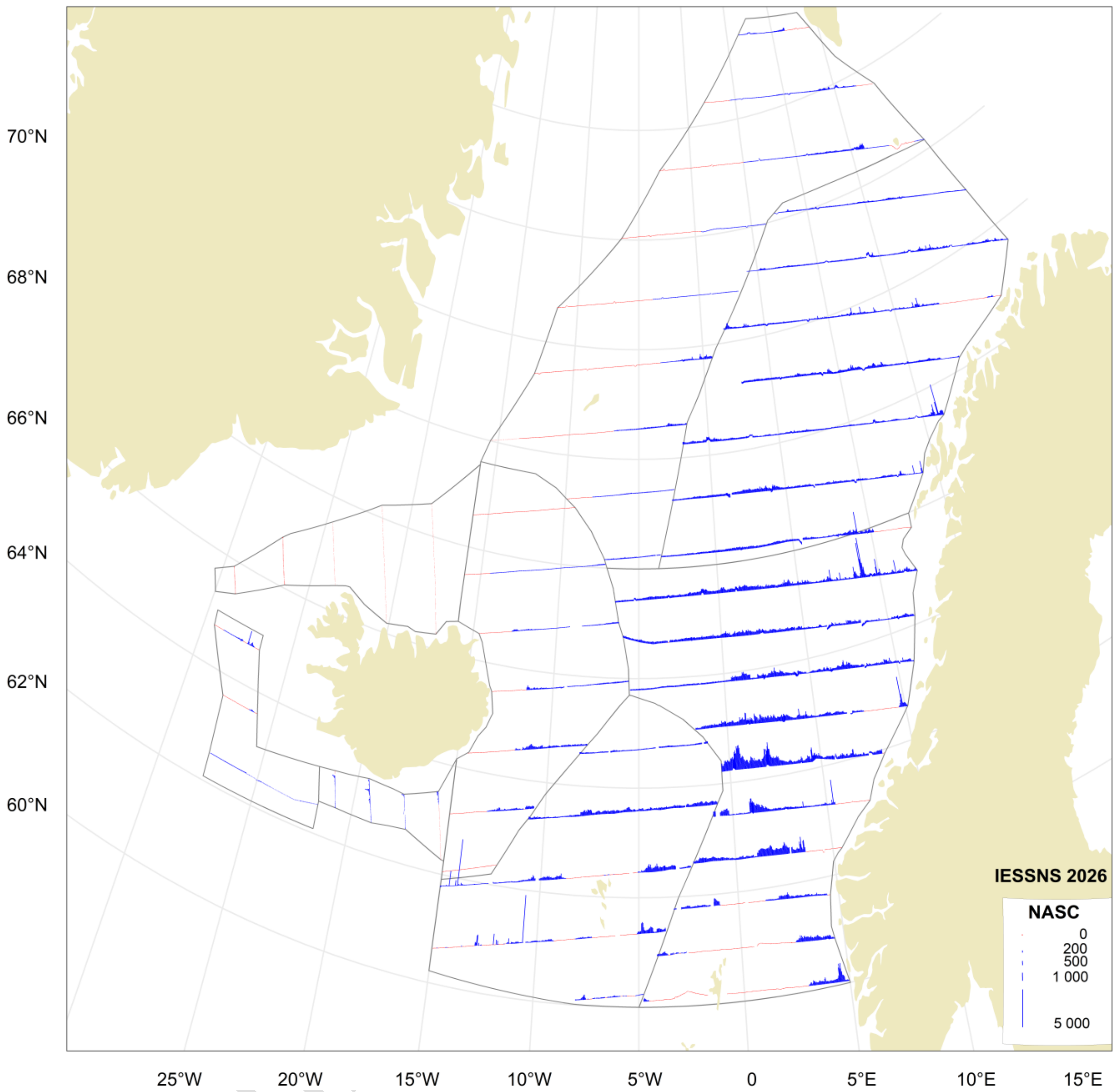


Figure 21b. The sA/Nautical Area Scattering Coefficient (NASC) values of blue whiting along the cruise tracks in IESSNS 2026. Presented as bar plot.

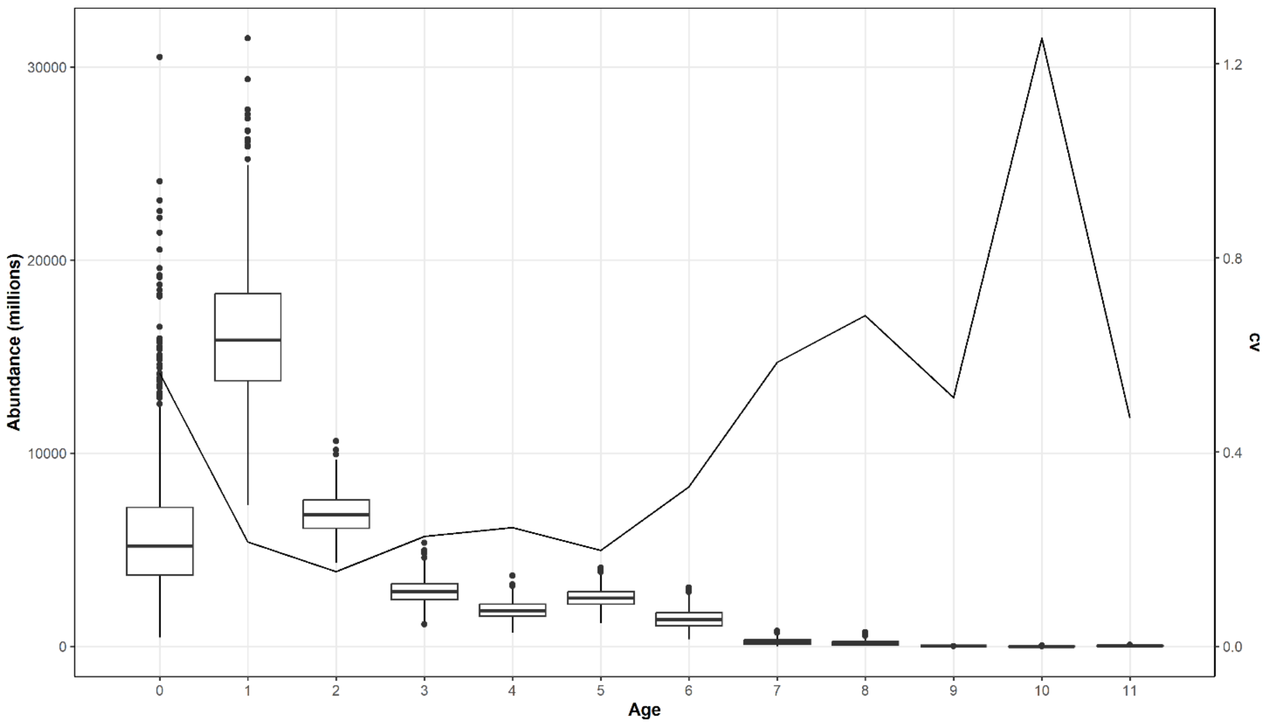


Figure 22. Number by age with uncertainty for blue whiting during IESSNS 2026. Boxplot of abundance and relative standard error (CV) obtained by bootstrapping with 1000 replicates using the StoX software.

Table 14. Estimates of abundance, mean weight and mean length of blue whiting based on calculation in StoX (bootstrap) for IESSNS 2026.

Length	Age in years (year class)													Number	Biomass	Mean
	0	1	2	3	4	5	6	7	8	9	10	11	12			weight
(cm)	2026	2025	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	(10^6)	(10^6 kg)	(g)
10-11															8.9	6.6
11-12															5.1	9.1
12-13	128.6													128.6	1.5	11.6
13-14	136.1													136.1	2.0	14.7
14-15	357.1													357.1	7.2	20.0
15-16	487.5													487.5	11.7	24.3
16-17	526.2	55.5												581.6	16.7	27.7
17-18	232.5	11.0												243.4	7.9	31.9
18-19	97.3													97.3	3.3	36.2
19-20		347.0												347.0	15.8	42.7
20-21		2717.7	110.9											2 828.6	139.1	49.0
21-22	18.1	5610.4	86.8											5 715.4	320.6	56.7
22-23		5424.4	210.5	24.0	5.1									5 664.0	354.7	64.6
23-24	53.5	1620.4	1501.4	140.5	13.5	3.3								3 332.6	241.3	75.0
24-25	33.2	327.6 .		193.0	99.6									653.5	247.7	86.5
25-26			2038.6	751.4	130.7	199.3								3 120.1	293.0	96.9
26-27				851.7	354.6	159.9	183.3							1 549.5	204.5	107.2
27-28								5.9						5.9	236.8	119.9
28-29								25.5						25.5	207.8	133.0
29-30								77.5	6.6					84.1	184.0	149.3
30-31									129.5					129.5	125.8	162.4
31-32		46.7						85.3						132.0	55.7	177.4
32-33					16.0			36.4	41.2					93.7	32.3	185.7
33-34							6.3	15.7	3.8			19.9		45.7	12.8	207.4
34-35							7.7		5.3		3.5			16.5	4.2	234.9
35-36										3.5				3.5	1.5	287.6
36-37															0.5	227.0
37-38																
38-39																
39-40																
40-41																
TSN(mill)	5880	16188	6883	2854	1875	2521	1414	246	186	3	3	20		39 173.2		
cv (TSN)	0.56	0.22	0.15	0.23	0.24	0.20	0.33	0.59	0.69	0.94	1.73	0.90		0.14		
TSB(1000 t)	77.9	956.8	596.7	290.0	222.5	343.3	189.3	39.5	27.6	0.9	0.7	3.9		2 750.4		
cv (TSB)	0.50	0.21	0.15	0.22	0.23	0.21	0.30	0.63	0.64	0.94	1.73	0.87		0.11		
Mean length(cm	13.5	21.7	24.5	26.3	27.2	28.5	29.0	30.2	31.2	35.0	34.0	33.0				
Mean weight(g)	20	63	94	112	122	142	148	157	171	271	194	199				

Table 15. IESSNS bootstrap time series from 2016 to 2026. StoX abundance estimates for ages 0-10+ and biomass estimates of blue whiting (millions).

	Age											
Year	0	1	2	3	4	5	6	7	8	9	10+	TSB(1000 t)
2016	4 019	5 781	11 423	4 324	2 353	1 190	351	158	160	7	205	2 269
2017	20 547	2 423	5 901	10 066	2 172	626	238	15	29	0	17	2 618
2018	0	893	1 208	3 198	6 434	3 070	938	371	107	47	43	2 039
2019	2 471	704	1 906	2 254	4 317	5 318	1 174	181	186	9	9	2 023
2020	4 461	6 027	2 903	1 608	1 135	1 762	1 924	929	186	33	37	1 799
2021	4 470	18 484	2 372	1 494	845	851	1 493	635	71	79	84	2 237
2022	955	12 623	9 748	2 175	883	313	510	303	691	148	67	2 224
2023	3 141	3 765	9 925	5 555	721	199	196	131	45	282	24	1 983
2024	5 724	2 518	2 057	4 856	6 157	1 494	279	100	90	30	170	1 953
2025	4 362	8 983	1 503	2 845	6 069	3 150	523	30	140	9	32	2 417
2026	5 880	16 188	6 883	2 854	1 875	2 521	1 414	246	186	3	23	2 750

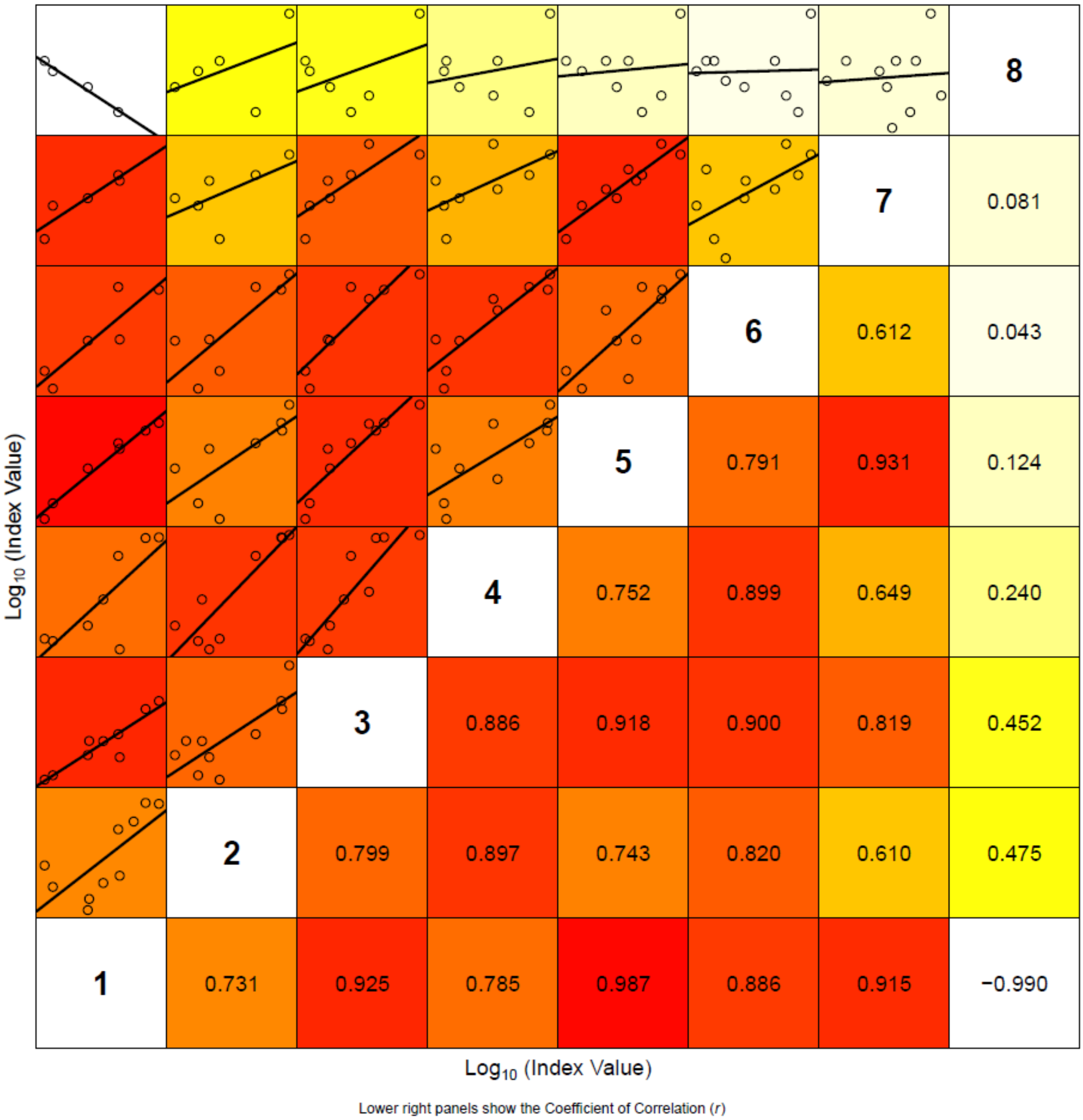


Figure 23. Internal consistency for blue whiting within the IESSNS. The upper left part of the plots shows the relationship between log index-at-age within a cohort. Linear regression line shows the best fit to the log-transformed indices. The lower-right part of the plots shows the correlation coefficient (r) for the two ages plotted in that panel. The background colour of each panel is determined by the r value, where red equates to r=1 and white to r<0.

4.6 Other species

Lumpfish (*Cyclopterus lumpus*)

Lumpfish was caught in 65% of the surface hauls (Figure 24) and was distributed across almost the entire survey area. Abundance of lumpfish was greatest north of 71°N. Moderate catches of lumpfish were done in areas from west of Shetland, via Faroe Islands to the eastern part of Iceland. Much lower concentrations and several stations with absence of lumpfish were documented in the central Norwegian Sea and lumpfish was almost absent in the North Sea. It is likely that the distribution of lumpfish extends beyond the survey coverage in northern areas. The lumpfish ranged between 11-45.5 cm in length and 28-4420 g, with the largest specimen found in the northernmost part including northwest of Jan Mayen and in the southwest part of Svalbard.

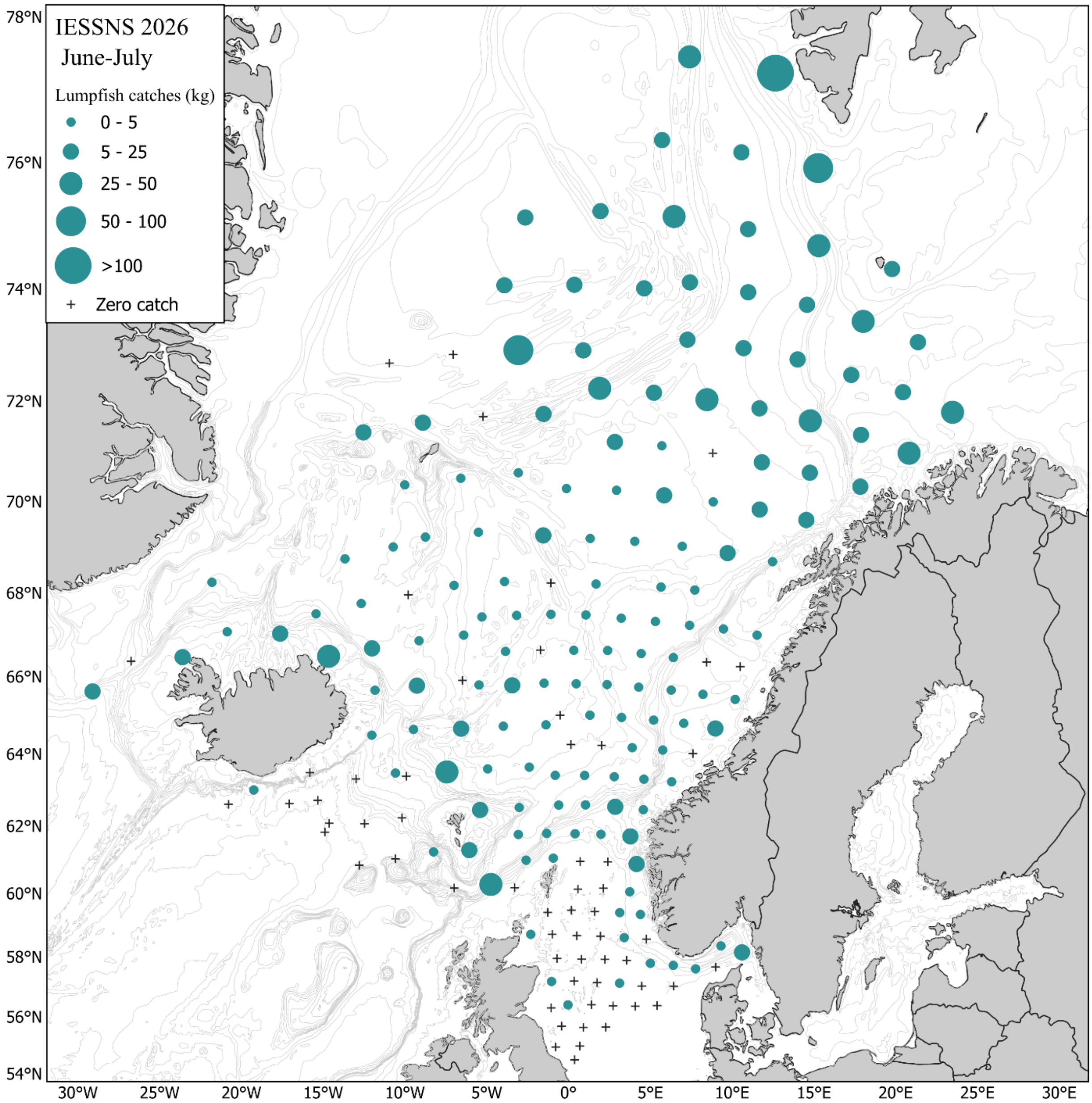


Figure 24. Lumpfish catches at surface trawl stations during IESSNS 2026. The bottom topography is shown on the map.

Salmon (*Salmo salar*)

A total of 64 salmon were caught in 21 surface trawl hauls in areas stretching from the northern North Sea to the central Norwegian Sea during (Figure 25).

The highest concentrations of salmon were found along the major "highway" of the North Atlantic current from 62-72°N, but salmon were also caught west of Lofoten and west of Jan Mayen. All salmon from 2026 have been confirmed to belong to the North Atlantic salmon (*Salmo salar*) population. No pink salmon (*Onchorhynchus gorbuscha*) where caught neither during the survey in 2025 nor in 2026.

The salmon sampled in July 2026 ranged from 0.061 kg to 3.3 kg in weight, with few post-smolt (61-180 g) and more 1 sea-winter individuals (0.67 - 3.3 kg) caught in 2026 compared to previous years. Of the 21 stations with salmon, nine stations had only 1 individual salmon, whereas 12 stations had two or more salmon – with a maximum of 14 salmon caught at one station. The length of the salmon ranged from 18 to 64 cm, with a bimodal distribution between 20-33 cm and 41-59 cm.

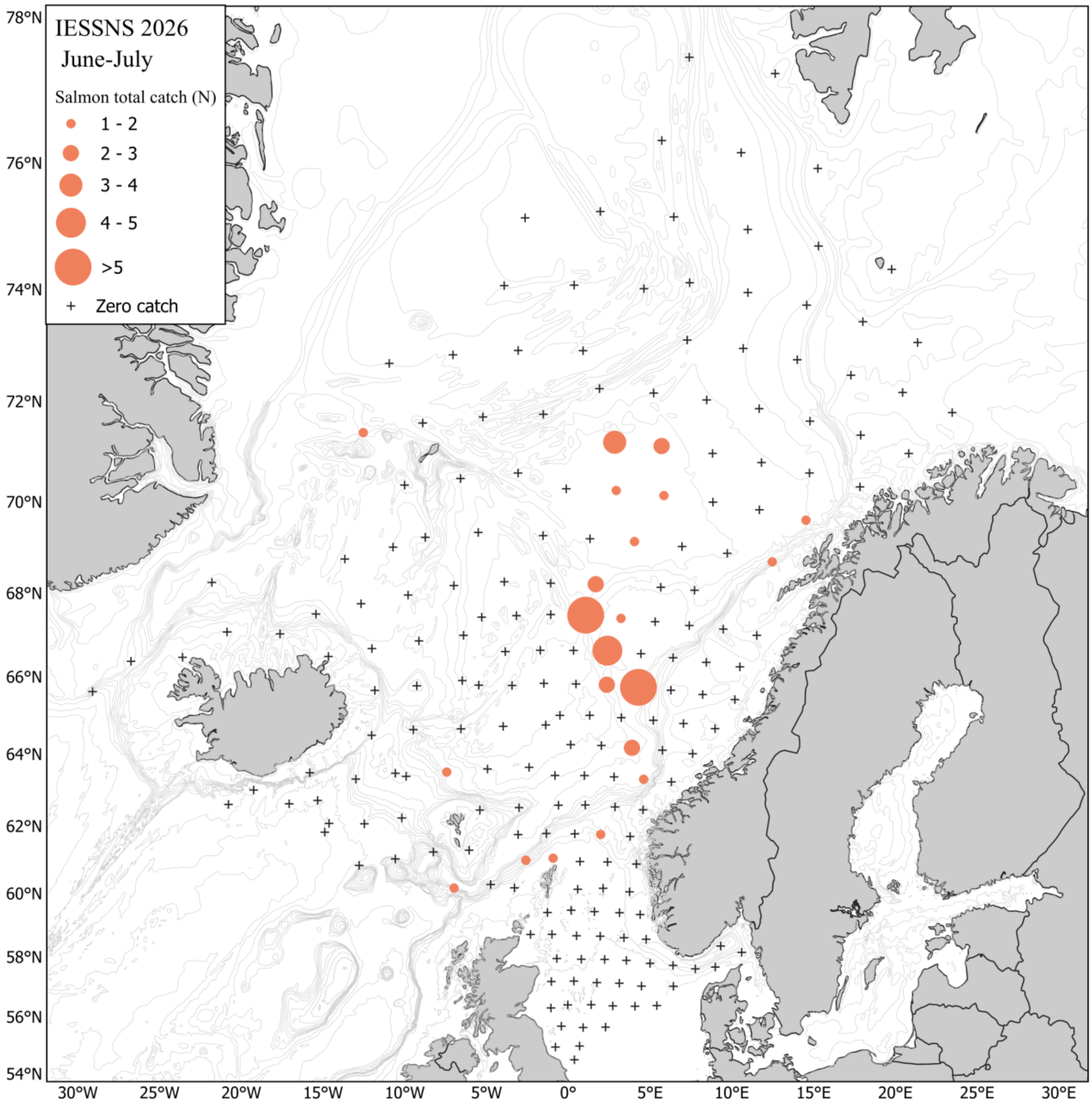


Figure 25. Catches shown as number of salmon caught at surface trawl stations during IESSNS 2026.

Capelin (*Mallotus villosus*)

Capelin was caught in the surface trawl on 29 stations north of Jan Mayen and along the northernmost part of the survey area as well as along the cold fronts west and northwest of Iceland (Figure 26a). The largest concentrations were caught southwest of Svalbard and west of Iceland. Both juvenile and adult capelin were caught during the survey. The length ranged from 7 - 20 cm, and weight from 2 – 35 gram. The average length and weight of the measured individuals were 12.0 cm and 8.9 g, respectively.

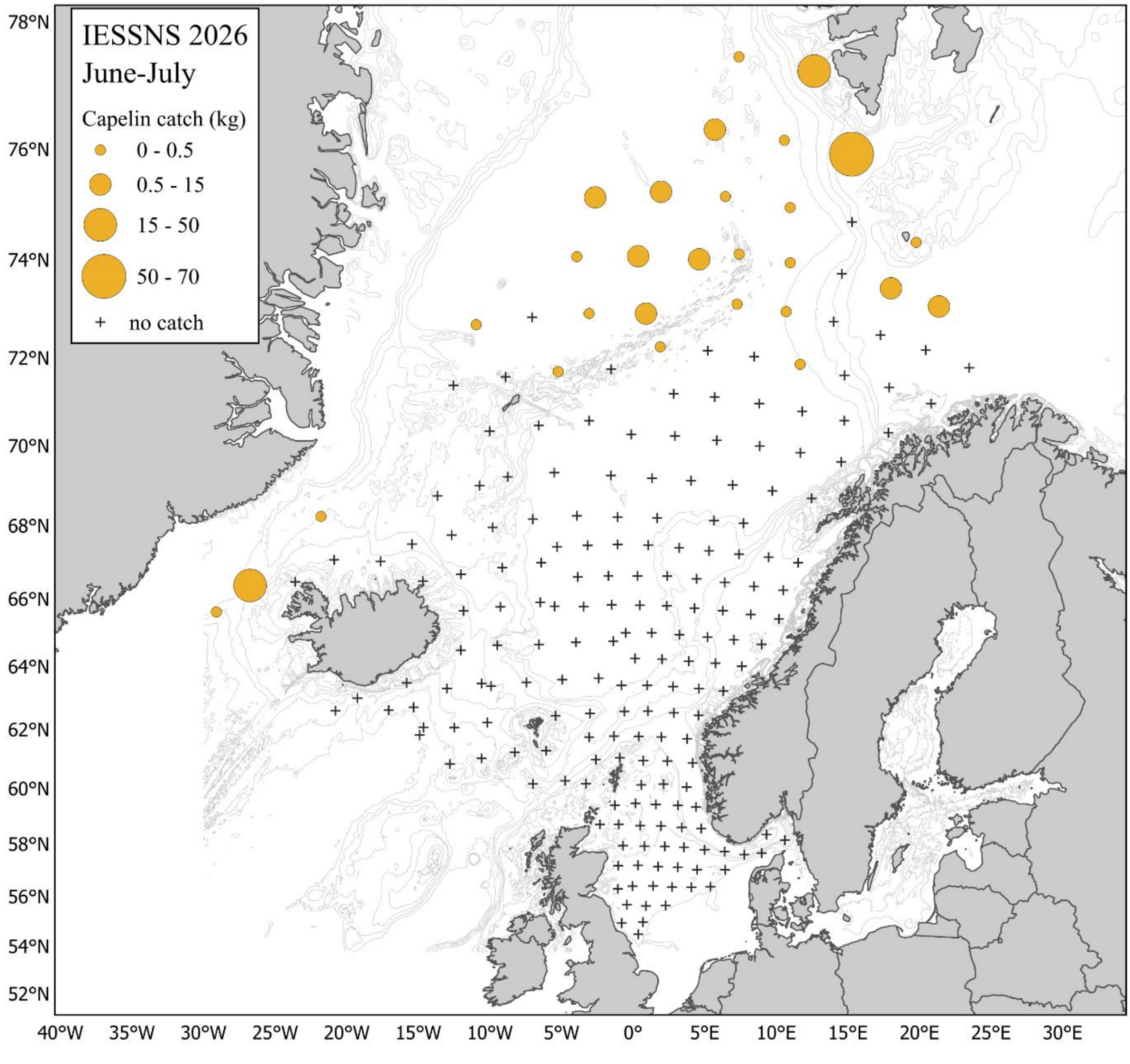


Figure 26a. Catches (kg) of capelin in surface trawl stations during IESSNS 2026. The survey strata are shown in the map.

Polar cod (*Boreogadus saida*)

Polar cod was altogether caught in 18 surface hauls (Figure 26b), which is only about half of the stations compared to 2025 (n=38). However, far more polar cod was caught compared to 2024 (one station northwest of Iceland). Polar cod were extending all the way from 71°N to 77.3°N in 2026. Both juveniles and adult polar cod were caught and the individuals had and average weight of 15.3 gram and average length of 12.9 cm.

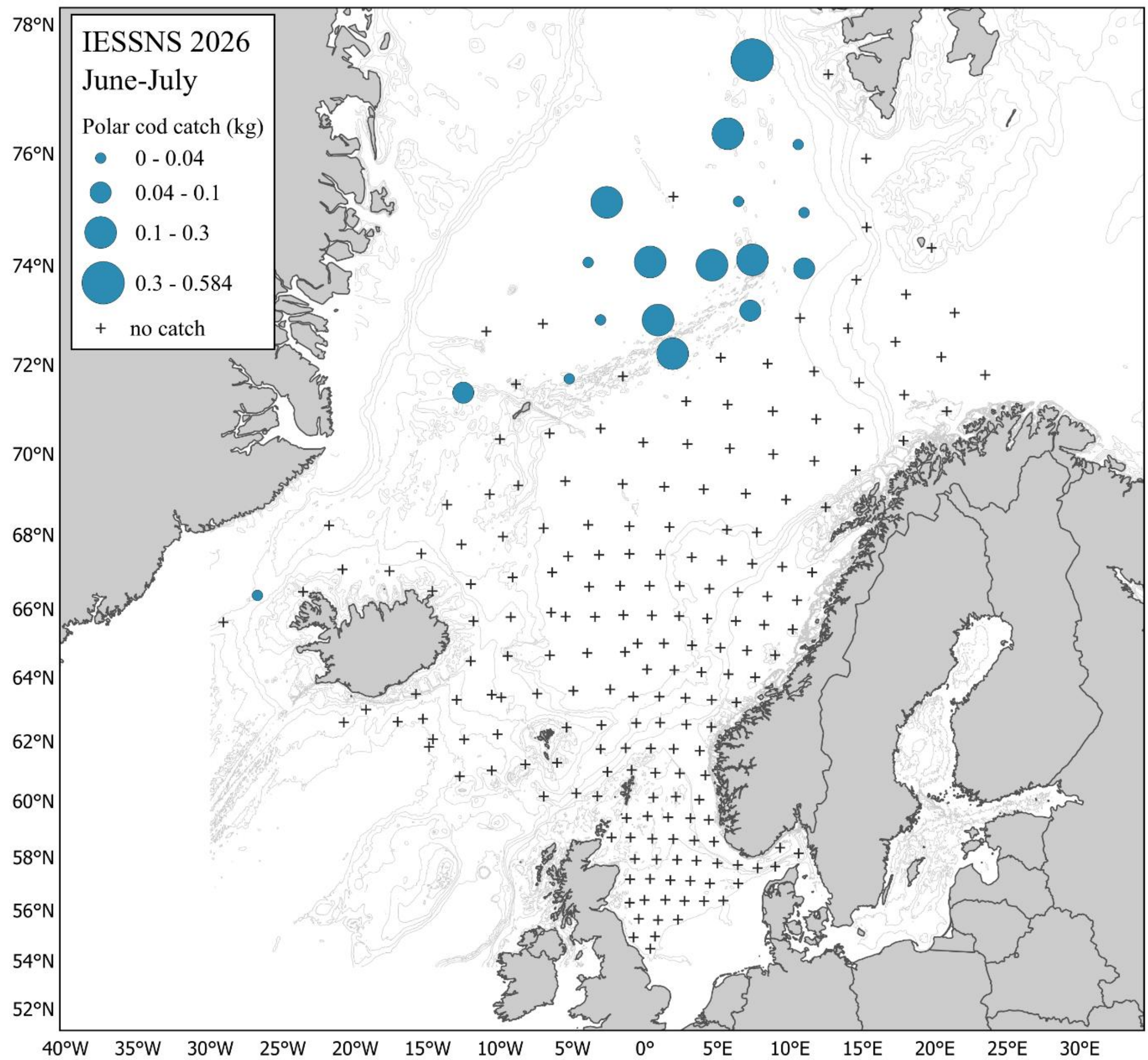


Figure 26b. Catches (kg) of polar cod in surface trawl stations during IESSNS 2026. The survey strata are shown in the map.

4.7 Marine Mammals

Dedicated marine mammal observations from the rooftop above the bridge onboard the two Norwegian chartered fishing vessels M/V "Eros", and "Vendla" have been conducted in the Norwegian Sea and surrounding waters during summers of 2025 and 2026. Results from 2025 has not yet been provided, whereas preliminary results and overall distribution map, based on both dedicated and opportunistic marine mammal observations, have been included from "Eros" and "Vendla" from July 2026 as Appendix 4.

5 Recommendations

The group suggested the following recommendation from WGIPS	To whom
It is recommended that the IESSNS survey on NEA mackerel in the North Sea in the future is included in the EU list of mandatory surveys and that the survey in the North Sea continues. The reason is that the recruitment timeseries from this survey (since the NEAM benchmark in 2025), has been included as the only recruitment index in the mackerel stock assessment. Thus, this timeseries is essential to the mackerel stock assessment.	WGIPS, RCG NANSEA, DPPO
It is recommended that the spatial coverage of the IESSNS survey will be revised based in the changes in the distribution of the main target species (mackerel, herring and blue whiting) and modified borders in those strata. This changes will consider not affecting the consistency in the survey spatial coverage is crucial for providing a stable time series for acoustic measurements of the blue whiting stock and the Norwegian spring-spawning herring stock.	WGIPS
It is recommended that collection and analysis of genetic samples for herring is continued.	WGIPS
It is recommended that all vessels participating in the IESSNS survey include marine mammal observers.	WGIPS, WGMME

6 Action points for survey participants

Action points	Responsible
We encourage registrations of opportunistic marine mammal observations.	All
It is recommended that the IESSNS survey strata system be revised prior to the 2027 survey. This revision should aim to optimize the use of survey time and reduce the distance between stations at adjacent stratum boundaries.	All
It is recommended that participants of the post-cruise meeting conduct a duplicate, independent StoX analysis of mackerel, herring, and blue whiting in advance of the meeting. This can be done prior to the meeting with preliminary data available.	All
It is recommended to add a table of mackerel length-at-age for the entire time series using a bootstrap method.	All

7 Survey participants

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Lab team:
Tom Svoldgaard, National Institute of Aquatic Resources, Denmark (Mackerel otolith extraction)
Maria Jarnum, National Institute of Aquatic Resources, Denmark (Mackerel otolith extraction and age reading)

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10 Appendices

Appendix 1

The mackerel index is calculated on all valid surface stations. That means, that invalid and potential extra surface stations and deeper stations need to be excluded. Below is the exclusion list used when calculating the mackerel abundance index for IESSNS 2026.

Vessel	Country	Horizontal trawl opening (m)	Exclusion list	
			Cruise	Stations
Vendla	Norway	65.0	2026203002	11, 21, 27, 32, 36, 42, 49, 55, 58, 60, 67, 71, 75
Eros	Norway	72.4	2026204002	19, 30, 35, 38, 45, 54, 56, 63, 69, 72, 74
R/V Árni Friðriksson	Iceland	65.7	352-1002-2026407	187, 198, 203, 209, 213, 214, 217, 219, 221, 223, 225, 227, 228, 230
R/V Jákup Sverri	Faroe Islands	64.6	234-1005-2630	18, 25, 47, 60, 68*
Ceton	Denmark	68.0	IESSNS_DK_2026	none

* Observe that in PGNAPES and the national database, station numbers are 8-digit numbers preceded by 263000 (e.g. ‘26300018’)

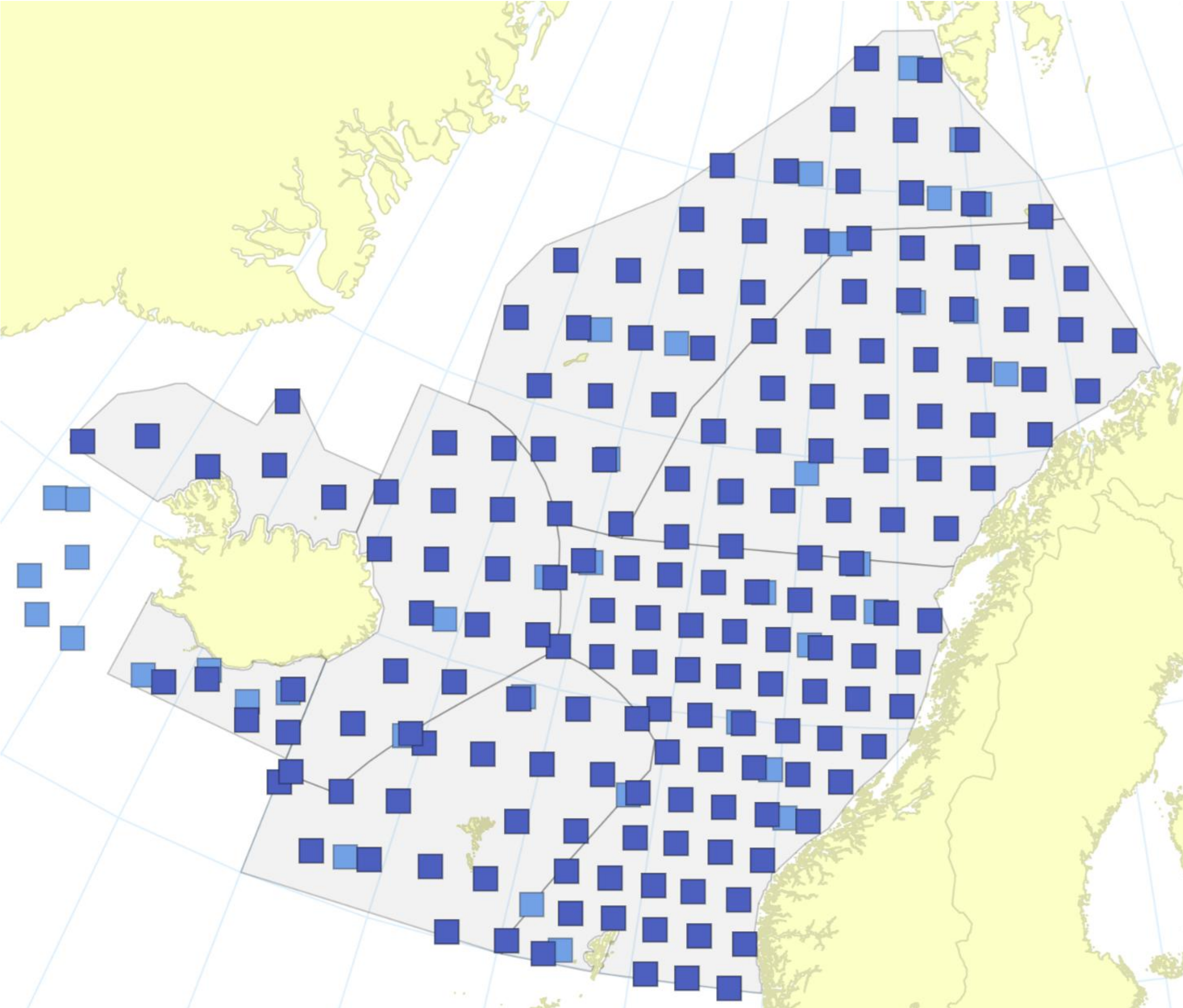

Fig. A1-1. IESSNS 2026. Surface trawl stations included (filled dark blue rectangle) and excluded (filled light blue rectangle) in calculations of mackerel age segregated index used in the assessment. Strata boundary also displayed (grey solid lines).

Appendix 2

Redefining IESSNS stratum 5 (west of Iceland) boundary focusing on blue whiting acoustic measurements and CTD/WP2 sampling

June 2026

Anna H. Ólafsdóttir and Sigurður Þ. Jónsson, MFRI, Iceland

Mackerel presence and density in IESSNS stratum 5 (waters west of Iceland) declined sharply after 2018, when the species was widely distributed and abundant. No mackerel was caught in 2020, and only a few individuals were recorded in 2021–2023. None was caught in 2024 or 2025. This gives six consecutive years of absent or negligible mackerel. At the IESSNS post-cruise meeting in August 2025, it was decided to stop mackerel measurements in stratum 5 in 2026.

Blue whiting is present in stratum 5, hence IESSNS will continue to measure its distribution and abundance, along with CTD/WP2 sampling. The stratum boundary was redefined to focus on this species.

Blue whiting in this area is confined to the Irminger Sea basin and the continental shelf edge. There are no records of blue whiting on the shelf part of stratum 5, from IESSNS, Icelandic bottom trawl surveys, or herring acoustic surveys. Presence and density west of Iceland vary between years, ranging from limited occurrence near the shelf edge to continuous distribution from the shelf edge to the western boundary of the stratum (IESSNS cruise reports 2016–2025).

IESSNS acoustic data on blue whiting distribution from 2016 to 2025 were used to define a new eastern boundary for stratum 5 that excludes shelf areas. This boundary roughly follows the 300 m depth contour, excluding Jökuldjúp and Kolluál (Figure A2-1).

The IESSNS covers this stratum with acoustic transects running east-to-west across the shelf edge and into the Irminger Sea basin and the chosen survey progression is northward. For the revised stratum, the southern, eastern and northern boundaries are static. The western boundary is dynamic, reflecting annual variability in blue whiting distribution.

In 2026, transect spacing is 65 nmi and CTD/WP2 station spacing is 60 nmi, along transect. Transect and station allocation was carried out using the StoX Survey Planner (v.4.2.0) in the R environment.

Survey planning results, attached files available on survey WGIPS SharePoint:

1. blue-west2026.R
2. Rplots.pdf
3. Routes5.gpx
4. Stations5.gpx
5. Stratum5_new2026.gpx

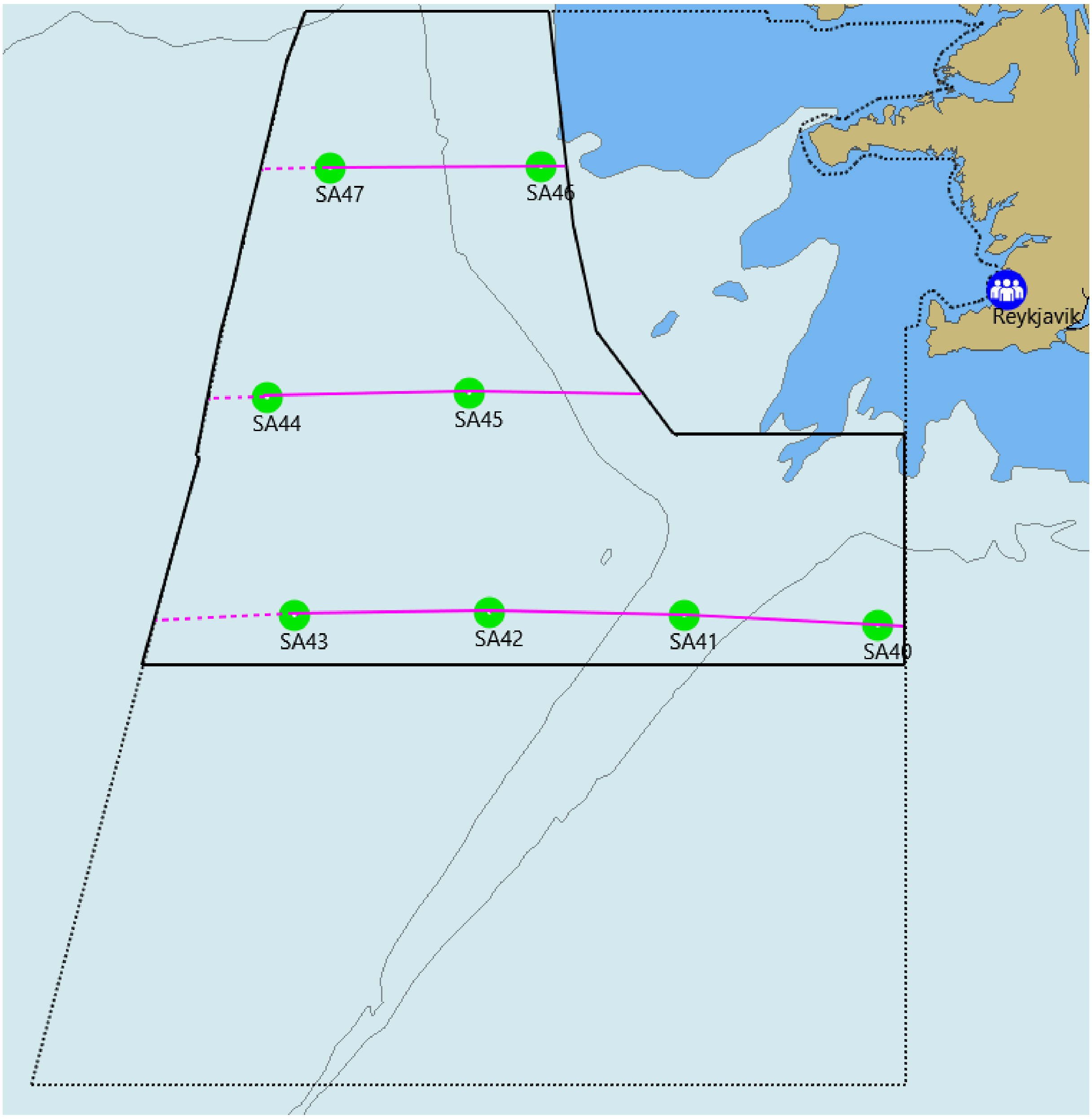

Figure A2-1. The redesigned stratum 5 for IESSNS 2026 (solid black line), revised to measure blue whiting distribution and abundance. The previous stratum boundary is shown as a broken black line. Also shown are the IESSNS 2026 survey track (pink line) and the CTD/WP2 stations labelled SA40-SA47 (filled green circles).

Appendix 3

Horizontal trawl opening of the Multpelt 832 trawl

Horizontal trawl opening of the Multpelt 832 trawl is a function of trawl door spread and tow speed (Table 6 in the 2022 report). The estimates in Table 6 are originally based on flume tank simulations in 2013 (Hirtshals, Denmark) where two formulas were empirically derived for two towing speeds, 4.5 and 5 knots:

Towing speed 4.5 knots: Horizontal opening (m) = 0.441 × Door spread (m) + 13.094

Towing speed 5.0 knots: Horizontal opening (m) = 0.3959 × Door spread (m) + 20.094

In 2017, the towing speed range was increased to 5.2 knots, i.e. an extrapolation of the trawl opening as a function of door spread and speed was performed. In 2022 the towing speed range was further extended down to 4.3 knots and up to 5.5 knots, using a kriging gridding method, see Figure A3-1. In 2023, the trawl opening was extended to 135m (Table 7).

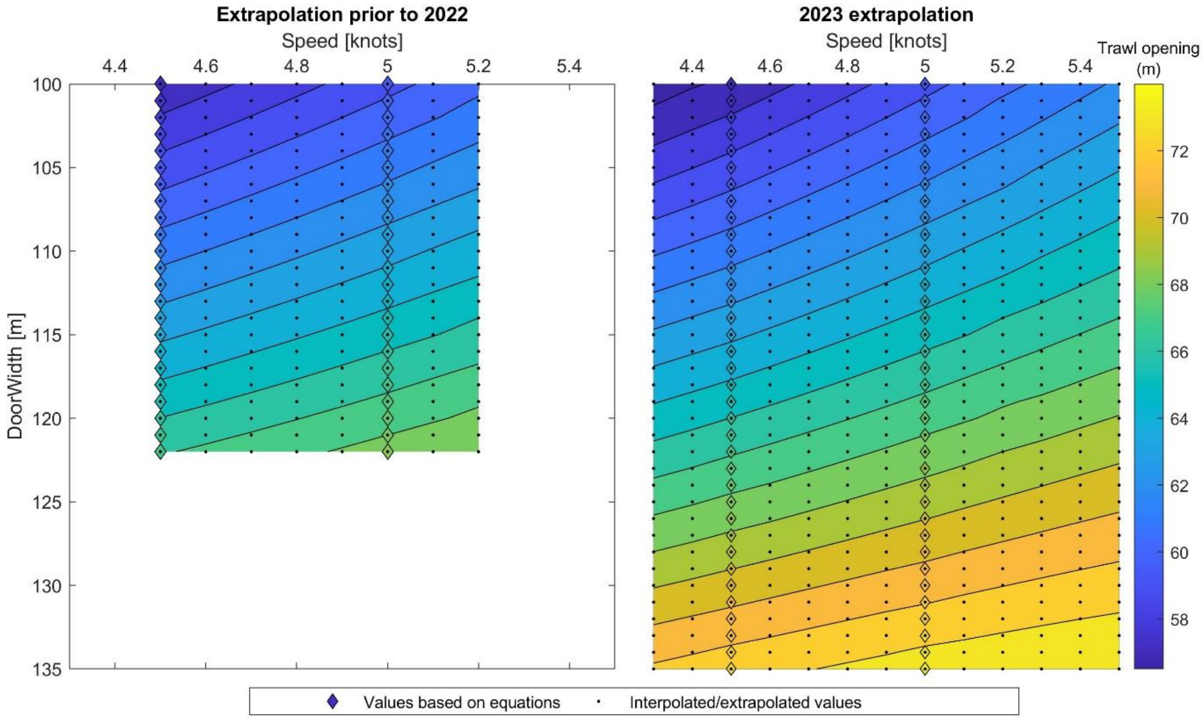

Fig. A3-1. Table 7 in the report shown as a plot.

Appendix 4

Dedicated and opportunistic marine mammal observations

Following the discontinuation of cetacean surveys from dedicated vessels after the 2024 season, dedicated and opportunistic marine mammal observations have been carried out from Norwegian vessels participating in the annual IESSNS cruises. The major objective of dedicated, systematic observations is to enable estimation of abundance of minke whales. These estimates will then be used in an assessment model to provide harvest advice for this commercially harvested species. In addition, observations also allow for abundance estimation of other ecologically important cetacean species (mainly, but not exclusively, fin-, humpback-, sperm- and killer whales, along with harbour porpoises and *Lagenorhyncus* dolphins). In addition to the key use for abundance estimation, , the use of fisheries survey vessels for marine mammal observations also allows us to link marine mammal sightings in space and time to fish biomass, distribution and behaviour to assess predator-prey interactions. Ultimately, these data can provide a more ecological context, specifically to address topics related to food-web dynamics.

Four dedicated marine mammal observers operated from a specially designed platform at the rooftop of the bridge on board each of the two Norwegian vessels M/V "Eros" and M/V "Vendla". The observers operated daily from 05:00h to 23:00h throughout the mackerel ecosystem survey (IESSNS 2026) in the Norwegian Sea and adjacent coastal and oceanic areas during July 2026. Opportunistic marine mammal sightings where also noted at night-time outside the dedicated operating time periods (23:00h– 05:00h) by the dedicated marine mammals observers.

Neither dedicated nor opportunistic marine mammal observations were conducted on board survey vessels from Faroe Islands, Iceland and Denmark during IESSNS 2026, due to too few survey participants and limited capacity to conduct marine mammal observations. In coordination with NAMMCO (North Atlantic Marine Mammal Commission), we will work toward including marine mammal observers also on vessels from these other nations in future surveys, in order to broaden the annual spatial coverage to cover relevant management areas for Norway as well as other NAMMCO countries.

Observation conditions at sea (Beaufort wind strength, fog, and other weather conditions) have been variable and sometimes poor, which can greatly influence the likelihood of detecting marine mammals in offshore waters. The marine mammal observers on board Eros and Vendla sometimes worked under challenging outdoor conditions from the specially designed platforms on the rooftop of the bridge on board Eros and Vendla.

Overall, marine mammal encounter rates were higher in the northern parts of the survey area compared to the central and southern Norwegian Sea , especially for baleen whales and smaller dolphin species, (see Fig A4-1).

Killer whales (*Orcinus orca*) were mainly observed in the central part of the Norwegian Sea, while sightings of beaked whales dominated the western parts of the Norwegian Sea. These patterns agree well with patterns during previous dedicated surveys. There were high-density areas (hotspots) with a significant number of whale observations within limited areas from southwest of Svalbard to Bear Island, and further south along the shelf areas towards the Finnmark coast (Fig. A4-1).

Groups of feeding fin whales (*Balaenoptera physalus*) and humpback whales (*Megaptera novaeangliae*) were often observed in association with capelin schools being registered on acoustic instruments (echosounders and sonar) and in trawl catches.

In addition, individual minke whales (*Balaenoptera acutorostrata)* and groups of white-beaked dolphins (*Lagenorhynchus albirostris*) were also observed, likely feeding on capelin schools, along with aggregations of fish larvae and juvenile fish of various species in the upper water layers in the northern seas.

Four blue whales (*Balaenoptera musculus*) were also observed in a relatively limited area south of Svalbard. Again, this is an area where this species has regularly been encountered during previous surveys.

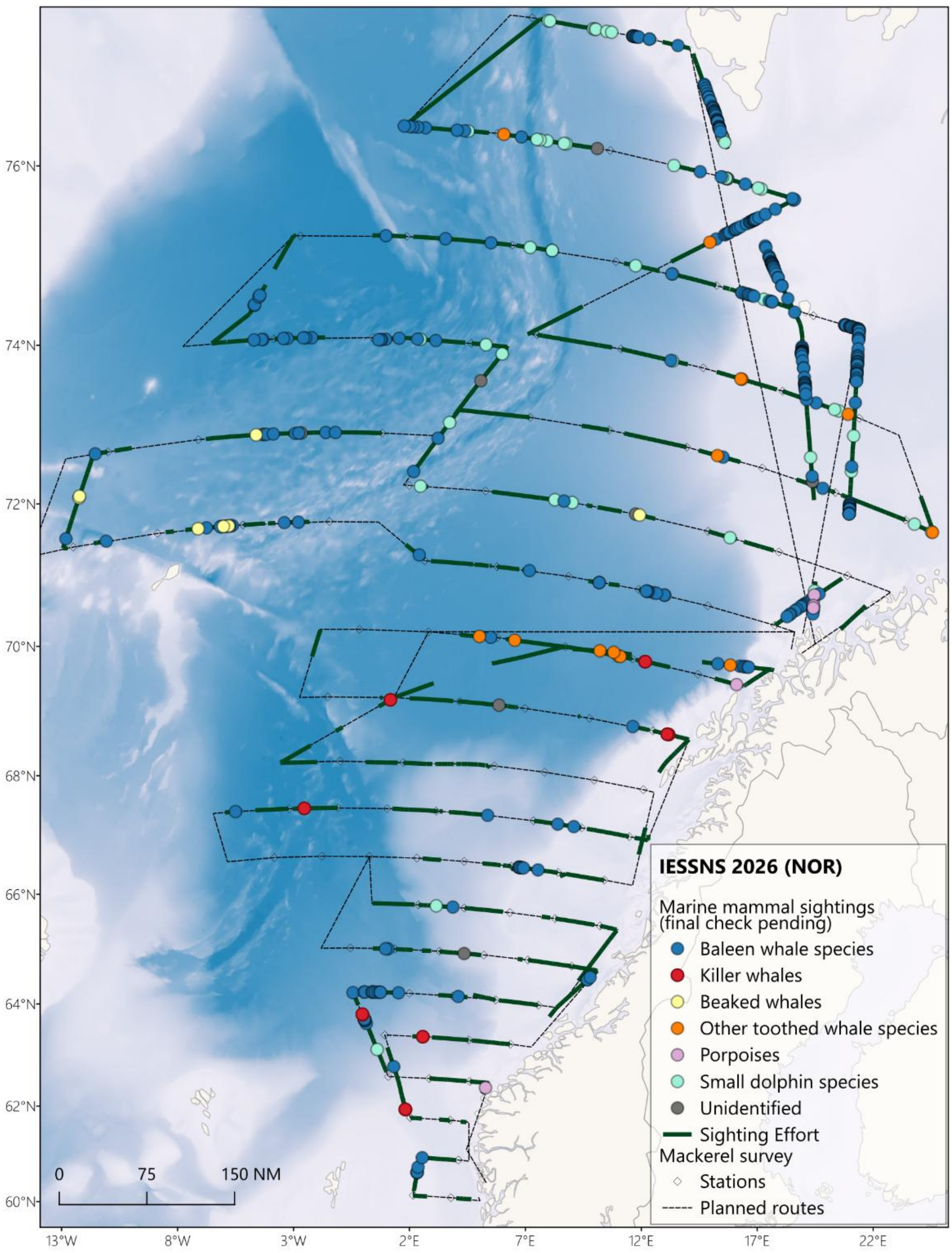

Fig A4-1. Preliminary and simplified overview of marine mammal (cetacean) observations during IESSNS 2026, from the two chartered fishing vessels M/V "Eros" and M/V "Vendla" divided by species groups. The observations are shown as points (each point can represent different group sizes), as well as lines showing the observation coverage. The data is preliminary, and the dataset is not yet fully completed, compiled or quality assured. Bathymetry data is taken from the GEBCO Compilation Group, GEBCO Grid (www.gebco.net). (Illustration: Frederike Boehm/Institute of Marine Research, Bergen, Norway)