

Appendix 1: Executive summary from IESSNS survey report 2019(ICES.2019. Working Group on Widely Distributed Stocks (WGWIDE). ICES Scientific Reports. 1:36. 948pp. <http://doi.org/10.17895/ices.pub.5574>).

The International Ecosystem Summer Survey in the Nordic Seas (IESSNS) was performed within approximately 5 weeks from June 28th to August 5th in 2019 using six vessels from Norway (2), Iceland (1), Faroe Islands (1), Greenland (1) and Denmark (1). The main objective is to provide annual age-segregated abundance index, with an uncertainty estimate, for northeast Atlantic mackerel (*Scomber scombrus*). The index is used as a tuning series in stock assessment according to conclusions from the 2017 ICES mackerel benchmark. A standardised pelagic swept area trawl method is used to obtain the abundance index and to study the spatial distribution of mackerel in relation to other abundant pelagic fish stocks and to environmental factors in the Nordic Seas, as has been done annually since 2010. Another aim is to construct a new time series for blue whiting (*Micromesistius poutassou*) abundance index and for Norwegian spring-spawning herring (NSSH) (*Clupea harengus*) abundance index. This is obtained by utilizing standardized acoustic methods to estimate their abundance in combination with biological trawling on acoustic registrations.

The mackerel index increased by 85% for biomass and 56 % for abundance (numbers of individuals) compared to the 2018 index. In 2019, the most abundant year classes were 2011, 2010, 2016, 2014 and 2013, respectively. Overall, the cohort internal consistency remained good and was similar to 2018.

The survey coverage area was 2.9 million km² which is similar as in 2017 and 2018. Furthermore, 0.3 million km² was surveyed in the North Sea. Distribution zero boundaries were found in majority of the survey area with a notable exception of high mackerel abundance at the survey boundary south-west of Faroe Island and in the northern Norwegian Sea. The mackerel were more north-easterly distributed in 2019, compared to the period from 2012 to 2018. This was specifically apparent in Greenland waters, where the catch was the lowest for the time series.

The total number of Norwegian spring-spawning herring (NSSH) recorded during IESSNS 2019 was 15.2 billion and the total biomass index was 4.78 million tonnes, which is slightly higher compared to 2018. The herring stock is dominated by 6-year old herring (year class 2013) in terms of numbers and biomass. This year class is now distributed in all areas with herring in the survey compared to last year when it was mainly found in the north-eastern part. It contributes 23% and 22% to the total biomass and total abundance, respectively.

The total biomass of blue whiting registered during IESSNS 2019 was 2.0 million tons, which is the same compared to 2018. The stock estimate in number for 2019 is 16.2 billion compared to 16.3 billion of age groups 1+ in 2018. The age group five is dominating the estimate (36% and 30% of the biomass and by numbers, respectively). A good sign of recruiting year class (0-group) was also seen in the survey this year.

As in previous years, the spatio-temporal overlap between mackerel and NSSH was highest in the southern and south-western parts of the Norwegian Sea. There was practically no overlap between mackerel and NSSH in the central part of the Norwegian Sea, whereas we had some overlap between mackerel and herring in the northern part of the Norwegian Sea. Herring distribution was mostly limited to the area east and north of Iceland and the southern Norwegian Sea. However, NSSH was also found in the central northern part for the first time in many years, dominated by the 2013- and 2016- year classes.

Other fish species also monitored are lumpfish (*Cyclopterus lumpus*) and Atlantic salmon (*Salmo salar*). Lumpfish was caught at 73% of surface trawl stations distributed across the surveyed area from Cape Farwell, Greenland, to western part of the Barents Sea. Abundance was greater north of latitude 66 °N compared to southern areas. A total of 58 North Atlantic salmon were caught, mainly in central and northern part of the Norwegian Sea. More salmon was caught in western regions compared to previous years.

Sea surface temperature (SST) was 1-2°C warmer in Icelandic and Greenland waters in July 2019 compared to the long-term average (20-year mean), but similar to the long-term average in eastern part of the Norwegian Sea. This contrasts with the situation in 2018 when SST was 1-2°C colder than the average in Icelandic and Greenland waters. The SST in the entire Norwegian Sea in July 2019 was similar to July 2018.

The overall average zooplankton index in 2019 declined substantially compared to 2018. In 2019, the index decreased in both Greenland and Icelandic waters, whereas the index increased in the Norwegian Sea compared to 2018.