

EU request for advice on a monitoring TAC for herring in ICES divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k

Advice summary

ICES advises that the number of samples in a monitoring fishery should be at least 17 and that these samples could be obtained through a monitoring catch of 869 tonnes.

Request

Given the zero catch advice for the following:

Herring in division 7.a South of 52°30'N, 7.g-h and 7.j-k

ICES is requested to

- provide advice on the minimum level of catches (tonnage) required in a sentinel TAC, which would provide sufficient data for ICES in order to continue providing scientific advice on the state of this stock.

Elaboration on the advice

Ireland is the main participant in the Celtic Sea herring fishery and has 86% of the TAC. The Irish Celtic Sea herring fleet has two components: (a) the “sentinel fleet”, which is defined as the fleet of vessels < 17 m that operate in ICES Division 7.aS, and (b) the “main fleet” that primarily operates in ICES Division 7.g. In this document “sentinel TAC” was replaced by “monitoring TAC” to avoid any confusion with the Irish sentinel fleet.

ICES advises that to obtain an adequate age composition, the number of fishery-dependent samples should be no less than 17. These samples could be obtained through a monitoring TAC of 869 tonnes. The catches in the monitoring fishery would be associated with a very low fishing mortality F (approximately 0.04) in 2020, which is lower than any previously observed F value (0.067 in 2009).

Existing quota allocation keys between EU Member States results in countries having a quota, but no targeted fishery in this area, which may limit the possibilities of collecting the required number of samples. ICES does not consider the mechanisms used to allocate the sampling amongst individual countries. Effort should be made to ensure appropriate spatial and temporal distribution of samples.

Basis of the advice

Background

The 2019 assessment of Celtic Sea herring estimated that the stock has decreased significantly since 2011, remaining below B_{lim} since 2017 (ICES, 2019a). ICES advised that there should be zero catch on this stock in 2020. ICES has interpreted the request as to advise on the minimum level of fishery-dependent data needed to achieve an adequate precision level of the sampling for age composition, and to estimate the impact of the associated catch on the recovery time of the stock.

Methods

An analysis was conducted of Irish sampling in 2013–2017 for herring in divisions 7.a South of 52°30'N and 7.g (ICES, 2019b). 2016 was chosen as the reference year because the fishery in this year was not constrained by quotas, the age structure included both strong and weak year classes, and there was a good distribution of samples from both divisions 7.aS and 7.g. The analysis was confined to quarter 4 because it is indicative of the winter fishery for which monitoring is required. The Data Collection Framework (DCF) reporting structure was used as guidance to define the precision target for this stock. This corresponds to precision level 2 (coefficient of variation [CV] < 12.5%; EU, 2010). The number of samples (see sample definition in Annex 1) required to achieve this precision level was calculated accordingly.

The analysis assumes the following:

- Sample hauls are equal to the average hauls, which for the main fleet is 65 tonnes and for the sentinel fleet 6 tonnes (information provided by the Irish industry).
- The relative contribution of each fleet remains the same in order to keep the same proportion of sampling between the two fleets, ensuring the same area coverage and accounting for potential differences in length compositions between fleets.
- The haul sampling protocol remains the same for each haul being sampled.
- Fleet behaviour remains the same.

Results and conclusions

Based on the 2016 data, the number of samples required to reach a sampling precision of < 12.5% is 17 (Figure 1); this corresponds to 13 samples for the main fleet and 4 for the sentinel fleet. When each sample is converted to a catch, based on the average catch per haul and assuming one sample per haul, the total monitoring catch becomes 869 tonnes (Table 1).

Table 1 Herring in ICES divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Sampling from the main and sentinel fishery, based on DCF precision level 2. One sample per haul is assumed, with an average haul in the fishery being 65 tonnes.

| Basis | CV% | No. of samples | Catch assuming hauls of 65 tonnes | Catch assuming hauls of 6 tonnes |
|-------------|----------|----------------|-----------------------------------|----------------------------------|
| DCF Level 2 | 2.5–12.5 | 13 | 845 t | - |
| DCF Level 2 | 2.5–12.5 | 4 | - | 24 t |

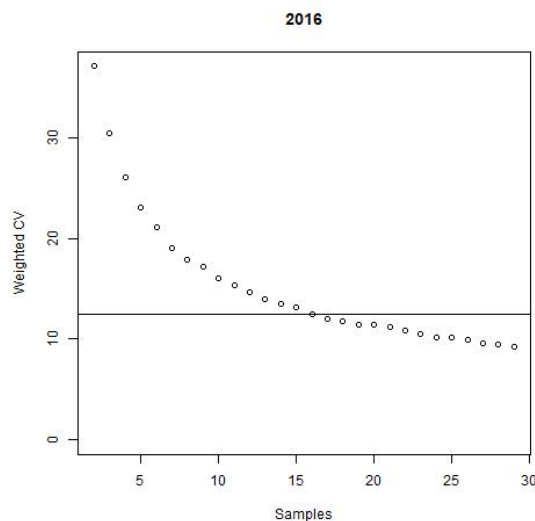


Figure 1 Herring in ICES divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Results of bootstrap analysis of sampling in quarter 4 of 2016, showing the improvement in precision of age composition as the number of samples increases. The horizontal line corresponds to a precision level of 12.5%; the associated number of samples is approximately 17.

The impact of a monitoring TAC of 869 tonnes on the recovery of the stock was examined through management strategy evaluation. Two catch scenarios were evaluated:

1. Zero catch (corresponding to the ICES advice for 2020).
2. The proposed monitoring TAC of 869 tonnes.

For each scenario, the realised F and the probability of the SSB being below B_{lim} in 2023 and 2024 are presented in Table 2.

The simulations show that with no fishing in 2020, the 95% probability of SSB being above B_{lim} ($P[SSB > B_{lim}] > 95\%$) is expected in 2023. The proposed monitoring TAC of 869 tonnes would delay this recovery by one year until 2024. The probability in 2023 is only marginally higher than 5% (5.1%).

Table 2 Herring in ICES divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Performance statistics (range of F over the years 2021–2026 derived from the management strategy evaluation (MSE) simulating two scenarios, i.e. no catch, proposed monitoring TAC fully caught.

| Scenario | Range of realised F | Year for which P[SSB > B _{lim}] > 95% | Probability of SSB < B _{lim} in 2023 | Probability of SSB < B _{lim} in 2024 |
|---------------------------|---------------------|--|--|--|
| 1. No catch | 0 | 2023 | 3.5% | 1.2% |
| 2. Total TAC = 869 tonnes | 0.04–0.01 | 2024 | 5.1% | 2.8% |

Suggestions

The monitoring fishery should be conducted to maximize the contribution to scientific data collection, including assisting with the acoustic survey.

Sources and references

Campbell, A. 2016. Sampling Precision in the 6.a, 7.b, and 7.c Herring Fishery. ICES Ad Hoc Report. ICES CM 2016/ACOM:51. 16 pp.

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Annex 1

Estimates of precision for the sampling of herring in divisions 7.a South of 52°30'N, 7. g–h, and 7.j–k were derived based on the methods used in Campbell (2016) and ICES (2019b). 2016 was chosen as the reference year.

In total, 29 samples were collected, with an average of 186 fish measured and 50 fish age estimated per sample. A bootstrap, with replacement, was performed, based on the complete sample dataset with a fixed number of samples. An age–length key was constructed using only age estimated fish from the bootstrapped samples. Each length frequency was passed through the key to generate a proportion-at-age. No raising was carried out, allowing each sample to carry equal weight. The total numbers-at-age was derived and the procedure repeated 1000 times. The CV was calculated weighted by mean numbers-at-age. It is assumed that the samples collected as part of the proposed monitoring programme will be processed in the same way, i.e. using a length frequency and a subset of fish that have been age estimated.