EU and Norway request concerning the long-term management strategy of haddock

Advice summary

ICES provides an answer to the request through combinations of $F_{\text{target}}$ and $B_{\text{trigger}}$; these would maximize the yield while ensuring a less than 5% probability of the SSB falling below $B_{\text{lim}}$. The $F_{\text{target}}$ and $B_{\text{trigger}}$ combinations vary, depending on the option for the management strategy. The main differences are the reduction of $F$ when the stock is below $B_{\text{lim}}$ and the application of different stability elements (limits on interannual TAC variation and on “banking and borrowing” schemes).

Optimum values of $F_{\text{target}}$ were found to be between 0.26 and 0.29, and for $B_{\text{trigger}}$ this was between 160 000 and 190 000 tonnes across management strategies. All requested management scenarios are considered precautionary in the long term, but none in the short term. ICES advises, however, the use of the existing ICES MSY advice rule with an $F_{\text{MSY}}$ of 0.194 and an MSY $B_{\text{trigger}}$ of 132 000 tonnes, with added stability elements if desired. This is because the ICES MSY advice rule was the only management strategy that was likely to remain precautionary across all robustness tests, with just over 10% loss of yield but markedly reduced interannual variation of the catch.

Request

The European Union and Norway jointly request ICES to advice on the long-term management strategies on joint stocks between Norway and the European Union. A summary is provided below.

For haddock ICES is asked to:

1. Tabulate the long-term yield, long term SSB, inter annual TAC variability and risk of SSB falling below $B_{\text{lim}}$ for the range of combinations of $B_{\text{trigger}}$ and $F_{\text{target}}$ values evaluated.
2. For each of the stocks requested, to estimate the combination of $F_{\text{target}}$ and $B_{\text{trigger}}$ that maximises yield given the rules set out in six “sets” defined in the table attached. The six sets are A, B, C, A+D, B+E and C+E.
3. Evaluate the performance of the six sets of rules with corresponding pairs of $F_{\text{target}}$ and $B_{\text{trigger}}$. Thereafter, ICES is requested to evaluate the additional fishing pressure scenarios of $0.9*F_{\text{target}}$, $F_{\text{target}}$, $1.1*F_{\text{target}}$, $F_{\text{MSY lower}}$ and $F_{\text{MSY upper}}$. (5 pairs, 6 sets = 30 scenarios per stock).
4. For haddock, two additional scenarios should be evaluated: $F_{\text{target}}$ & $1.5*B_{\text{trigger}}$ and $F_{\text{target}}$ & $2*B_{\text{trigger}}$ (2 pairs, rules sets A and A+D = 4 scenarios).

Elaboration on the advice

ICES was tasked to find optimal combinations of harvest control rule parameters ($F_{\text{target}}$ and $B_{\text{trigger}}$) for management strategies, with or without stability elements (see D and E in Table 1). Optimal combinations were defined as those combinations of $F_{\text{target}}$ and $B_{\text{trigger}}$ that simultaneously maximize long-term yield while being precautionary (no more than 5% probability of SSB < $B_{\text{lim}}$). The requesting parties provided three different harvest control rules (HCRs) that differ only in the reduction of $F$ if SSB is below $B_{\text{lim}}$ (Table 1 and Figure 1).

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*Risk3 = maximum probability in any year of SSB < $B_{\text{lim}}$, measured over a pre-defined period.
Figure 1  Graphic illustration of the requested harvest control rules (HCRs) for haddock.

For the purposes of this advice, short term refers to the first five years, medium term to years 6–10, and long term to years 11–20.

The request also asks for sensitivity tests once the management strategy is optimized. These tests were performed with different Fs. In addition, robustness tests were carried out with alternate operating models.

The management strategy evaluation (MSE) approach adopted for haddock was to model the assessment and forecast, as implemented by ICES, to mimic the assessment and advice process as closely as possible.

Table 1  Definition of harvest control rules (HCRs) for management strategies for haddock.

<table>
<thead>
<tr>
<th></th>
<th>Definition of harvest control rules (HCRs) for management strategies for haddock.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Long-term yield</td>
</tr>
<tr>
<td>1</td>
<td>When the spawning stock (SSB) at the start of the TAC year is at or above ( B_{\text{trigger}} ), the yearly TAC set shall correspond to a fishing pressure equal to ( F_{\text{target}} ).</td>
</tr>
<tr>
<td>2</td>
<td>If SSB at the start of the TAC year is below ( B_{\text{trigger}} ), the TAC set shall correspond to a fishing mortality of ( F_{\text{target}} \times \frac{SSB}{B_{\text{trigger}}} ).</td>
</tr>
<tr>
<td>B</td>
<td>Long-term yield</td>
</tr>
<tr>
<td>1</td>
<td>When the SSB at the start of the TAC year is at or above ( B_{\text{trigger}} ), the yearly TAC set shall correspond to a fishing pressure equal to ( F_{\text{target}} ).</td>
</tr>
<tr>
<td>2</td>
<td>If SSB at the start of the TAC year is below ( B_{\text{trigger}} ) but above ( B_{\text{lim}} ), the TAC set shall correspond to a fishing mortality of ( F_{\text{target}} \times \frac{SSB}{B_{\text{trigger}}} ).</td>
</tr>
<tr>
<td>3</td>
<td>When the SSB is estimated to be below ( B_{\text{lim}} ) at the start of the TAC year, the TAC shall be set at a level corresponding to a fishing mortality rate of ( 0.25 \times F_{\text{target}} ).</td>
</tr>
<tr>
<td>C</td>
<td>Long-term yield</td>
</tr>
<tr>
<td>1</td>
<td>When the SSB at the start of the TAC year is at or above ( B_{\text{trigger}} ), the yearly TAC set shall correspond to a fishing pressure equal to ( F_{\text{target}} ).</td>
</tr>
<tr>
<td>2</td>
<td>If SSB at the start of the TAC year is below ( B_{\text{trigger}} ) but above ( B_{\text{lim}} ), the TAC set shall correspond to a fishing mortality of ( F_{\text{target}} \times \frac{SSB}{B_{\text{trigger}}} ).</td>
</tr>
<tr>
<td>3</td>
<td>When the SSB is estimated to be below ( B_{\text{lim}} ) at the start of the TAC year, the TAC shall be set at a level corresponding to a fishing mortality rate that is the greater of ( F_{\text{target}} \times \frac{SSB}{B_{\text{trigger}}} ) and ( 0.25 \times F_{\text{target}} ).</td>
</tr>
<tr>
<td>D</td>
<td>Stability</td>
</tr>
<tr>
<td>1</td>
<td>Where the rule in paragraph A1 leads to a TAC that deviates more than 25% up or 20% down from the preceding year, the change is limited to 25% up or 20% down.</td>
</tr>
<tr>
<td>2</td>
<td>The TAC given by paragraphs A1 and D1 can deviate with up to 10%. This is according to the interannual quota flexibility provided for in paragraphs 1–3 of Annex VII of the “Agreed Record of fisheries consultations between Norway and European Union for 2018”, signed in Bergen on 1 December 2017 (the “banking and borrowing” scheme; see the Annex attached to this advice).</td>
</tr>
</tbody>
</table>
1. Where the rule in paragraphs B1 or C1 leads to a TAC that deviates more than 25% up or 20% down from the preceding year, the change is limited to 25% up or 20% down.

2. The TAC given by paragraphs [B1, B2, B3, and E1] or [C1, C2, C3, and E1] can deviate with up to 10% according to the “banking and borrowing” scheme.

An additional HCR (A*) was also tested. This was the ICES MSY advice rule with present values for $F_{MSY}$ and MSY $B_{trigger}$ (ICES, 2018a).

The baseline operating model (OM1) was not conditioned on the accepted benchmark assessment model for haddock (TSA), but rather on a version of the SAM assessment model. This is based on the same data and approximates well the latest TSA stock assessment for haddock (ICES, 2018a). TSA cannot be used in the management procedure (MP) because it takes a long time to converge and requires \textit{ad hoc} adjustments to deal with atypical situations. An approach was attempted where the OM was conditioned on the TSA assessment, while SAM was used to approximate TSA in the MP. However, this approach led to a systematic bias between the OM and the MP that is not representative of the retrospective pattern in the TSA assessment. The TSA, therefore, could not be used as the baseline OM. Instead, it was used as an alternative OM (OM2) combined with SAM in the management procedure. OM3 was the same as OM1, but modelled future recruitment by fixing the timing of recruitment spikes. Reference points between SAM and TSA were found to be very similar and thus the current reference points for haddock were adopted for all OMs.

### Search grid for optimal combination of $F_{target}$ and $B_{trigger}$

The search for optimal combinations of $F_{target}$ and $B_{trigger}$ (i.e. those that maximize long-term yield while fulfilling the ICES precautionary criterion), was only conducted for the baseline OM1 for each of the six management strategies (see Figure 2 for management strategy A). The grid is only partially complete because of the length of time required to run each cell. The optimal combinations for the six management strategies requested are shown in Table 2, along with three additional management strategies. These are as follows: a version of management strategy A that sets $F_{target} = F_{MSY} = 0.194$ and $B_{trigger} = MSY B_{trigger} = 132 000$ t, labelled as A* (i.e. the ICES MSY advice rule; see Figure 2); a version of A* that includes stability elements, labelled as A* + D; and an F = 0 scenario.
Figure 2  Haddock in Subarea 4, Division 6.a, and Subdivision 20: Grid search for “optimal” combination of \(F_{\text{target}}\) and \(B_{\text{trigger}}\) for management strategy A for the long term (i.e. final 10 years of the 20-year projection). Top left: median long-term catch; top right: the long-term probability of \(SSB < B_{\text{lim}}\) (Risk3); bottom left: the median long-term interannual catch variability; and bottom right: the median long-term SSB. The optimal combination is indicated by a black box. The combinations that meet the precautionary criterion are in black text, while those that do not are in red. For the catch plot, only those cells that are precautionary and within 5% of the maximum are coloured.

Table 2  Haddock in Subarea 4, Division 6.a, and Subdivision 20: “optimal” combinations for \(F_{\text{target}}\) and \(B_{\text{trigger}}\) for the baseline OM1, with six management strategies and three additional management strategies (scenarios 7–9). Also reported are the median long-term values for catch (in tonnes), \(SSB\) (in tonnes), interannual catch variability (ICV), and probability \((SSB < B_{\text{lim}})\) over the final 10 years of the projection.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Management strategy</th>
<th>(F_{\text{target}})</th>
<th>(B_{\text{trigger}})</th>
<th>Catch</th>
<th>(SSB)</th>
<th>(\text{Realized } F(2–4))</th>
<th>ICV *</th>
<th>(P(SSB &lt; B_{\text{lim}}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>0.28</td>
<td>180 000</td>
<td>51 358</td>
<td>196 587</td>
<td>0.262</td>
<td>0.275</td>
<td>4.9%</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>0.29</td>
<td>190 000</td>
<td>51 574</td>
<td>194 672</td>
<td>0.265</td>
<td>0.296</td>
<td>4.8%</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>0.28</td>
<td>180 000</td>
<td>51 350</td>
<td>196 587</td>
<td>0.262</td>
<td>0.275</td>
<td>4.9%</td>
</tr>
<tr>
<td>4</td>
<td>A + D</td>
<td>0.28</td>
<td>180 000</td>
<td>49 628</td>
<td>196 781</td>
<td>0.256</td>
<td>0.348</td>
<td>5.0%</td>
</tr>
<tr>
<td>5</td>
<td>B + E</td>
<td>0.27</td>
<td>170 000</td>
<td>49 831</td>
<td>200 267</td>
<td>0.256</td>
<td>0.393</td>
<td>4.9%</td>
</tr>
<tr>
<td>6</td>
<td>C + E</td>
<td>0.26</td>
<td>160 000</td>
<td>49 398</td>
<td>203 534</td>
<td>0.251</td>
<td>0.378</td>
<td>5.0%</td>
</tr>
<tr>
<td>7</td>
<td>A* (ICES MSY advice rule)</td>
<td>0.194 = (F_{\text{MSY}})</td>
<td>132 000 = MSY (B_{\text{trigger}})</td>
<td>45 296</td>
<td>252 152</td>
<td>0.203</td>
<td>0.207</td>
<td>1.9%</td>
</tr>
<tr>
<td>8</td>
<td>A* + D</td>
<td>0.194 = (F_{\text{MSY}})</td>
<td>132 000 = MSY (B_{\text{trigger}})</td>
<td>44 480</td>
<td>251 788</td>
<td>0.201</td>
<td>0.361</td>
<td>2.1%</td>
</tr>
<tr>
<td>9</td>
<td>F = 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>578 988</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Median absolute interannual rate of change in catch over the final 10 years.
The performance of management strategies A and C are very similar, because SSB does not drop low enough in the majority of replicates to result in a difference. Management strategy B results in a slightly higher median long-term catch and lower SSB, with higher interannual variability in the catch. Short-term comparisons indicate that management strategies A, B, and C have an associated more than 5% probability of SSB < Blim; the medium-term risk of SSB < Blim is just over the 5% threshold for all three management strategies. In all three cases, the median long-term SSB is above the Btrigger value, indicating that rules are mostly operating “on the plateau”. The high ICV is driven by the sporadic nature of haddock recruitment.

When stability mechanisms are included median long-term catch is reduced, long-term SSB is increased, and ICV is increased. The increase in ICV results from the implementation of the extreme “banking and borrowing” scenario (see section on “Caveats” below). Ftarget and Btrigger are reduced in management strategies B + E and C + E. It is likely that this is because of the differences in the application of the “banking and borrowing” scheme (only when SSB ≥ Btrigger for A, but throughout for B and C; additional safeguards [paragraph 5 in the Annex] are introduced for B and C compared to A). The management strategy C + E results in the highest long-term SSB, though management strategy B gives the overall highest long-term catch. The probability of SSB < Blim remains over the 5% threshold for all three management strategies in the short and medium term.

The ICES MSY advice rule (A*) produced a lower long-term yield and higher SSB compared to the six management strategies, but with a much lower probability of SSB < Blim and a lower ICV. A* + D was similar to A*, but with much higher ICV because of the extreme banking and borrowing tested.
Figure 3  
Haddock in Subarea 4, Division 6.a, and Subdivision 20: Summary projections for optimized management strategy A. Top plot is recruitment (age 0), second plot SSB, third plot catch, and bottom plot mean F (ages 2–4). The vertical black line separates the historical period from the projection period. The SSB plot includes $B_{pa} = MSY \times B_{trigger}$ (horizontal solid line) and $B_{lim}$ (horizontal dashed line), while the mean F plot includes $F_{MSY}$ (horizontal solid line) and $F_{lim}$ (horizontal dashed line). The actual plots show medians (solid black line) with the darker shaded area indicating the 25th and 75th percentiles, and the light shaded area the 5th and 95th percentiles. The results for five individual replicates are shown as solid coloured lines.

Sensitivity testing

The median total catches are similar across the $0.9 \times F_{target}$, $F_{target}$, and $1.1 \times F_{target}$ range in the short, medium, and long term. Correspondingly, ICV increases and SSB decreases with increasing F in the medium and long term. Both $F_{MSY-lower} = 0.167$ and $F_{MSY-upper} = 0.194$ have lower catches compared to the other scenarios as these values of F are much lower than the $F_{target}$.

The risk of $SSB < B_{lim}$ in the long term is above 5% for $1.1 \times F_{target}$ for all management strategies. ICES considers both $F_{MSY-lower}$ and $F_{MSY-upper}$ to be precautionary.

The scenarios that increase $B_{trigger}$ to 1.5 or $2 \times B_{trigger}$ result in lower catches, lower risk, higher ICV, and higher SSB in the long term. This is because the higher $B_{trigger}$ values mean the rules are operating “on the slope”, which leads to more variation in the realized F.

Robustness of management strategies across alternative operating models

The alternative operating model 2 (OM2) was conditioned on a different assessment model (TSA). Compared to the baseline OM (OM1), this alternative OM results in higher catches, ICV, and SSB. The probability of $SSB < B_{lim}$ in the short and long term (Figure 4) were lower for OM2. This is likely because the management procedure (MP = SAM) estimates show less fish than are found in the OM (OM = TSA), as there is a bias in the estimates of F and SSB from the management procedure compared to the underlying “truth” of the operating model. A bias in the opposite direction is likely to exist if the combination of MP = TSA (currently used by ICES for advice) and OM = SAM (a plausible alternative to TSA); however,
it was not possible to test this scenario. Such a bias is plausible; to mitigate against it management strategies may thus need to be more precautionary than those optimized under the baseline OM1.

The alternative operating model 3 (OM3) was conditioned on the results from a SAM stock assessment fit, but fixed the regularity of “spikes” in recruitment. Compared to the baseline OM (OM1), this alternative OM results in higher catches and higher SSB across the short, medium, and long terms, and with lower risk in the short and medium term. The ICV for this OM is mostly lower or has similar values compared to the baseline (OM1). Risk3 in the medium term has similar values for both OMs. The fixed regularity of spikes in recruitment prevents long periods of poor recruitment; such long periods of poor recruitment would increase the risk of SSB falling below $B_{lim}$.

Figure 4  
Haddock in Subarea 4, Division 6.a, and Subdivision 20: Performance statistics for the various management strategies with alternate operating models in the long term (final 10 years). Individual plots are as indicated by the label on the y-axis. Within each plot, the management strategies are $F_0$ (i.e. $F = 0$), $A^*$ (i.e. management strategy A with $F_{target} = F_{MSY} = 0.194$ and $B_{trigger} = MSY_{Btrigger} = 132,000$ t and the six “optimized” management strategies (A, B, C, A + D, B + E, and C + E). The operating models are OM1 (Baseline), OM2 (Alt1), and OM3 (Alt2). In the box and whisker plots, the heavy horizontal line within the box indicates the median, the edges of the box indicate the 25th and 75th percentiles, and the whiskers extend to the largest and smallest values within 1.5 times the interquartile range (IQR) from the edges. The remaining points indicated as dots outside the whiskers are the outliers to $1.5 \times$ IQR from the edges.
Caveats

Mixed fisheries

Haddock is often caught together with cod, whiting, and saithe in mixed fisheries in the North Sea. The MSE has been conducted on a single-species basis without considering any mixed-fisheries interactions. Management strategies that are precautionary on a single-species basis may only be precautionary if mixed fisheries are stopped as soon as the first species quota is exhausted (i.e. enforcement of the landing obligation), which would lead to a reduction in overall yield compared to that predicted in the MSE.

Multispecies effects and environmental considerations

Multispecies effects have not been taken into account for haddock in robustness tests. Likewise, future environmental changes, e.g. because of climate change, have not been directly considered. Indirectly, environmental change was taken into account by choosing appropriate historical periods of recruitment as the basis for future recruitment, and through robustness tests to alternative recruitment. Any results are only valid under the assumptions about productivity made in the simulations.

Banking and borrowing

The optional possibility of banking quota to be used next year, or borrowing quota from next year to be used this year (known as “banking and borrowing”), has been implemented in a subset of the MSE runs. The approach taken for the demersal stocks has been to consider an extreme case of full banking in year $y$ followed by full borrowing in year $y+1$, as this is likely to generate the maximum risk from “banking and borrowing” (see Figure 3 for the resulting zigzag pattern in F and catches). This is done to simulate a worst-case scenario for “banking and borrowing” (through a potential increase in the probability of $SSB < Blim$), although this behaviour has not been observed historically. An additional issue is that simulations with banking and borrowing also included the +25% / −20% limit on variation of TAC asked for in the request. The TAC variation limits are thought to increase stability in catches, while the “banking and borrowing”, as implemented, should decrease stability. The request did not separate “banking and borrowing” from the TAC variation limits. ICES highlights that more active interaction / participation of the requester in the process would aid in deciding upon management assumptions that are more realistic to implement in the MSE.

Implementation error

The recommendations for haddock do not consider additional uncertainty in annual catch beyond the “banking and borrowing” scheme. An example would be uncertainty in implementation of the landing obligation, phased in from 2015, which may result in underestimation of annual catches in the simulations.

Suggestions

Discontinuities in HCRs

Management strategy B has a discontinuity at $B_{lim}$ (i.e. a sudden change in $F$), which is problematic when $SSB$ is estimated to be very near $B_{lim}$. The rule, as specified, is applied in simulations, but in practice this could lead to arguments about to which side of the discontinuity the stock is, potentially leading to TACs that deviate from what was simulated. ICES therefore recommends that HCRs with discontinuities or sharp changes are avoided.

Stability elements

The suspension of the application of stability elements below $B_{trigger}$ can have some unintended consequences. If the stock is recovering from below $B_{trigger}$, the 25% TAC change limit could lead to a loss in potential catch because of the restrictive 25% increase in TAC being applied to a low starting point. The increase in catch levels would lag behind the increase in stock size, particularly for stocks with large variation in recruitment. For stocks where this could be a problem, this might be accounted for in the HCR by adding a clause saying that the stability criterion should also be suspended in the first year.
after recovering above $B_{\text{trigger}}$. The consequences of this should be simulated to estimate the potential impact of such a rule given the assessment uncertainty. Such a clause is included in the HCRs for northeast Arctic cod, haddock, and saithe.

### Basis of the advice

#### Methods

The MSE for haddock was conducted using the a4a MSE framework ([https://github.com/flr/mse](https://github.com/flr/mse)), as developed by the Joint Research Centre of the European Union (JRC).

A feedback MSE was conducted (i.e. not using a "short-cut" approach to generate assessment error), as described by ICES (2013) and Punt et al. (2016). It was not possible to use the assessment model that ICES would use to conduct annual assessments (following the stock annex) as the estimation model, because it takes too long to converge and requires *ad hoc* adjustments to handle atypical situations. Instead, in this approach, the estimation model (SAM) gives similar results to the assessment model used by ICES for the annual stock assessment (TSA). It is run as an exploratory assessment alongside the annual ICES stock assessment, as detailed in the stock annex, using exactly the same type of data. The approach here also incorporates the same assumptions used for conducting a short-term forecast through the intermediate year to the start of the TAC year. It was not possible to reproduce the forecast procedure exactly for haddock because the forecast is based on deterministic multifleet forecast software that was not possible to include in the management procedure. Instead, the SAM stochastic forecast approach was used, taking the medians to represent the deterministic forecast.

The number of projection years and replicates to use in the MSE were explored for cod, and to a limited extent for autumn-spawning herring (ICES, 2019b). A 20-year projection period was considered long enough for the effects of initial numbers to have largely dissipated by the time the long-term phase had been reached (final 10 years) and median SSB had stabilized. This projection period was adopted for haddock. Current guidelines suggest 1000 replicates should be the default; this was considered adequate and also adopted for haddock. However, it appears that Risk3 (the appropriate measure for precaution following ICES guidelines) was both positively biased and relatively slow to converge. Given that bias in Risk3 is negatively correlated with the number of replicates, the use of Risk3 with 1000 replicates can be considered a conservative approach.

A key part of the MSE is the inclusion of uncertainty. This is introduced through the operating model (OM) by including parameter-estimation error (using e.g. a variance–covariance matrix derived from fitting a model to data), process error (e.g. in recruitment and survival), observation error (when deriving monitoring data), and implementation error (e.g. introduced by the “banking and borrowing” scheme). Such uncertainty is included in a self-consistent manner within each iteration.

Uncertainty can also be introduced by defining alternative OMs, and from the fact that the estimation model in the MP does not have to be the same as the model on which the OM is conditioned. Base case OMs were defined for each stock as the primary focus of the evaluation. These were conditioned on the current ICES assessment. A number of alternative operating models were also used as robustness tests.

Recruitment was modelled by resampling residuals (with replacement) from a stock–recruitment function (e.g. segmented regression), fitted to stock–recruitment pairs from a selected period in the recent past. Any significant autocorrelation was included. A validation check conducted in each case ensures that recruitment generated in the future is consistent with that estimated in the past.

More information can be found in the report of the Workshop on North Sea stocks management strategy (WKNSMSE; ICES, 2019a).

#### Sources and references

[https://www.pelagic-ac.org/media/afbeeldingen/EU_Norway%20agreed%20records%20for%202018.pdf](https://www.pelagic-ac.org/media/afbeeldingen/EU_Norway%20agreed%20records%20for%202018.pdf).


Annex

Copied below is Annex VII of the “Agreed Record of fisheries consultations between Norway and the European Union for 2018”, signed in Bergen on 1 December 2017 (European Union and Norway, 2017).

ANNEX VII

INTER-ANNUAL QUOTA FLEXIBILITY

1. The Inter-annual quota flexibility scheme as described in this Annex is applicable for the quotas of herring, haddock, saithe, plaice and whiting established in this Agreed Record.

2. Each Party may transfer to the following year unutilised quantities of up to 10% of the quota allocated to it. The quantity transferred shall be in addition to the quota allocated to the Party concerned in the following year. This quantity cannot be transferred further to the quotas for subsequent years.

3. Each Party may authorise fishing by its vessels of up to 10% beyond the quota allocated. All quantities fished beyond the allocated quota for one year shall be deducted from the Party’s quota allocated for the following year.

4. Complete catch statistics and quotas for the previous year should be made available to the other Party no later than 1 April in the format as set out below. The Delegations agreed that in order to ensure transparency in the operation of inter-annual quota flexibility, more detailed information on catch utilisation shall be exchanged.

5. The inter-annual quota flexibility scheme should be terminated if the stock is estimated to be under the precautionary biomass level ($B_{pa}$) and the fishing mortality is estimated to be above the precautionary mortality level ($F_{pa}$) the following year, or if the SSB is estimated to be below $B_{pa}$ in two consecutive years.