

Request from the Joint Norwegian-Russian Fisheries Commission to ICES

The Joint Norwegian-Russian Fisheries Commission (JNRFC) has previously agreed to revise the existing harvest control rules for Northeast Arctic cod and haddock and Barents Sea capelin by 2015. In order to provide background information for this revision, JNRFC asks ICES to explore the consequences of the following harvest control rules:

Northeast Arctic cod:

1. The existing harvest control rule, but with $F_{\text{target}}=0.30$ instead of 0.40 and removing the $F \geq 0.30$ constraint
2. The existing harvest control rule ($F_{\text{target}}=0.40$)
3. The existing harvest control rule, but with $F_{\text{target}}=0.50$ instead of 0.40
4. The existing harvest control rule ($F_{\text{target}}=0.40$), but with maximum 20% variation in TAC from year to year
5. The existing harvest control rule ($F_{\text{target}}=0.40$) but with no constraint on maximum variation in TAC from year to year and removing the $F \geq 0.30$ constraint.
6. The existing harvest control rule, but with increased F for high SSBs ($F = F_{\text{target}}=0.40$ for SSB between B_{pa} and $2*B_{\text{pa}}$, then increasing linearly to $F=0.60$ at $\text{SSB}=3*B_{\text{pa}}$, equal to 0.60 for SSB above $3*B_{\text{pa}}$) and with maximum 20% variation in TAC from year to year.
7. The existing harvest control rule, but with increased F for high SSBs ($F = F_{\text{target}}=0.40$ for SSB between B_{pa} and $2*B_{\text{pa}}$, then increasing linearly to $F=0.60$ at $\text{SSB}=3*B_{\text{pa}}$, equal to 0.60 for SSB above $3*B_{\text{pa}}$) and no constraint on maximum variation in TAC from year to year and removing the $F \geq 0.30$ constraint.
8. The existing harvest control rule, but with increased F for high cod SSBs if the capelin stock is low. $F = F_{\text{target}}=0.40$ for SSB between B_{pa} and $2*B_{\text{pa}}$, irrespective of capelin stock size. If the capelin stock is low, then F should be increased linearly from 0.40 at $\text{SSB}=2*B_{\text{pa}}$ to $F=0.60$ at $\text{SSB}=3*B_{\text{pa}}$, and set equal to 0.60 for SSB above $3*B_{\text{pa}}$. Maximum 20% variation in TAC from year to year.
9. The existing harvest control rule, but with increased F for high cod SSBs if the capelin stock is low. $F = F_{\text{target}}=0.40$ for SSB between B_{pa} and $2*B_{\text{pa}}$, irrespective of capelin stock size. If the capelin stock is low, then F should be increased linearly from 0.40 at $\text{SSB}=2*B_{\text{pa}}$ to $F=0.60$ at $\text{SSB}=3*B_{\text{pa}}$, and set equal to 0.60 for SSB above $3*B_{\text{pa}}$ and no constraint on maximum variation in TAC from year to year and removing the $F \geq 0.30$ constraint.
10. The existing harvest control rule, but with increased F for high SSBs (F increasing linearly from $F_{\text{target}}=0.40$ for $\text{SSB}=B_{\text{pa}}$ to 0.60 at $\text{SSB}=5*B_{\text{pa}}$, equal to 0.60 for SSB above $5*B_{\text{pa}}$), no constraint on maximum variation in TAC from year to year and removing the $F \geq 0.30$ constraint.

This gives a total of 10 different rules to be explored, one of which is the existing harvest control rule.

In cases 1-9 the following conditions should apply in the harvest control rule:

*TAC for the quota year will be set to the average TAC level for the coming 3 years based on F_{target} .
if the spawning stock in the quota year falls below B_{pa} , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from F_{target} at B_{pa} , to $F=0$ at SSB equal to zero. At SSB-levels below B_{pa} in any of the operational years (quota year, the year before and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.*

In case 10 the following conditions should apply in the harvest control rule:

*TAC for the quota year will be set to the average TAC level for the coming 2 years based on F_{target} .
If the spawning stock in the quota year falls below B_{pa} , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from F_{target} at B_{pa} , to $F=0$ at SSB equal to zero.*

In cases 8 and 9, the capelin stock will be considered as low when the total stock is below 1 million tonnes and the immature stock is below 500 thousand tonnes. The quota advice for cod would initially be given based on $F = F_{target} = 0.40$, for all cod SSB values exceeding B_{pa} , when the cod assessment is carried out. Then the possible adjustment in F related to capelin stock size would be applied after the capelin stock assessment has been carried out.

Northeast Arctic haddock

1. The existing harvest control rule, but with $F_{target} = 0.27$ instead of 0.35
2. The existing harvest control rule
3. The existing harvest control rule, but with $F_{target} = 0.43$ instead of 0.35
4. The existing harvest control rule, but with a constraint of maximum 10% TAC variation from year to year instead of a 25% constraint which is presently used
5. The existing harvest control rule, but with no constraint of maximum TAC variation from year to year
6. The existing harvest control rule, but without limitation +25%

This gives a total of 6 different rules to be explored, one of which is the existing harvest control rule.

In all cases the following condition should apply in the harvest control rule:

if the spawning stock in the quota year falls below B_{pa} , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from F_{target} at B_{pa} , to $F=0$ at SSB equal to zero. At SSB-levels below B_{pa} in any of the operational years (quota year and the year before) there should be no limitations on the year-to-year variations in TAC.

Barents Sea capelin

The existing harvest control rule with varying probabilities for the spawning stock biomass to be above 200 thousand tonnes (i.e. 80, 85, 90 or 95 %). This gives a total of 4 different rules to be explored, one of which corresponds to the existing harvest control rule.

The effect of each of the harvest control rules for cod stated above on the capelin yield should be explored.

For all stocks, information about yield, variability, risk levels, stock levels and size/age composition of catch and stock in a short, medium and long term perspective should be provided.