ICES MSY Framework

NEAFC November 2010
MSY concept

- Example: Northeast Arctic cod

Fig. 15. Average catch for 2026-2105 as a function of fishing mortality for different cannibalism functions

Kovalev, Y.A. and Bogstad, B. 2005
ICES Demersal stocks
15-year running means

Yield or SSB in million t

Fishing mortality

0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 0.80

0 1 2 3 4 5 6


Yield
SSB
F

ICES 2009
Background – Based on UNCLOS

1995 UN Fish stock Agreement

1998 ICES PA approach

2002 WSSD rebuild fisheries to MSY by 2015

2006 EC MSY Policy

2009 – ICES MSY framework

Evolution continues
Background

1998 – ICES PA approach

Avoid recruitment impairment

2009 – ICES MSY framework

Getting most out of the stocks

MSY sufficient for PA

PA necessary but not sufficient for MSY
ICES MSY Framework

- Conceptual – not linked to a particular model
- Production function with an optimum
- We model this production function using several different approaches
- We advise based on stock specific knowledge and broad experience
- MSY estimates are never global but are conditional (on selectivity, growth, ...)
ICES MSY Harvest Control Rule (HCR)

Set $F_{MSY}$ and MSY $B_{trigger}$ Ref. Points

Assess current SSB in relation to MSY $B_{trigger}$
MSY Framework Ref. Points

Based on an $F_{\text{MSY}}$ and a biomass safeguard against low spawning stock biomass

$F_{\text{MSY}}$ is the fishing mortality that in the long-term will maximize yield

$\text{MSY } B_{\text{trigger}}$ is a biomass reference point that triggers a cautious response: “A cautious biomass triggering action to maintain a stock within a desirable stock size range”

$B_{\text{MSY}}$ is not explicitly a reference point
Reference points:

$F_{MSY}$ proxies

$Y/R$ ($F_{max}$, $F_{35\%}$, $F_{0.1}$, $M$, ....)

Modified by

1) Intra-species interaction (Cannibalism, growth)

2) Environmental drivers (Recruitment)

3) Species interaction (Growth – Mortality)
Reference points:

**MSY** $B_{\text{trigger}}$

Low percentile on expected observed SSB range when fishing at $F_{MSY}$

Accounting for

1) Natural variability: Recruitment – Growth – Mortality
2) Observation / implementation error

For **2011**: mainly $B_{pa}$ (if available)
What to do for:

Data Rich situations

Long lived species (F and SSB estimates and projections)

MSY Framework

1) MSY ICES HCR
2) MSY Transition scheme
MSY Transition

Moving from Current F to MSY in 2015

In 5 steps

2011: \( (F(2010) \times 0.8 + F_{MSY} \times 0.2) \)

2012: \( (F(2011) \times 0.6 + F_{MSY} \times 0.4) \)

2013: \( (F(2012) \times 0.4 + F_{MSY} \times 0.6) \)

2014: \( (F(2013) \times 0.2 + F_{MSY} \times 0.8) \)

2015: \( (F(2014) \times 0.0 + F_{MSY} \times 1.0) \rightarrow F_{MSY} \)
What to do for:

Data Rich situations

Short lived species

Escapement strategy (assure minimum SSB)

\[ \text{Escapement SSB} = B_{\text{MSY}} \]

1. Preliminary TAC (well below expected fishing possibilities)
2. In-year assessment: typically through a survey (acoustic)
3. Adjust TAC based on in-year information assuring that SSB (surviving stock) is above a pre-defined level
What to do for:

Stocks without projection

No projection of the stock status and fisheries performance

Stable stock: not an indication of fishing at MSY

Look for

1. stock trend indicators: cpue (Commercial), cpue (R/V)
2. Exploitation pressure (e.g. catch curve, effort trend)
3. MSY references (e.g. based on longevity)
## Catch options
### Stocks without projection

<table>
<thead>
<tr>
<th></th>
<th>No Overfishing</th>
<th>Overfishing or Unknown Exploitation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decreasing stock trend</strong></td>
<td>Reduce catch from recent level at rate of stock decrease</td>
<td>Reduce catch from recent level at rate greater than the rate of stock decrease</td>
</tr>
<tr>
<td><strong>Stable stock trend</strong></td>
<td>Maintain catch at recent level</td>
<td>Reduce catch from recent level</td>
</tr>
<tr>
<td><strong>Increasing stock trend</strong></td>
<td>Increase catch from recent level at rate of stock increase</td>
<td>Maintain catch at recent level</td>
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</table>
Stocks without projection

ICES Advice October 2010:


• Fishing mortality based rules perform poorly.

• Stock abundance based rules better.
What to do for:

Stocks with no stock indicator

Usualy only catch statistics available

If Effort statistics available see previous slide

Acknowledged that no information is available and provide ‘No advice’.
Thank you!