

# The MSY Framework and The ecosystem approach

**BSRAC general Assembly**

**11 May 2010**

## 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**

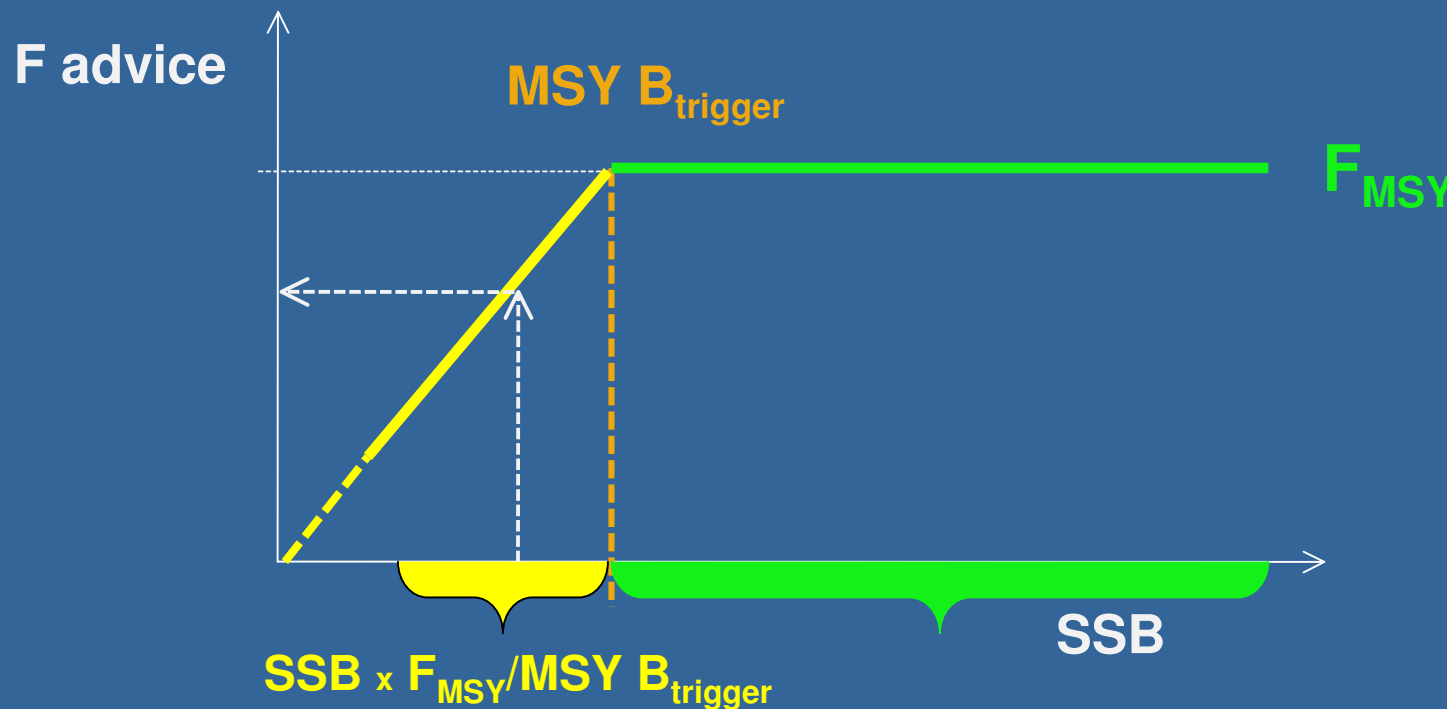
## **ICES MSY Framework**

- **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  $F_{MSY}$  and a biomass safeguard against low spawning stock biomass

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

**MSY  $B_{trigger}$**  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”

$B_{MSY}$  is not explicitly a reference point

## Reference points - $F_{MSY}$

$F_{MSY}$  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: $MSY$ $B_{trigger}$

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

### Accounting for

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

For **2011**: use  $B_{pa}$  (if available)

## **Is the MSY approach a step backwards if we want to move to an ecosystem approach?**

**YES , if it is all we do**

- Based on a single species approach**
- Ignores species interactions and ecosystem impacts of fisheries**

**NO on the contrary, if we use it as one measure among others**

- MSY as one component in an overall ecosystem approach**

## **A cross-sectoral approach is required**

**An ecosystem approach cannot be implemented through one sector policy**

**Different sector policies must all contribute to a cross-sectoral ecosystem approach to marine management**

**The issue is therefore not an ecosystem approach to fisheries (EAF) but the contribution of the fisheries policy to an ecosystem approach to marine management (EAMM)**

**Benefits to fisheries as EAMM addresses the interaction both ways:**

**The impacts OF fisheries on marine ecosystems**

**The impact ON fisheries from other sectors – pollution, mineral extraction etc**

**The Marine Strategy Framework Directive is the cross-sectoral ecosystem approach in the EU – good environmental status by 2020**

## Good Environmental Status Descriptors in MSFD

- (1) **Biological diversity** is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.
- (2) **Non-indigenous species** introduced by human activities are at levels that do not adversely alter the ecosystems.
- (3) Populations of all **commercially exploited fish and shellfish** are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
- (4) All elements of the marine **food webs**, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive Capacity.
- (5) Human-induced **eutrophication** is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.
- (6) **Sea-floor integrity** is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.
- (7) Permanent alteration of **hydrographical conditions** does not adversely affect marine ecosystems.
- (8) Concentrations of **contaminants** are at levels not giving rise to pollution effects.
- (9) **Contaminants in fish and other seafood for human consumption** do not exceed levels established by Community legislation or other relevant standards.
- (10) Properties and quantities of **marine litter** do not cause harm to the coastal and marine environment.
- (11) Introduction of **energy, including underwater noise**, is at levels that do not adversely affect the marine environment.

## Descriptors with important fisheries impacts

1. **Biological diversity** is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.
3. Populations of all **commercially exploited fish and shellfish** are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
4. All elements of the marine **food webs**, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive Capacity.
6. **Sea-floor integrity** is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

# 1. Biodiversity

**Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.**

ATTRIBUTE	Criteria to assess the descriptor	Indicators to be measured
Species state	Species distribution  Population size  Population condition	Range  Pattern  Abundance and/or biomass  Demographic characteristics  Genetic structure
Habitat state	Distribution  Extent  Condition	Range  Pattern  Area (volume)  Condition of typical species  Relative abundance/biomass  Physical, hydrological, chemical composition
Ecosystem state	Ecosystem structure	Condition and relative proportion of habitats and species

## 3. Commercially exploited fish and shellfish populations

Populations of all **commercially exploited fish and shellfish** are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

ATTRIBUTE	Criteria to assess the descriptor	Indicators to be measured
Sustainability of exploitation	Exploitation sustainable consistent with high long-term yield	Fishing mortality (F equal to or lower than FMSY) If F not available: ratio catch/biomass
Reproductive capacity	Reproductive capacity should not be compromised	Spawning stock biomass or biomass indices
Age and stock composition	Enough older/larger fish to ensure stock resilience	Proportion of fish larger than size of first maturity Mean maximum length across all species found in research vessel surveys 95% percentile of fish length distribution observed in research vessel surveys Secondary: size at first sexual maturity

## 4. Food webs

All elements of the marine **food webs**, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive Capacity.

ATTRIBUTE	Criteria to assess the descriptor	Indicators to be measured
Energy flow in food webs	Productivity of key species or groups	Performance of key predator species (production/biomass)
Structure of food webs	Proportion of selected species at the top of food webs Abundance of key groups/species	Proportion of large fish  Abundance of functionally important groups/species -Early warning indicators/fast turnover -Affected by human activities -Habitat defining -Top of food web -Migratory -Species tightly linked to species at other trophic level

## 6. Sea floor integrity

**Sea-floor integrity** is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

<b>ATTRIBUTE</b>	<b>Criteria</b> to assess the descriptor	<b>Indicators</b> to be measured
Physical damage having regard to substrate characteristics	Biogenic substate impact  Overall impact	Type, abundance and areal extent of biogenic substrate  Extent of seabed affected by human activities for different substrate types
Condition of benthic community		Presence of particularly sensitive or tolerant species  Indexes assessing bentic community function and functionality (diversity, richness, proportion of opportunistic or sensitive species)

## **Is a move to approach a step backwards for an ecosystem approach?**

**Present situation: Fishing mortality 2-3 times FMSY for many stocks**

**This means that there are excessively high pressures on marine ecosystems – habitat impacts, bycatches etc**

**Member States have subscribed to a MSY by 2015 target**

**Reducing Fishing mortality is IN THE PRESENT SITUATION the most significant step one can take to reduce ecosystem impacts (bycatches, habitat impact – descriptor 1,4,6)**

**In parallel to that efforts must be made to reduce bycatches and habitat impacts (MSFD descriptor 1,4 and 6)**

**MSY by 2015 is a first step only which in itself does not address all aspects of an ecosystem approach – beyond 2015 further steps are required (MSFD descriptor 1,4 and 6)**

**MSY is a necessary but not sufficient element in an ecosystem approach**

## Is a move to MSY an economic threat to the industry?

**YES, if a large step is made in one year undermining the short term viability of some fleets**

**No, on the contrary. Once at MSY there will be better fishing opportunities which may be taken with lower costs. Economically one would even go below  $F_{MSY}$**

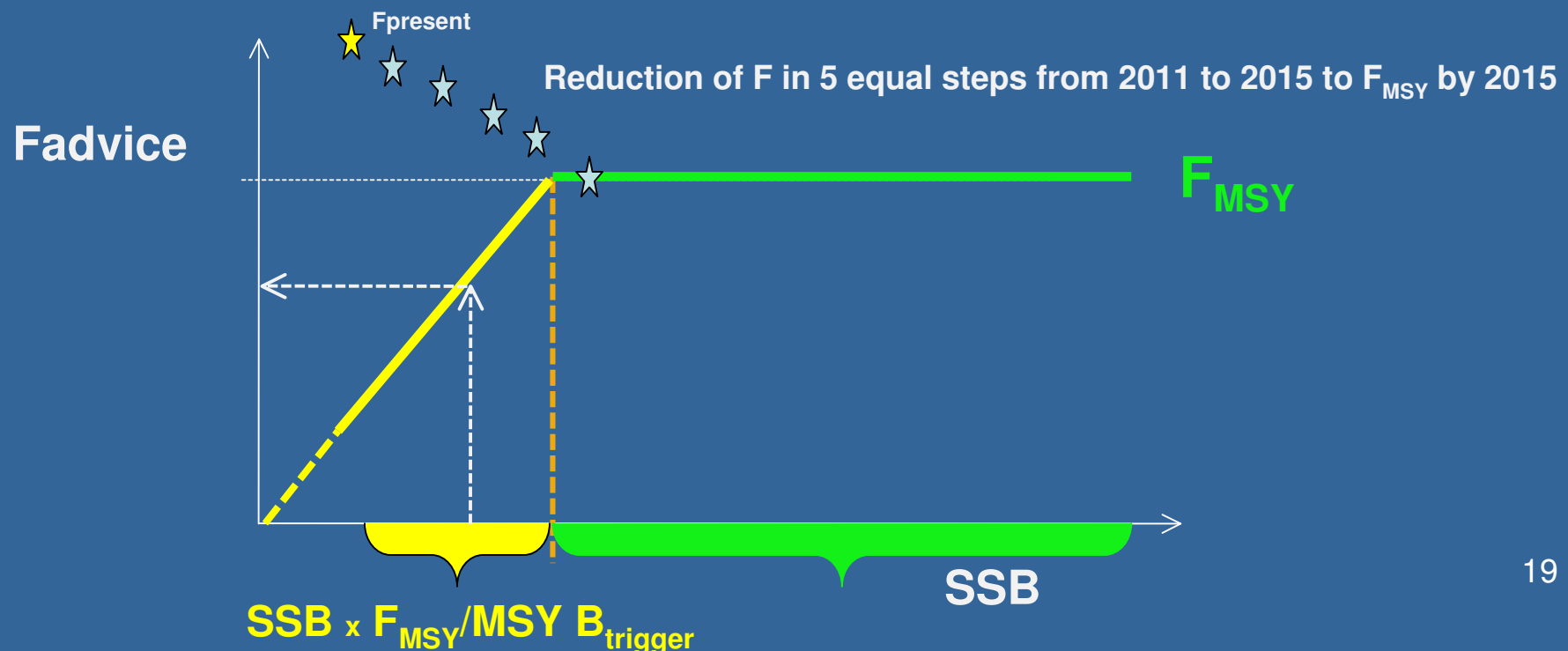
**The challenge is to make a transition which ensures that we get there while maintaining economic opportunities**

## ICES MSY Harvest Control Rule (HCR) - Transition

WSSD 2002: Move to MSY at the latest by 2015

EU implementation: fish at  $F_{MSY}$  at the latest by 2015

$B_{MSY}$  is not a target initially, will emerge when ecosystem adapts to reduced fishing pressure



## Advice for 2011?

ICES clients have given mixed messages – they want both the MSY advice and advice on basis of the pa framework and management plans

ICES approach – make these **policy choices** explicit

Management objective	Catch in 2011
Transition to an MSY-based approach with caution at low stock size (i.e. $F_{MSY-HCR-transition}$ (2011))	Less than 16.8 kt
Cautiously avoid impaired recruitment (i.e. PA)	n/a (greater than 50% increase in exploitation rate)
Cautiously avoid impaired recruitment and achieve other objective(s) of a management plan that is precautionary (e.g. catch stability)	Less than 13.2 kt  (Celtic Sea Herring example)

## Process and next steps

Consultations with clients – spring 2010

Advice Drafting Group MSY 3-4 May

Advice for 2011 will include options according to the MSY framework – but will also include options according to former framework and management plans

Interactions with RACs on advice presentation meetings

Experiences will be basis for approach in 2011

**Thank you!**