# IOTC
## Management Procedures Dialogue Workshop

Objectives for management as provided in guidelines in IOTC Resolution 13/10, a view for the future

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# Management objectives shared at international levels

## *Towards the MSY approach*

Maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield.

***Management objective expressed, i.a.***

- *already in the 1958 Geneva Convention on Fishing and Conservation of Living Resources of the High Seas*

  *cf. Art. 2: the expression "conservation of the living resources of the high seas" means the aggregate of the measures rendering possible the optimum sustainable yield from those resources*

- *under article 61 the United Nation Convention of the Law of the Sea (UNCLOS, 1982)*
- *in the Johannesburg Declaration of the World Summit on Sustainable Development (WSSD, 2002)*

# Management objectives shared at international levels

## *Towards the Precautionary approach*

Protect aquatic resources and preserve the aquatic environment and maintain harvested fish stock within safe biological limits.

***Management objective expressed, i.a.***

- *in the United Nations Conference in Environment and Development (UNCED, 1992)*
- *in the United Nations Straddling Fish Stocks Agreement (UNSFA, 1995)*
- *in the FAO Code of Conduct for Responsible Fisheries (1995)*

# Assessing current or future management frameworks against management objectives

## *A need for specific descriptors and indicators*

## ***MSY and Precautionary approaches***

- *Indicators to monitor the "fishing pressure"*
  - Fishing capacity:
    expressed as *i.a.* a number of fishing vessels, kW, GT,…
  - Fishing effort:
    noted E or f and expressed as *i.a.* a number of kW.days, GT.days,…
  - Fishing mortality rate
    Noted F
  - Catches

# Assessing current or future management frameworks against management objectives

***A need for specific descriptors and indicators***

***<u>MSY and Precautionary approaches</u>***

- *Indicators to monitor the Biomass*
  - total Biomass:
    noted B
  - Spawning Stock Biomass:
    noted SSB or $B_f$
- *Indicators to monitor the Recruitment*
- *Synoptic indicators*
  - Catches Per Unit of Effort

# Assessing current or future management frameworks against management objectives

***Fixing specific metrics related to the management objectives and strategies***

***Biological Reference Points*** *considered as targets:*

***Target Reference Points - TRPs***

- *Values of the selected indicators translating management objectives to be achieved*
- *IOTC Resolution 13/10 fixes two specific TRPs,*

  $B_{MSY}$ *and* $F_{MSY}$

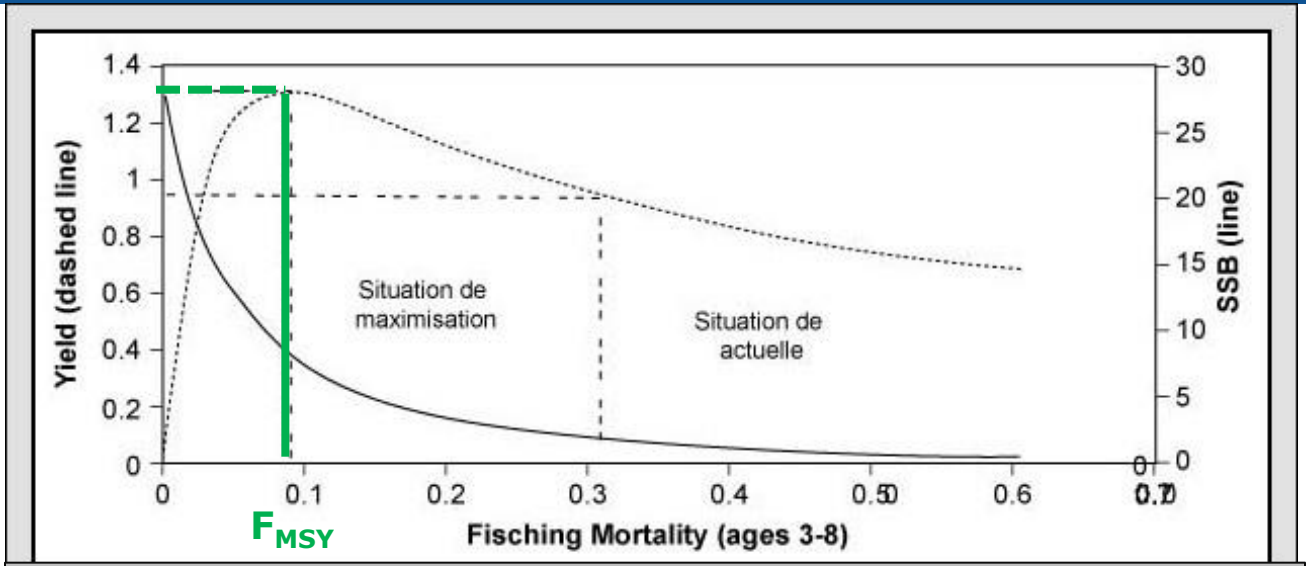
# Assessing current or future management frameworks against management objectives

***$B_{MSY}$*** *and* ***$F_{MSY}$,*** *as* ***TRPs****, correspond to* ***optimal situations*** *where the biomass level and the exploitation pattern contribute, on the long term, either*

- *to the* ***maximum sustainable yield*** *or*
- *to the* ***maximum yield per recruit****,*

*depending also on the type of mathematical models used for the assessment.*

# Assessing current or future management frameworks against management objectives




**Yield per Recruit (kg) as a function of the fishing mortality**

**Results of the assessment of the Celtic Sea Monkfish stock (*Lophius piscatorius*)**

***Source:*** **Gascuel et al., 2006;** *Dynamique des populations marines exploitées*, ENVAM, Rennes, 263 pp.

# Assessing current or future management frameworks against management objectives

***Fixing specific metrics related to the management objectives and strategies***

***Biological Reference Points*** *considered as absolute thresholds:*

***Limit Reference Points – LRPs***

- *matching with specific values of the selected indicators which shouldn't be exceeded*
- *IOTC Resolution 13/10 establishes* ***two LRPs*** *with associated* ***interim values***

$B_{LIM}$ *and* $F_{LIM}$

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# Assessing current or future management frameworks against management objectives

***$B_{LIM}$*** *and* ***$F_{LIM}$*** *values match situations where,* ***if exceeded****, the* ***stock renewal will be dramatically affected****, will become erratic or completely unknown.*

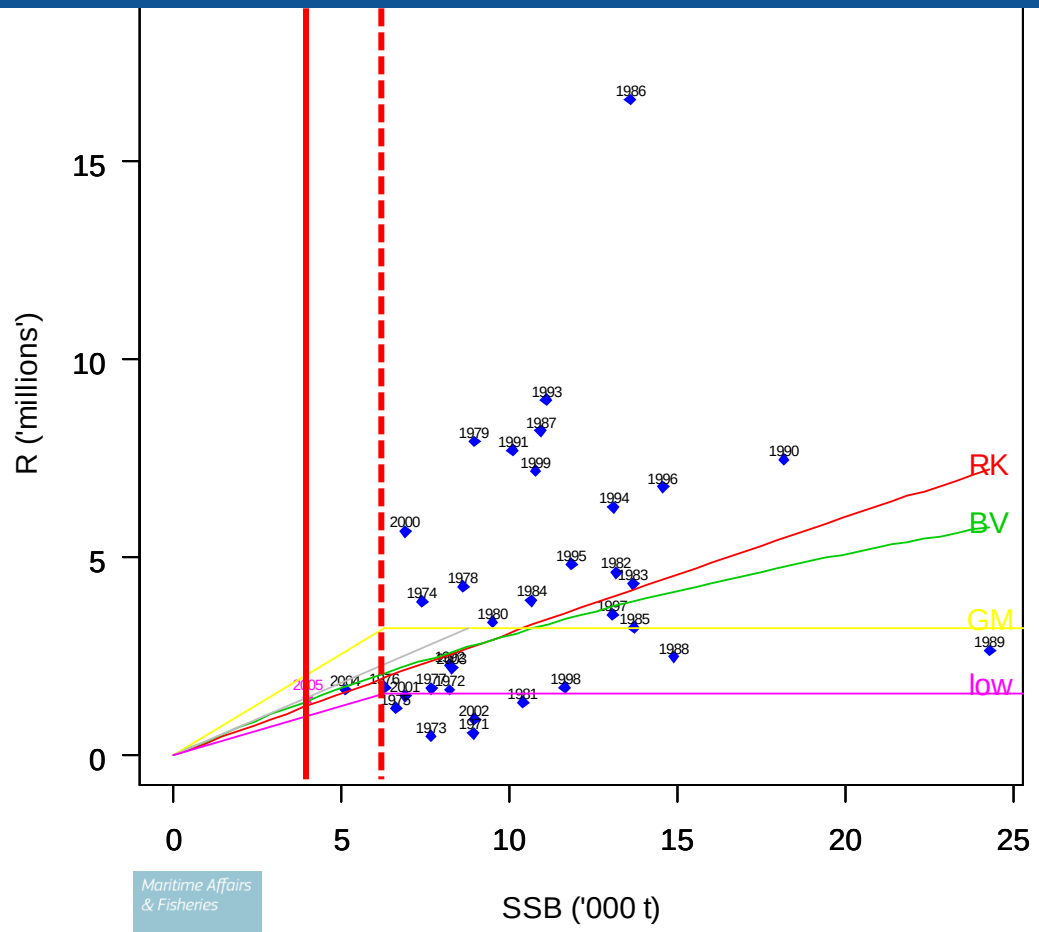
***LRPs values*** *are* ***often derived from relationships*** *observed between the* ***Biomass*** *and the* ***Recruitment*** *levels, e.g.*

- *the smallest spawning biomass observed in the series of annual values of the spawning biomass.*
- *a very high value of F, showing a great probability of collapse of the fishery*
  - very low level of SSB and
  - recruitment dramatically jeopardized

# Assessing current or future management frameworks against management objectives

***Celtic Sea Cod***
***Stock-Recruitement relationship simulations***

*from Alain Biseau, Ifremer*

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# Assessing current or future management frameworks against management objectives

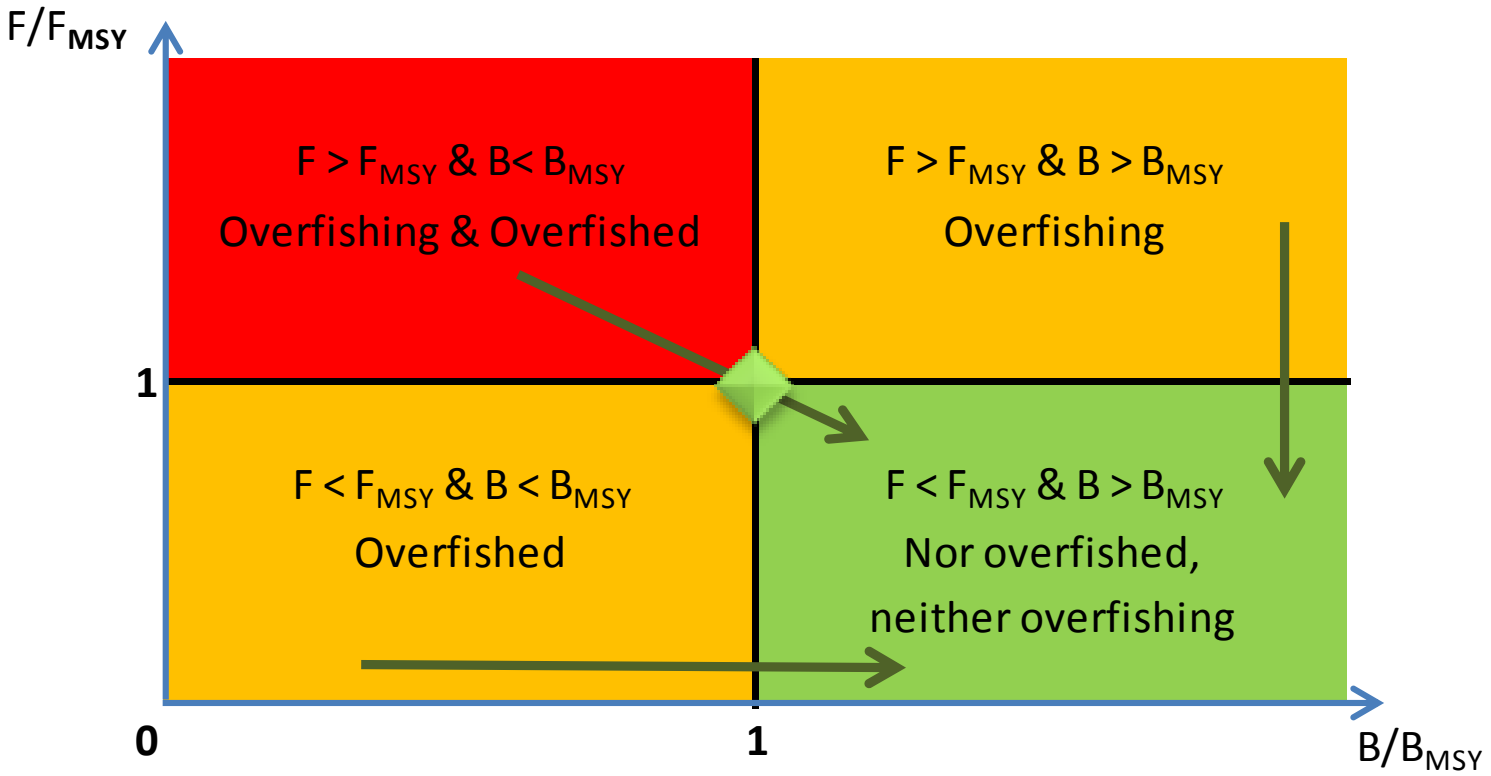
- *TRPs and LRPs, associated to interim values, have been adopted for several IOTC stocks through the IOTC Resolution 13/10*
  - $B_{MSY}$ and refers to the biomass level for the stock that would produce the Maximum Sustainable Yield;
  - $F_{MSY}$ refers to the level of fishing mortality that produces the Maximum Sustainable Yield.

| Stock | Traget Reference Points | Interim Limit Reference Point |
|---|---|---|
| Albacore | $B_{MSY}$ | $B_{LIM} = 0{,}40.B_{MSY}$ |
| | $F_{MSY}$ | $F_{LIM} = 1{,}40.F_{MSY}$ |
| Bigeye tuna | $B_{MSY}$ | $B_{LIM} = 0{,}50.B_{MSY}$ |
| | $F_{MSY}$ | $F_{LIM} = 1{,}30.F_{MSY}$ |
| Skipjack tuna | $B_{MSY}$ | $B_{LIM} = 0{,}40.B_{MSY}$ |
| | $F_{MSY}$ | $F_{LIM} = 1{,}50.F_{MSY}$ |
| Yellowfin tuna | $B_{MSY}$ | $B_{LIM} = 0{,}40.B_{MSY}$ |
| | $F_{MSY}$ | $F_{LIM} = 1{,}40.F_{MSY}$ |
| Swordfish | $B_{MSY}$ | $B_{LIM} = 0{,}40.B_{MSY}$ |
| | $F_{MSY}$ | $F_{LIM} = 1{,}40.F_{MSY}$ |

# Assessing current or future management frameworks against management objectives

- *IOTC Resolution 13/10 also specifies that*
  - for stocks which assessed status will match with the lower right (green) quadrant of the Kobe Plot, aim at maintaining the stocks in a high probability within this quadrant;
  - for stocks which assessed status will match with the upper right (orange) quadrant of the Kobe Plot, aim at ending overfishing with a high probability in as short a period as possible;
  - for stocks which assessed status will match with the lower left (yellow) quadrant of the Kobe plot, aim at rebuilding these stocks in as short a period as possible;
  - for stocks which assessed status will match with the upper left quadrant (red), aim at ending overfishing with a high probability and at rebuilding the biomass of these stocks in as short a period as possible.

# Assessing current or future management frameworks against management objectives




Structure of the Kobe plot usually applied in the IOTC

# Implementing management objectives: a question of timeline

## *A first question:*

**"In as a short a period as possible"or how to consider the time schedule fixed to achieve management objectives ?**

- ***2015*** *was mentioned in the WSSD in 2002 as the deadline related to objectives deriving from the MSY approach*
- ***2020*** *seems to be now taken as the new deadline to restore fish stocks at levels allowing MSY, e.g.*
  - the new EU Common Fisheries Policy (CFP), which fixes the deadline in 2015 where possible and 2020 at the latest.
- *Other deadlines or time lines may also be specified, e.g.*
  - stock at MSY levels in the place of the following 10 or 20 years,…

# Implementing management objectives: a question of acceptable risks

## *A second question:*

**"In a high probability" or how to consider Level of Risks associated either to TRPs or LRPs ?**

*If consider as **TRPs**, it may be considered that*

*the **probability** of being **at around the $B_{MSY}$ and $F_{MSY}$** by **the term agreed** trough the management framework might be fixed at around 50 %, i.e.*

- $p(B_{at\ and\ after\ the\ fixed\ term} \geq B_{LIM})$ # 50 %
- $p(F_{at\ and\ after\ the\ fixed\ term} \leq F_{LIM})$ # 50 %

# Implementing management objectives: a question of acceptable risks

***A second question:***

**"In a high probability" or how to consider Level of Risks associated either to TRPs or LRPs ?**

*As matter of principle, due to the nature of the* ***absolute thresholds****, it may be considered that*

*the* ***risk of exceeding Limit Reference Points*** *should be absolutely avoided, i.e.*

- ***Probability*** *of* $B < B_{LIM}$ *and of* $F > F_{LIM}$ *to be maintained* ***at a low or very low level***

# Implementing management objectives: a question of acceptable risks

## *Typology of level of risks and associated probabilities of exceeding LRPs to be possibly used as guidance of the decision making process*

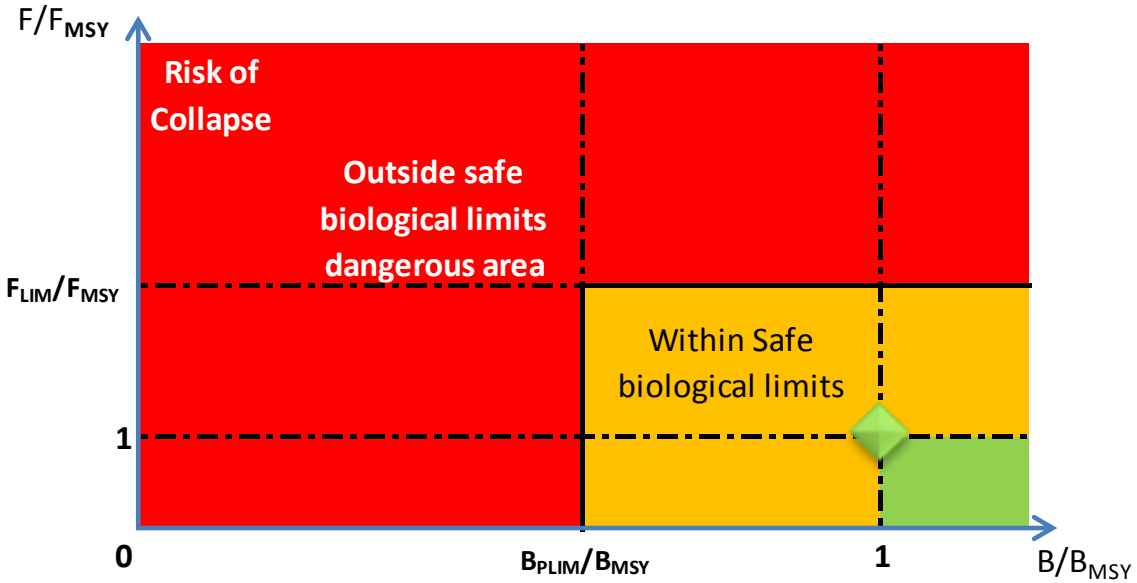
***derived from the draft table defining risk tolerance designation made available in documentation of Fisheries and Oceans - Canada***

| Probability of exceeding LRPs | Level of Risk | Associated probabilities |
|---|---|---|
| $p(B < B_{LIM})$ $p(F > F_{LIM})$ | Very Low | $p < 5\,\%$ |
| | Low | $5\,\% \leq p < 25\,\%$ |
| | Moderate | $25\,\% \leq p < 50\,\%$ |
| | Neutral | $p = 50\,\%$ |
| | Moderately High | $50\,\% < p \leq 75\,\%$ |
| | High | $75\,\% < p \leq 95\,\%$ |
| | Very High | $p > 95\,\%$ |

# Advice and recommendations based on TRPs or LRPs: a question of presentation

*Taking into account TRPs and LRPs might also imply*

- *modifications on how to introduce scientific advice on stock status, e.g. through Kobe plots*




Possible new structure of the Kobe plot

# Advice and recommendations based on TRPs or LRPs: a question of presentation

*Taking into account TRPs and LRPs might also imply*

- *modifications on how to introduce management recommandations,*
  - e.g. through Kobe matrices, by possibly taking into account the following probabilities
    - **$p(B \geq B_{MSY} \ \& \ F \leq F_{MSY})$**, and
    - **$p(B < B_{LIM} \ \& \ F > F_{LIM})$**

# One remaining question: TRPs or LRPs, how to Consider $B_{MSY}$ and $F_{MSY}$ ?

***UNFSA provides some guidance on how to consider both $B_{MSY}$ and $F_{MSY}$:***

*The fishing mortality rate which generates Maximum Sustainable yield ($F_{MSY}$) should be regarded as:*

*a minimum standard for a **Limit Reference Point**.*

- **For stocks which are not overfished**, fishery management strategies shall ensure that
  - Fishing mortality **does not exceed** that which corresponds to Maximum Sustainable Yield,
  - the Biomass **does not fall below** a predifined threshold
- **For overfished stocks**, the Biomass which would produce Maximum Sustainable Yield ($B_{MSY}$) can serve as a rebuilding target.

# One remaining question: TRPs or LRPs, How to Consider $B_{MSY}$ and $F_{MSY}$ ?

***Status of $B_{MSY}$ and $F_{MSY}$ as TRPs or LRPs might also appear as not so explicit, even in the IOTC context***

- *Resolution 13/10 specifies that management measures shall be designed to result in a high probability of*
  - ending overfishing and rebuilding fish stocks in as a short period as possible
  - maintaining stocks in the green quadrant of the Kobe plot.
- *By considering that fish stocks should be*
  - rebuilt at levels of Biomass **over $B_{MSY}$**
  - Haversted at levels corresponding to fishing mortality rates **below $F_{MSY}$**
- *Conclusion might be that*
  - **$B_{MSY}$ and $F_{MSY}$** might be considered **as LRPs**
  - **and not as TRPs**

# One remaining question: TRPs or LRPs, How to Consider $B_{MSY}$ and $F_{MSY}$ ?

*Considering **LRPs as absolute thresholds** might also lead to define* additional ***Biological Reference Points*** *considered as precautionary thresholds*

- *matching with specific values of the selected indicators, and*
- *triggering specific actions when approached*
  - e.g. $B_{PA}$, $F_{PA}$

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# One remaining question: TRPs or LRPs, How to Consider $B_{MSY}$ and $F_{MSY}$ ?

***Precautionary thresholds*** *are adopted* ***to establish a buffer*** *aiming at* ***preventing any situation*** *where the selected indicator would* ***exceed the Limit Reference Points****.*

*Values adopted for* ***$B_{PA}$*** *and* ***$F_{PA}$*** *consequently* ***derives from $B_{LIM}$ and $F_{LIM}$*** *estimates and* ***take account of uncertainties*** *associated to the mathematical models and to the assumptions supporting the use of these models.*

# One remaining question: TRPs or LRPs, How to Consider $B_{MSY}$ and $F_{MSY}$ ?

IOTC Resolution 13/10 finally specifies that

the **IOTC Scientific Committee** shall **assess**, as soon as possible and more particularly **through the Management Strategy Evaluation** process (MSE) process, the robustness and the performance of

- the **interim reference points** […] and
- **other reference points**

based on the **guidelines of International agreements** taking into account:

- the **nature of these reference points** – target or limits,
- the best scientific knowledge on population dynamics and on life-history parameters,
- the fisheries exploiting them, and
- the **various sources uncertainty**.

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# Possible future questions for future meetings of the Dialogue Working Group ?

*Before designing possible new and more efficient management frameworks, strategies or measures, several questions might have to be further discussed, particularly:*

- *Which Biological Reference Points should be taken as TRPs to express in metrics specific management objectives to be achieved ?*
- *Which supporting information should be used to fixed the LRPs ?*
- *How to fix precautionary buffers which should reflect uncertainties attached to the assessment of LRPs ?*
- *Would have 2020 to be considered as the generic and explicit deadline, suffering or not possible exceptions, to achieve agreed mangement objectives ?*
- *What would be the acceptable level of risks of exceeding either precautionary and "absolute" LRPs ?*
- *Which probability ceiling should be associated to the accepted level of risk ?*