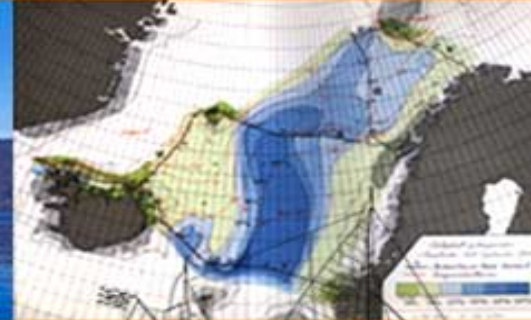
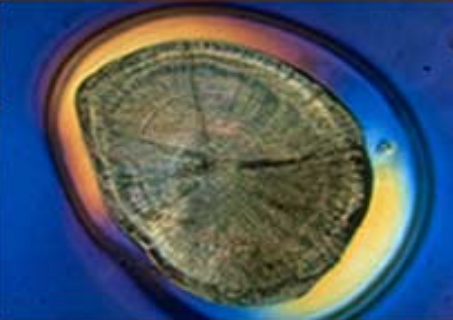
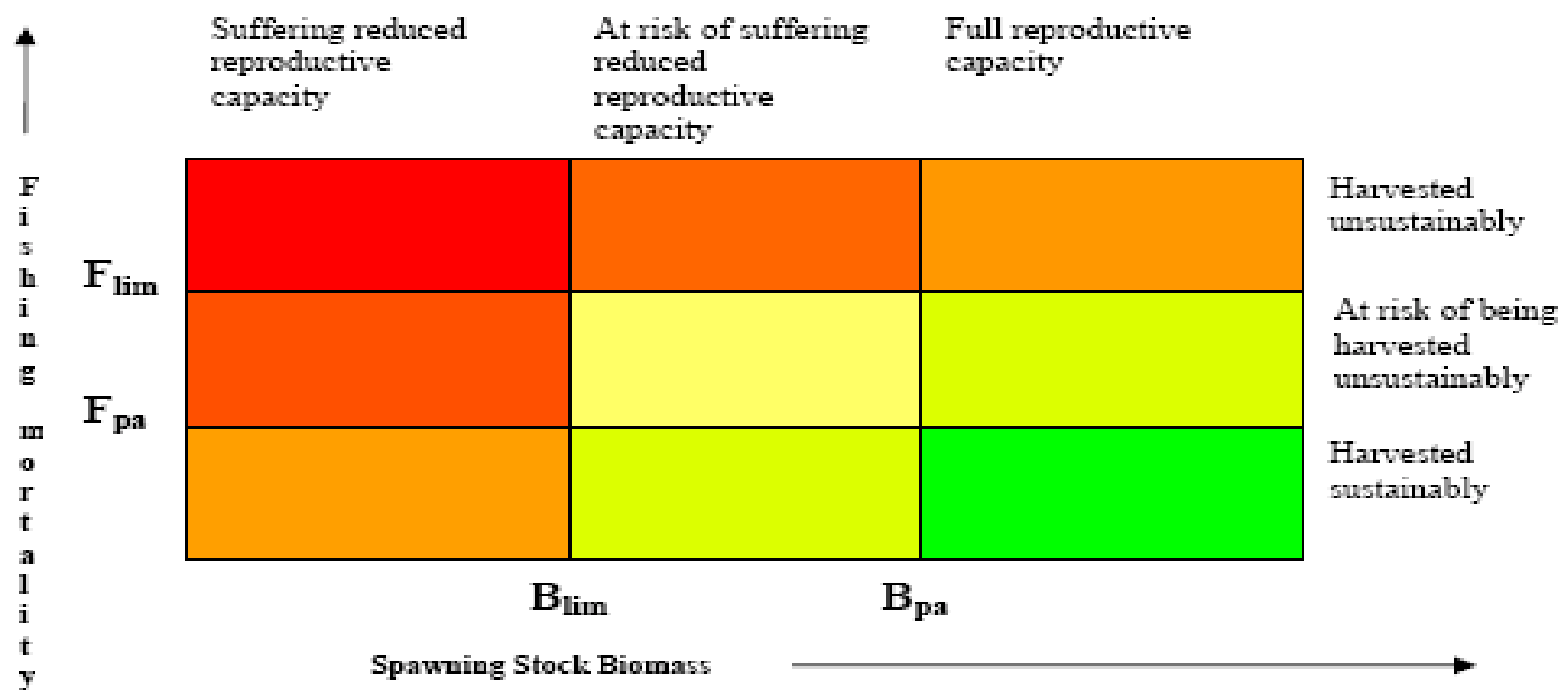




INSTITUTE OF MARINE RESEARCH



**K. H. Hauge, K.N. Nielsen, K. Korsbrette**  
Precautionary Reference Points and  
Ambiguous Uncertainty



# What is the danger to be avoided?

- *Impaired recruitment, serious decline in recruitment, hampered recruitment, reproduction failure, stock depletion*
- *Collapse*
- ICES: The meaning of collapse is ... severely reduced productivity. Collapse does not mean that a stock is at high risk of biological extinction. However, recovery to an improved status is likely to be slow, and will depend on effective conservation measures.
- Reversible danger.
- SSB a proxy for future recruitment or catch.

# Blim (ICES 2005)

- Lowest observed spawning stock biomass (Bloss)
- Based on SSB-R relationship
  - Statistical procedure
  - Judgment
- Derived by Bpa (the “magic formula”)
- Not defined

# Flim (ICES 2005)

Differs with respect to:

- Whether it is based on Blim,
- Kind of data is used,
- Based on judgment,
- Based on Fpa (“magic formula”)
- Not defined

# Fpa and Bpa

- Calculated (e.g. the “magic formula”), simulated or judgment
- Uncertainty: estimate or prediction
  - Also *how* to take uncertainty into account and *what*
  - Historic average or year-to-year uncertainty
  - Based on no uncertainty considerations
  - Not defined

# PA framework

- Unwanted state: inconsistent and unclear
- Inconsistency in limit reference points
- Inconsistency in uncertainty considerations in PA points
- Double uncertainty perspective: “The risk of risking impaired recruitment”. What is the accepted level of what risk?

# Simplicity in PA Framework

- Hides inconsistencies in defining problem and methods used,
- Mixes estimate and prediction uncertainties,
- Bpa: *The risk of risking impaired recruitment,*
- Produces expectations that the class of “Blim” or “Fpa” is the same and
- Produces expectations of a clear-cut border between science and management
- Standardization produces other kinds of uncertainties.

# Is more transparency possible within the ICES PA framework regarding:

- Communication of uncertainties?
- A clear-cut border between management and science?

# Yes!

- More consistency is possible on the use of
  - Terms,
  - Methods and
  - Uncertainties included,
- Add presentations of uncertainties in introduction to ICES advice.
- “Accepted risk”

# No!

- There are no distinct thresholds in nature,
- Even with no uncertainty in stock estimates, the future productivity, the basis for future fisheries, would still be unknown.
- Science problem not well defined so that exact percentages of risk are not “real”.
- Data and knowledge basis will vary,
- Stock dynamics will vary,
- The prediction uncertainty (and the quality of advice) will depend on how the advice is received and implemented.

# Conclusion

*The transparency dilemma of the PA Framework  
and state predictions :*

- A simple framework, but too simple to handle complexities or
- Communicating and handling complexity, but then standardization is impossible.