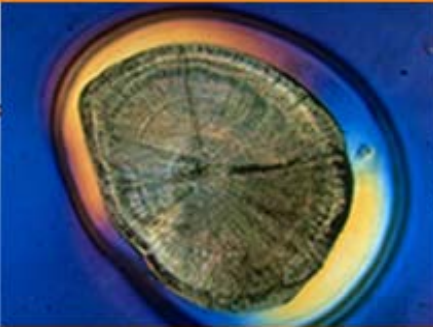




# INSTITUTE OF MARINE RESEARCH



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# EcoFish

Ecosystem Dynamics and Fish Stocks

# ECO FISH

- The overall objective of EcoFish
- How EcoFish will contribute to the ecosystem approach to fisheries,
- Examples





## *Ecosystem dynamics and Fish Stocks*

*Objective:* To develop an integrated scientific approach to assess key ecosystem dynamics of importance to exploited fish stocks and demonstrate application in operational assessment.



# Ecosystem Approach to Fisheries

*Two viewpoints:*

- How do the fisheries affect the ecosystem?
  - *Bottom habitat, bycatch,*
- How does the ecosystem influence fish stocks?



# How to Approach the Ecosystem

## Approach to Fisheries:

### What is its aim?

*(ecosystem influence on fish stocks)*

- Increase precision in fisheries advice
- Take into account species interactions
- Increase precaution (early warning)
- Input to public issues concerning ecosystem changes (*why is this change happening, what may be the consequences*).





- Given
  - Existing knowledge, models, data and people
  - Within the disciplines: oceanography, biology, observation methodology and fish stock assessment
- How can we take advantage of this great potential to make a framework more appropriate for ecosystem approach to fisheries?
  - Interdisciplinary, data formats, knowledge “formats”, quality evaluation in relation to purpose.



# Subgoals



1. Develop an integrated system of models that describe the ecosystem function with focus on processes of importance to harvestable stocks.
2. Renew observation systems through utilization of modern technology to give access observations needed to monitor ecosystem system dynamics (1).



# Subgoals (cont)



- 3) Develop analysis that establishes a set of ecosystem state variables by combining observation from (2) with a fresh view of available knowledge.
- 4) Improve realism in the proposed approach through
  - a) developing a rational use of indicators (state variables covering a wide range of properties of importance to ecosystem dynamics).
  - b) Develop a feedback loop from the model runs (1) that substantially improve efficiency of the sampling regime.



# EcoFish sample 1: larvae drift

Multidisciplinary study to predict larvae drift:

- Starting with
  - Oceanography model to predict particle flow
  - Rule based model to predict larvae drift,
- Quantify vertical distribution by echo-sounder attached to bottom
- Compare with particle drift models and rule based models



# Relevance of Specific Study

- Knowledge on larvae drift
- Dynamic survey design based on knowledge and model
- Area-closure (bycatch of larvae)
- Larvae – contamination
- Recruitment: distribution overlap
- Evaluation of improvement and relevance



# Extended Relevance

- Highly interdisciplinary experience, passing on to other studies:
- Dynamic survey design for key resource surveys
- Observations to support the ecosystem approach:  
how to develop survey designs at the same cost.



# EcoFish Sample 2: Condition Studies on NSS herring

*With existing data and knowledge:*

- How plankton abundance affects condition and recruitment,
- How condition affects growth and fecundity,
- Uses for ecosystem approach.



# Relevance of Specific Study

- Improve knowledge on growth and fecundity,
- Dominant impact on fecundity: condition, skipped spawning or age structure?
- Ecosystem approach:
  - (Early warning) indicator
  - Improving parameters (SSB)
  - For simulations (regimes for evaluating HCRs)
  - Public issues (collapses, climate change scenarios)



# Extended Relevance

- Useful insights for other stocks with
  - Less data,
  - Less knowledge,
  - Smaller range or
  - In more trouble ?
- Evaluating contribution to the ecosystem approach on other stocks.





- Develop existing knowledge into interdisciplinary knowledge
- How and what to monitor at the same cost level?
- Assist the ecosystem based approach:  
(Precision, Indicator, Precautionary approach, Big picture)
- Evaluate relevance of results
- Cooperate and utilize a great potential





Thank you!

And thanks to all my EcoFish colleagues!

