IBAM – Integrated Bayesian risk analysis of ecosystem management in the Gulf of Finland

Inari Helle
Fisheries and Environmental Management Group (FEM)
University of Helsinki

IBAM in brief

- The aim is to create a model that
  - Integrates several risk factors in the Gulf of Finland:
    - harvesting
    - eutrophication
    - oil spills
    - climate change
  - Includes uncertainty estimates
  - Can be used to rank decision options
- Input from other projects (past and ongoing)

IBAM partners

- Fisheries and Environmental Management Group (FEM), University of Helsinki, Finland
- Helsinki University of Technology (TKK), Finland
- Estonian Marine Institute, University of Tartu, Estonia
- Finnish Environment Institute, Finland
- University of Skövde, Sweden

WP1: Geographical analysis of the spreading of the common reed *(Phragmites australis)* in the GOF

- Model the historical and future development of the reed community in the Finnish coast (a map application)
- Complex ecological phenomenon: eutrophication, ice conditions etc.
- Ecological effects: biodiversity
- Economic consequences?
- TKK, SYKE

WP2: Herring fisheries analysis

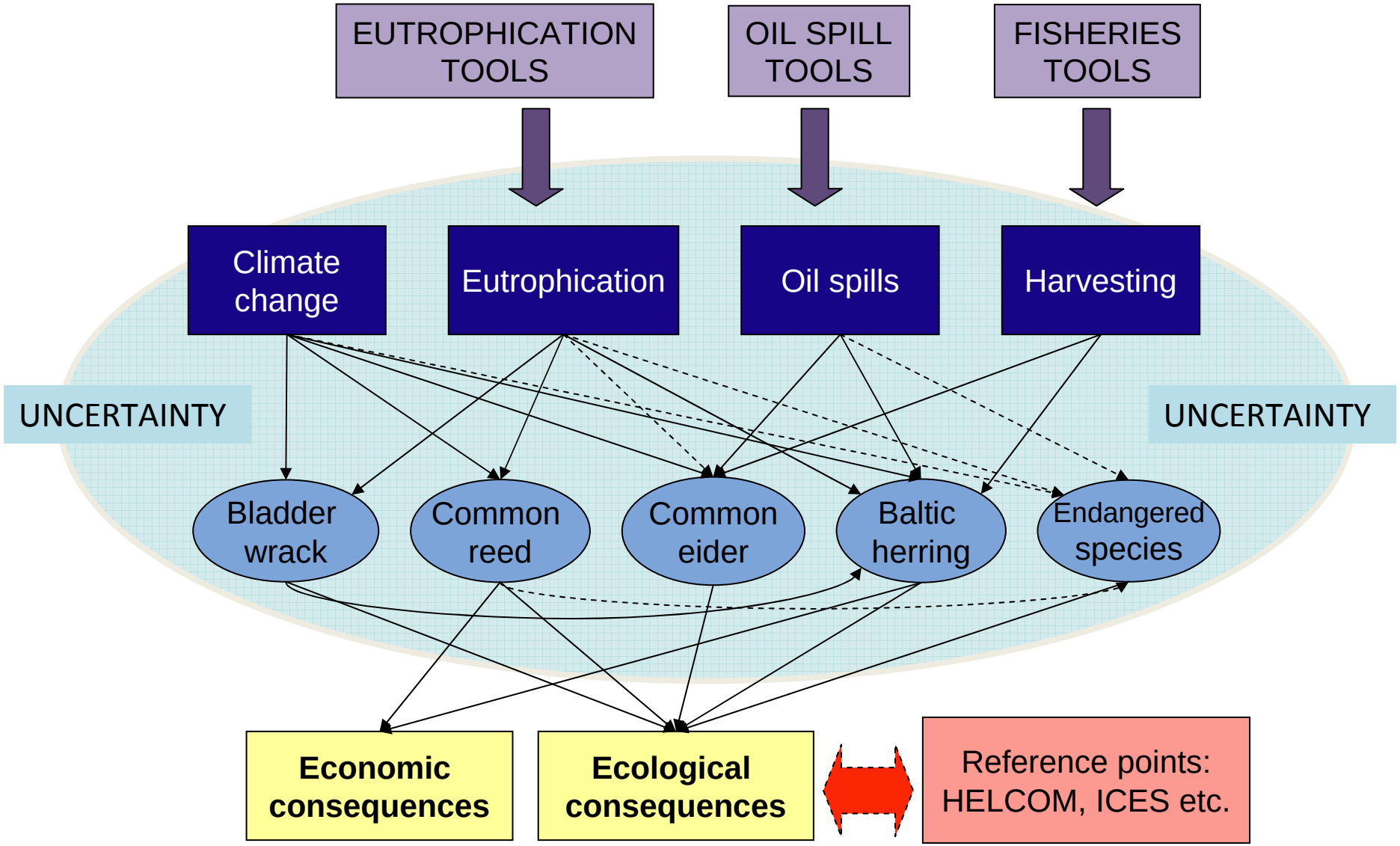
- Effects of environmental factors (eutrophication, climate) and fishing on the GOF herring stock
- Effect of oil spills (unknown frequency and magnitude)
- Setting up Bayesian quota for herring fisheries
  - Optimisation between total effort and total catch
  - Biological and economic aims
- UT, US, UH

WP3: Development of an integrative environmental decision support system (DSS)

- Integrating different risk factors into one model
  - climate change, eutrophication, oil spills, fishing/hunting
- Policy analysis: integrated policy vs. separate policies
- Ecological and economic consequences

Ecological:
Common reed
Common eider
Bladder wrack
Baltic herring
One endangered species

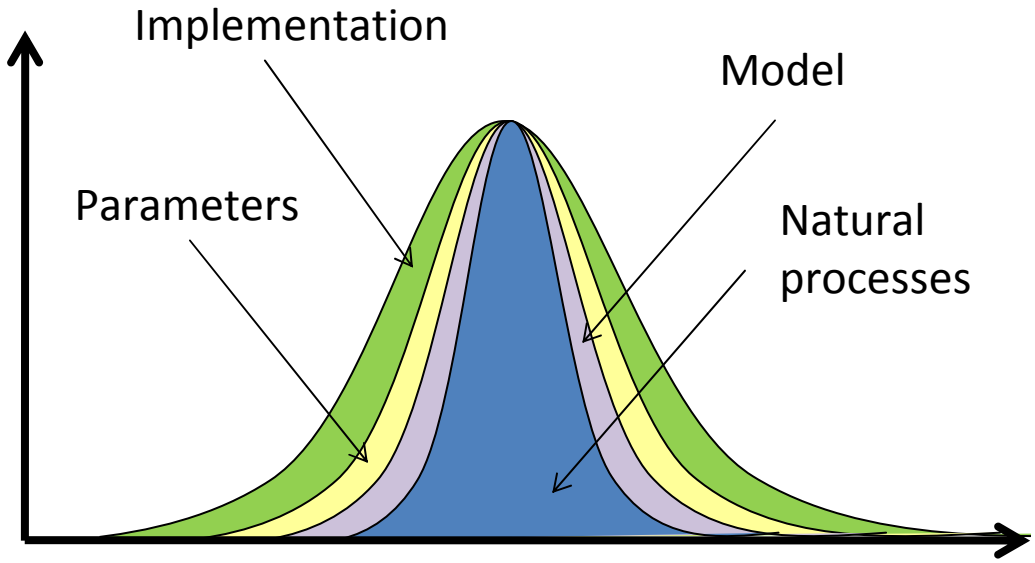
Economic:
Common reed
Baltic herring

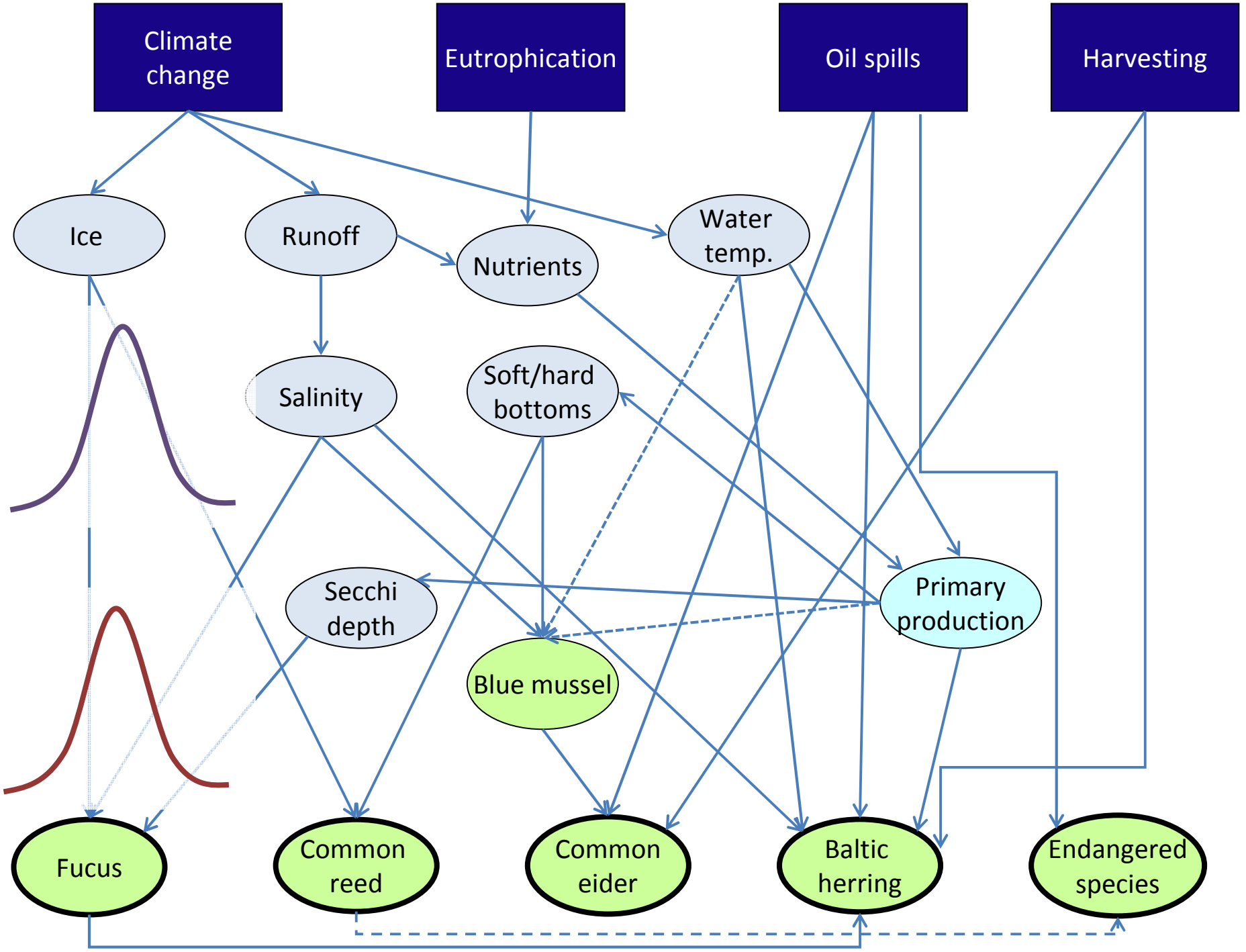

EUTROPHICATION TOOLS
OIL SPILL TOOLS
FISHERIES TOOLS
Climate change
Eutrophication
Oil spills
Harvesting
UNCERTAINTY
UNCERTAINTY
Bladder wrack
Common reed
Common eider
Baltic herring
Endangered species
Economic consequences
Ecological consequences
Reference points: HELCOM, ICES etc.

Uncertainty and risk

- Uncertainties in different steps of the management process:
  - stochasticity of natural processes, lack of knowledge about natural responses etc.
  - uncertainty in human responses to management (?)

Bayesian modelling, probabilistic models




Climate change
Eutrophication
Oil spills
Harvesting
Ice
Runoff
Nutrients
Water temp.
Salinity
Soft/hard bottoms
Secchi depth
Primary production
Blue mussel
Fucus
Common reed
Common eider
Baltic herring
Endangered species


Questions? Comments?
inari.helle@helsinki.fi
sakari.kuikka@helsinki.fi