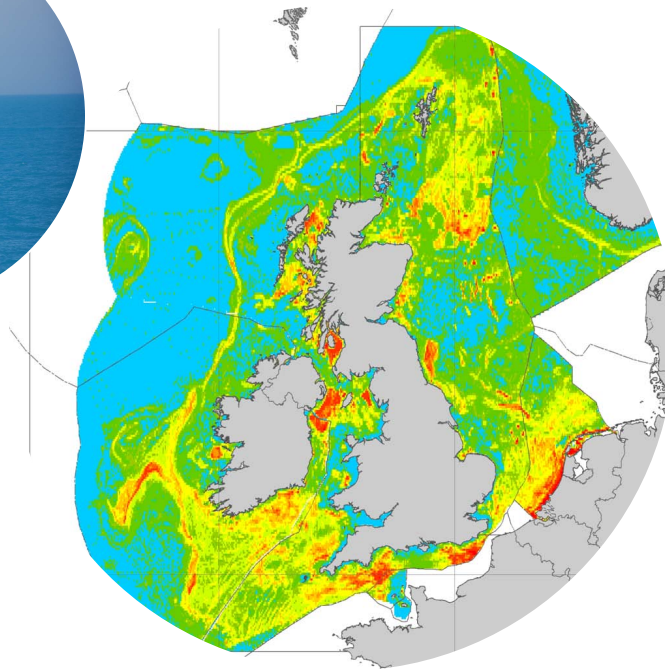
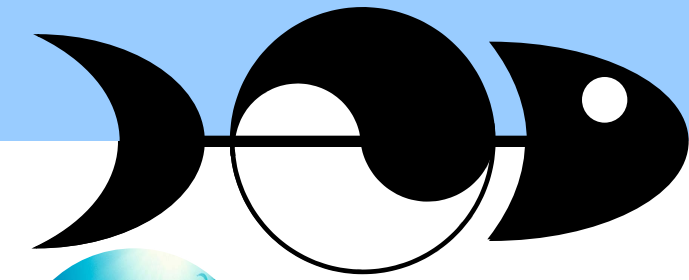


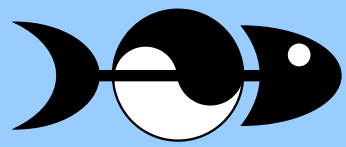
MEFEPO

North Sea fisheries case studies:

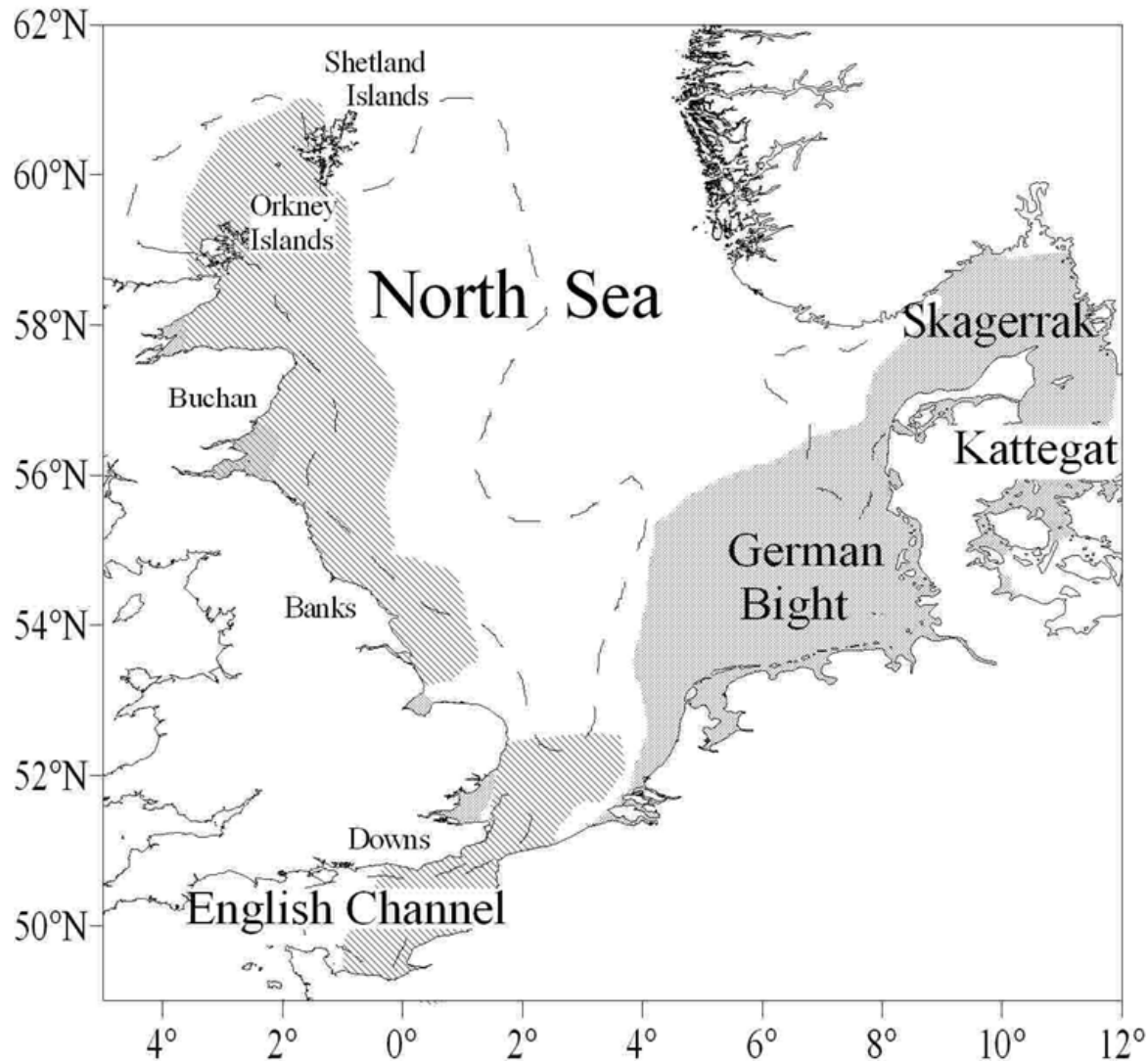
- Herring
- Beam Trawl

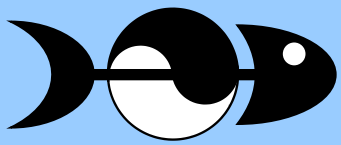
MEFEPO Final symposium
3-4 October 2011, Brussels





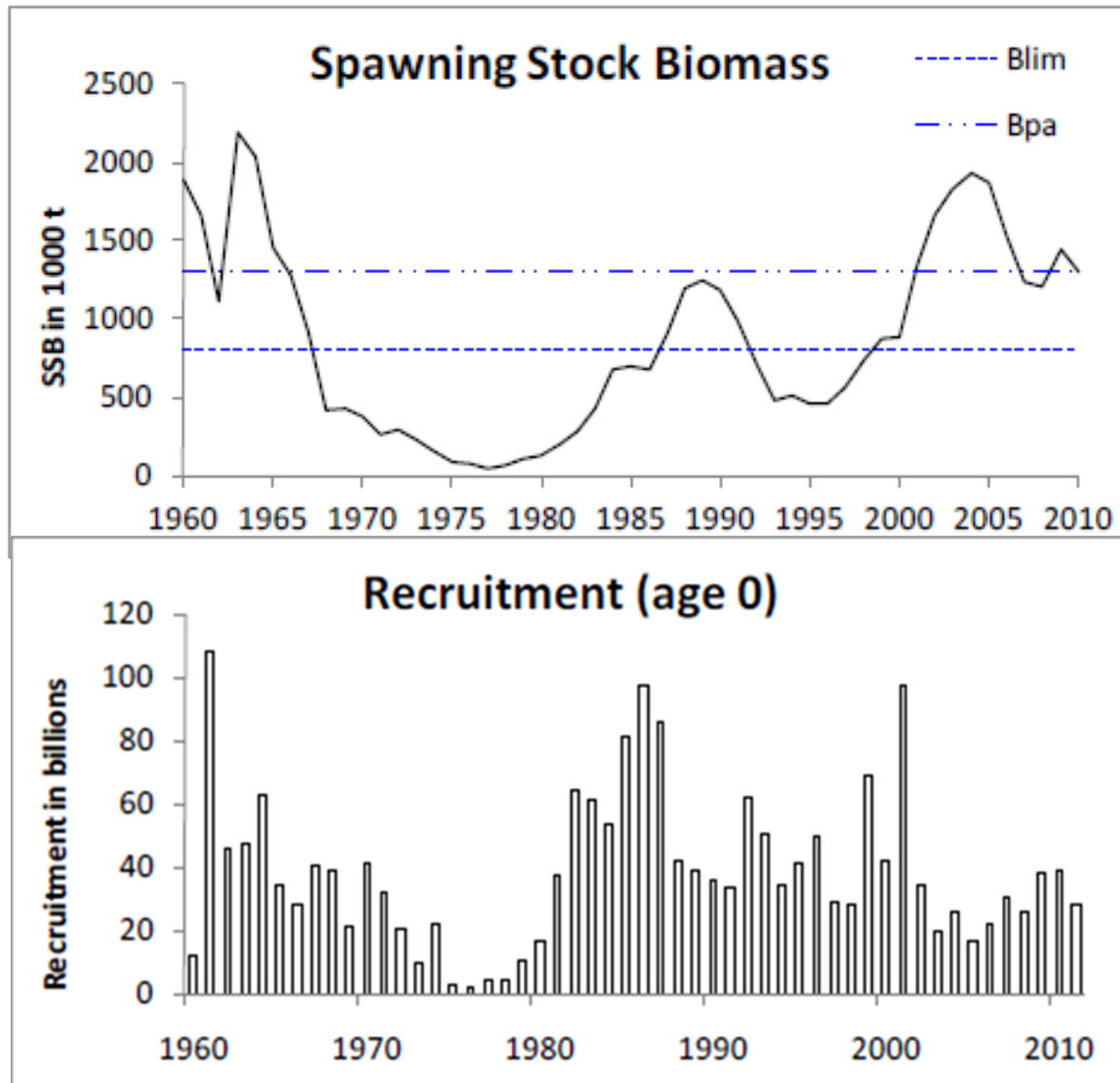
North Sea herring fishery

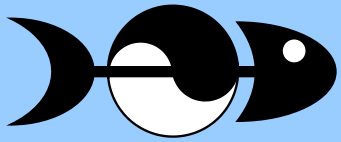




North Sea herring stock

- ICES NS herring stock assessment (1960-2010)





NS herring management

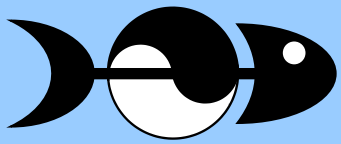
EU/Norway management plan

Key element:

fishing mortality set separately for adult and juvenile herring

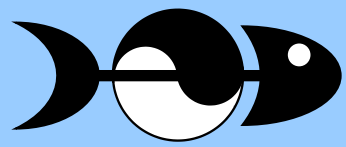
→ **TAC** for the human consumption fishery (adult)

→ **by-catch ceiling** for the industrial fishery (juveniles)

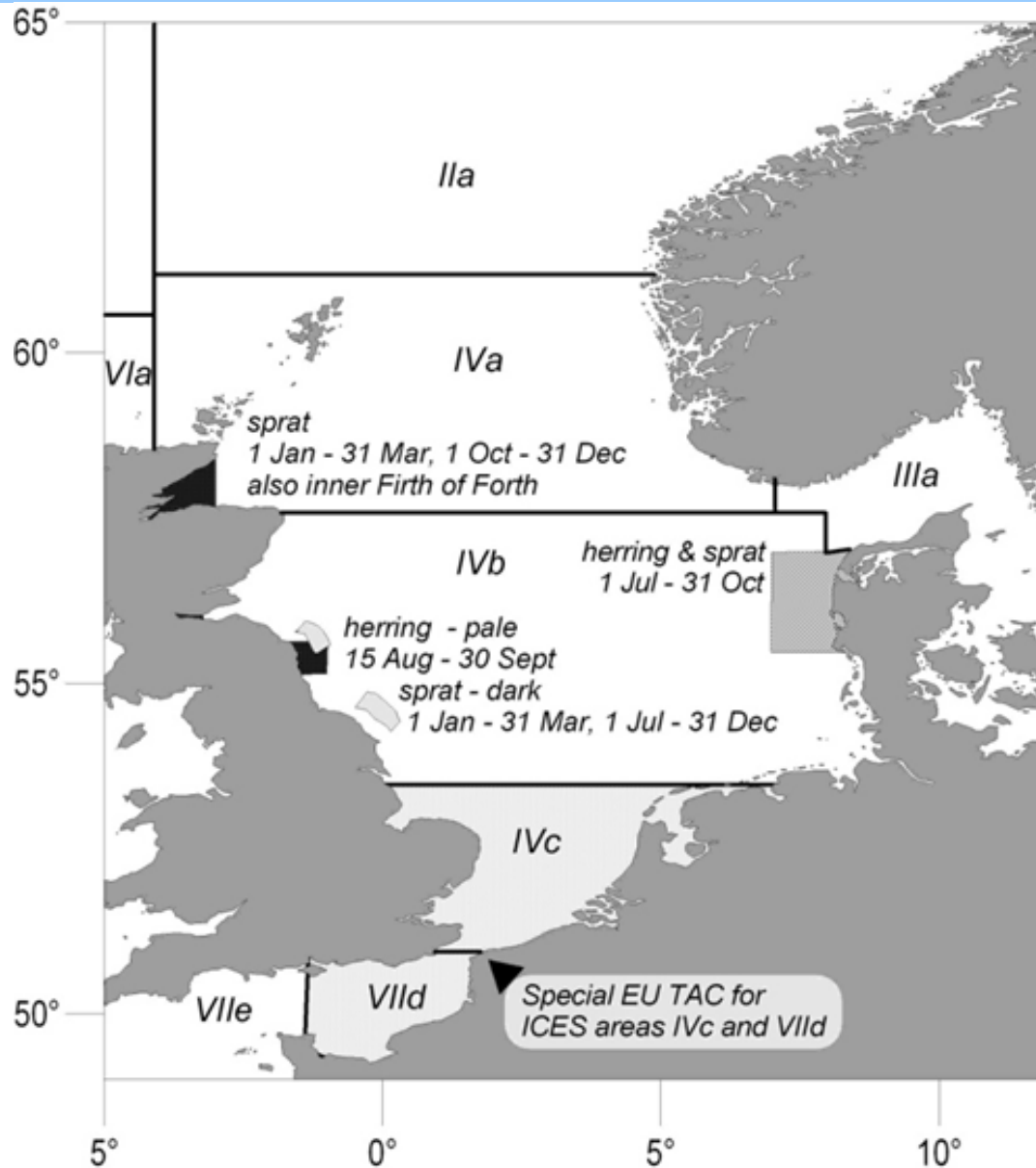


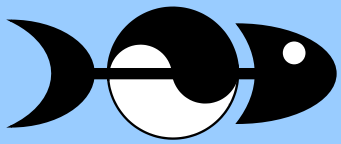
Specific management tools

- Minimum landing size for human consumption herring
- separate sub-TAC for the “Downs” spawning component
- Closed areas for both herring and/or sprat fisheries to protect either spawning or juveniles



Herring/ sprat Closures

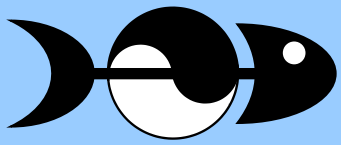




Specific management tools

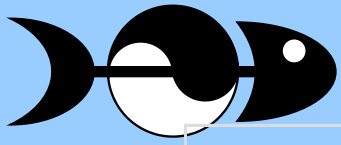
- Minimum landing size for human consumption herring
- separate sub-TAC for the “Downs” spawning component
- Closed areas for both herring and/or sprat fisheries to protect either spawning or juveniles

- And a few more, plus some general tools, not specific to herring fisheries



Alternative management strategies

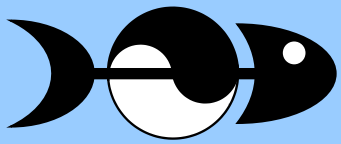
- A. Simplify: remove sub-TAC for the southern North Sea.
- B. Simplify: remove seasonal local fishing closures
- C. Maintain sub-stock structure (phenotypic diversity).
- D. Greater conservation - Introduce MPAs
- E. Protect sensitive habitats - close all spawning beds to active anthropogenic impact. (MSP action)
- F. Prey for predators
- G. Fish down to allow cod to recover - bio-manipulation approach, high risk
- H. No change in the current management approach



The evaluation matrix

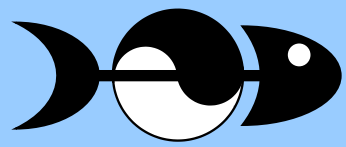
	Biodiversity	Commerical Fish	* Seafloor Integrity Food Webs	Efficiency	Community Stability	Viability	Food Security
A. Remove Southern NS Sub-TA	1	2	3	4	5	6	7
B. Remove Seasonal Closures	1	2	3	4	5	6	7
C. Maintain Sub-Stock Structure	1	2	3	4	5	6	7
D. Marine Protected Areas	1	2	3	4	5	6	7
E. Protect Spawning Habitats	1	2	3	4	5	6	7
F. Prey for Predators	1	2	3	4	5	6	7
G. Fish Down for Cod	1	2	3	4	5	6	7
H. BAU	1	2	3	4	5	6	7

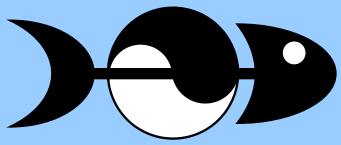
**Take with caution!
Uncertainties,
assumptions,
unknowns....**



Reflections/ Questions ...

- The matrix can visually highlight trade-offs.
- A means for discussing management scenarios/ strategies with stakeholders in a transparent way
- Combine matrix with tools to communicate uncertainties (quantitative as well as qualitative)
- Bias, if evaluation considers only “measurable” indicators
- → More holistic approach: not rely on only a few measurable indicators but take into account all possible criteria related to a descriptor.
- Value of expert judgement versus model results?





Current management plan

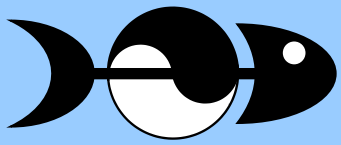
ICES evaluation:

“The management plan appears to operate well in relation to the first two objectives ...”

- Consistency with the Precautionary Approach
- A rational exploitation pattern

... but not in relation to achieving

- Stable yield
- High yield

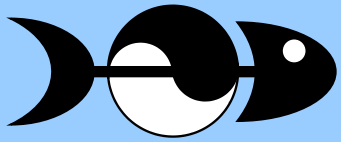


Business as usual

current EU/Norway management plan

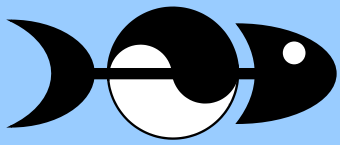


- Fished below F at MSY
- biomass should increase \rightarrow hence efficiency as well
- Biodiversity: effects of phenotypic diversity and sub-stock structure unknown
- current management plan does not include any social objectives (e.g. employment)



Strategy F: Prey for predators

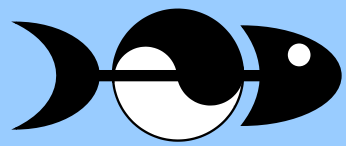
- Management objective: provision of prey for predators
 - Size of herring populations required to maintain ecosystem services?
 - The scenario considers the management of the fishery such that the herring biomass increases to such an extent that it can be considered a sufficiently abundant prey source for predators
- ➔ most likely overriding impact: reduction in fishing effort



Strategy F: Prey for predators

	Biodiversity	Commerical Fish	* Seafood Integrity	Food Webs	Efficiency	Community Viability	Stability	Food Security
F. Prey for Predators	1	2	3	4	5	6	7	8

- Positive effect for commercial fish, biodiversity and foodweb structure
- Herring fisheries have second claim, after predators
- Food security:
 - Herring: cheaper, larger quantities
 - Cod: higher priced, less abundant



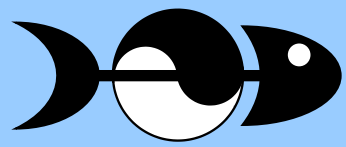
Strategy E: protect spawning habitats

Management strategy E. Protect sensitive habitats – close all spawning beds to active anthropogenic impact.

- maintain the potential diversity of spawning habitats, thus providing increased resilience of the herring stock to environmental or fishing induced pressures
- re-population of abandoned spawning areas

NB:

a “marine spatial planning management action” that would have an impact on the herring fisheries.



Strategy E: protect spawning habitats

	Biodiversity	Commerical Fish	* Seafloor Integrity	Food Webs	Efficiency	Community Viability	Stability	Food Security
E. Protect Spawning Habitats	1	2	3	4	5	6	7	8

Crucial: Where else are the other activities going to take place?

- spatial changes
- redistribution of activities

positive ecological and economic effects, IF activity displacement does not negatively affect herring biology.