

**SGHERWAY**  
2008-2010

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Pelagic RAC. 11<sup>th</sup> October 2010

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**Acknowledgements**

This project would not have been possible without the input of the following people:

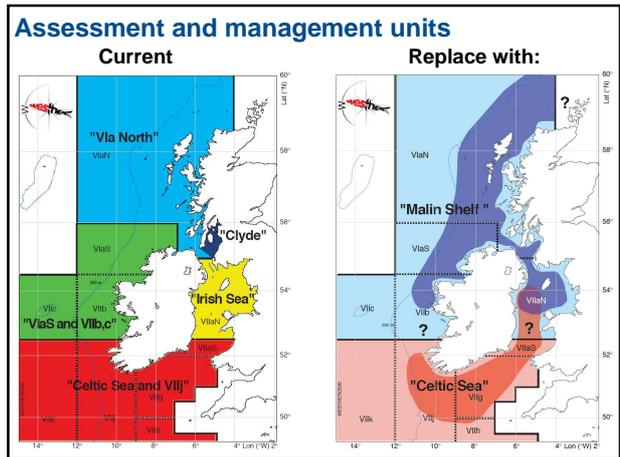
Steven Beggs, Maurice Clarke, Afra Egan, Clementine Harna, Niels Hintzen, Beatriz Roel, Norbert Rohlf and John Simmonds

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**SGHERWAY**  
Study Group on the evaluation of assessment and management strategies of the western herring stocks

- Convened in 2008 to explore and evaluate recommendations of WESTHER project:
  - assess two stock units - Malin Shelf (Via North, ViaS and VIIb, c, Clyde and Irish Sea (VIIaN)) and Celtic Sea (the current Celtic Sea and VIIj stock)
  - combined survey on non-spawner distributions mixing on the Malin Shelf
  - management plans should recognise there is a population in the Celtic Sea and VIIj and a metapopulation centred on area Via

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**SGHERWAY ToRs**

- investigate combined assessment of the VIaN, VIaS, Irish Sea (VIIaN) – **the Malin Shelf metapopulation**
- evaluate sustainable alternative management strategies for the metapopulation of VIaN, VIaS and VIIaN, through simulation
- evaluate the utility of a synoptic acoustic survey in the summer for the Hebrides, Malin and Irish shelf areas, in conjunction with WGIPS surveys of VIaN and the North Sea

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**1. Combined assessment of the three stocks.**

**Results**

- poor retrospective pattern in each scenario
- combined assessment is not sensitive to the choice of settings

**Conclusions**

- combined assessment does give important information on the Malin Shelf metapopulation, unlikely to be useful for management advice purposes
- it is unlikely that it will replace individual assessments of the constituent stocks. However, it is necessary to segregate these stocks in the Malin Shelf acoustic surveys

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## 2. Alternative Management Strategy Evaluation

- **Populations:** the populations of the three different ICES areas, VIaN, VIaS/VIb.c and VIIaN are assumed to each represent a spawning population. During spawning they only occupy the area they are named after, while during the feeding season parts of a population can migrate to other areas where they are susceptible to the fishery active within the area
- **Fisheries:** within each of the three management areas, the fishery is targeting the biological populations during the feeding season when mixing between populations occurs. Hence, each fishery only has the fish occurring in the management area they are active in available to it
- **Surveys:** within the simulation framework only one survey is designed and this is an acoustic survey over the Malin/Hebrides Shelf, targeting the combined population of VIaN, VIaS/VIb.c and, depending on the scenario investigated, VIIaN, and it reports on all ages

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## 2. Alternative Management Strategy Evaluation

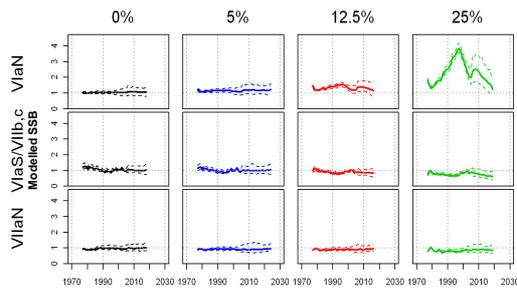
In total, four different processes or scenarios were varied to evaluate whether management of the ICES stocks is precautionary or not:

- level of mixing between populations
- accuracy of correctly splitting the Malin Shelf survey into three different survey indices
- number of samples taken in the Malin Shelf survey
- management target

These procedures were modeled including feedback loops where, over time, the outcomes of management actions affect the biological population the year after which, in its turn, affects the fishery and management

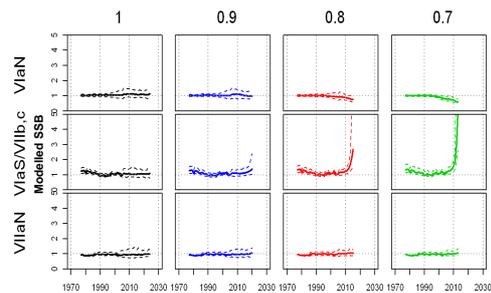
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## 2. MSE. Mixing



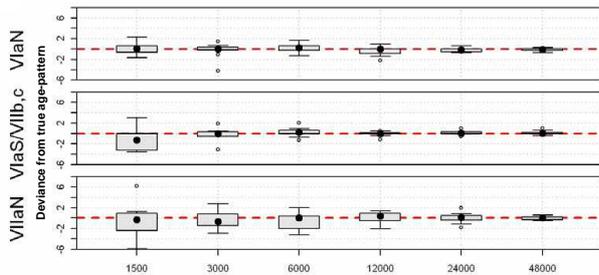
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## 2. MSE. Population Identification success



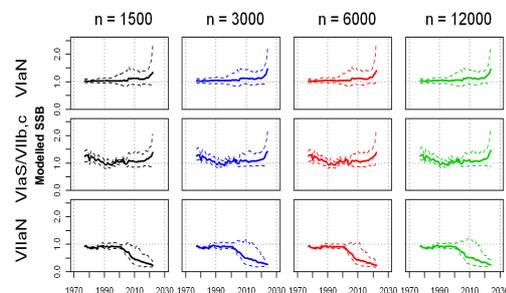
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## 2. MSE. Survey samples / design



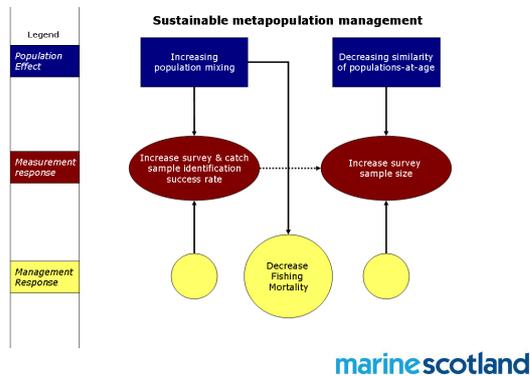
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## 2. MSE. Survey samples / design. II.



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## 2. MSE. Discussion



## 2. MSE. Conclusions

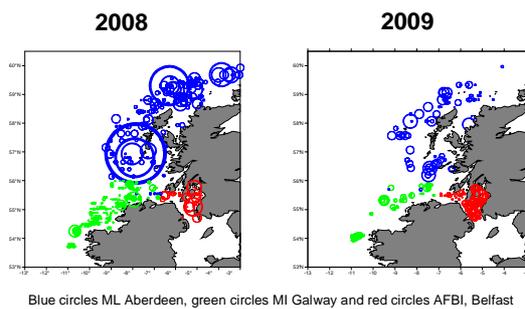
No sustainable management of metapopulation. In none of the scenarios where the VIIaN population is included in the Malin Shelf survey can the VIIaN ICES stock be sustainably managed.

Sustainable management possible for the VIaN and VIaS/VIIb,c ICES stocks

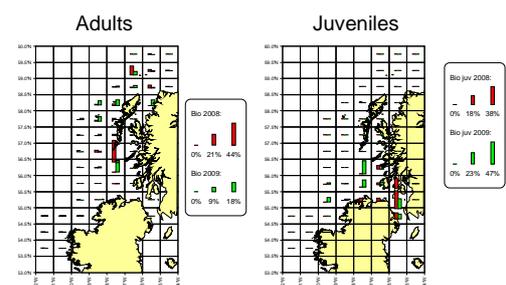
**Strong trade-offs between level of mixing, uncertainty in stock identification and sustainable fishing mortality**

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## 3. A synoptic Malin Shelf acoustic survey Acoustic Density



## 3. A synoptic Malin Shelf acoustic survey Distribution of biomass per rectangle



## 3. A synoptic Malin Shelf acoustic survey

- the amount of mixing between stocks cannot be resolved by the current sampling regime in the Malin Shelf survey
- consequently, a sampling programme has been developed to enable proper identification of fish stock origins, making use of otolith and body shape techniques and analyses that will be compared to the fish of known spawning origin collected during the EU project WESTHER
- this sampling programme has been initiated in the 2010 summer surveys

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## SGHERWAY conclusions

- it is unlikely that a combined assessment will replace individual assessments of the constituent ICES stocks (VIaN, VIaS/VIIb,c and Irish Sea). However, it is necessary to segregate these stocks in the Malin Shelf acoustic surveys
- MSE shows that sustainable management is possible for the VIaN and VIaS/VIIb,c ICES stocks but not for the Irish Sea ICES stock when it is included in the metapopulation model (and survey)
- the amount of mixing between stocks cannot be resolved by the current sampling regime in the Malin Shelf survey but a new sampling regime should resolve population identification
- there are strong trade-offs between the level of mixing, uncertainty in stock identification and sustainable fishing mortality**

