DEEPFISHMAN

Management and monitoring of deep-sea fisheries and stocks

EU FP7 project

grant No 227390

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Deepfishman

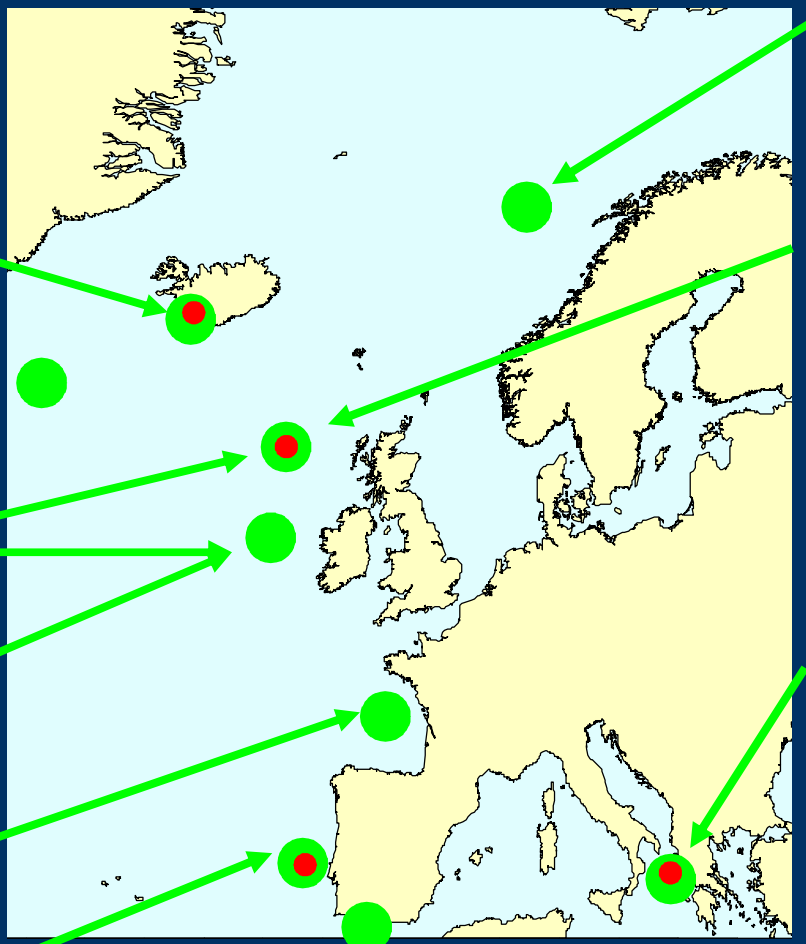
DEEPFISHMAN project

- 13 partners from 9 countries
- 3 millions Euros EC contribution
- April 2009 - September 2012

General aims

Stock assessment methods
Biological reference points (BRPs)
Harvest control rules (HCRs)
Managements strategies
Monitoring requirements

DEEPFISHMAN Case studies



Redfish

Redfish

Blue ling

Greenland halibut (NAFO area)

Mixed species trawl fishery

Orange roughy

Blackspot sea bream

Black scabbardfish

Blackspot sea bream

Blackspot sea bream

Orange roughy

(Namibia)

● Deepsea sharks studied

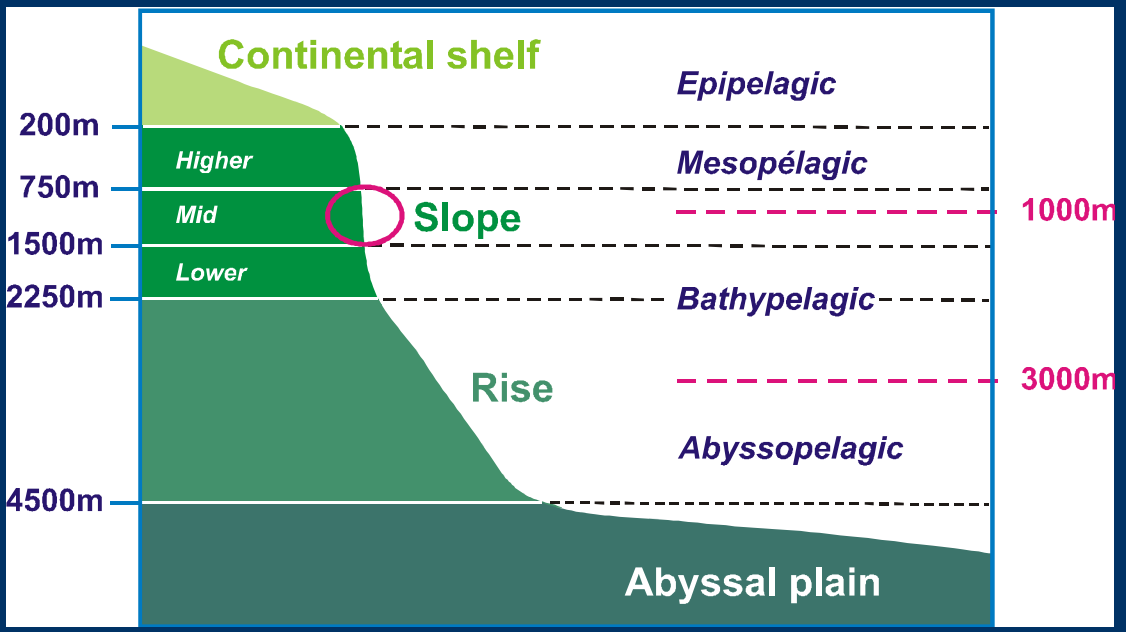
Areas of DEEPFISHMAN progress

- Economics of deep-water fisheries
- Definition of deep-water environment and species
- Estimation of deep-water fishing effort, management implications of observed effort distribution
- Deep-water fish stock assessment methods
- Steps towards an ecosystem approach
- Monitoring and management framework
- Future research needs for deep-water fisheries, stocks and ecosystems

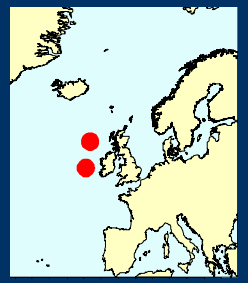
New definition of deep-water species and environments

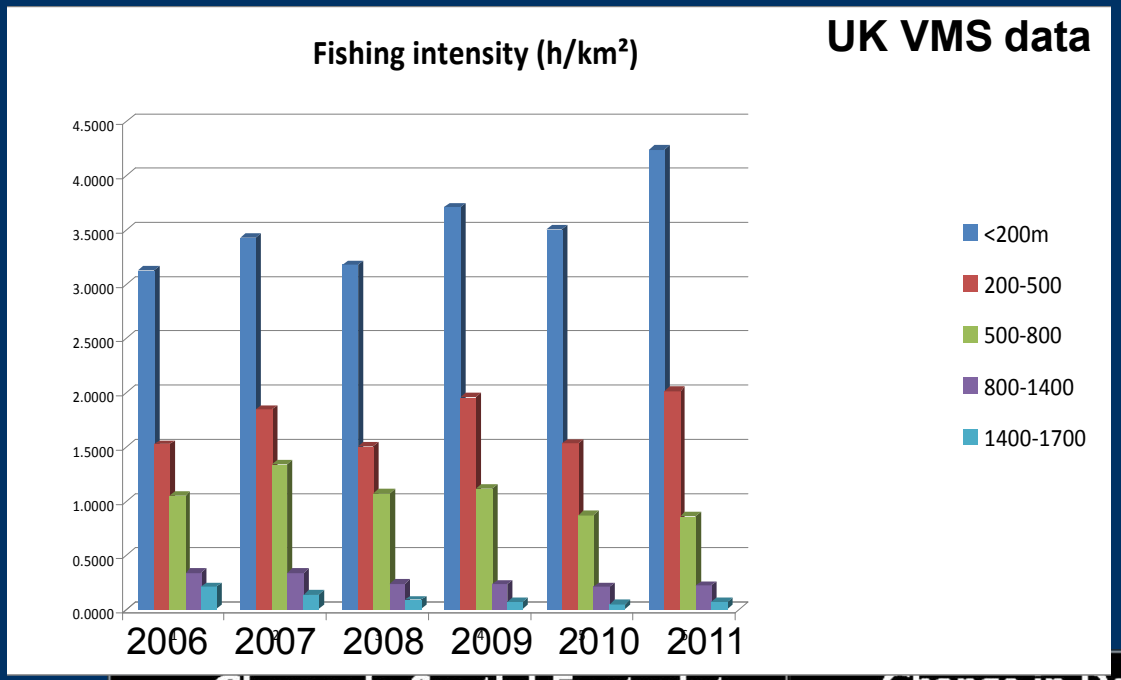
DEEPFISHMAN proposal

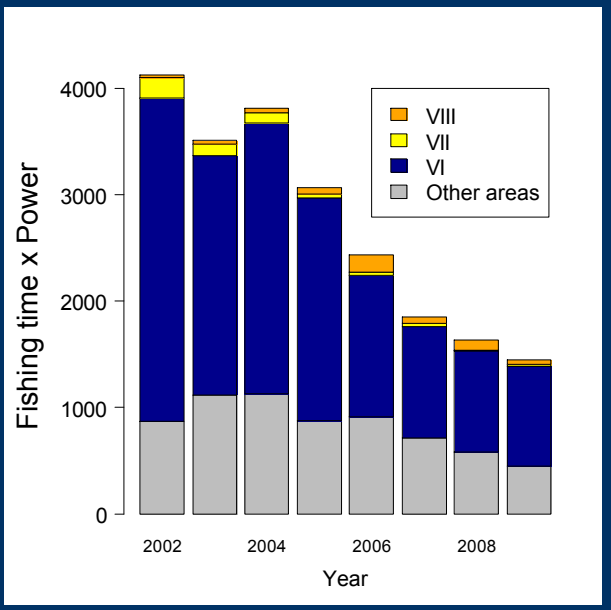
- Deep-water habitat: below 200 m
- Deep-water fish species: species with more than 50% of the biomass distributed deeper than 200 m
- EU vessel licensing: combination of annex I and II with some adjustment (e.g. including Greenland halibut and beaked redfish)



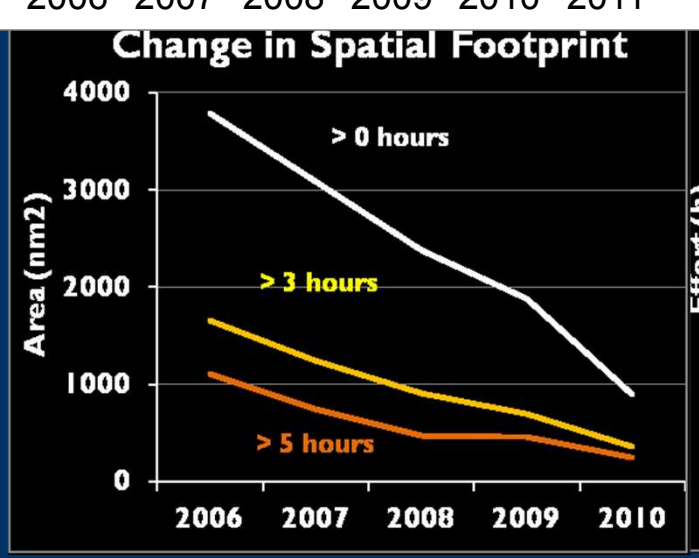
Estimation of deep-water fishing effort with VMS

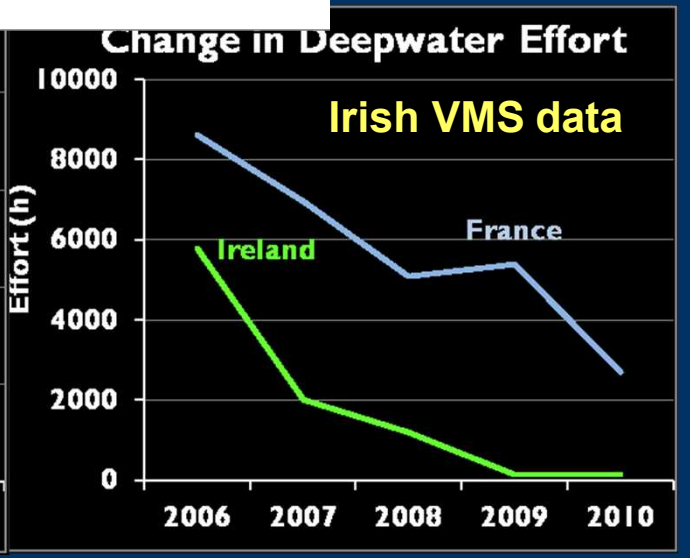




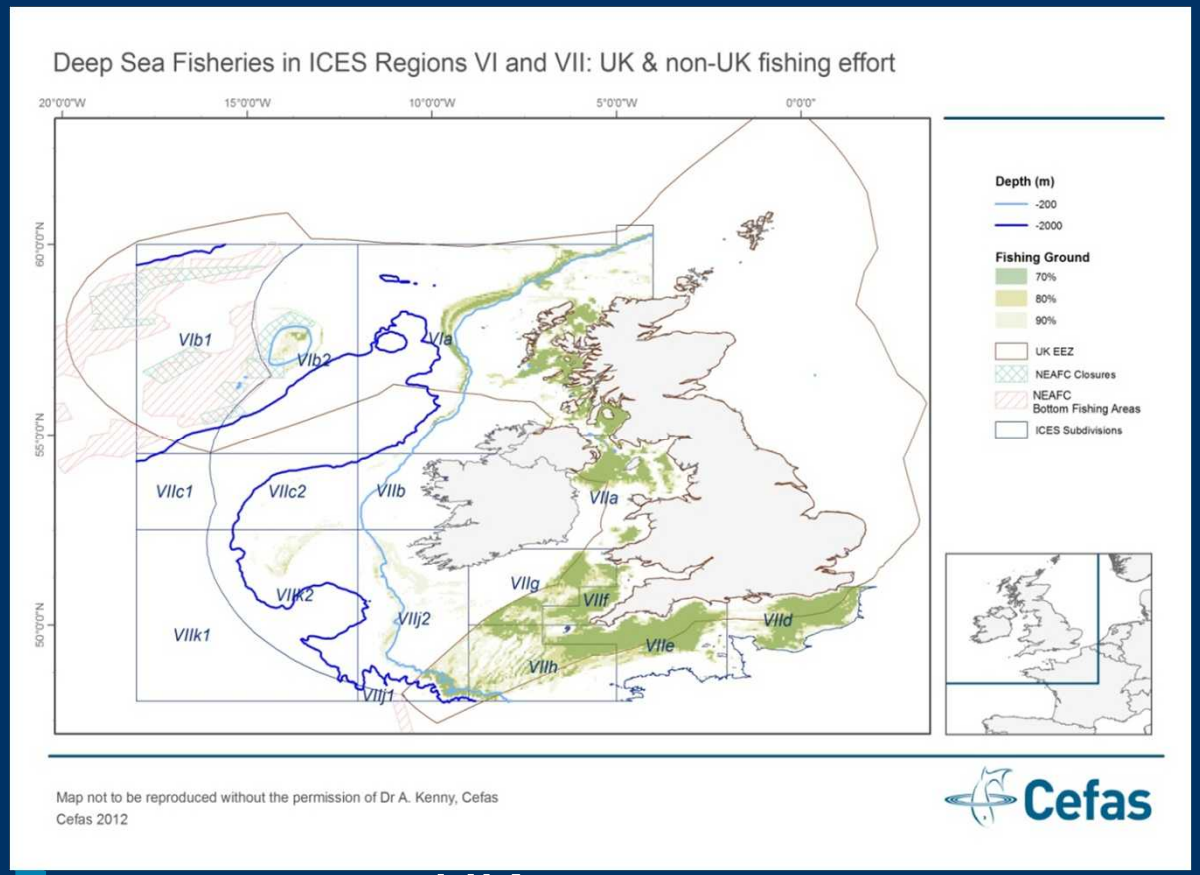


French deep-water fleet >800 m

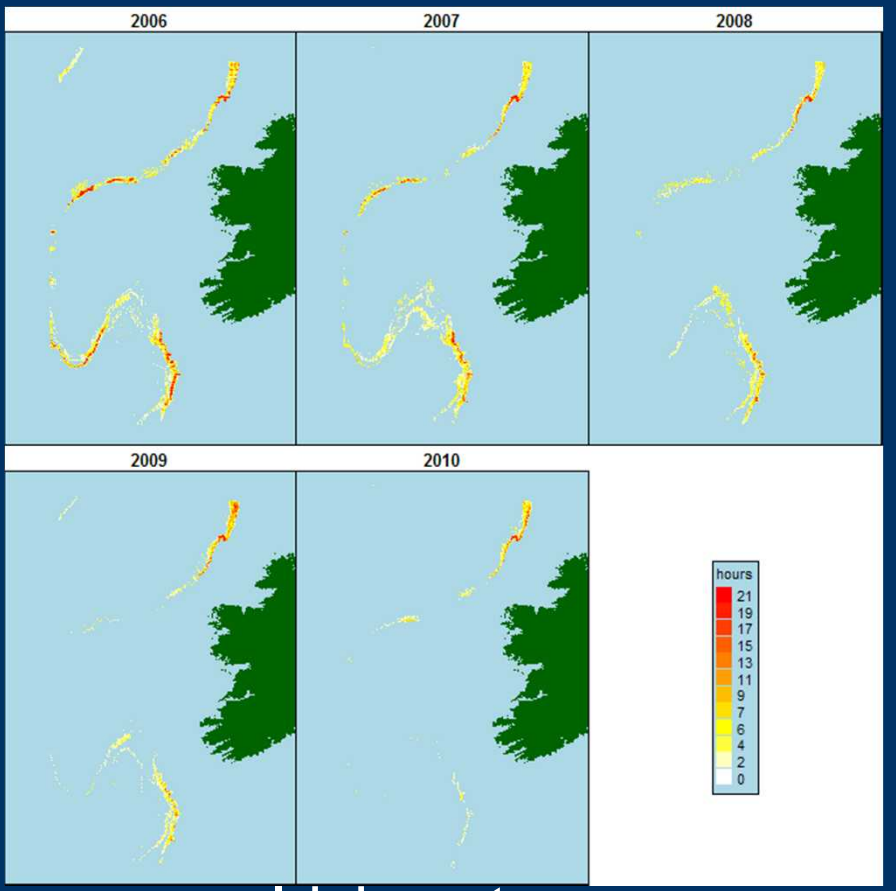




Spatial and temporal distribution of deep-water fishing from VMS

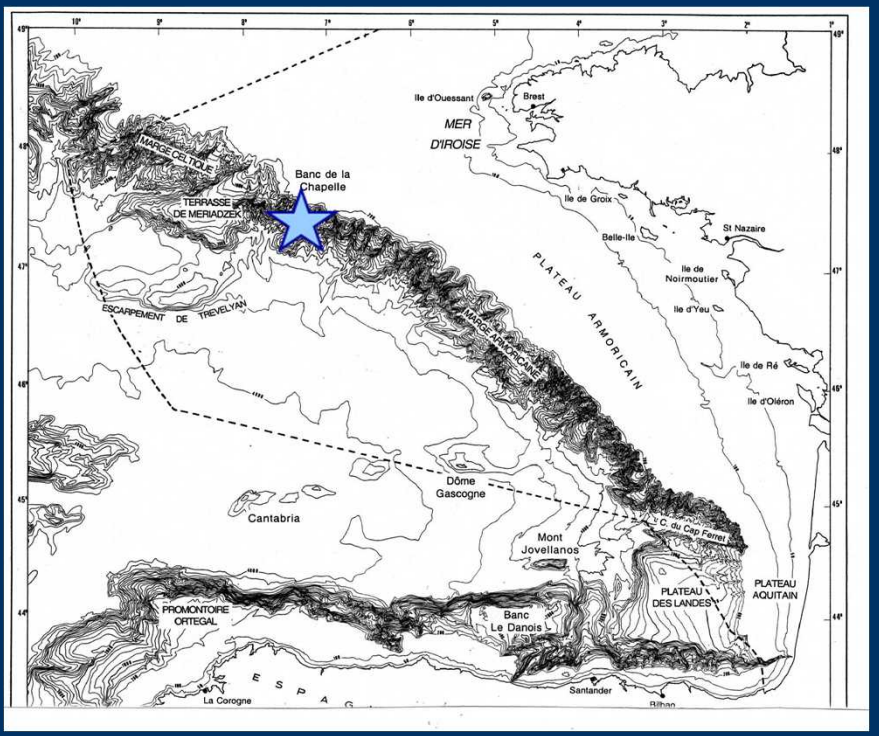


UK waters



Irish waters

Vulnerable Marine Habitats (VMEs) and fishing



Example of the Bay of Biscay

- Depth range 160-400 m : coral habitats remain only as coral rubbles (ICES WGDEC 2010)
- Deepsea fisheries (sensus 2347/2002 regulation) almost non-existent in the Bay of Biscay

More studies of deep-water VMEs have been carried out in CoralFISH project

Laffargue P. & Lorance P. (2012). Interaction of fisheries and benthic habitats in the Bay of Biscay margin with a special focus on cold water corals. Ecosystem based management and monitoring in the deep Mediterranean & Atlantic, Galway, 28-31 August 2012

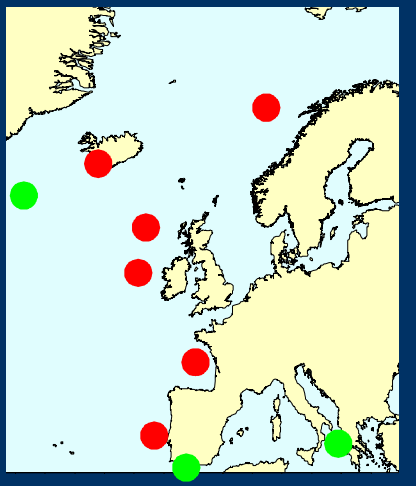
Management implications of observed effort distribution

- Deep-water fishing effort can be efficiently estimated from VMS data
- Deep-sea fisheries regulation has been efficient in reducing deep-water fishing effort
- Spatial footprint of deepsea fisheries has shrunk over time
- Effort on the upper-slope (from fishing for hake monkfish, saithe…) much higher than effort on mid-slope (deepsea fishing)
- Impact on VME not only generated by deepsea fisheries

Need for a spatial planning approach for all fisheries

Deep-water fish stock assessments

- Stock assessments are essential for PCP and MSFD to manage at MSY
- Challenging for data poor stocks
- Wide range of situations labelled « Data poor »
- Deep-water stocks not necessarily data-poor
- DEEPFISHMAN contribution: Data collation to improve stock diagnostics
- DEEPFISHMAN contribution: New assessment methods



DEEPFISHMAN new methods

Stock assessment methods

- Multi-annual year class curves (age based)
- Bayesian state space model of black scabbardfish and deep-sea sharks (two-stages)
- Bayesian production model for roundnose grenadier
- GADGET toolbox for Icelandic blue ling
- Simulation testing of new and traditional assessment methods for data poor situations

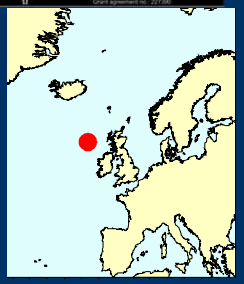
Indicator based assessment

- Standardizing CPUEs using GAMs
- Likelihood method for identifying joint time trends in multiple time series
- Spatial density modelling
- Spatial indicators
- Community level size-based indicators
- Productivity susceptibility Analysis (PSA) of orange roughy

Management

- Mono-specific Management Strategy Evaluation (MSE)
- Spatially explicit MSE
- Qualitative MSE
- Trade-off analysis

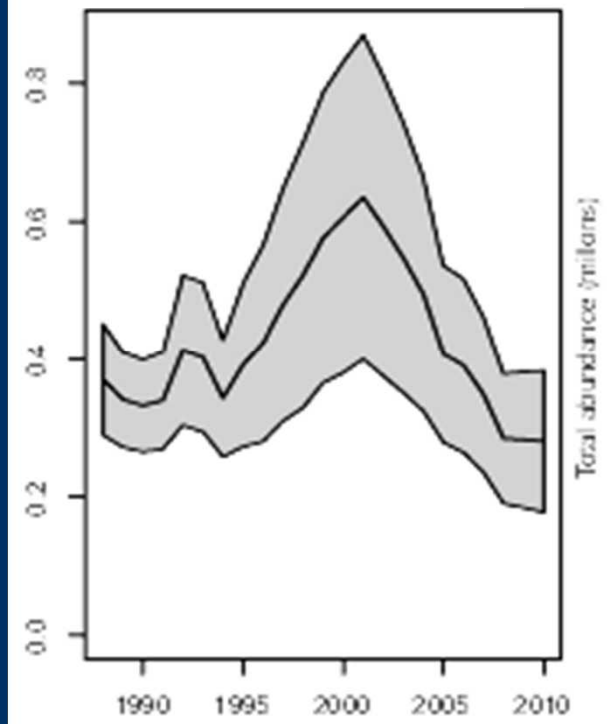
Blue ling stock assessment



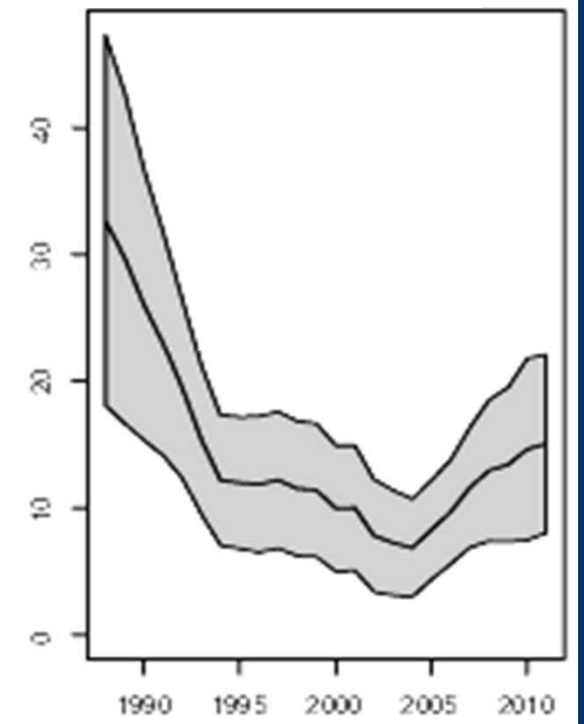
Data from commercial fishery

- Total catch (t) 1988 - 2011
- Numbers-at-length sample data (missing years)
- Age-length sample data (missing years)

Total mortality



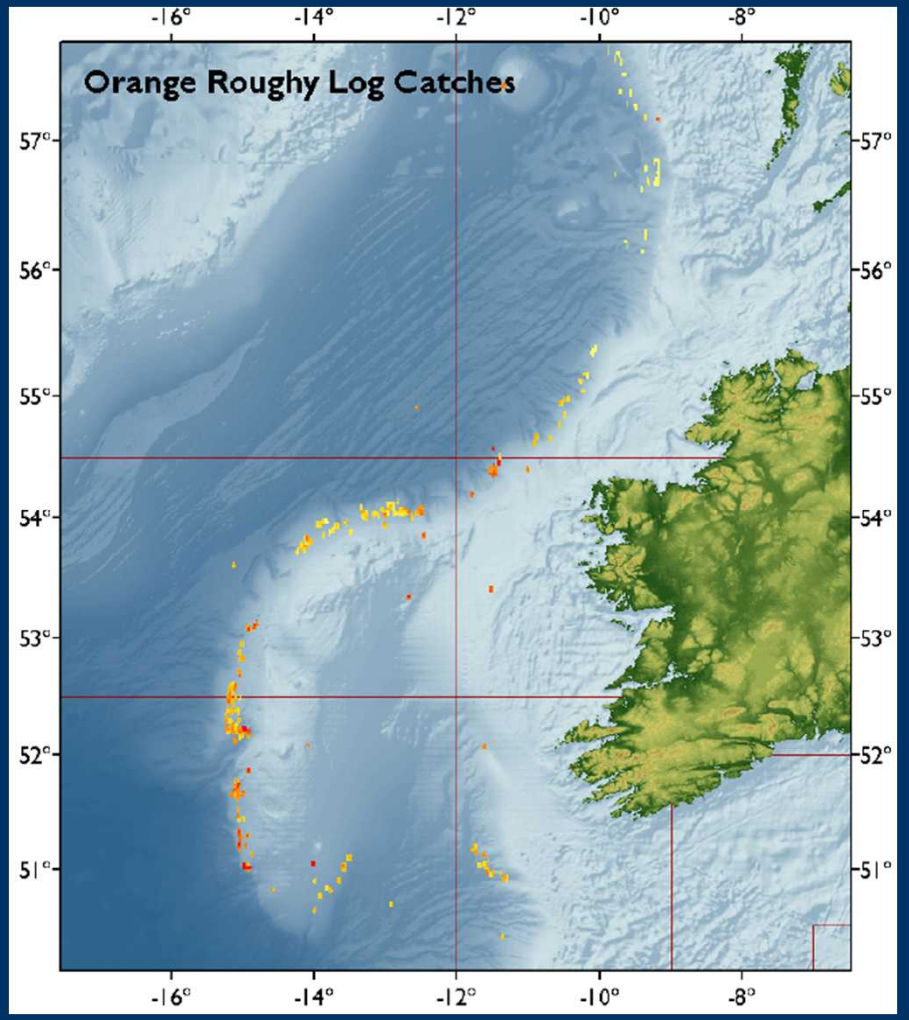
Abundance



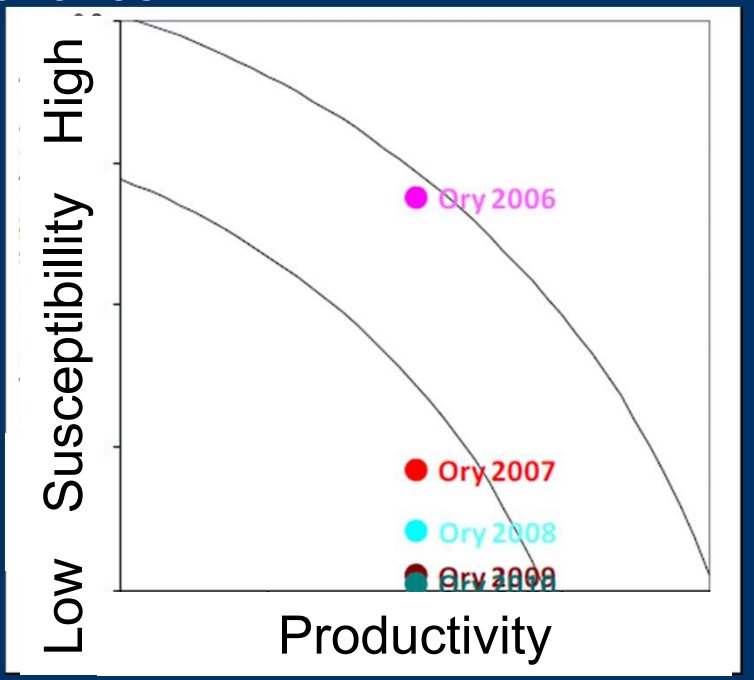
Assumptions

- constant catchability ages 9 - 19+
- CV(catch) = 0.01

Orange roughy
Productivity Susceptibility Analysis



DATA
- 0n-board observations
- Personal log books
- Scientific surveys
- VMS data of the French and Irish Deepwater fisheries



Dransfeld, L, Hareide, NR, & Lorance, P. (in prep.) Managing the risk of vulnerable species exposure to deepwater trawl fisheries- The case of Orange Roughy to the west of Ireland and Britain. (DEEPFISHMAN Special Issue)

Conclusion on assessment methods

- Deep-water stocks are not all data-poor
- Several methods were developed or adapted for DEEPFISHMAN case studies: already used for ICES advice for 5 stocks
- DEEPFISHMAN assessment methods provide estimates of fishing mortality and absolute biomass for 4 stocks
- Spatial analysis complement stock assessment
- Survey data are not required by all assessment methods

Ongoing work

- Spatial data repository for VMEs and fishing ground (VMS data) distributions (need for an internationally coordinated data system) -FAO database-

- Fishing scenarios simulations of the size-structured fish community (1)

- Ecosystem management taking account of trade-offs, e.g. between conservation and fishery management
  - For the same total blue ling catch by-catch of deep-water sharks and swept area are smaller when blue ling is caught from spawning aggregation (2)
  - Shark by-catch depends on spatial/depth distribution of fishing effort (3)

- Development of stock assessment of deepsea sharks
  - motivation: (i.) main conservation concern in the deep-water fish community, (ii.) high catchability to longlines

(1) Blanchard et al. (2011). The effects of fishing on deep sea food webs". Session on: "Food webs, networks, complexity and dynamics. British Ecological Society Annual Meeting. University of Sheffield, UK. Sept.12-14, 2011.
(2) Lorance. (2012) Continental slope fisheries and conservation of vulnerable fish species and deep-water benthic communities: Implications for management (World Fisheries Conference, Edimburgh, Scotland, 7-11 May 2012
(3) Trenkel et al. (Submitted). Testing CPUE derived spatial occupancy indicators for management (Aquatic Living Resourcers)

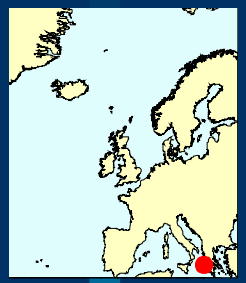
Future research needs

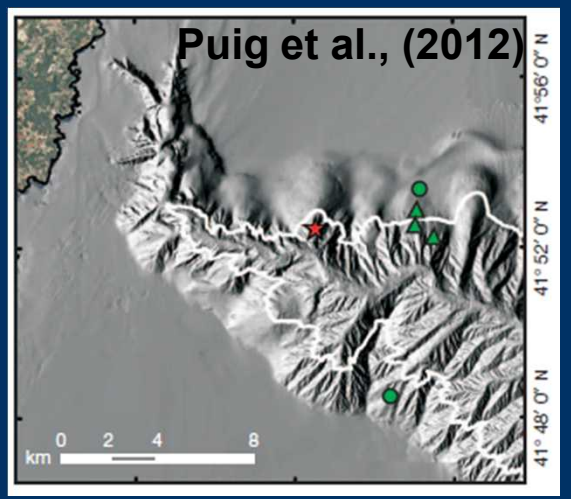
Ecosystem impacts and seafood production

- Food supply chain analysis

To compare deep-water fisheriesto other seafood productions (capture and aquaculture):

- Environmental impacts
- Energy intensity
- Economic efficiency





Mediterranean blue and red deep-sea shrimp:
-impact on bottom habitat

Tropical shrimp ponds:
- impact on mangrove

Acknowledgements

- Presentation uses material from all DEEPFISHMAN partners and the stakeholder consultation process
- Project material on http://deepfishman.hafro.is/