

WP7: Bioeconomic modelling of North Atlantic fish resources

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Istanbul, 22-24 October 2013

WP7: Objectives



“assess the impacts of Global Environmental Change (GEC), including climate change, fisheries management and market developments, on the productivity, dynamics and services of North Atlantic fish commodities”

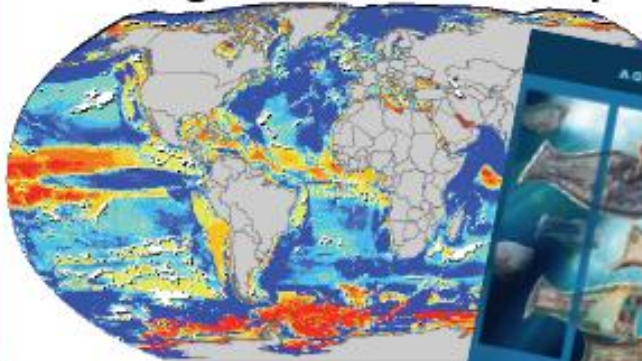
(3 sub-wp)

WP7.1. Economic cost of suboptimal fisheries management

WP7.2. Climate change driven predictions of distribution and production of fish stocks

WP7.3. Bioeconomic model of fish commodities in the NA. Investigate consequences of CC and economic globalization in the NA fish production systems.

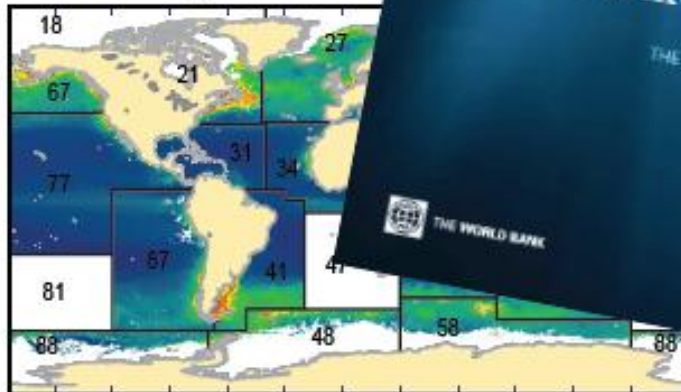
Maximum catch potential changes Using Bioclimate envelopes



Cheung et al. (2010) Global C

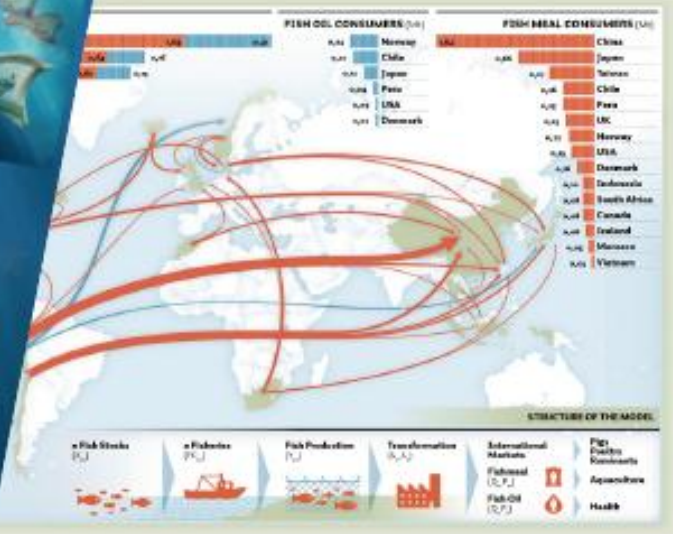
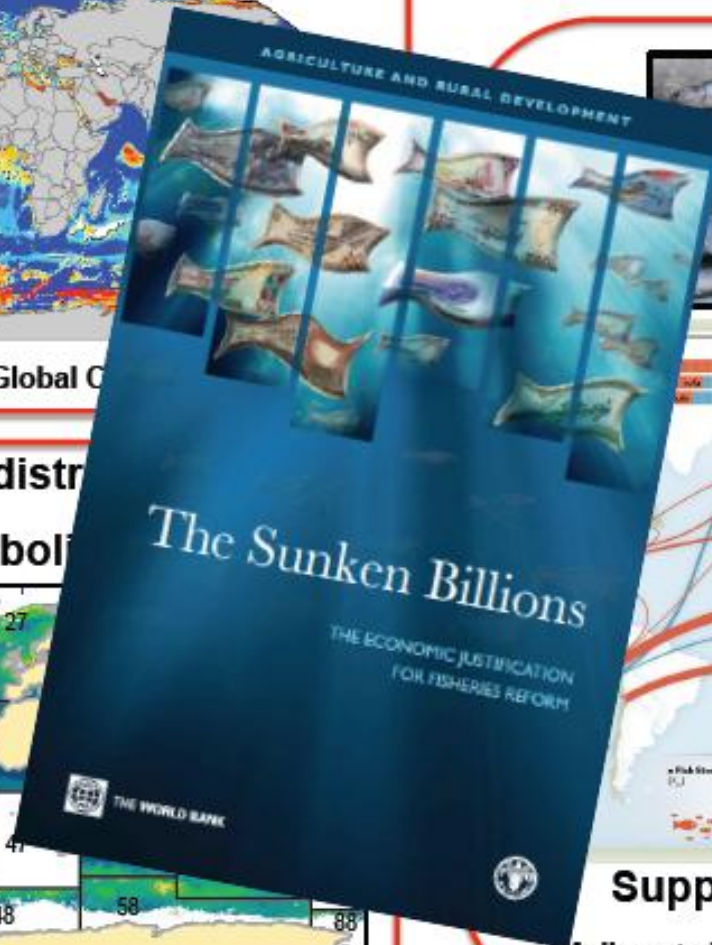


Biomass distribution Using Metabolism



Jennings et al. 2008. Proc Roy Soc.

Merino et al. Glob. 2012 Env. Change (QUEST_Fish)



Supply-demand trade models

[Mullon et al. 2009 Nat. Res. Model.; Merino et al. 2010a J Mar. Sys. and 2010b Glob. Env. Change]

WP7.2: Model description, validation and results published
in *Global change biology*. **Cool science?**

Global Change Biology

Global Change Biology (2013) 19, 2596–2607, doi: 10.1111/gcb.12231

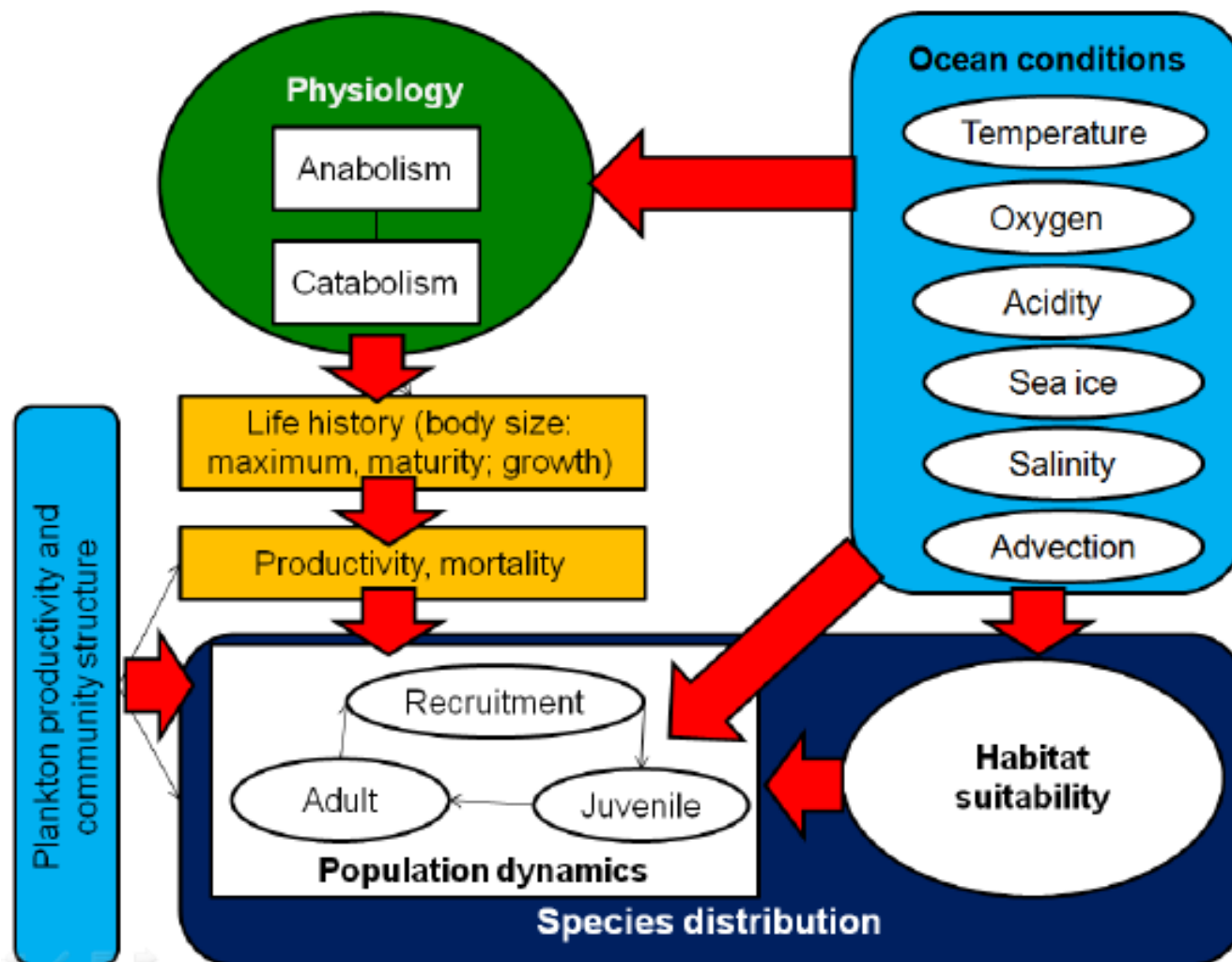
TECHNICAL ADVANCE

Modelling the effects of climate change on the distribution and production of marine fishes: accounting for trophic interactions in a dynamic bioclimate envelope model

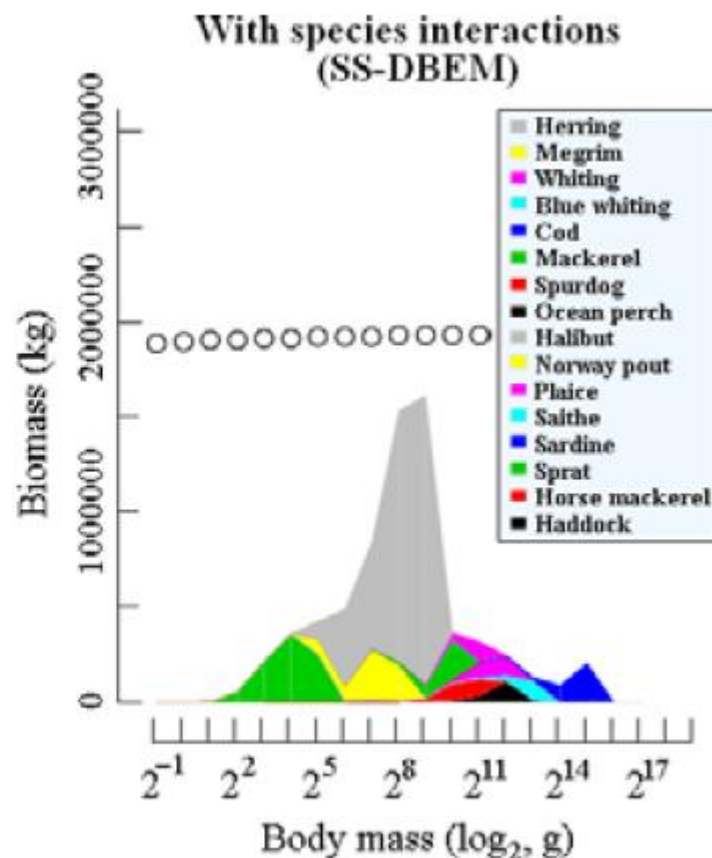
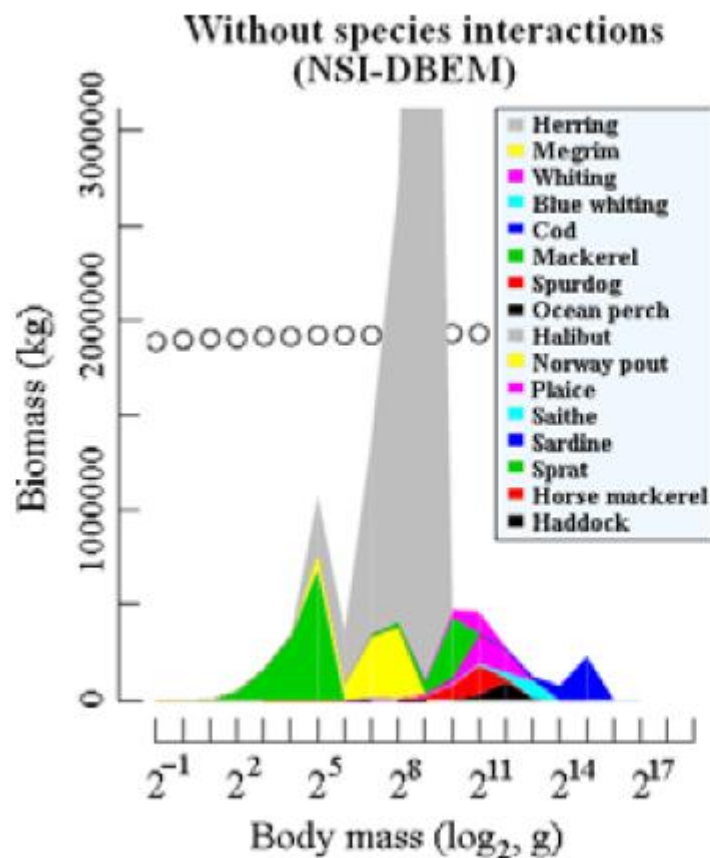
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WP7.2: Bioclimate model overview.



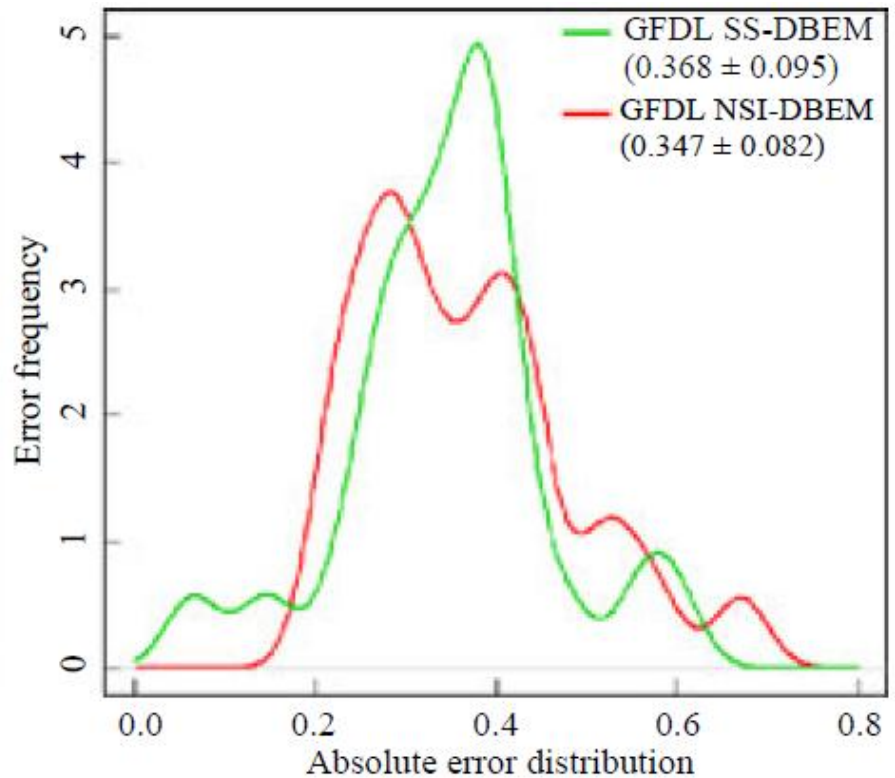
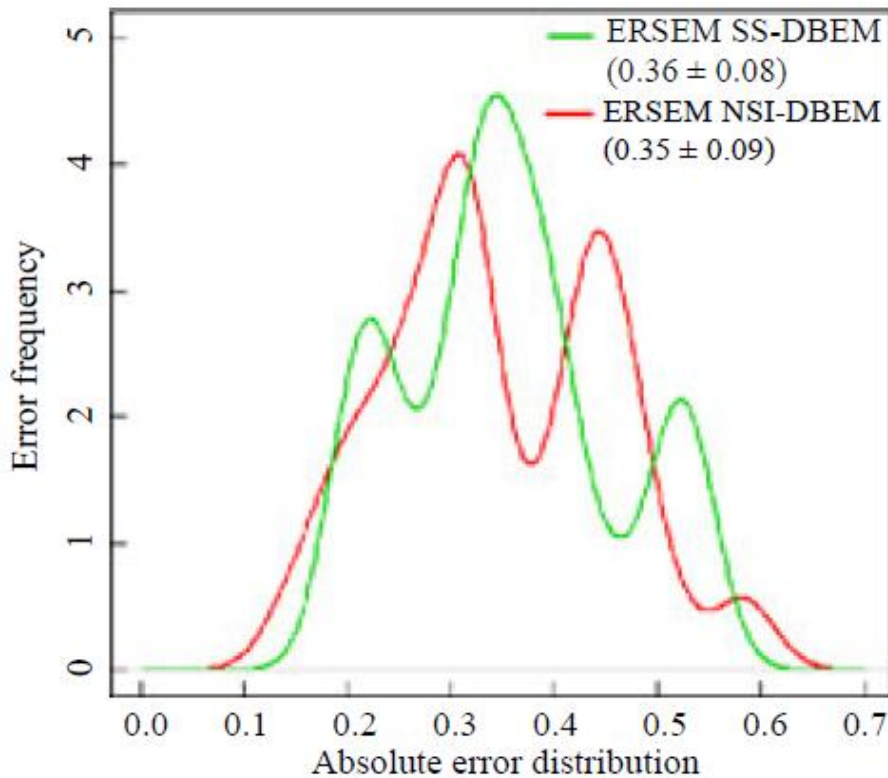
WP7.2: Model implementation of competition.



NSI: No Species interaction.

SS: Size-Spectrum based species interaction.

WP7.2: Model validation: empirical biomass from stock assessments



NSI: No Species interaction.

SS: Size-Spectrum based species interaction.

WP7.2: Modelling the effects of climate change on the distribution and production of marine fishes: accounting for trophic interactions in a dynamic bioclimate envelope model.

Predicted latitudinal shifts are, on average, reduced by 20% when species interactions are incorporated with pelagic species showing the greatest reductions.

Projection	Latitudinal Shift (km decade ⁻¹)		
	All species	Demersal	Pelagic
NSI-DBEM GFDL	16.7	14.1	26.0
SS-DBEM GFDL	13.7	12.6	18.4
NSI-DBEM ERSEM	18.1	15.2	28.2
SS-DBEM ERSEM	15.7	15.3	16.9

NSI: No Species interaction.

SS: Size-Spectrum based species interaction.

WP7.2: Fish and climate at Scarning Primary School (Norwich). Board game based on the model . Fun science?



As part of SAW trust program: science, art and writing.
http://www.sawtrust.org/classroom_projects/2012/classroom_project2012-Scarning_Primary_School.html

WP7 progress and scientific output by PML

- **WP7.2 (UEA + PML + CEFAS + UBC)**

- Paper published in Global Change Biology journal: “Modelling the effects of climate change on the distribution and production of marine fishes: accounting for trophic interactions in a dynamic bioclimate envelope model”.
- Deliverables were provided on time in December 2012.
- Fish and climate at Scarning Primary School (Norwich). As part of SAW trust program: science, art and writing. Board game based on SS-DBEM model.
- Work presented in two international conferences in 2012: Edinburg and Korea.
- The model used also in other funded projects and was presented in ICES annual conference in Reykjavík (2013): “Modelling ocean acidification impact: from biological experiments to economic assessment and social impact”.