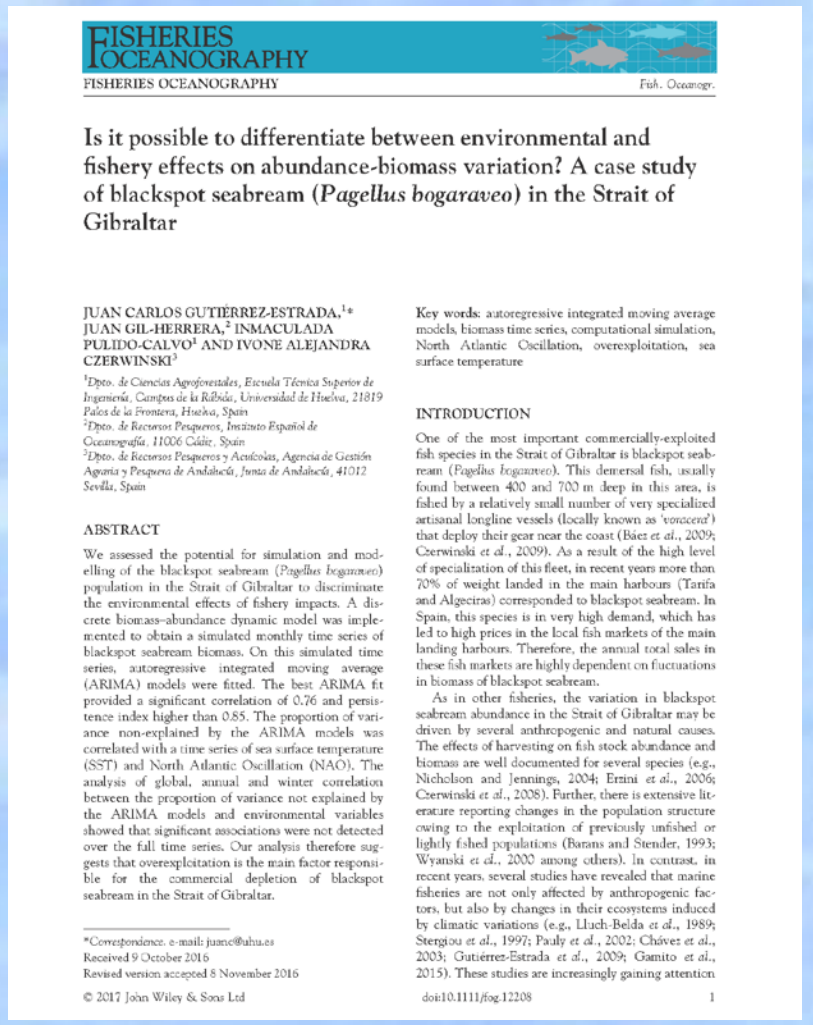
…before starting

Information uploaded to the 2017 WGDEEP sharepoint (WDs foulder)

-"The Spanish Red seabream fishery of the Strait of Gibraltar: an update of the available information (Gil *et al*., WD 2017)"

-"Is it possible to differentiate between environmental and fishery effects on abundance-biomass variation? A case study of blackspot seabream (*Pagellus bogaraveo*) in the Strait of Gibraltar (Gutiérrez Estrada *et al*., 2017)": [1]discrete biomass–abundance dynamic model to simulated Red seabream biomass, [2]AutoRegressive Integrated Moving Average (ARIMA), [3]time series of sea surface temperature (SST) and North Atlantic Oscillation (NAO). Overexploitation might be the main factor for the commercial depletion of the Strait of Gibraltar Red seabream population.



FISHERIES OCEANOGRAPHY

FISHERIES OCEANOGRAPHY Fish. Oceanogr.

Is it possible to differentiate between environmental and fishery effects on abundance-biomass variation? A case study of blackspot seabream (*Pagellus bogaraveo*) in the Strait of Gibraltar

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ABSTRACT

We assessed the potential for simulation and modelling of the blackspot seabream (*Pagellus bogaraveo*) population in the Strait of Gibraltar to discriminate the environmental effects of fishery impacts. A discrete biomass–abundance dynamic model was implemented to obtain a simulated monthly time series of blackspot seabream biomass. On this simulated time series, autoregressive integrated moving average (ARIMA) models were fitted. The best ARIMA fit provided a significant correlation of 0.76 and persistence index higher than 0.85. The proportion of variance non-explained by the ARIMA models was correlated with a time series of sea surface temperature (SST) and North Atlantic Oscillation (NAO). The analysis of global, annual and winter correlation between the proportion of variance not explained by the ARIMA models and environmental variables showed that significant associations were not detected over the full time series. Our analysis therefore suggests that overexplcitation is the main factor responsible for the commercial depletion of blackspot seabream in the Strait of Gibraltar.

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Key words: autoregressive integrated moving average models, biomass time series, computational simulation, North Atlantic Oscillation, overexploitation, sea surface temperature

INTRODUCTION

One of the most important commercially-exploited fish species in the Strait of Gibraltar is blackspot seabream (*Pagellus bogaraveo*). This demersal fish, usually found between 400 and 700 m deep in this area, is fished by a relatively small number of very specialized artisanal longline vessels (locally known as '*voracera*') that deploy their gear near the coast (Báez *et al*., 2009; Czerwinski *et al*., 2009). As a result of the high level of specialization of this fleet, in recent years more than 70% of weight landed in the main harbours (Tarifa and Algeciras) corresponded to blackspot seabream. In Spain, this species is in very high demand, which has led to high prices in the local fish markets of the main landing harbours. Therefore, the annual total sales in these fish markets are highly dependent on fluctuations in biomass of blackspot seabream.

As in other fisheries, the variation in blackspot seabream abundance in the Strait of Gibraltar may be driven by several anthropogenic and natural causes. The effects of harvesting on fish stock abundance and biomass are well documented for several species (e.g., Nicholson and Jennings, 2004; Erzini *et al*., 2006; Czerwinski *et al*., 2008). Further, there is extensive literature reporting changes in the population structure owing to the exploitation of previously unfished or lightly fished populations (Barans and Stender, 1993; Wyanski *et al*., 2000 among others). In contrast, in recent years, several studies have revealed that marine fisheries are not only affected by anthropogenic factors, but also by changes in their ecosystems induced by climatic variations (e.g., Lluch-Belda *et al*., 1989; Stergiou *et al*., 1997; Pauly *et al*., 2002; Chávez *et al*., 2003; Gutiérrez-Estrada *et al*., 2009; Gamito *et al*., 2015). These studies are increasingly gaining attention

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Developing a gadget model to assess the target Red seabream fishery of the Strait of Gibraltar

Juan Gil Herrera (IEO)
Bjarki Thor Elvarsson and Gudmundur Thordarson (HAFRO)
Gunnar Stefánsson (UoI)

MOVING TO ANALYTICAL ASSESSMENT (gadget)

gadget has successfully been used to investigate the population dynamics of some WGDEEP stocks in Icelandic waters.

The SBR in IX is not benchmarked yet

Iceland internship opportunity (grant PRX16/00437)

SPANISH AVAILABLE INFO

1 area (Strait of Gibraltar fishing grounds)
2 main ports (Tarifa and Algeciras)
Landings by market category: Monthly from 1983 to 2016
Effort info (days at sea): Monthly from 1983 to 2016
Length distributions by market category: Monthly from 1997 to 2016
Biological data (growth, maturity and… ageing?)
Tag-recapture data
Bottom trawl surveys both sides of the Strait of Gibraltar

MOROCCO AVAILABLE INFO (*in prep*.)

1 area (Strait of Gibraltar fishing grounds)
1 main port (Tangier)
Total landings: Monthly from 2001 to 2016
Effort info (days at sea): Monthly from 2001 to 2016
Length distributions: Monthly from 2009 to 2016

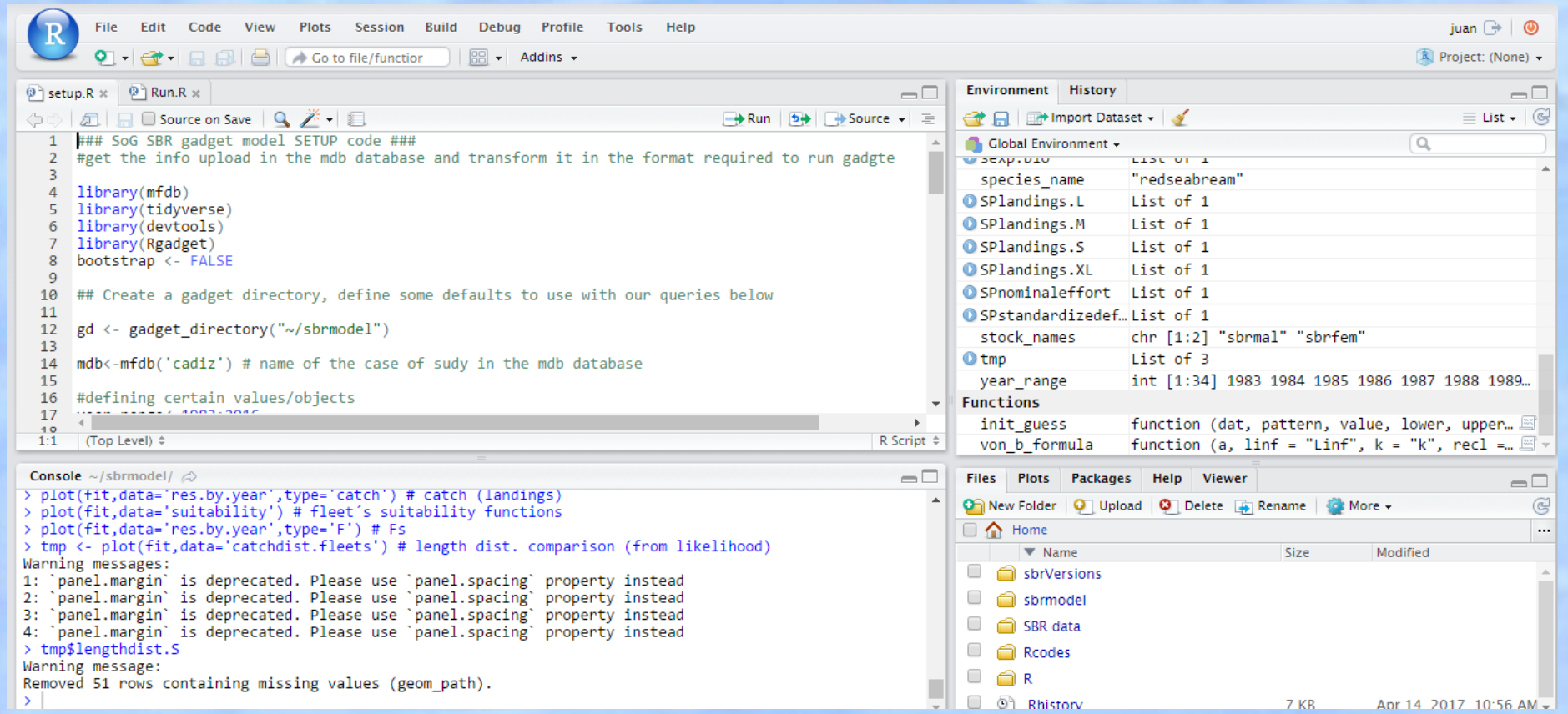
WHERE WE CURRENTLY ARE?

Total change of mind?…trying to look like Icelandic ;-)

Preliminary steps only with Spanish info

Learning the tool from tusk and ling models:

R enviroment (Rcodes and Rpackages: mfdb and Rgadget)
Raw data base (not raising samples and/or cooking recipes):mdb(cadiz)



MODEL DESCRIPTION

- One area (SoG)
- 1983 to 2016
- Steps (quarters)

Population Model

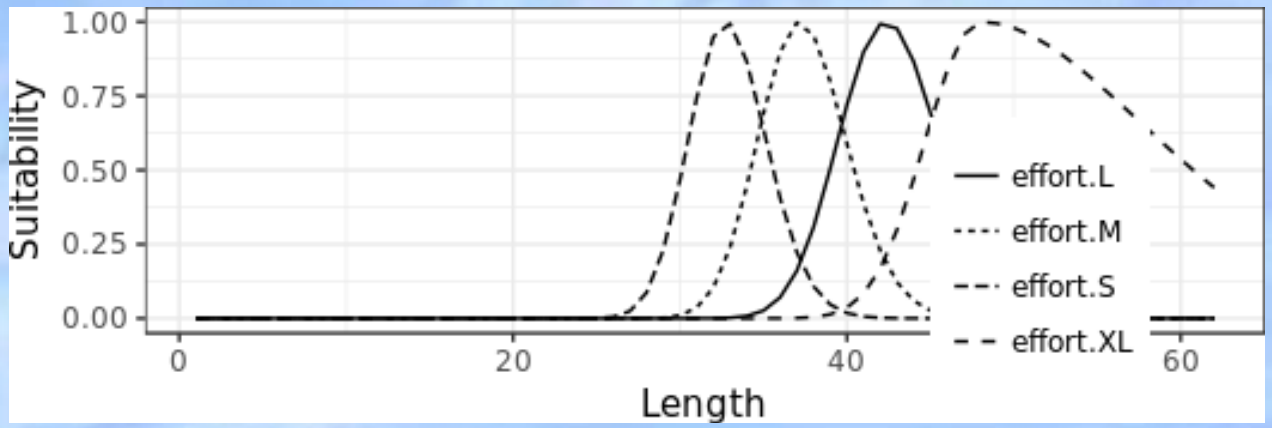
2 stock components: males and females (instead of immatures and matures)
Recruits at age 0 from 1983 to 2016, estimated by the model
Abundance at age (1 to 17) at first year (1983), estimated by the model
Growth: VBGF parameters, could be estimated by the model or fixed by the user
Length weight relationship: from biological samplings
M = 0.2 assumption for all ages every year

Fishing model

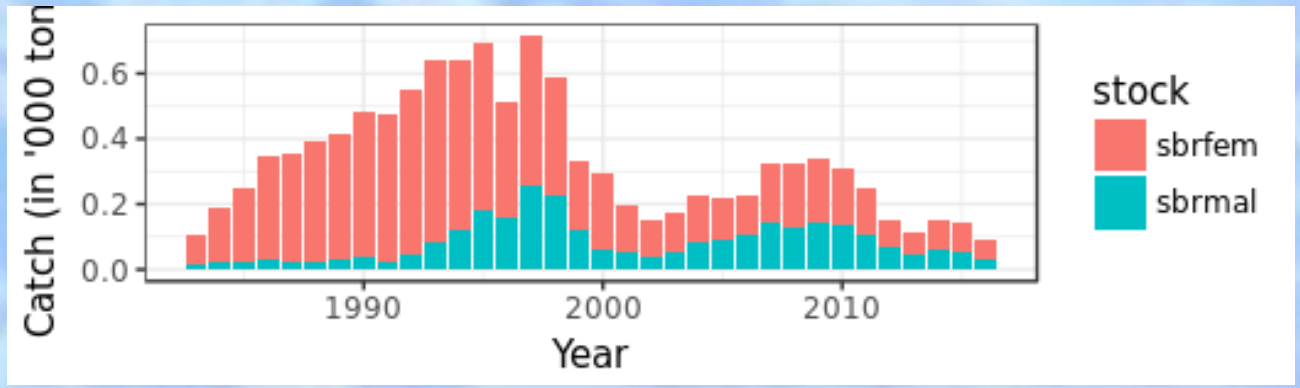
Landings length distribution were fitted to an Andersen suitability function by market category (market categories as fleets, in the case of Spanish info)

PRELIMINARY RESULTS … the fancy ones ☺

Fleet suitability (selectivity)

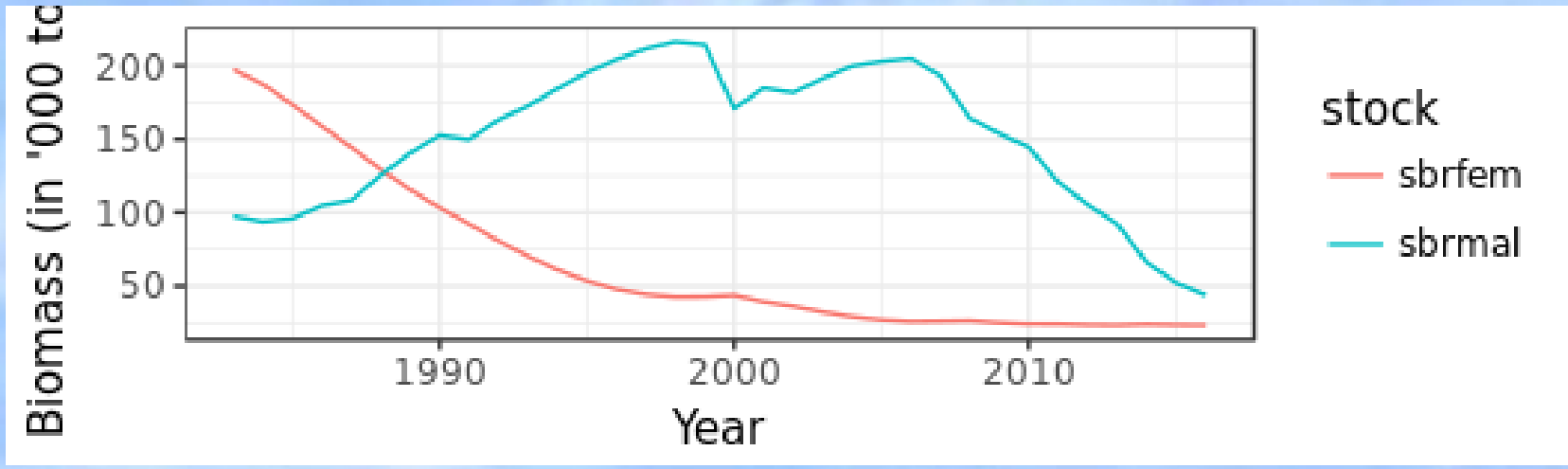


Catches

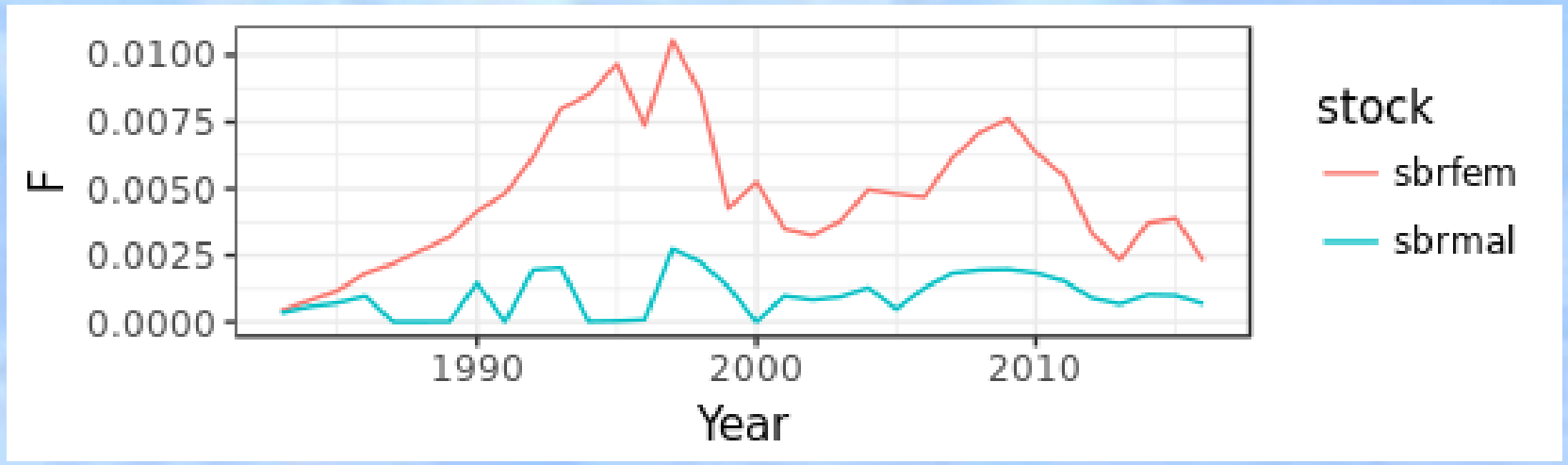


PRELIMINARY RESULTS … not so fancy ☹

Biomass (males and females)



Fishing mortality



SO….THERE´S A LOT OF WORK TO DO

Time flies, Iceland internship till 30 June.....so keep on shoveling!!

Incorporation of the rest of the available data (including Morocco info)

Explore tag-recapture

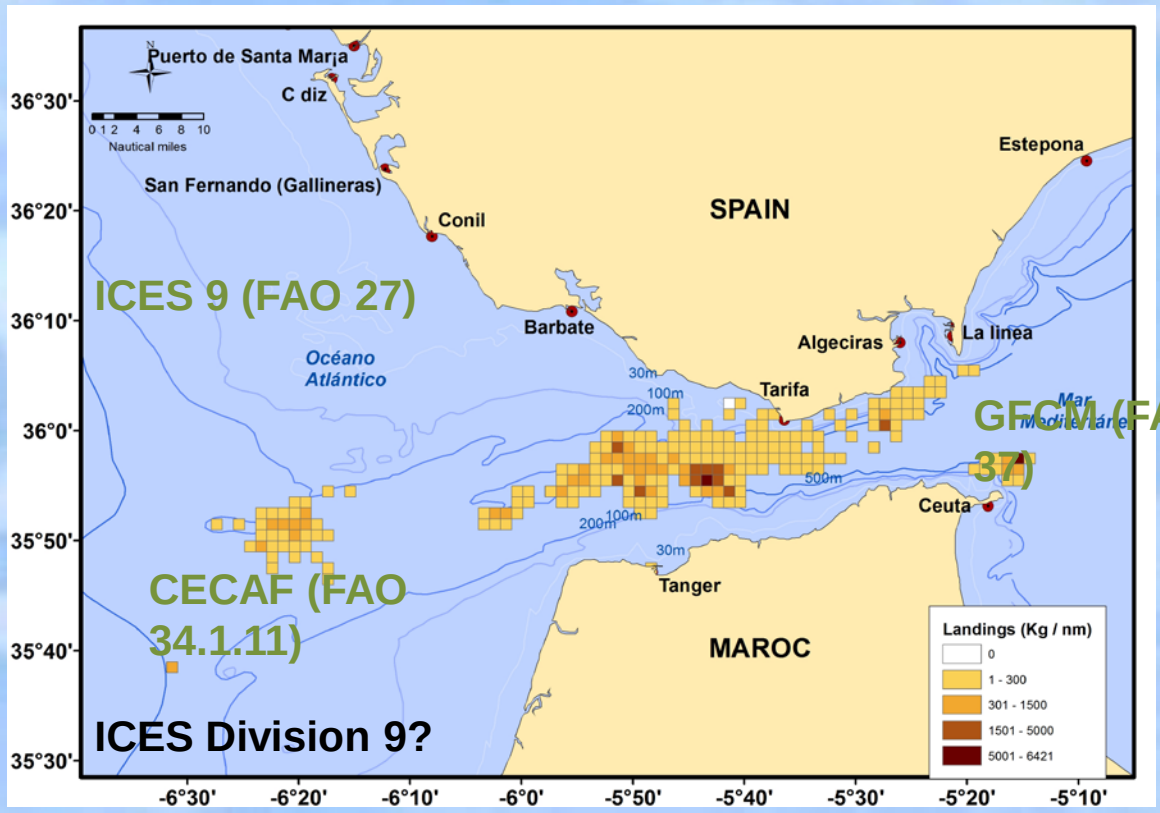
MAIN CONCLUSIONS….AND REASONS TO CARRY ON

GFCM meeting (November 2016)

But, at ICES framework the issue to include all the landings from ICES IX looks more complex. Historical landings data series coming from by-catch fisheries (Spain and Portugal) are aggregated by year and its size composition might be different than the target fishery of the Strait of Gibraltar

Any comments/ideas?

Þakka þér fyrir stuðninginn!!



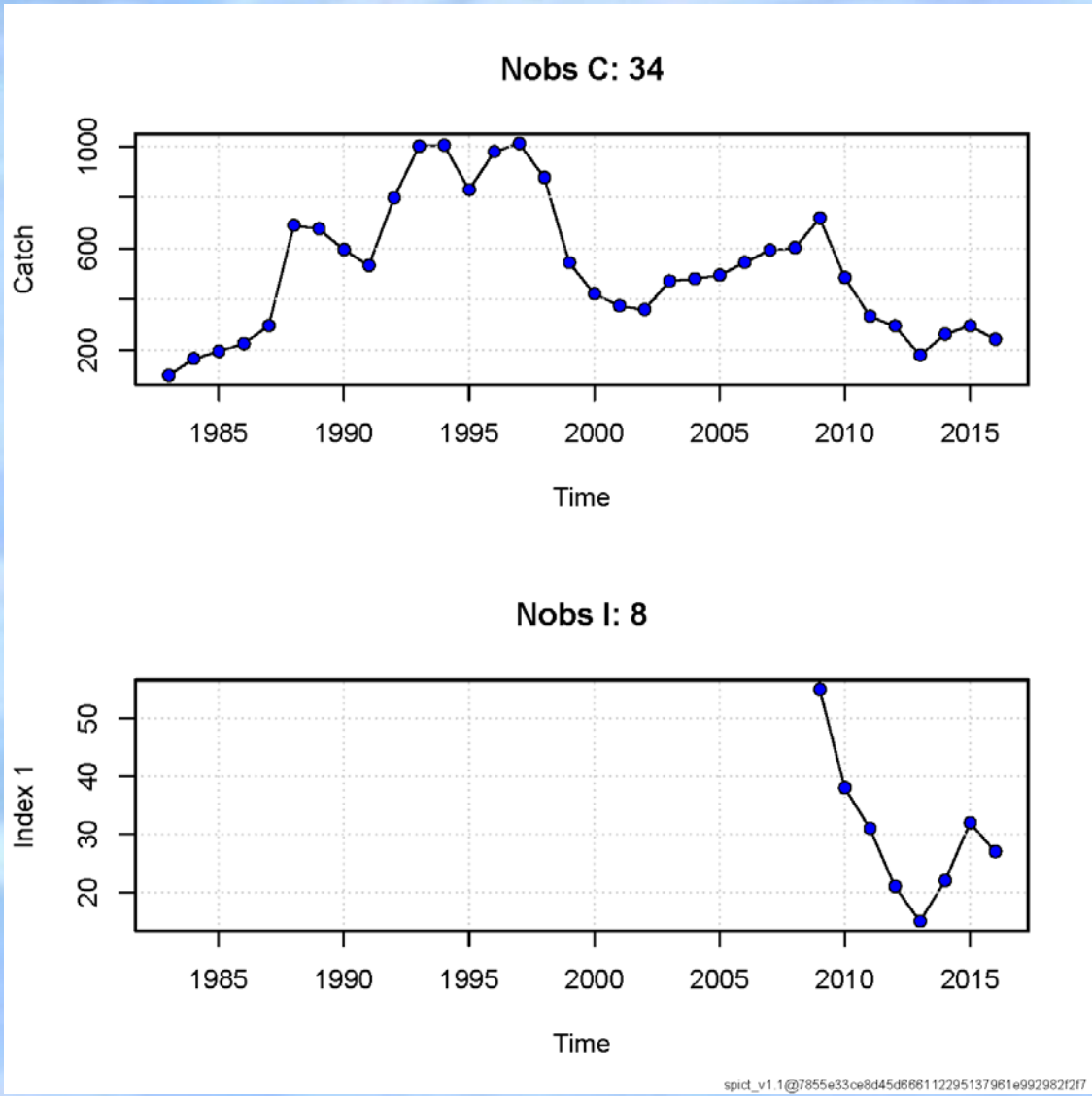
2017 ICES Working Group on the Biology and Assessment of Deep Sea Fisheries Resources (WGDEEP)

SPiCT attemp to the sbr9

Juan Gil Herrera (IEO)

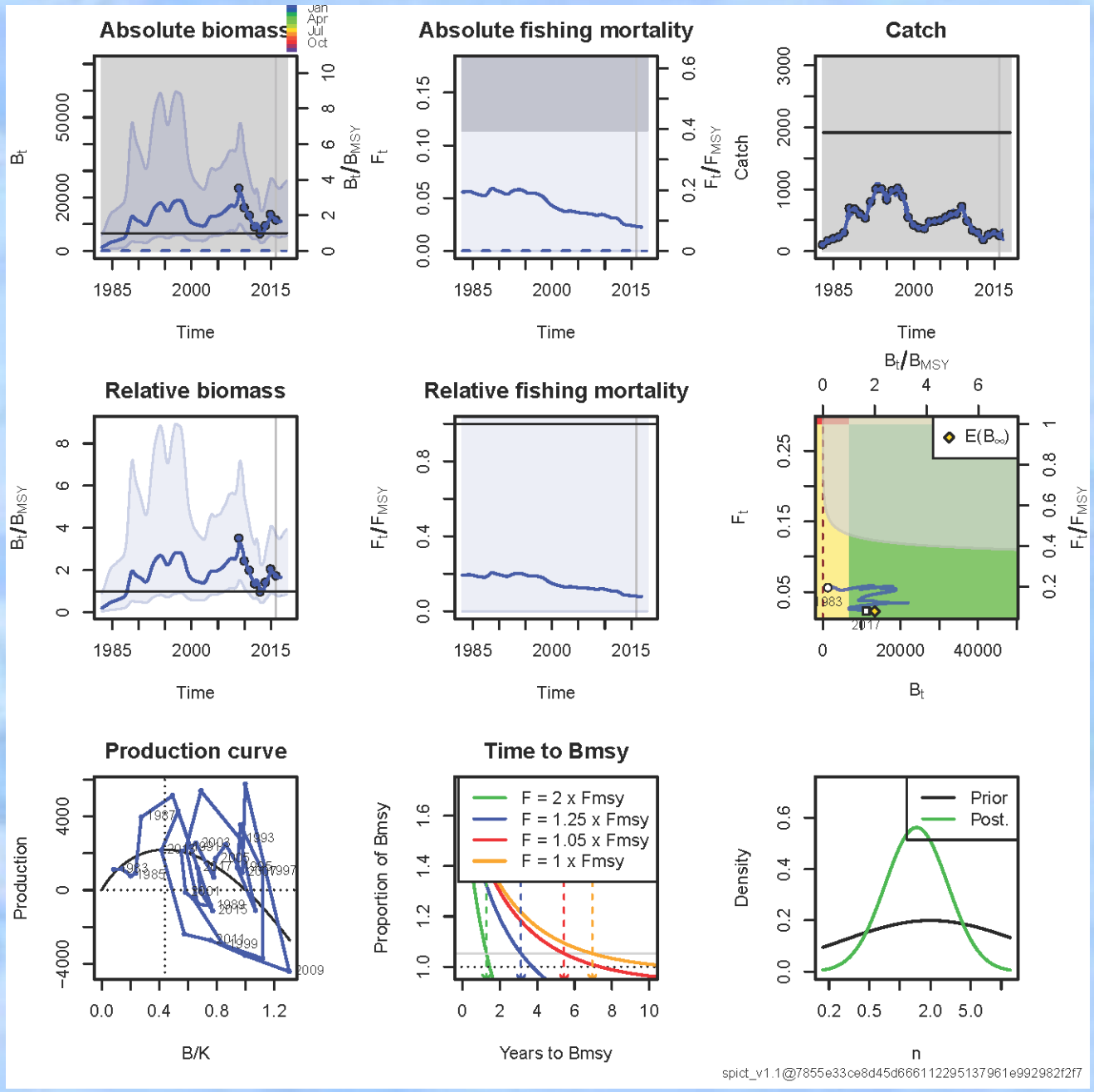
SPiCT attemp to the sbr9

Inputs



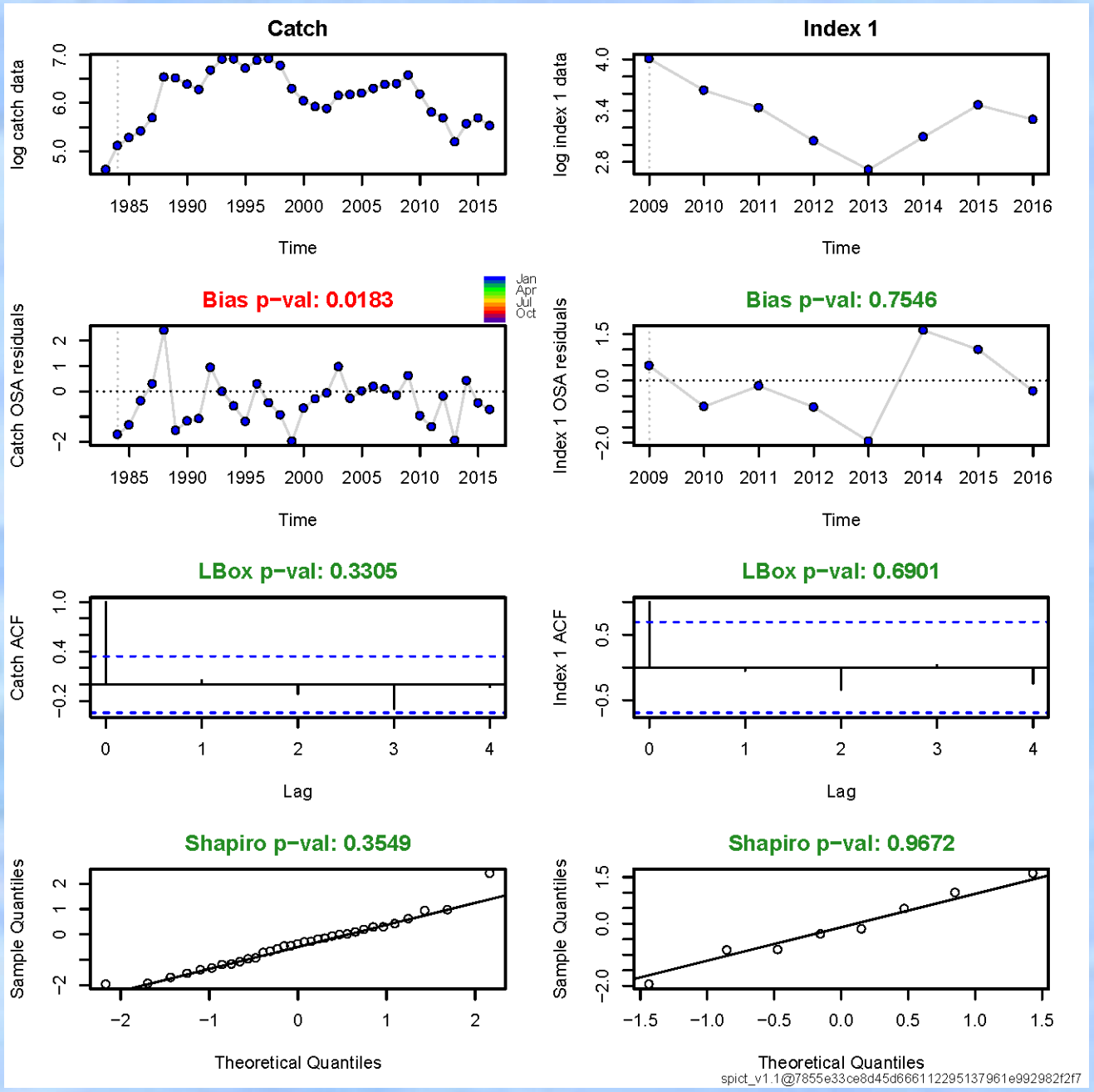
SPiCT attemp to the sbr9

Model results summary



SPiCT attemp to the sbr9

Model residuals analysis:



SPiCT attemp to the sbr9

Retro analysis: