Storyline # 13

SEABREAM AND SEABASS IN WESTERN MEDITERRANEAN AND ATLANTIC COASTS OF SOUTHERN EUROPE

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CERES Final Meeting

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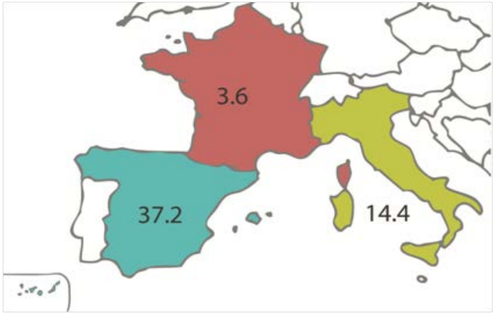
This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678193.

Introduction



Total production in 2017 (x1000 tons) (data from FAO, FEAP and APROMAR)

- ✓ Gilthead sea bream (*Sparus aurata*) and European seabass (*Dicentrarchus labrax*) are the main species currently farmed on a large scale in South Europe.
- ✓ **Total aquaculture production** of sea bream and sea bass in Europe: **339,724 tons** in 2017 (FAO, 2018; FEAP, 2018)
- ✓ **First-sale value** of the sea bream and sea bass Mediterranean aquaculture: **1,814 million Euros** (FAO, 2018; FEAP, 2018)
- ✓ The main producers countries in West Europe were Spain, Italy and France

How climate change will affect seabream and seabass culture in Western Mediterranean and Atlantic coast of Southern Europe and how should fish farms adapt to ocean warming?

Main Findings & Results

T1.1

- Model of environmental conditions. *PML*

WP3
Biological consequences

- T3.1. Direct effects. *UHAM, IEO*

WP3
Biological consequences

- T3.2 Indirect effects. *IPMA*

T3.3

- Modelling impact in aquaculture productivity. *LLE*

T4.2

Economic consequences

- Typical farm aproach. *TI-SF*
- Updated a global fishmeal and fish oil model. *PML*

WP5

- Bow-Tie. *UHULL*

Main Findings & Results

T1.1

- Model of environmental conditions. *Susan Key*

WP3
Biological consequences

- T3.1. Direct effects. *Marta Moyano, Virginia Martín*

WP3
Biological consequences

- T3.2 Indirect effects. *Antonio Marques*

➢ Modelled of environmental conditions and projected change under different scenarios in West Mediterranean and South Atlantic (PML)

WP5

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"World market scenario" "Global sustainability scenario"

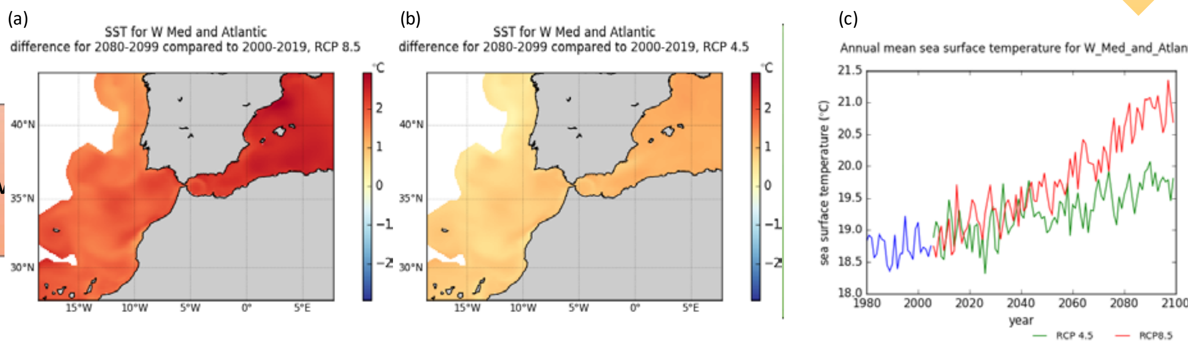

Figure 2 Projected changes in sea surface temperature for Western Mediterranean/Atlantic coasts of Southern Europe. Mean temperatures for mid and end-century under RCP 8.5 (a) and RCP 4.5 (b). (c) Annual mean for the same region.

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Collecte

(UHAM, DTU, HCMR, IEO, IPMA, DLO, IMR, INCDDD, CSIC, ICR)

•Data-reviews on direct and indirect effects on seabream and seabass production.

•A meta-analytical approach to analyze quantitatively the collected data.

T4.2

WP5

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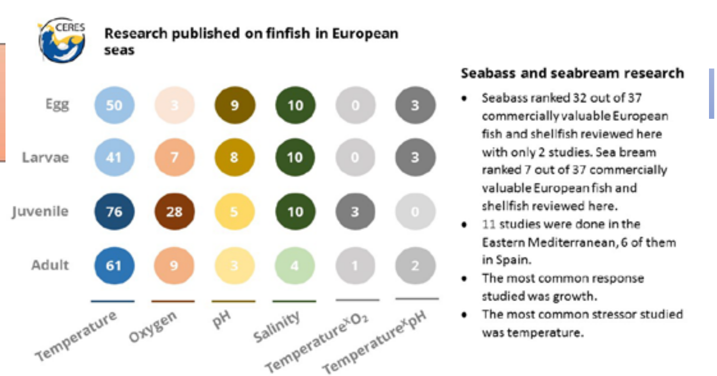

T3.3

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Combined effect of temperature and feed restriction on growth, survival and stress biomarkers of farmed seabream juveniles (IEO)

Estimation of critical thermal limits (CT) in seabream and seabass larvae and early juveniles (UHAM)

Impact of toxic algal exposure on farmed seabream under warming and acidification (IPMA)

Effect of acidification on Fish-jellyfish interactions (IPMA)

Main Findings & Results

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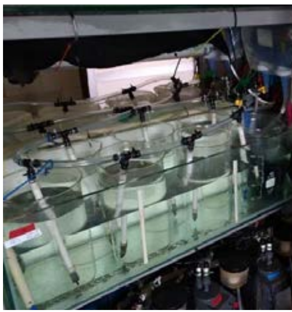
Mortalities rates are not significantly affected by temperature, pH or feed restriction

Seawater warming may promote toxin accumulation in fish during HABs



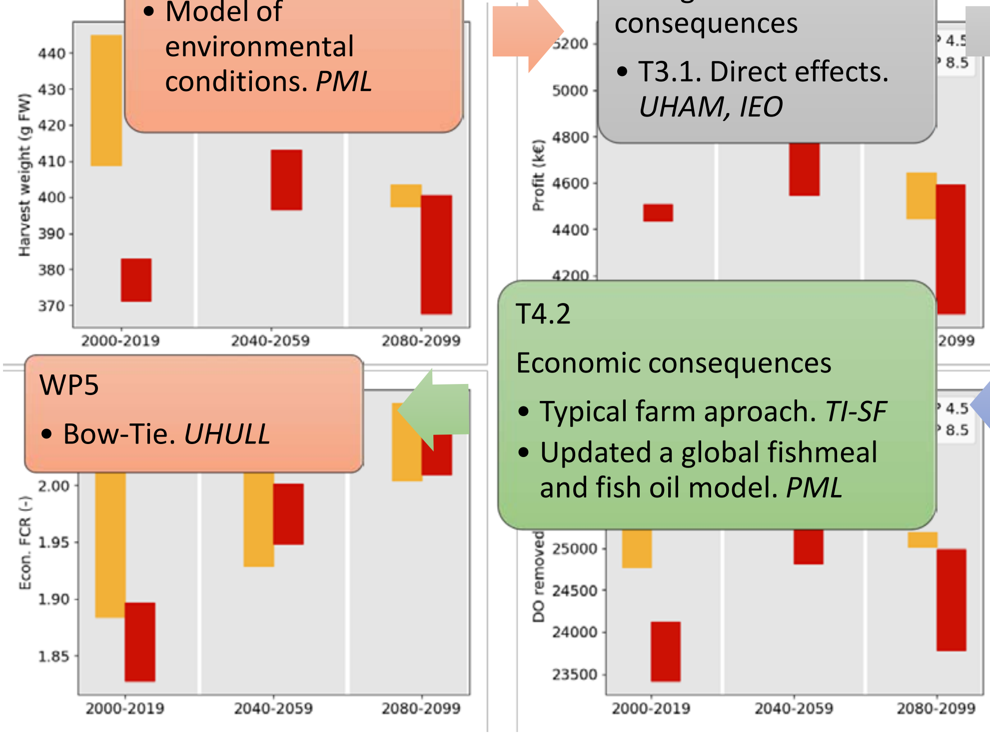
Seawater warming promote increased growth and intake regardless of the food restriction

Acidification conditions result in a higher vulnerability of bream to jellyfish predation.

Main Findings & Results

✓Individual growth model (WinFish) and Population model (FARM model) were developed for seabream

✓FA[...] e typical se[...]
Med[...] mate chan[...]



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✓ Gr[...] greate[...] scenario, although they tend to converge with tim[...]
✓ Under both em[...]n scenarios the **feeding efficiency** of sea bream diminishes as climate chan[...]
Conv[...]

T4.2

Economic consequences

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Range of FARM outputs for the typical sea bream farm in the Western Med under the different climate change scenarios. Blue and orange lines represent the minimum and maximum simulation values for the low-emission scenario and yellow areas represent the spread of simulation values for the high-emission scenario. LW: live weight; DO: dissolved oxygen.

Main Findings & Results

Typical sea bass farm from Canary Islands (ES-BSS-1224):
- Annual production 1224 tons
- Main cost factors
  - feed costs 61.67%
  - stocking costs 18.13%
  - labour costs 9.16%.

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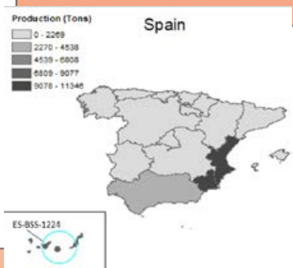

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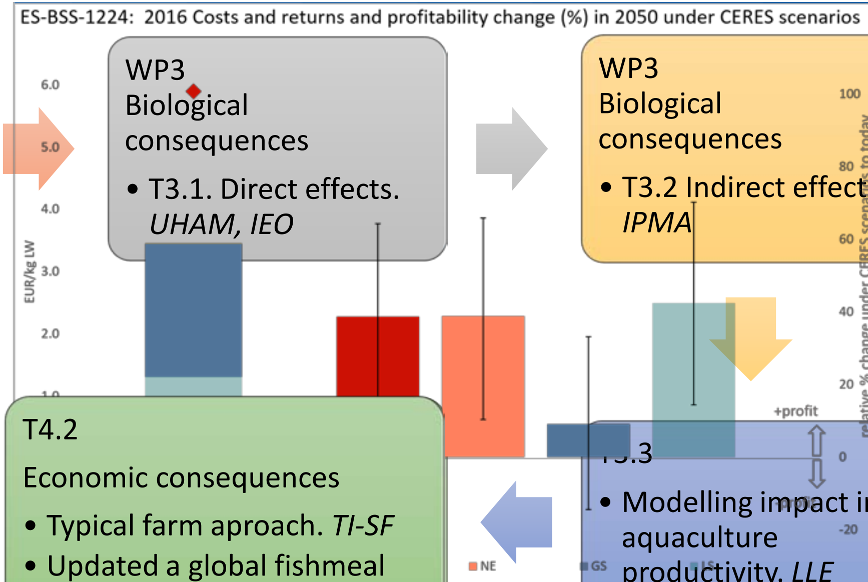
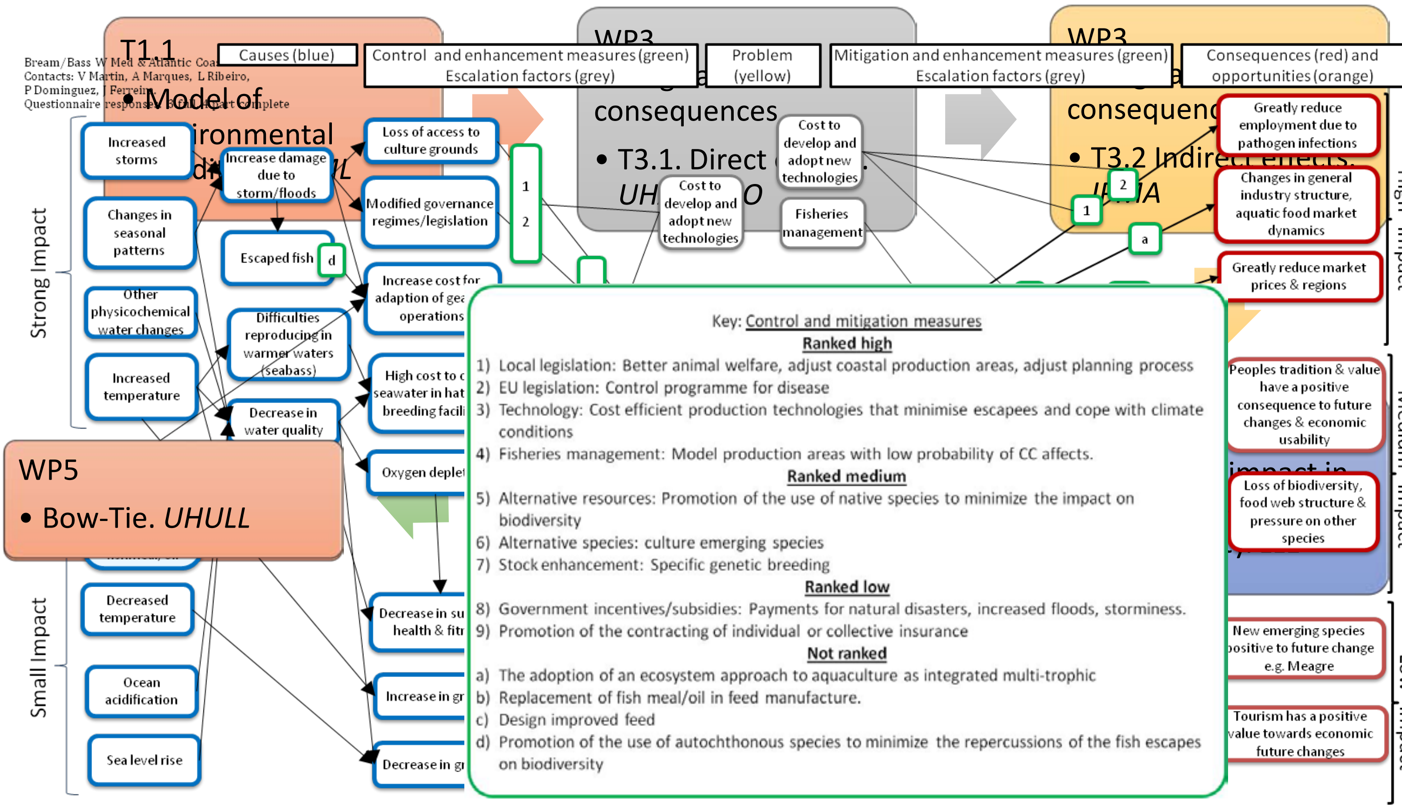


... typical Spanish seabass farm (ES-BSS-1224) ... ability (returns against costs) in the year 2050 under the CERES scenarios World Market = WM, National Enterprise = NE, Global Sustainability = GS, Local Stewardship = LS compared to today (right). Error bars indicate 95% upper and lower probability ranges from Monte Carlo simulation results. Grey lines indicate higher or lower profitability compared to 2016.

Main Findings & Results



Main Findings & Results

WP5

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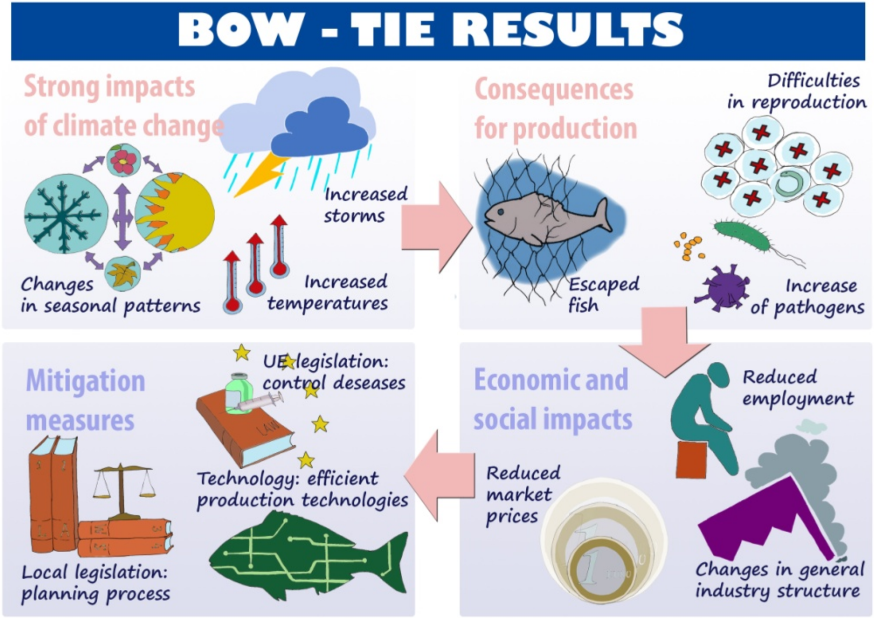

Main Findings & Results

Main recommendations

- Simplify certain administrative procedures. Regulations and administrative procedures appropriate to the possible adaptation measures of the facilities.
- Diversification of species. Development of techniques for rearing and production of the new species for aquaculture including promotion of the use of native species.
- Proper planning and management of aquaculture sites. Facility designs to minimize massive leaks.
- Control diseases. Implementing severe biosecurity programs.

Stakeholder Engagement

- Large corporations do not provide any information about their activity

- Small fish farms were more collaborative. They are more concerned about looking for practical solutions to the day to day problems.

CERES

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Thanks for your attention

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THÜNEN · IPMA Instituto Português do Mar e da Atmosfera · PML Plymouth Marine Laboratory · University of Hull · LONGLINE ENVIRONMENT · UH Universität Hamburg DER FORSCHUNG | DER LEHRE | DER BILDUNG