

Mussel aquaculture in Galicia (NW Spain)

Simulation case study

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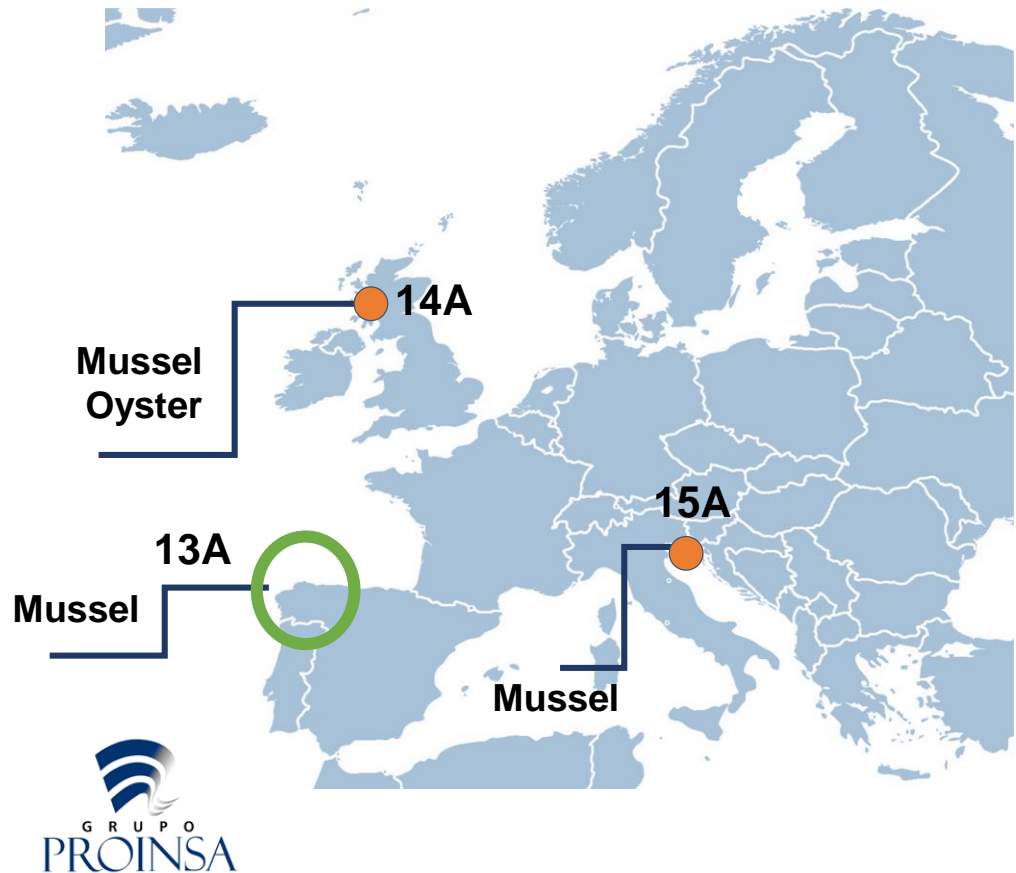
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677039



Shellfish aquaculture in Galicia

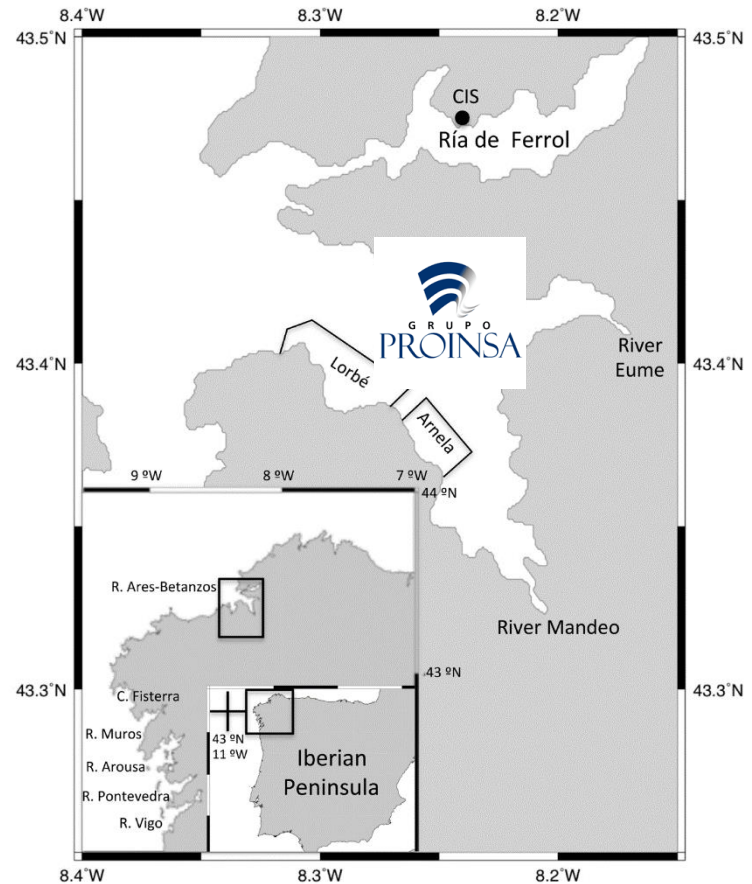
- Mediterranean mussels.
- Raft suspended culture in the Galician Rías.



Shellfish aquaculture in Galicia

Stakeholders

- Local producers (PROINSA)
- Departments of Marine Affairs and Environment (Regional Admin.)
- INTECMAR

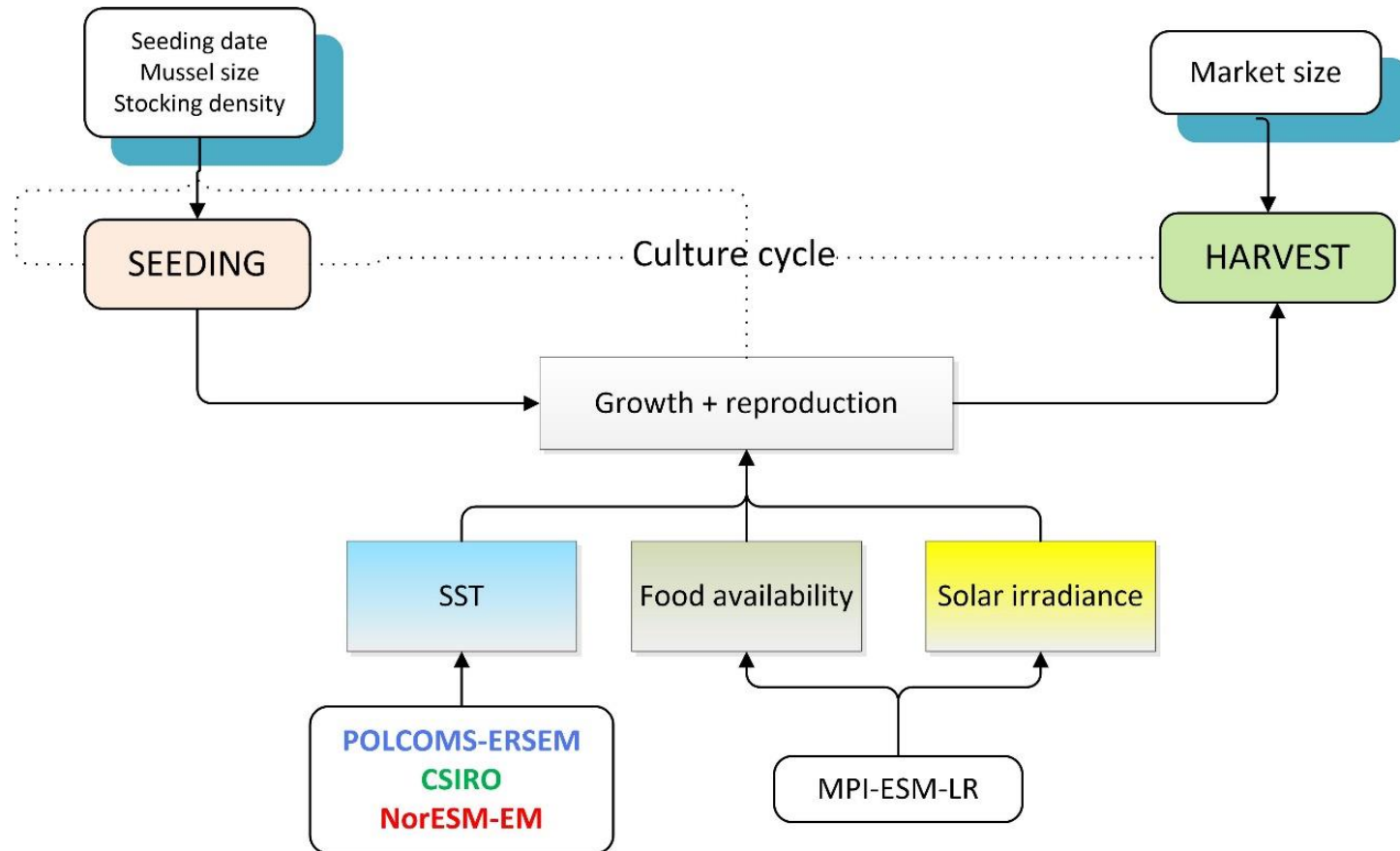


Co-creation approach

- Galician mussel culture is the **main aquaculture industry of Spain**. Galicia is the 2nd producer in the World.
- Not modelled stressors such as harmful algal blooms, extreme weather events were considered in CAPs.
- C13A followed the double loop of co-creation with stakeholders.

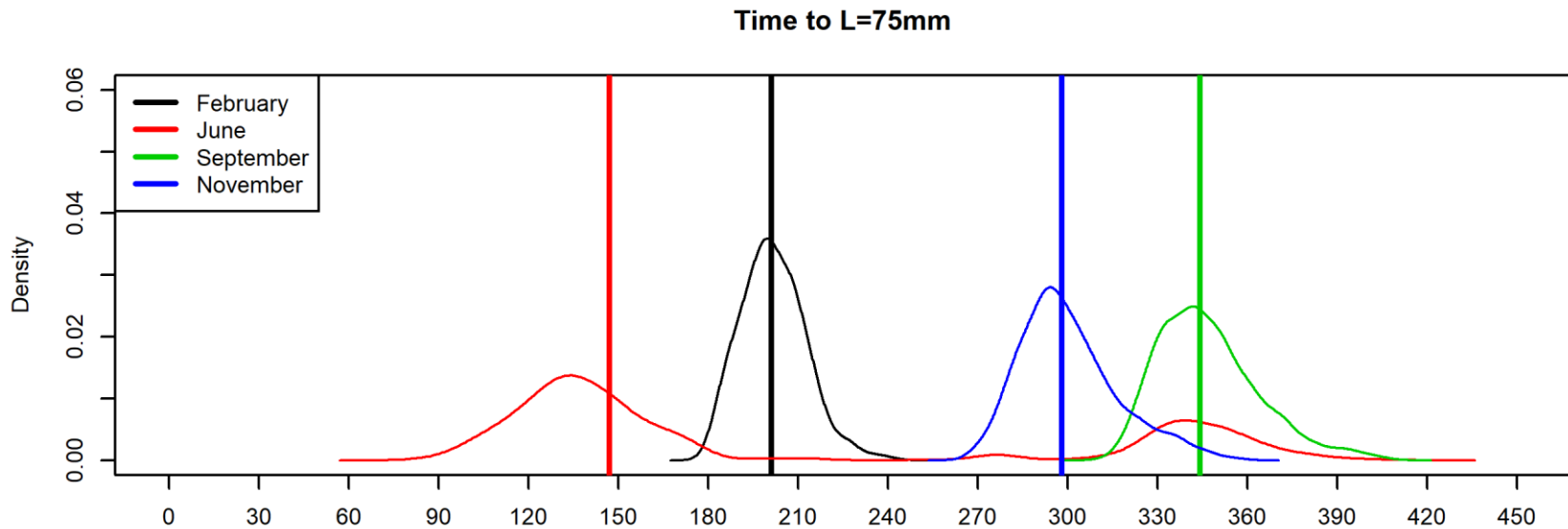


Biological forecasting



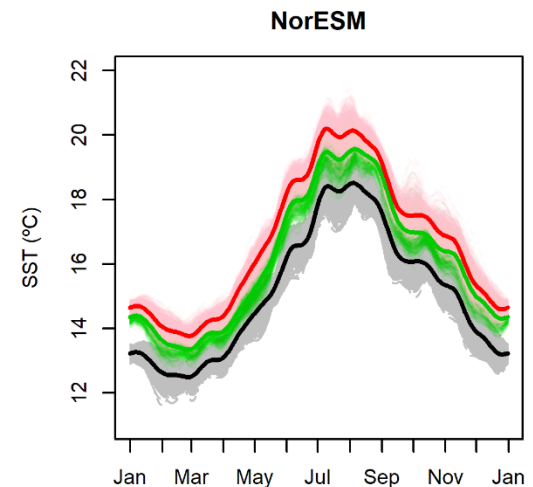
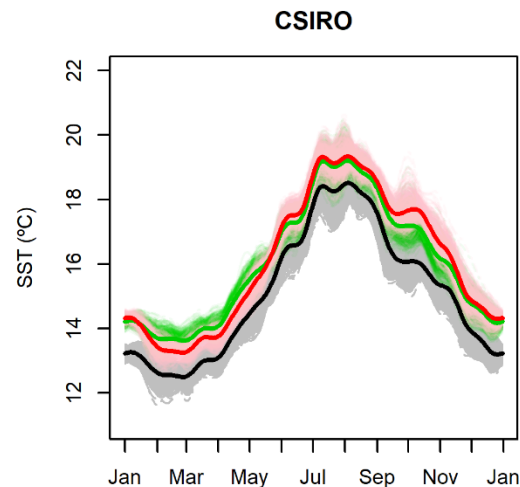
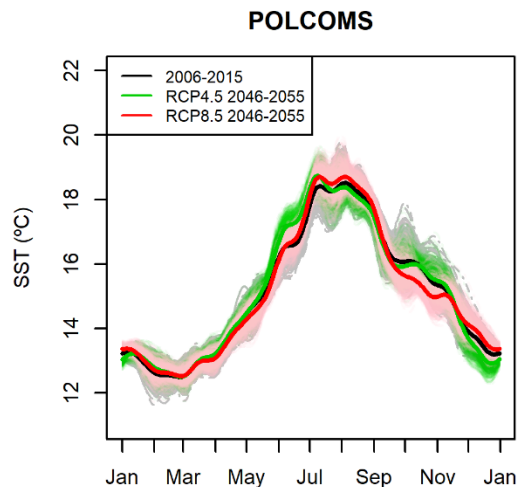
Biological forecasting

- **Management:** culture length depends on seeding date.



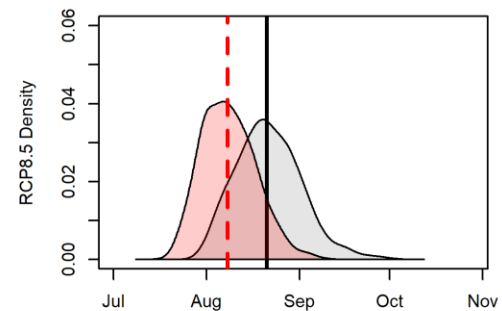
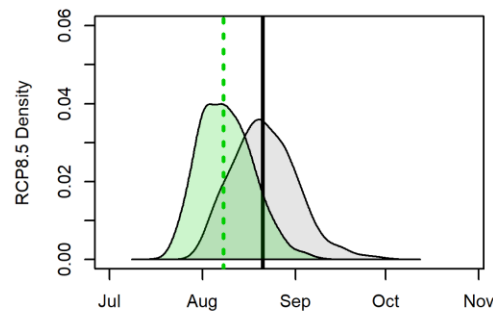
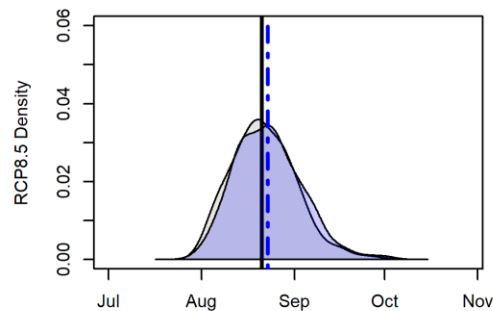
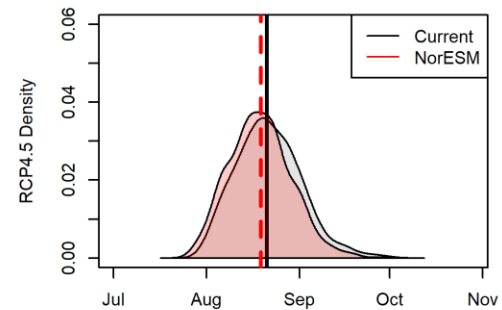
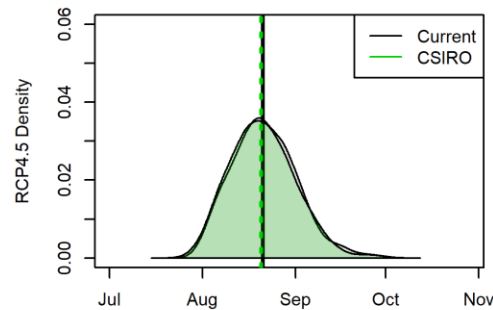
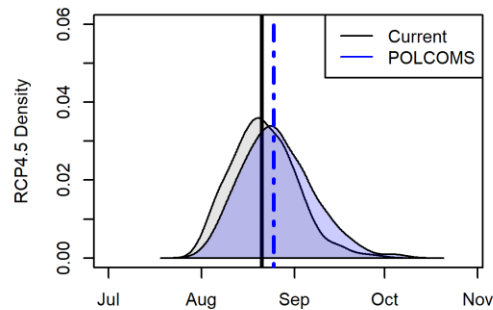
Biological forecasting

- **ENVIRONMENTAL INPUTS:** SST may remain stable (POLCOMS) or increase between 1^o (winter) and 2^o (summer) in 2050 (NorESM) under RCP8.5.



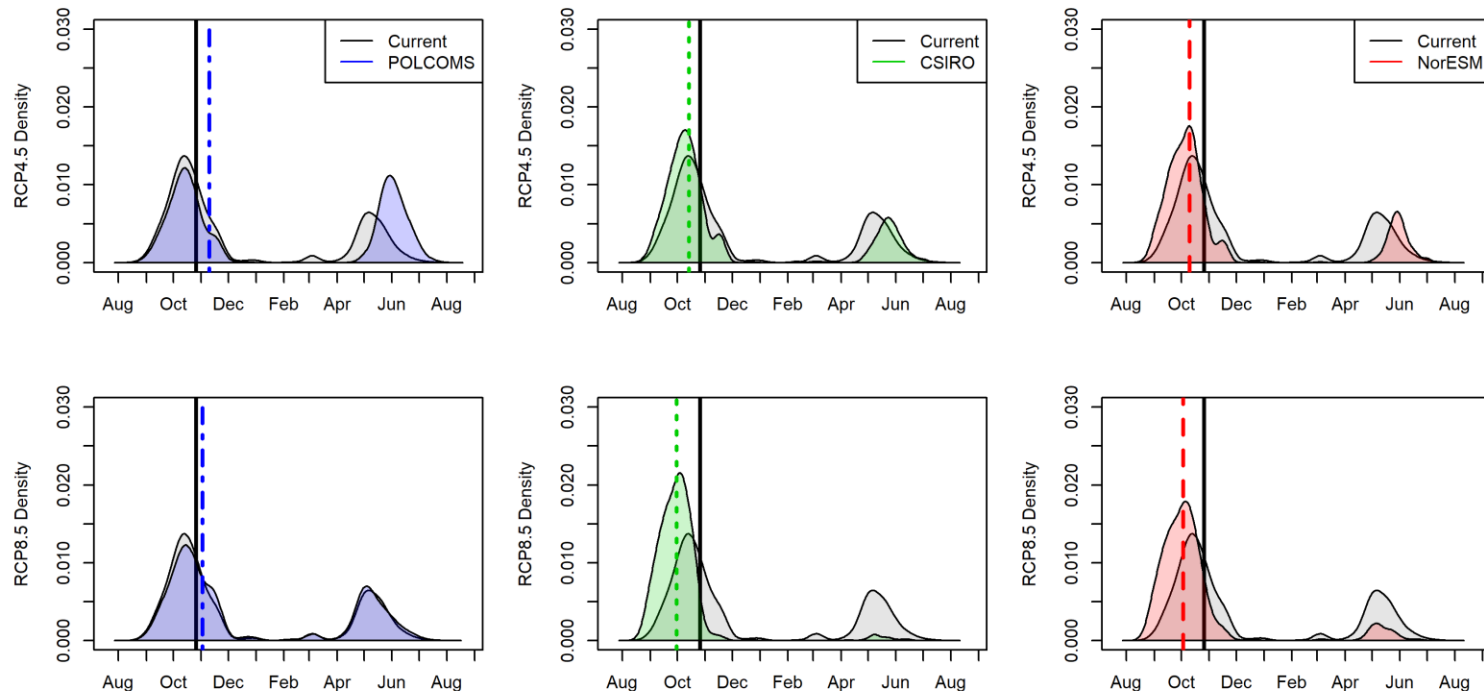
Biological forecasting: February

- Faster growth under RCP8.5 (CSIRO, NorESM-EM)



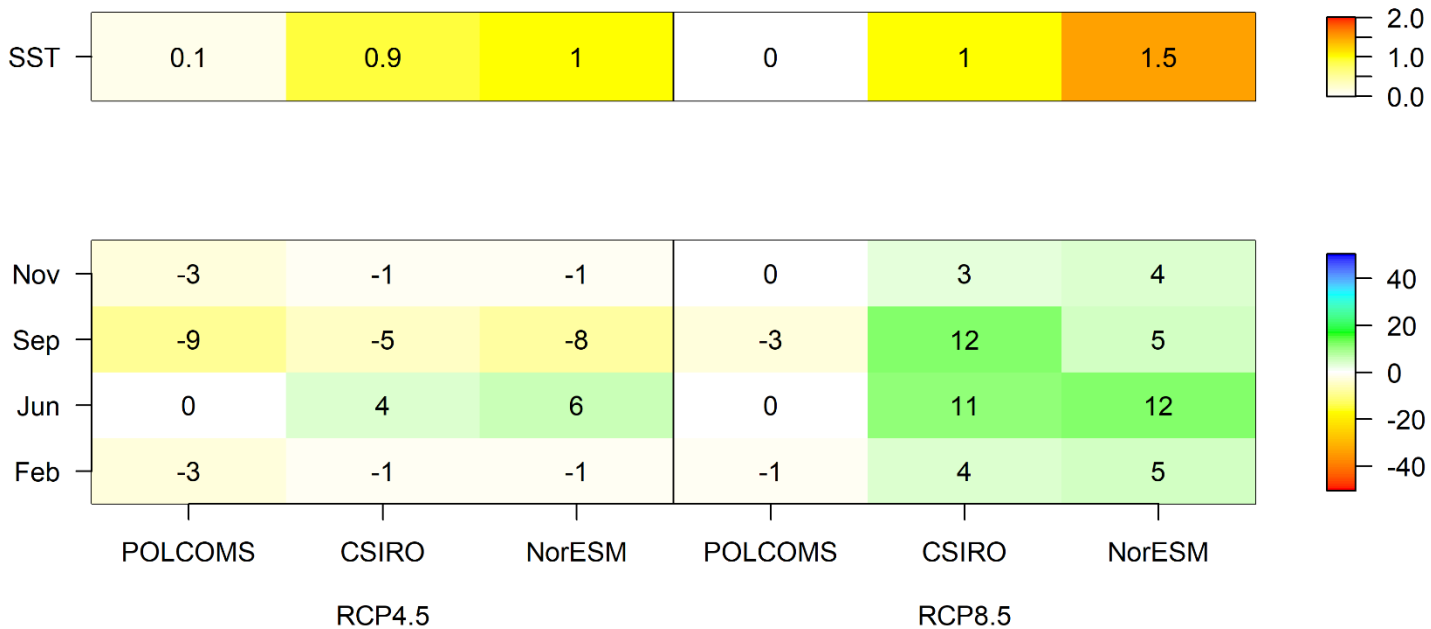
Biological forecasting: June

- Higher chance of harvesting in autumn under RCP8.5 (CSIRO, NorESM-EM).



Biological forecasting

- SST increase favors mussel growth (5-10% by 2050).



Major risks and opportunities

OPPORTUNITIES

- Faster mussel growth.

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- Faster mussel growth.

RISKS

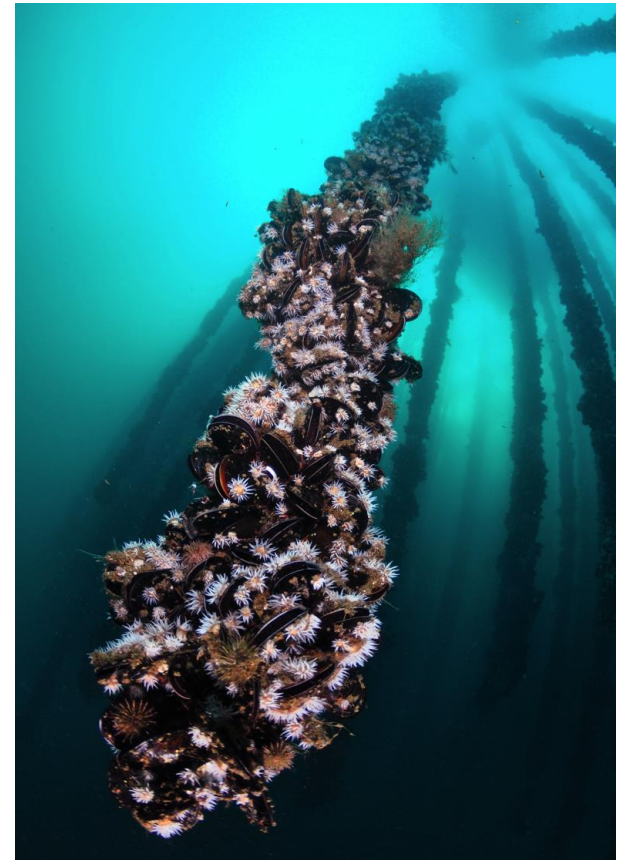
- More presence of seed predators.
- Increase of extreme storm events.
- Harmful algal blooms.



Opportunity: faster mussel growth

IMPACT

- Slight reduction (5-10%) of culture length.



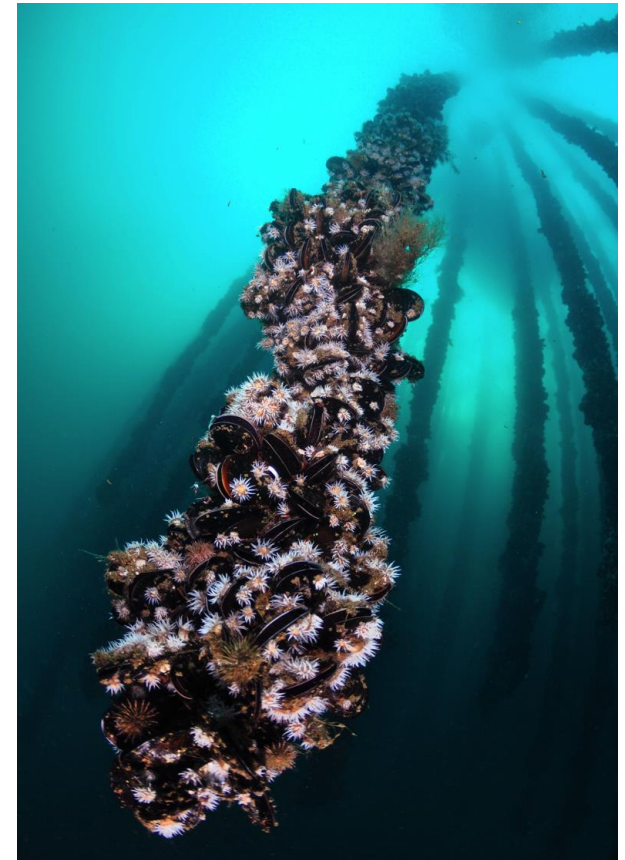
Opportunity: faster mussel growth

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ADAPTATION PLAN

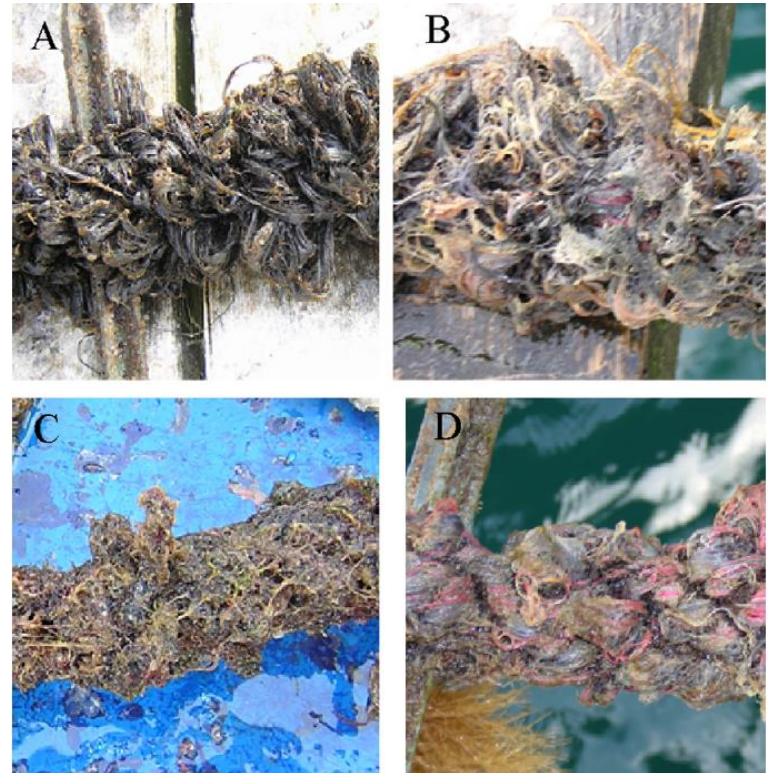
- Adapt culture strategies to optimize the impact of faster growth on productivity.



Risk: seed predators

IMPACT

- Reduced seed availability.



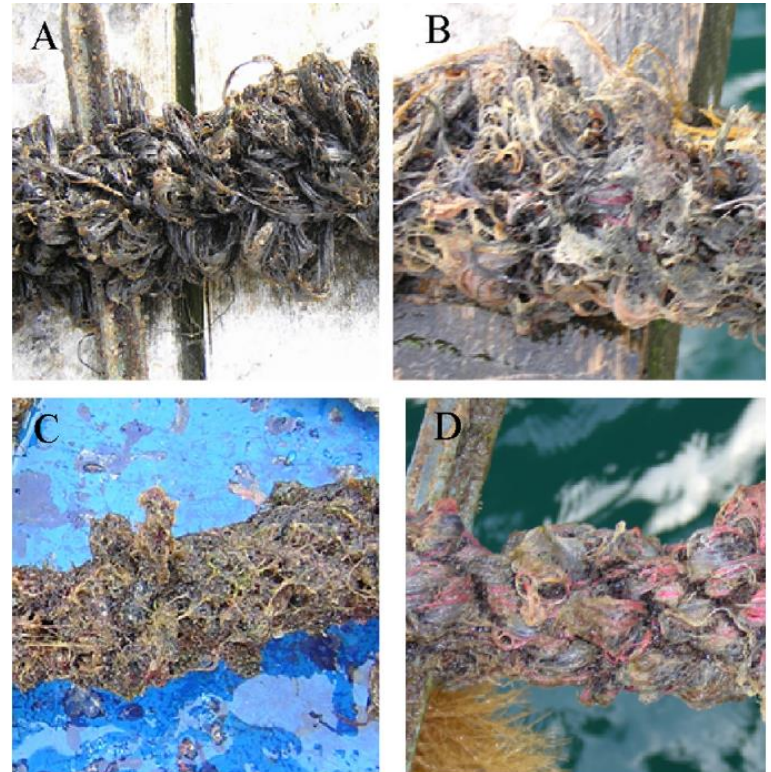
Risk: seed predators

IMPACT

- Reduced seed availability.

ADAPTATION PLANS

- Surround rafts with protection nets.
- Selective fishing of predators.



Risk: extreme storms

IMPACT

- Detachment of mussels.
- Loss of rafts.



Risk: extreme storms

IMPACT

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ADAPTATION PLANS

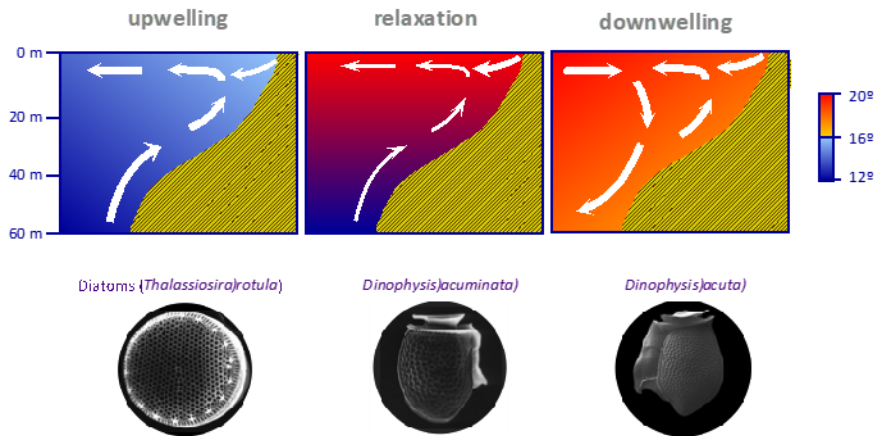
- Early warning systems.
- Insurances/subsides



Risk: Harmful algal blooms

IMPACT

- Larger harvesting closures.



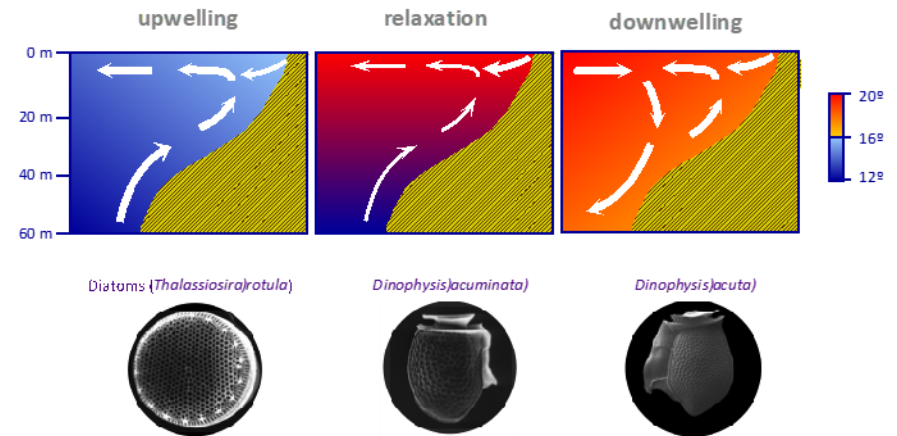
Risk: Harmful algal blooms

IMPACT



- Larger harvesting closures.

ADAPTATION PLANS

- Early warning system.
- Mussel decontamination.
- Partial closure of culture areas.



Adaptation measures

	Protection nets and selective fishing of predators.
	Early storm warning systems. Insurances/subsides.
	Early HAB warning system. Mussel decontamination.
	Design culture strategies that optimize the impact of faster growth on productivity. Orient production to medium-large sizes.



Future challenges

Prediction of **climate change impacts on local level** requires:

- Upscaling the biological model to the farm and ecosystem level
- Forecasting climate change impacts on:
 - Reproduction and settlement patterns of mussels.
 - Presence of predators in the area.
 - Extreme weather events.
 - Harmful algal blooms.



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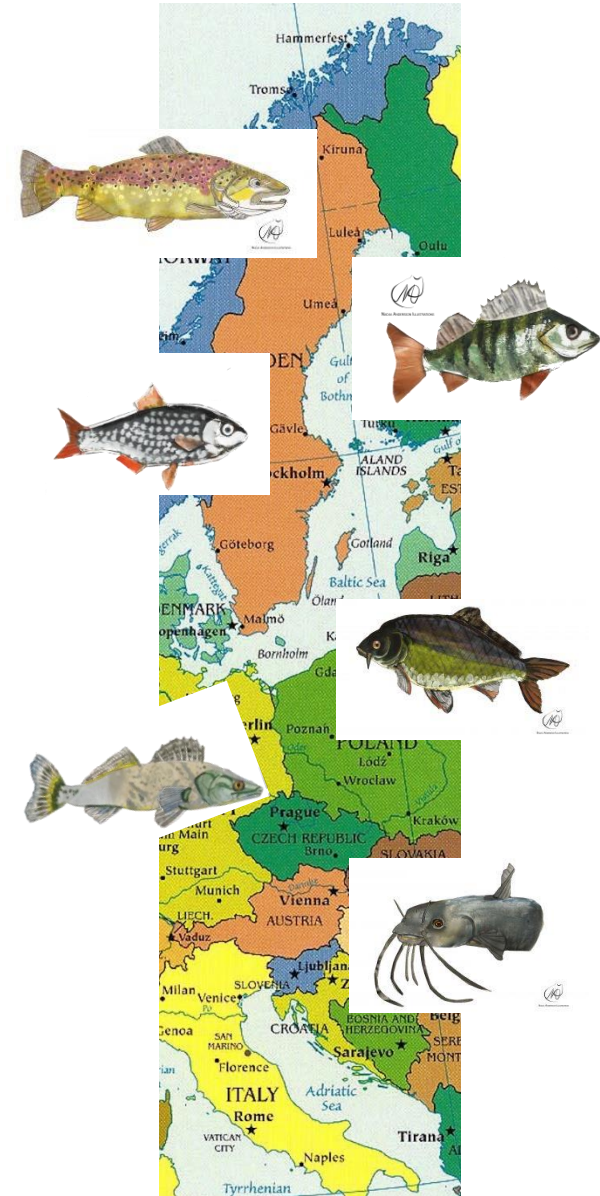
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FIRST AND MAIN STEP
SITE-SPECIFIC CLIMATE MODEL FOR
EMBAYMENTS AND COASTAL AREAS



THANKS FOR YOUR ATTENTION



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References

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