EU Coastal Use Cases Workshop

September 16, 2024

Modelling and monitoring in support of biodiversity restoration and oyster aquaculture in Galway Bay, Ireland.

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COPERNICUS MARINE SERVICE NATIONAL COLLABORATION PROGRAMME 2022-2028

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Project in a nutshell

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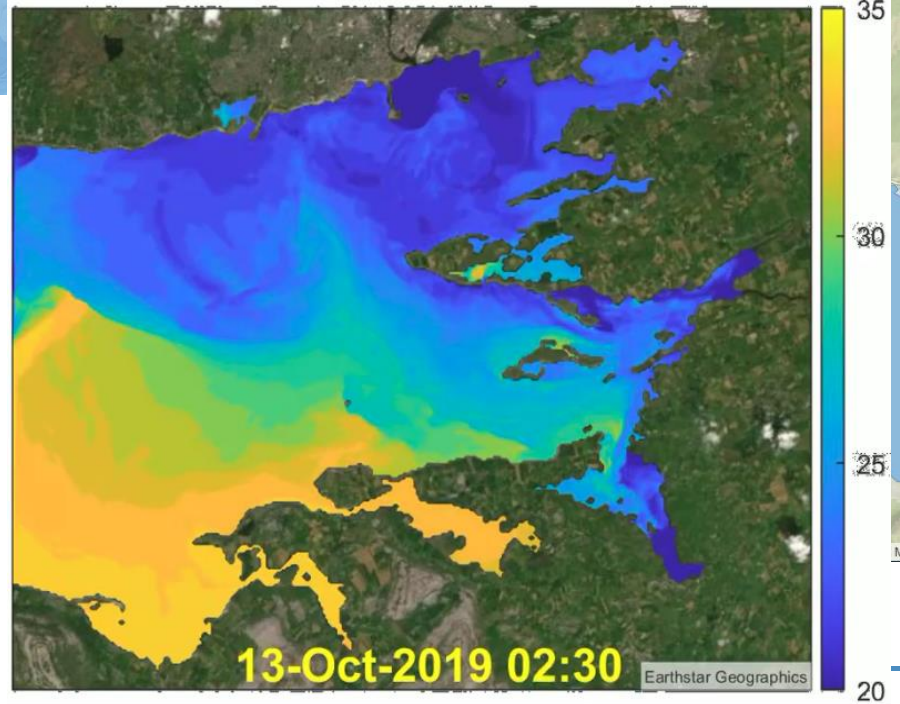
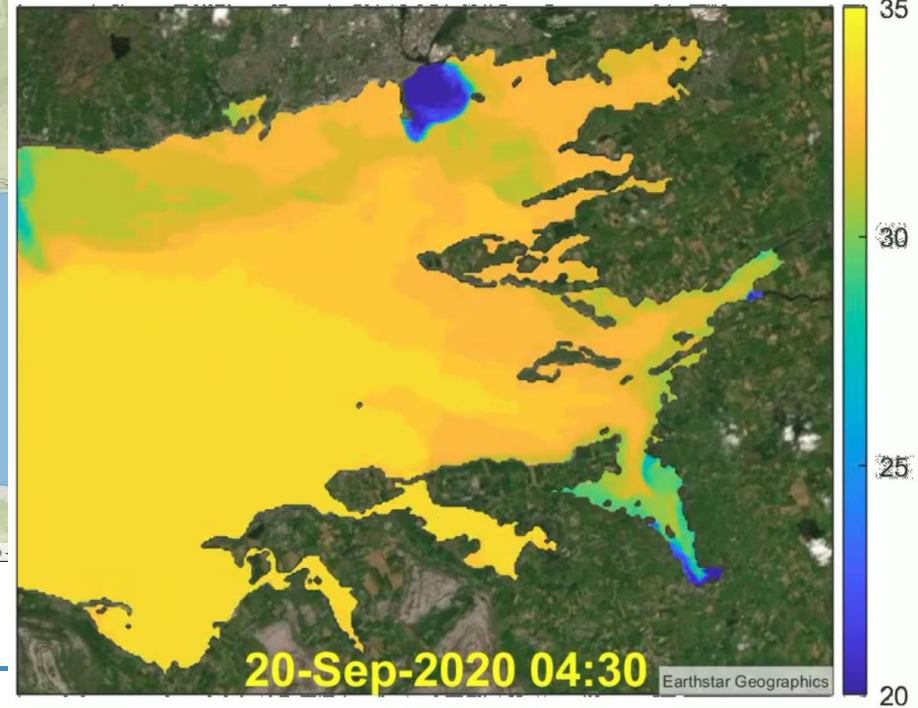
Galway Bay

Salinity distribution in Galway Bay





BIODIVER-COAST service

The service that is being developed aims to support:

- sustainable mariculture
- biodiversity restoration
- informs policy and supports policy implementation

Two Use Cases:

- mapping marine conditions (example Fig. 1)
- low salinity warning (example Fig. 2)

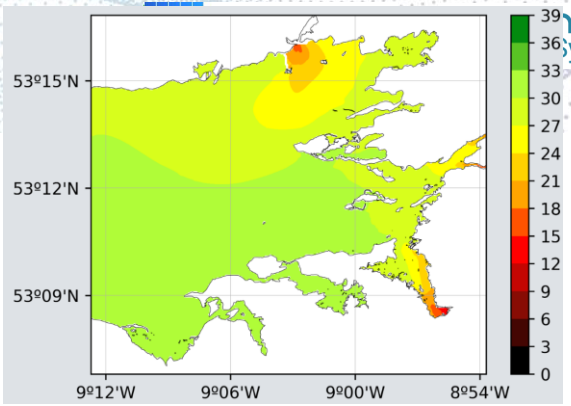


Fig. 1. Long-term (2012 – 2022) average surface salinity.

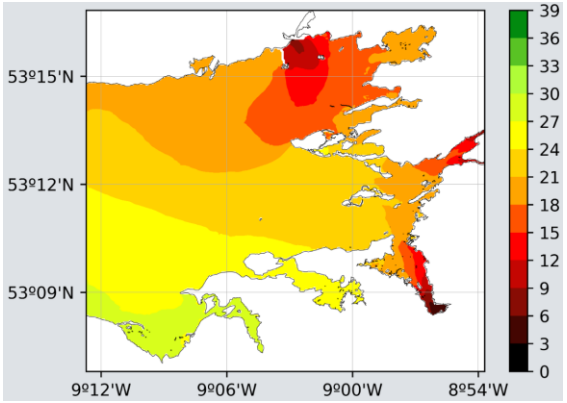


Fig. 2. Surface salinity during a wet period in March 2020.

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Consortium

Marine Institute, Ireland

State agency responsible for marine research, technology development and innovation in Ireland.

https://www.marine.ie/

Nologin Oceanic Weather Systems, Spain

Developer of operational downstream coastal monitoring and forecasting services actively contributing to build Digital Twins of the Ocean and Coast

https://www.nowsystems.eu/

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Copernicus Marine Products and Coastal model

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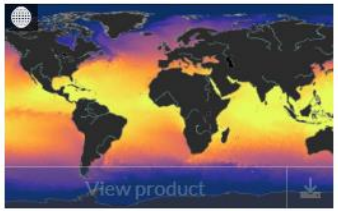
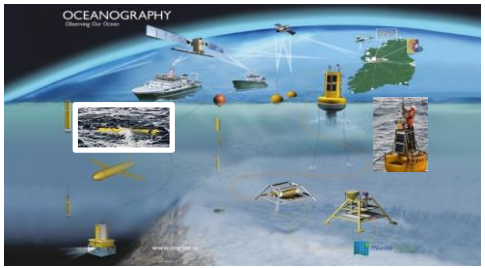
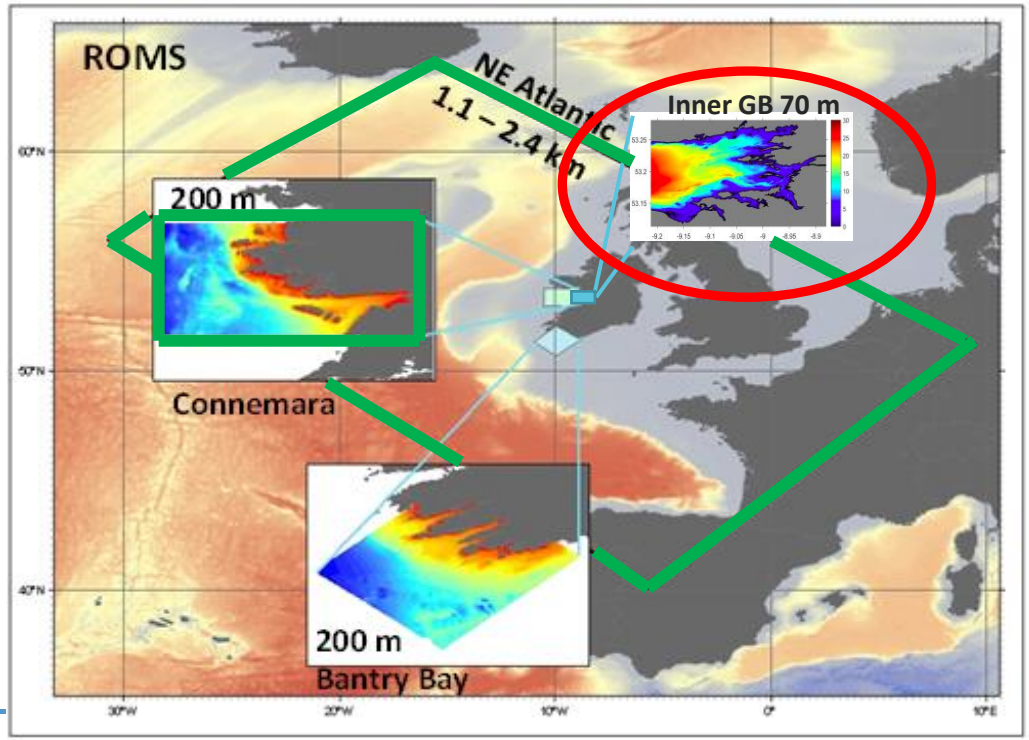
Downscaling to Galway Bay



Global Ocean Physics Analysis and Forecast





Galway Bay model

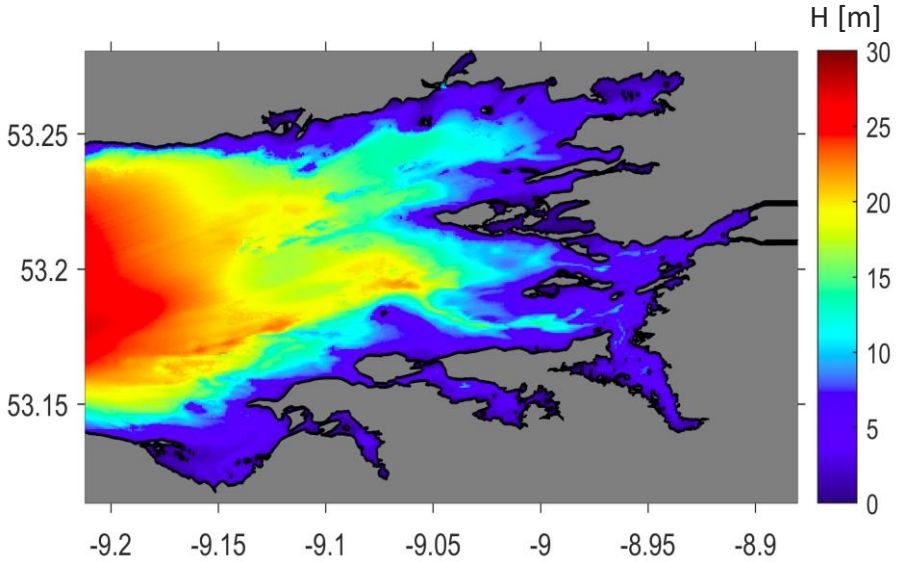


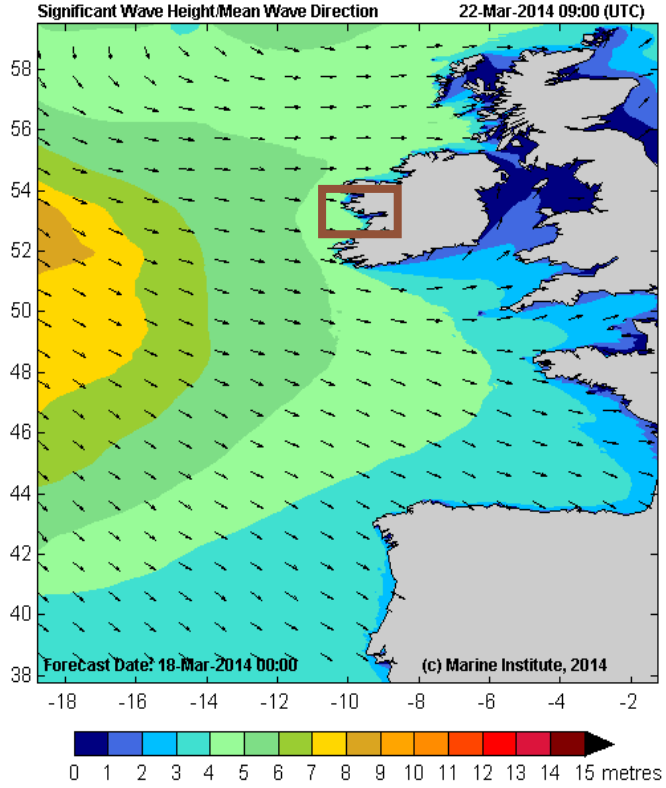
Fig 1. The extents and bathymetry of Galway Bay model

Lon 1 = 8.88 W
Lon 2 = 9.21 W

Lat 1 = 53.11 N
Lat 2 = 53.28 N

Horizontal resolution = 70 m
Vertical resolution = 8 sigma levels
Max depth = 30 m

Wave model is also part of the service



Model code	**SWAN**
Model Grid	Rectangular 0.025° and 200 m
Bathymetry	GEBCO & INFOMAR
Forcing	• 1-Hourly ECMWF 0.1° • Copernicus GLO wave model
Forecast Period	+6 days (daily)
Hindcast Period	-7 days (weekly)
Output	• significant wave height, wave period, wave spectra • @ 3 hrs spatially • 20 stations @ 0.5hr
Other Domains	West Coast 0.004°

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Seamless Coastal Marine Service

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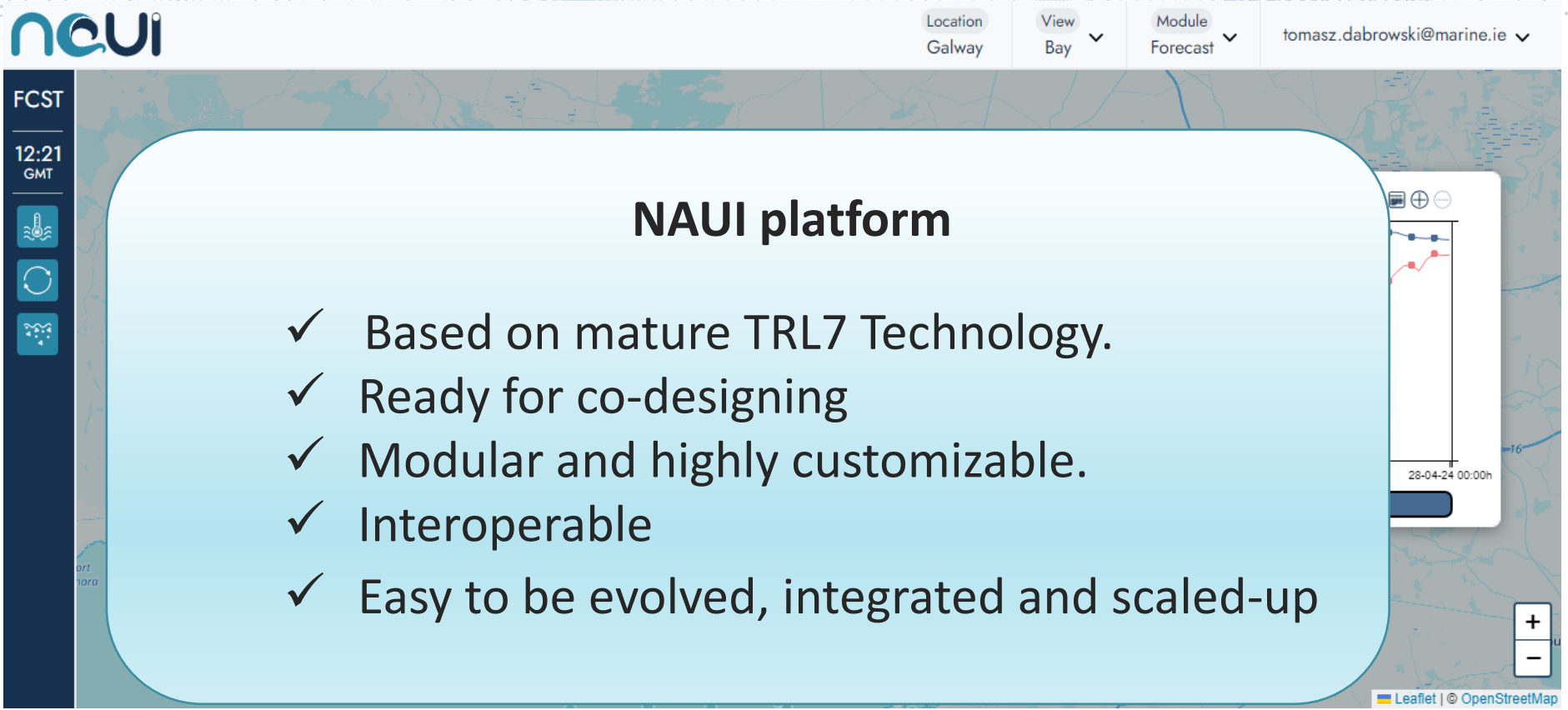


NAUI platform

- ✓ Based on mature TRL7 Technology.
- ✓ Ready for co-designing
- ✓ Modular and highly customizable.
- ✓ Interoperable
- ✓ Easy to be evolved, integrated and scaled-up

Use Case 1 – mapping marine conditions

- NAUI provides static layers with long-term (2012-2022) statistics provided
- Temperature, salinity, bottom stress and wave kinetic energy
- Means, anomalies, standard deviations, minimum, maximum, PC01, PC05, PC10, PC90, PC95, PC99
- Multiyear, annual, seasonal and monthly
- **Data has been used to map oyster mortality in Galway Bay based on T & S**

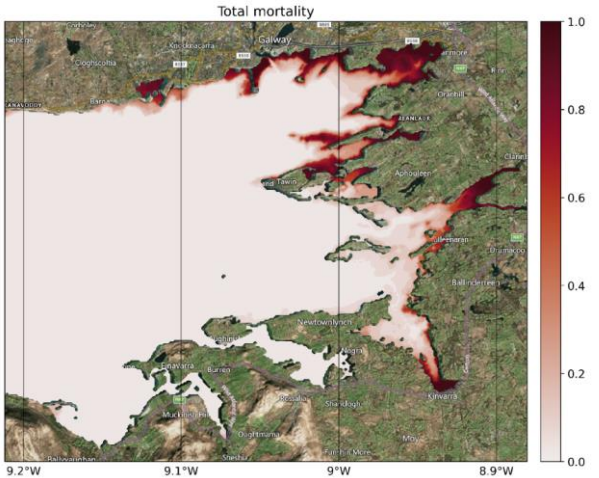
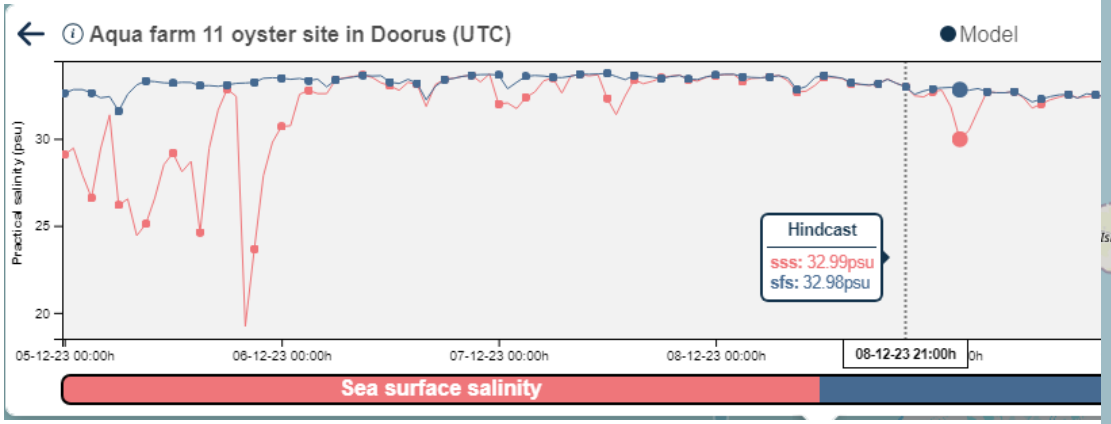
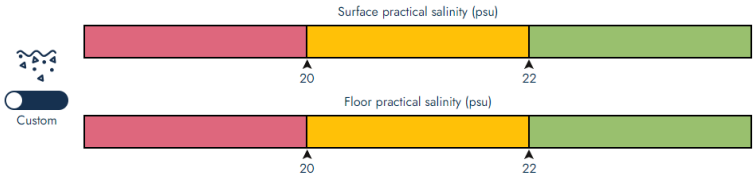


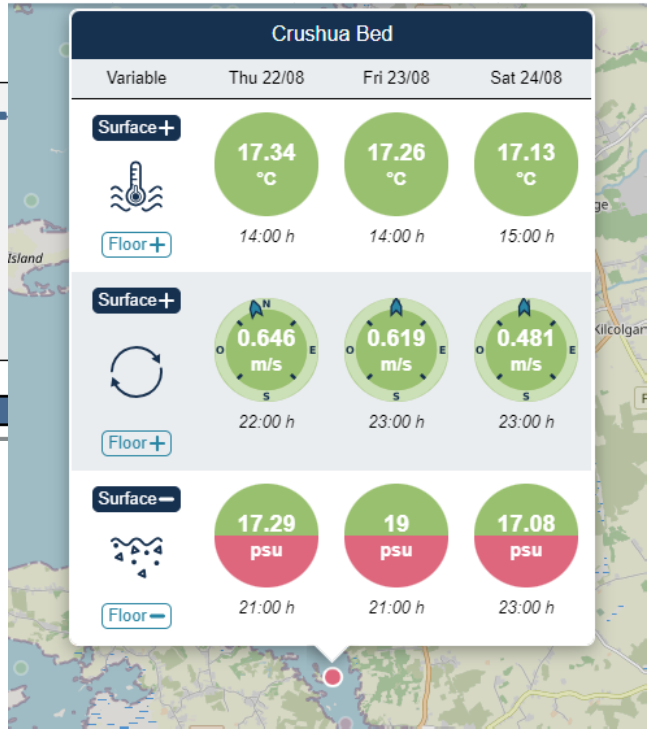
Fig. Oyster mortality computed from a 10 year hindcast

Use Case 2 – low salinity warning

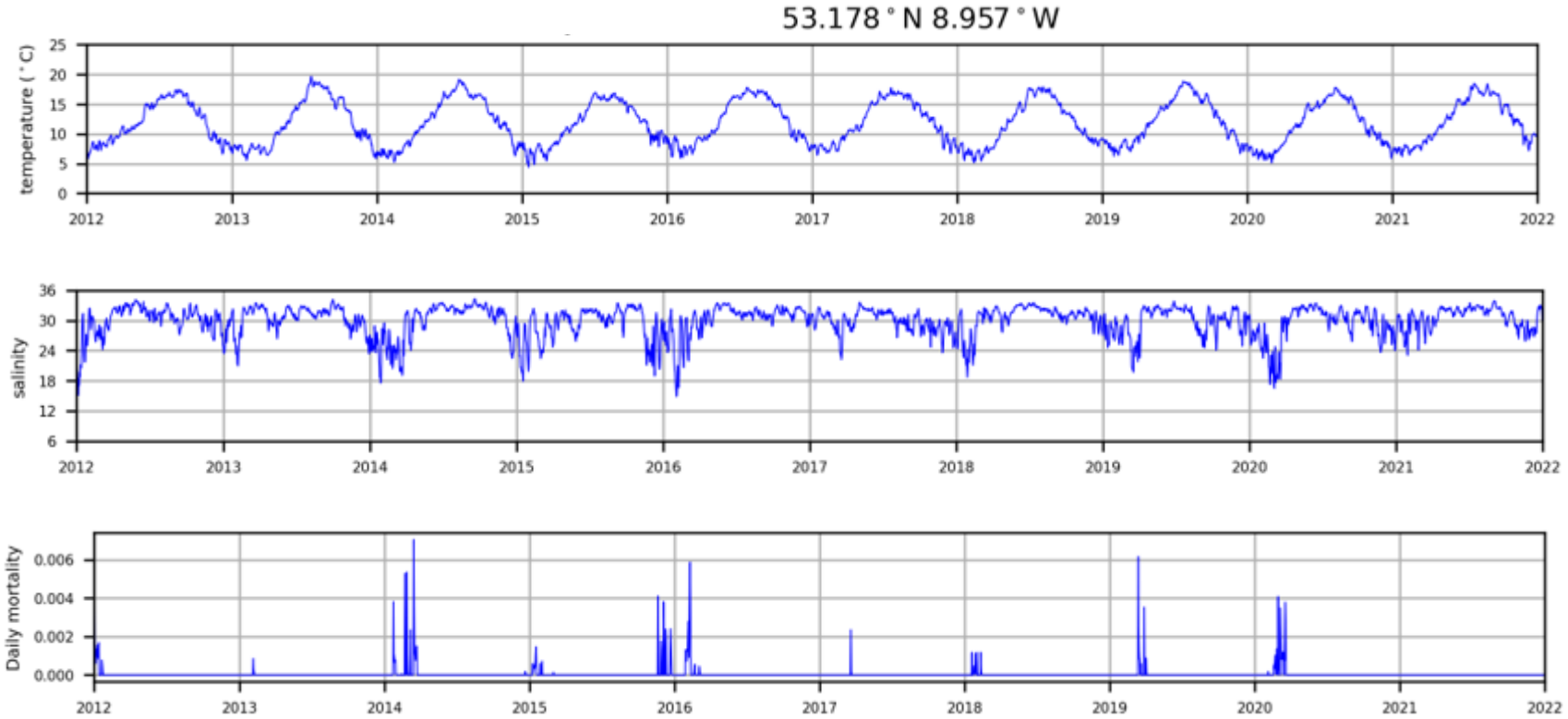




Warning thresholds customizable by users



Use Case 2 – low salinity warning



Acknowledgements

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