

SEASONAL OCEAN FORECASTING FOR DECISION SUPPORT IN FISHERIES & AQUACULTURE

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CLIMATE RISKS

Increasing temperatures
Marine heatwaves



Thermal limits exceeded
Changes in growth rates
Increased disease risk
Poor fish quality
Changing distributions
Altered migration
Harmful algal blooms





DECISION TIMESCALES

- **Proactive vs reactive** management
- Advance warning of events could improve business performance & industry resilience
- Management response to climate pressures is influenced by agility & risk appetite of marine sectors





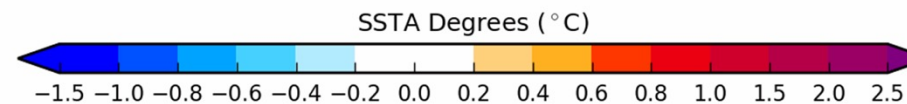
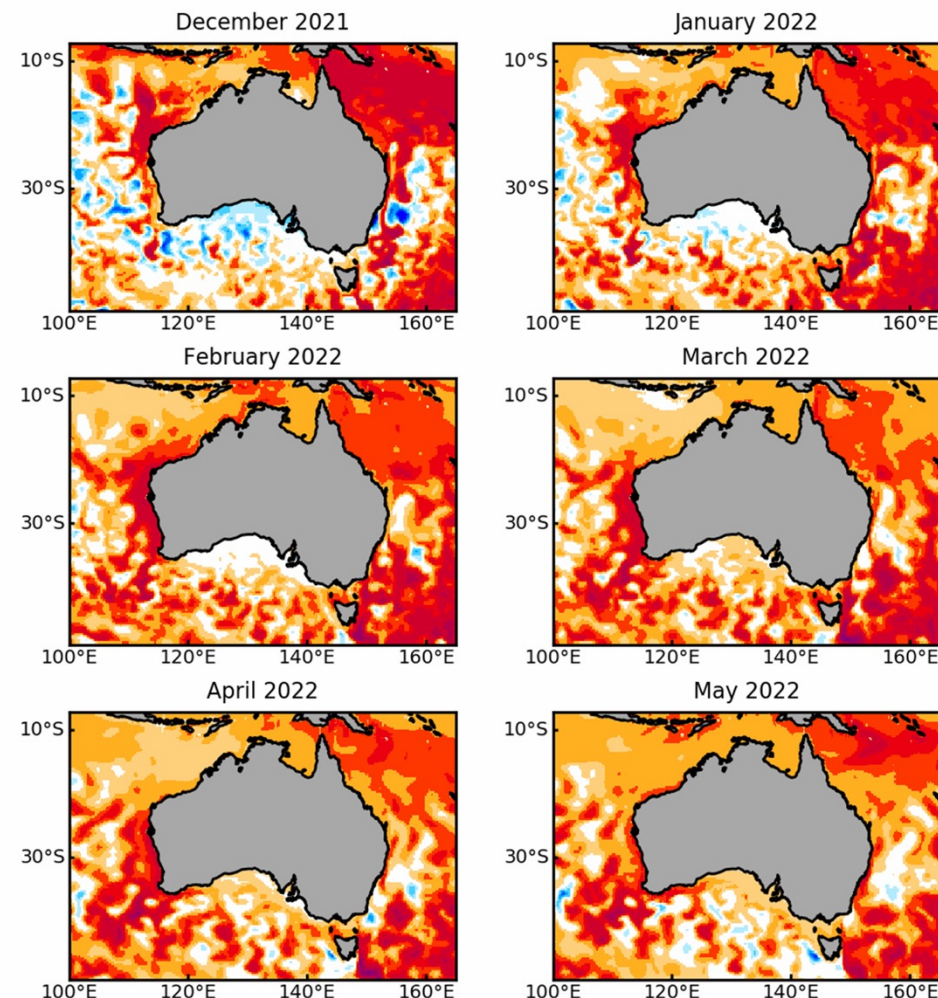
ACCESS-S2

Dynamical global coupled ocean-atmosphere forecast system

- Operational ocean forecasts out to 6 months
- 1981-2018 hindcast
- 25 km horizontal resolution
- 75 layers vertical layers
- Realtime from Oct 2021

<http://www.bom.gov.au/oceanography/oceantemp/sst-outlook-map.shtml>

Australia Sea Surface Temperature Anomaly Outlook





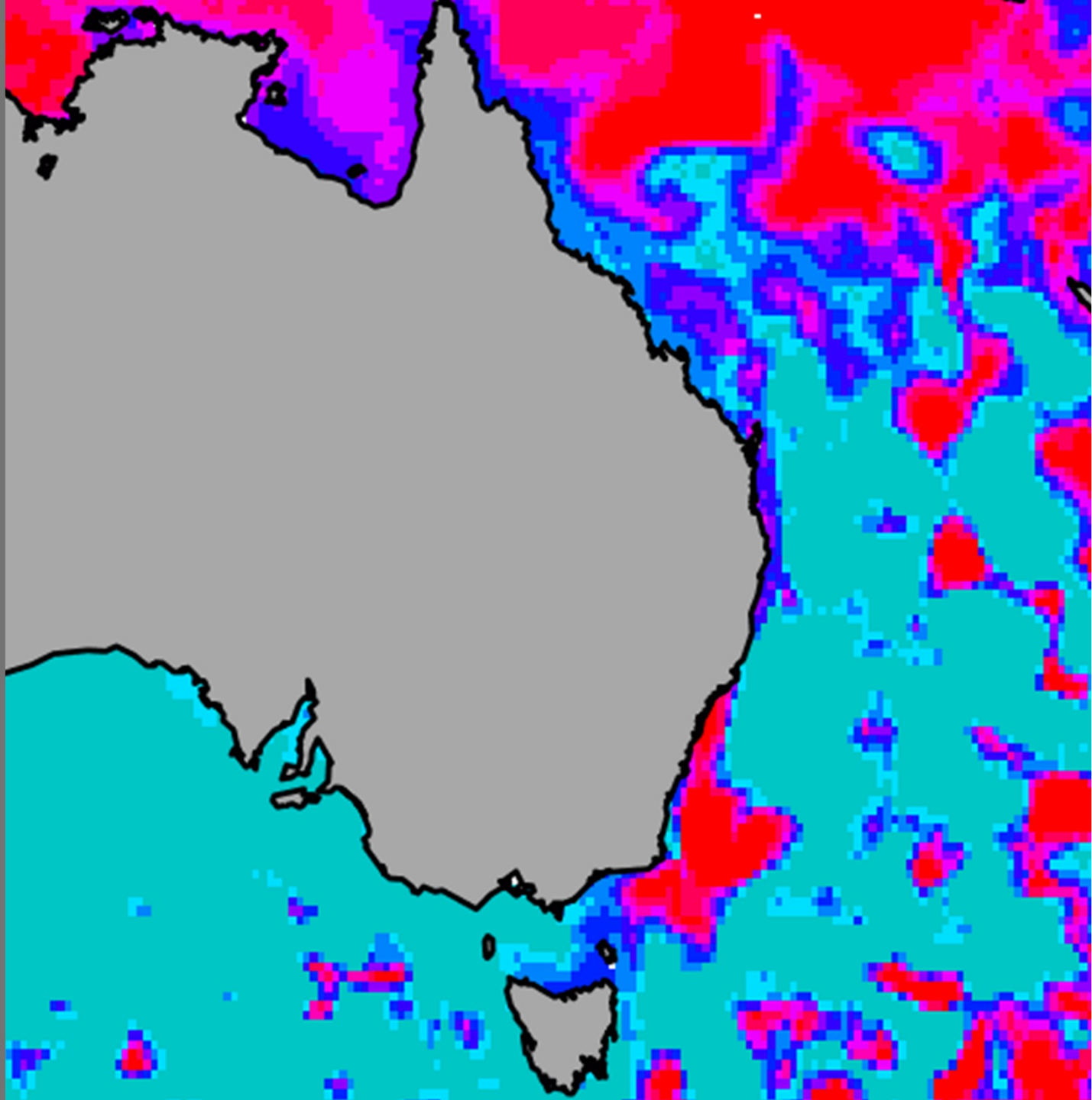
MANAGEMENT NEEDS

Typical management issues:

Changes in growth rates, fish quality, disease risk & habitat distributions

Management tools:

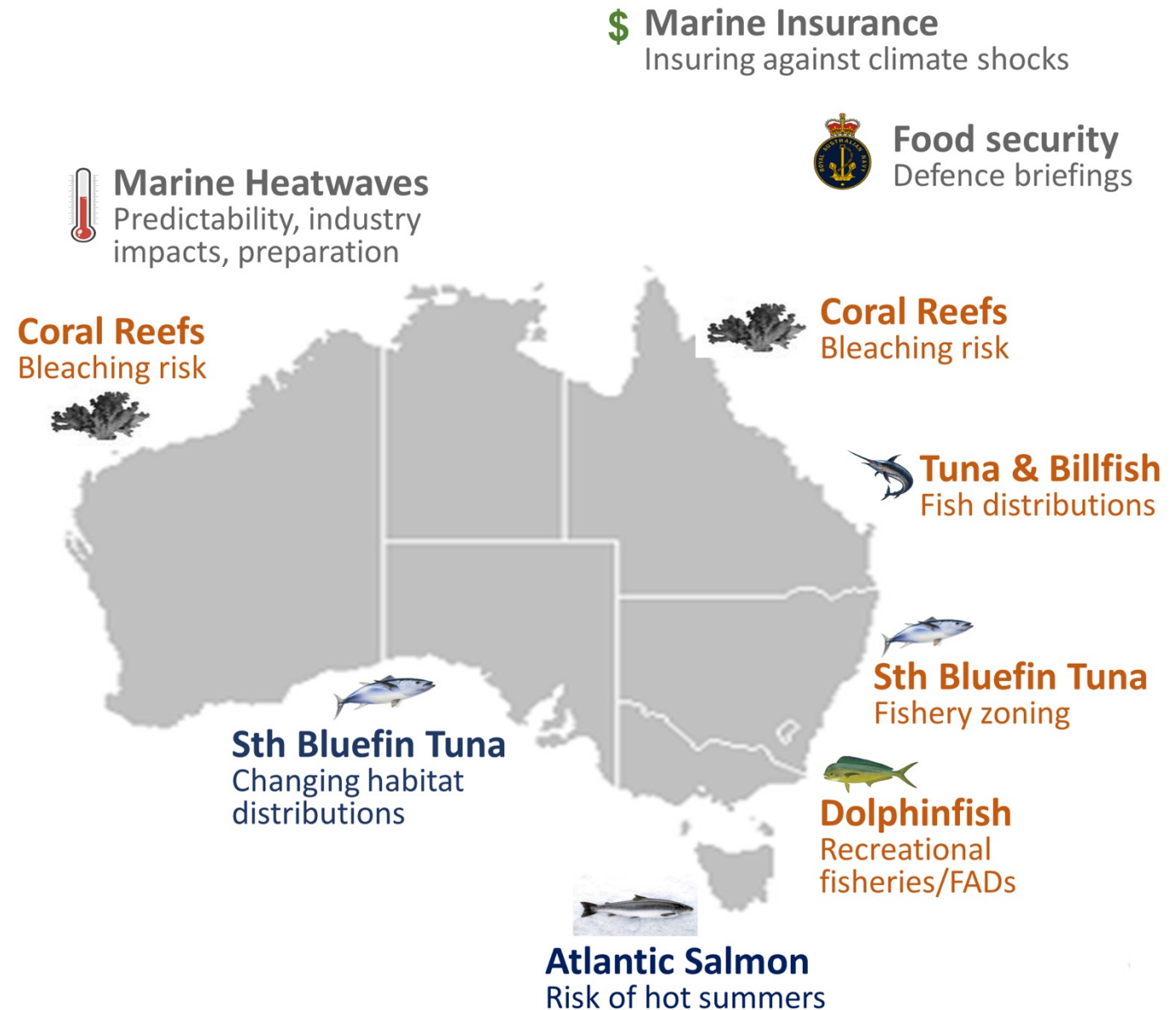
Seasonal forecasts of future conditions to allow marine stakeholders to better plan their operational activities and mitigate their risk





SEASONAL APPLICATIONS

- Strong industry engagement essential
- Clear understanding of user issues, skills & decision making timescales





DECISION SUPPORT

Will our fish stocks be further south this year?

When best to leave port?

Do we need extra staff to manage operations?

Should we increase or decrease our stocks?

Should we harvest early?

Will there be food security concerns?



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MARINE HEATWAVE PREDICTION

New Bureau-CSIRO project:
Developing prototype
seasonal MHW forecast
products for Australia

<https://research.csiro.au/cor/home/climate-impacts-adaptation/marine-heatwaves/dynamical-forecasting-of-marine-heatwaves/>

* FOO Spotlight



EXCLUSIVE POLITICS FEDERAL MARINE LIFE

Marine heatwave early warning system for aquaculture industry

By Mike Foley

August 21, 2020 – 12.00am



Australia's \$3 billion fisheries and aquaculture industries will receive up to six months' warning of damaging marine heatwaves under a national forecasting system developed by the CSIRO and Bureau of Meteorology.

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The sea surface temperature around Australia has [warmed by about 1 degree since 1910](#), according to the bureau, with eight of the 10 warmest years on record occurring since 2010.



THANK YOU

Dr Claire Spillman

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Further information:

- Benthuisen et al (2021) Env Research Letters
- De Mott et al (2021) EOS
- Spillman & Smith (2021) Frontiers Marine Science
- Smith & Spillman (2019) Coral Reefs
- De Burgh-Day et al (2019) NZ J Mar FW Res
- Hobday et al (2018) Frontiers Marine Science
- Tommasi et al (2017) Progress Oceanography
- Hobday et al. (2016) Fisheries Oceanography
- Spillman et al. (2015) Aquaculture
- Spillman & Hobday (2014) Climate Risk Mgmt
- Spillman et al (2012) Int J Climatology
- Spillman (2011) J Operational Oceanography
- Spillman et al (2009) Coral Reefs