TRACTUUM

SOUTHEAST AUSTRALIA MARINE ECOSYSTEM SURVEY

Prospective Impact Assessment
Feb 2023

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Glossary

AFMA	Australian Fisheries Management Authority
AODN	Australian Ocean Data Network
BCR	Benefit cost ratio
BRAN	Bluelink Reanalysis
CBA	Cost Benefit Analysis
CPUE	Catch per unit effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ECOP	Early Career Ocean Professionals
EEZ	Exclusive Economic Zone
EPBC	Environment Protection and Biodiversity Conservation
FIE	Fishery-Induced Evolution
FIS	Fishery Independent Surveys
FRDC	Fisheries Research and Development Corporation
HSE	Health Safety Environment
IMOS	Integrated Marine Observing System
ITSS	Indigenous Time at Sea Scholarship
MNF	Marine National Facility
MPA	Marine Protected Area
MRI	Marine Resources and Industries
NERA	National Energy Resources Australia
NESP	National Environment Science Program
NSW	New South Wales
O&G	Oil and Gas
RV	Research Vessel
SE	South-east
SESSF	Southern and Eastern Scalefish and Shark Fishery
SPF	Small Pelagic Fishery
SLO	Social Licence to Operate
STEM	Science, technology, engineering and mathematics
TAC	Total Allowable Catch
TBL	Triple Bottom Line
UoM	University of Melbourne
UNSW	University of New South Wales
UTAS	University of Tasmania
wrt	With respect to

1 EXECUTIVE SUMMARY

Australia's oceans are undergoing rapid change. The south-east (SE) marine waters are one of a series of global ocean warming hotspots, warming at a rate of four times the global ocean surface average. Extreme events, such as marine heatwaves, have harmed Australia's seagrass, kelp forests, mangroves, and coral reefs; and could be influencing the distribution and local abundance of commercial fish species.

Human use of the marine ecosystem has created dire economic, environmental, and social consequences for the wider marine industry, including (but not limited to) fisheries, the oil and gas industry, marine parks, tourism, and offshore renewables. Most stressors are concurrent and cumulative and underline the need for integrated, and multidisciplinary solutions.

Science Challenge

There is a significant gap in understanding the effects of warming SE marine waters of Australia, and its interaction with wild-capture fisheries. Over the past 20 years, observations from these fisheries have indicated a change in the abundance and composition of the main fish species, manifested in their commercial catch rates. Several hypotheses have been proposed, but none are conclusive.

CSIRO's Proposed Response

CSIRO will conduct a series of voyages under the SEA-MES initiative, co-designed with key stakeholders (including end-users of research outputs) using the RV Investigator research vessel to improve understanding about the relative (and cumulative) impacts of climate change, and human use on marine ecosystems. Under this extensive effort, CSIRO will work with key stakeholders to:

- Revisit previous biophysical and ecosystem assessments of the Australian SE continental shelf and document and determine changes within habitats, fish assemblages and species abundances in the 25 years since it was last examined.
- Establish how the changes in the marine ecosystem affect the multiple-use management of the region.
- Determine the implications of these changes to inform marine spatial planning and adaptive management.

Key Impact Areas

The key impact areas under this initiative include:

i) Industry impact from the uptake of research outputs by public and private sectors (e.g. Fisheries; Oil and Gas industry etc).

ii) Marine parks and Sea Country management impacts, supporting evidence-based planning and co-management with Traditional Owners.

iii) Research impact through the uptake of new scientific knowledge, including peer-reviewed publications, technical reports, and data products.

iv) Capability building through the development of staff and Early Career Ocean Professionals (ECOPs), including Indigenous participants.

Key use cases in focus

The key use cases—aligned with the National Marine Science Plan and critical to Australia's sustainable blue economy—include:

- *Improving biodiversity conservation:* In the absence of baseline data, Parks Australia is currently unable to reliably monitor ecosystem condition and trends within its Australian Marine Parks. SEA-MES is expected to provide contextual knowledge of species and habitats over the past 25 years—using historical data and analyses of change drivers—to inform management of current pressures and establish future baselines.
  Impact partner: Parks Australia

- *Improving the understanding of climate change effects:* SEA-MES outputs are expected to reveal how climate change has influenced south-east marine ecosystems over the past 25 years. This insight will position stakeholders to tackle climate-related challenges more effectively than existing approaches allow.
  Impact partners: Various.

- *Improving energy sector risk assessments:* Regulators and offshore energy companies currently lack the full ecosystem context needed for robust environmental impact assessments (EIAs). SEA-MES is expected to complement EIAs by situating them within broader ecological data, thereby underpinning more informed approval processes.
  Impact partners: Various regulators and energy companies.

- *Improving food security*: AFMA's management of commercial fish stocks is constrained by unclear ecosystem drivers and limited data. SEA-MES outputs are expected to clarify the relative impacts of fishing and climate change on target stocks, delivering evidence-based insights that support improved management and decision-making.
  Impact partner: AFMA

- *Building national capability for the marine science workforce*: SEA-MES supports the development of ECOPs, including Indigenous participants, by providing structured, field-based experience in applied research, technical sampling methods, ecological science, collaboration, and networking. This enables the next generation of marine experts to contribute to national priorities such as fisheries management, ecosystem monitoring, and marine spatial planning — strengthening Australia's long-term capacity to support a sustainable blue economy.
  Impact partner: ECOPs and staff

Prospective Impacts

SEA-MES is an aspirational initiative, designed from the outset with the focus on realising measurable benefits for Australia's marine environment, industries, and communities. Prospective impacts include the proactive identification and management of emerging marine threats—such as marine heatwaves and habitat degradation—through enhanced risk assessments; the strengthening of marine park and fisheries policies via evidence-based contributions to management plans and EIAs; improved economic resilience for fisheries, offshore energy, and tourism sectors driven by timely, data-informed decisions; deeper understanding of long-term ecosystem trends to guide climate adaptation strategies; and the cultivation of a capable national marine workforce by embedding ECOPs (including Indigenous participants) in hands-on, multidisciplinary field programs. The work also has potential to assist with the development of a replicable framework and best-practice guidelines to inform similar multi-voyage investigations in other Australian marine regions.

Impact Planning, Monitoring and Evaluation

SEA-MES embeds impact-management processes from the outset. CSIRO will work with key stakeholders—regulators, industry partners, Traditional Owners, Parks Australia, AFMA, ECOPs and other end users—to define core impact areas and use cases that establish pathways for long-term realisation of benefits.

Throughout the five-year program, ongoing stakeholder engagement, systematic data collection and interim reporting will track progress against these impact areas, while periodic reviews will assess emerging findings, identify risks, refine methods and guide any necessary adjustments—ensuring SEA-MES remains on course and delivers its intended value to Australia.