

# NSW-IMOS An Integrated Marine Observing System for SE Australia: The East Australian Current and its interaction with coastal environments

Moninya Roughan and Iain Suthers

Sydney Institute of Marine Science and The University of New South Wales

mroughan@unsw.edu.au

## 1. Introduction

The Integrated Marine Observing System, (IMOS), is a centrally co-ordinated nationally distributed set of equipment and data-information services which collectively contribute to meeting the needs of marine research in Australia. The observing system provides data in the open oceans around Australia as well as the coastal waters. The in situ data when combined with satellite data, enables the modeling required to explain the role of the oceans in seasonal prediction and climate change. Sustaining the project will allow identification and management of climate change in the coastal marine environment. It will also provide an observational nexus to better understand and predict the fundamental connections between coastal biological processes and regional/oceanic phenomena that influence biodiversity. In this paper we introduce the New South Wales node of the Integrated Marine Observing System (NSW-IMOS), one of 5 regional nodes.

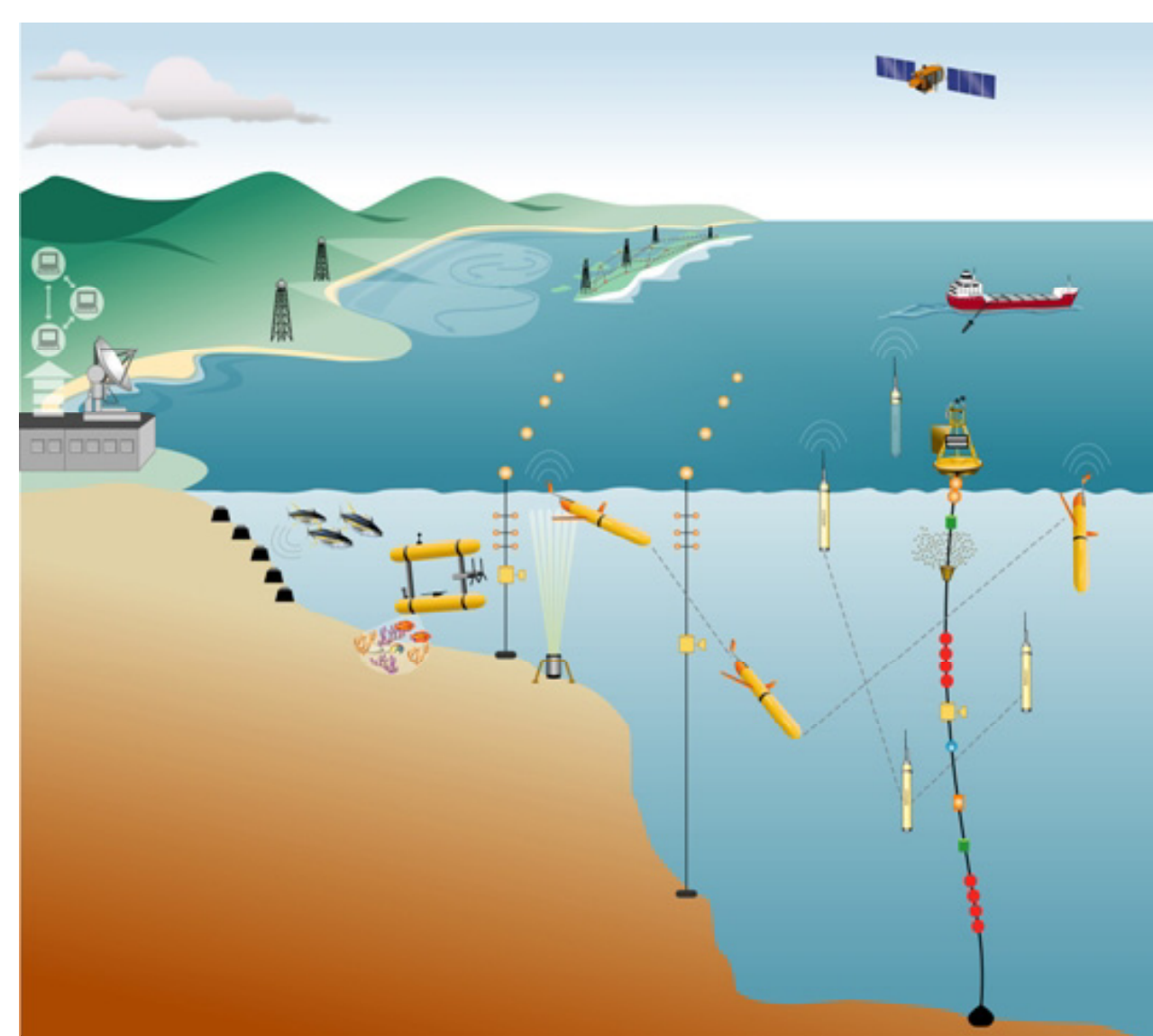
## 2. The National IMOS Program



### 5 Nodes

- GRBOOS
- WAI OS
- SAIMOS
- NSW-IMOS
- Blue Water and Climate

Each node is responsible for instrumenting the ocean as per the figure below.



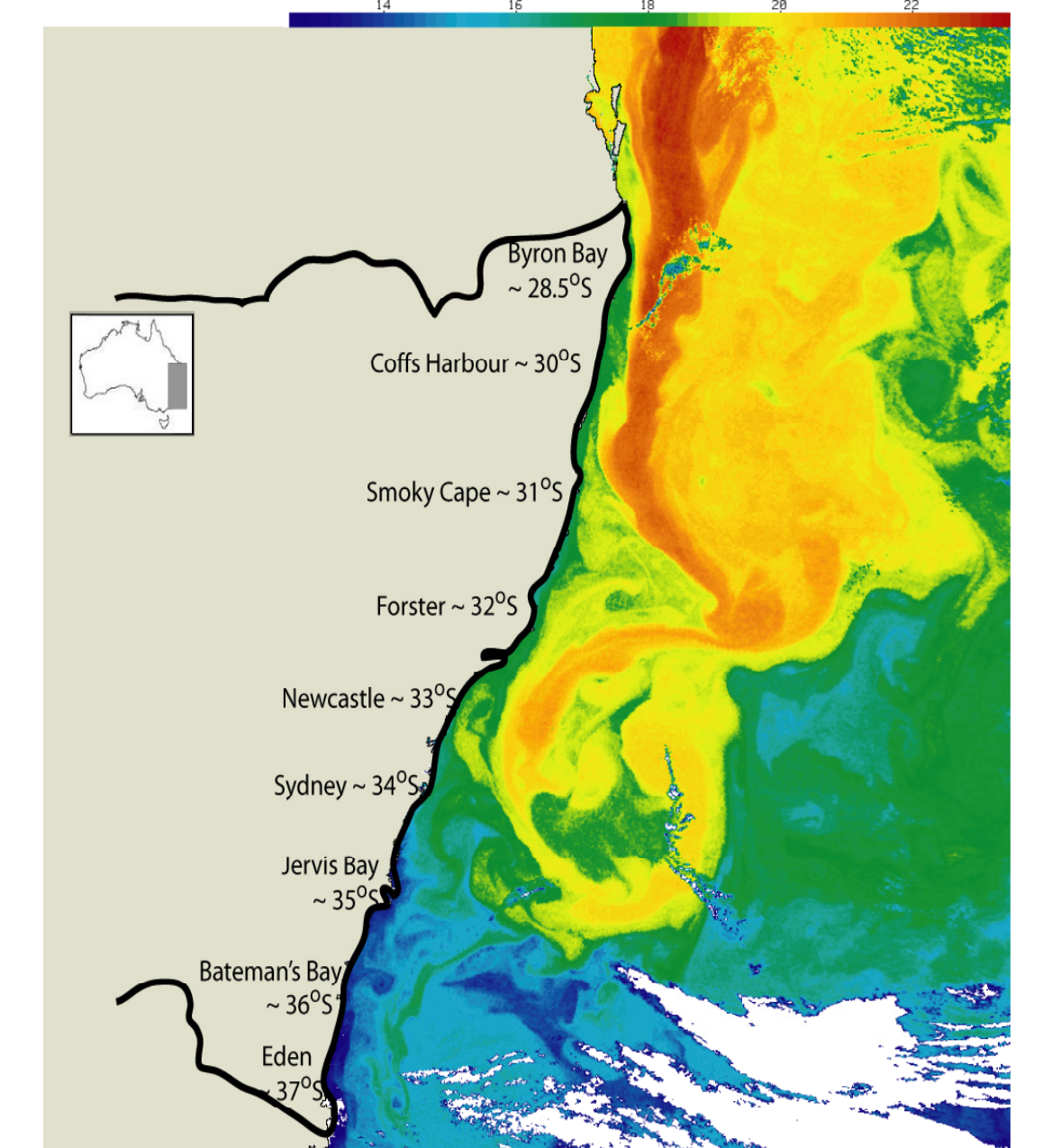
### 11 Facilities

- Argo Australia
- Measurements from Ships of Opportunity
- Southern Ocean Automated Time Series Obs
- Australian National Facility for Ocean Gliders
- Autonomous Underwater Vehicle Facility
- Australian National Mooring Network
- Australian Coastal Ocean Radar Network
- Acoustic Tagging and Monitoring System
- Facility for Automated Intelligent Monitoring of Marine Systems
- eMarine Information Infrastructure (eMII)
- Satellite Remote Sensing

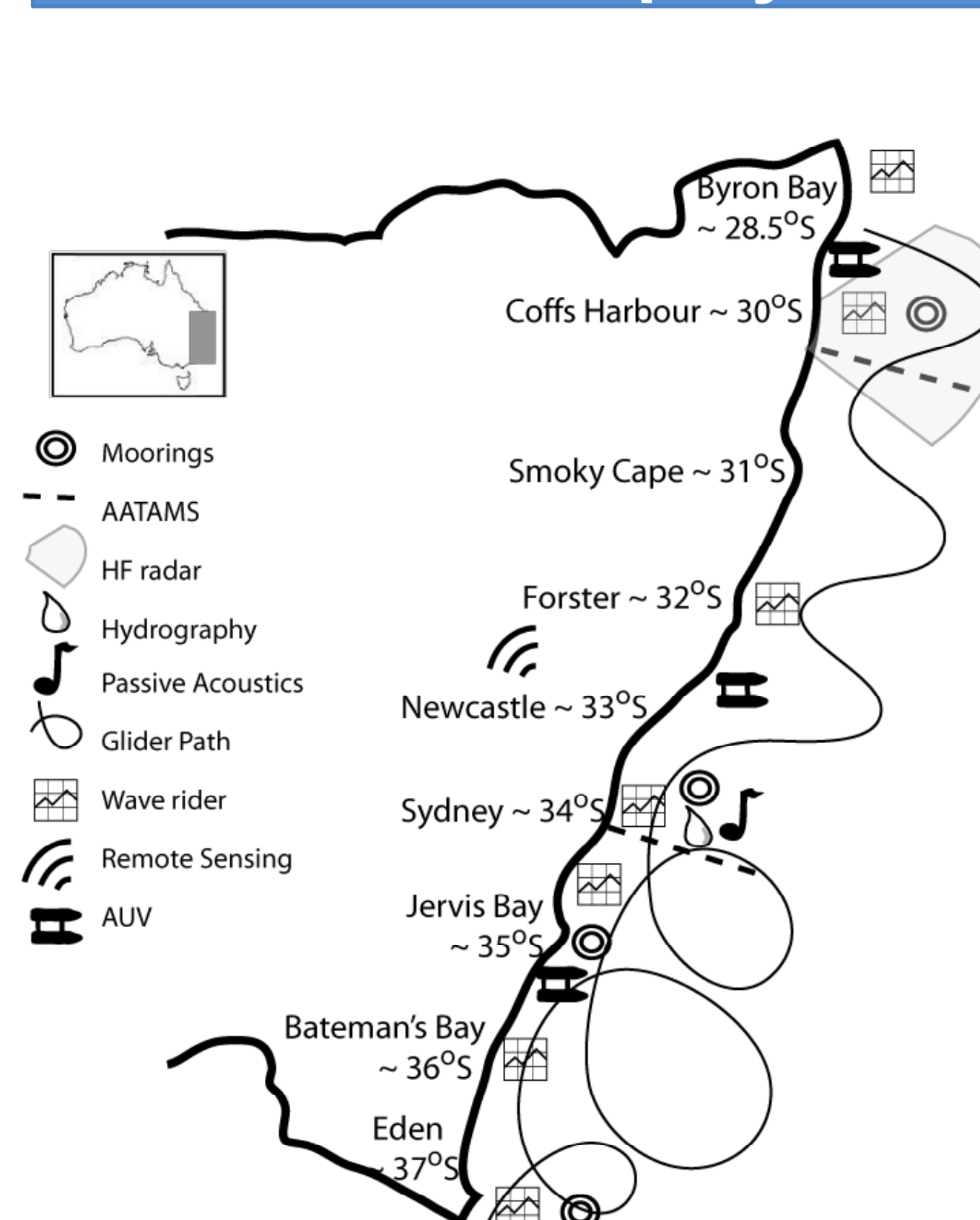
## 4. NSW-IMOS Monitoring Program

We will achieve these goals through an integrated monitoring program along the NSW continental shelf which includes:

1. Establishing a national reference transect of **oceanographic moorings**, supported by a **high frequency coastal radar**;
2. Monthly sampling near the oceanographic moorings (for calibration and especially chlorophyll and zooplankton), supported by **autonomous ocean gliders**
3. Deploying two cross-shelf transects of **acoustic receivers** ("listening posts") from the shore to the shelf break off Sydney and off Coffs Harbour, and using an **Autonomous Underwater Vehicle (AUV)**;



## 5. Instrument Deployments



- 2007-2008**
- National Reference Transect off Sydney (SYD100m, SYD140m June 2008)
  - Port Hacking monthly monitoring, extend hydrographic sampling (March 2008)
  - Jervis Bay coastal mooring (JB70 Feb 2008)
- 2008 -2009**
- Slocum glider missions from Oct 2008
  - Coastal moorings Coffs Harbour (CH70m, CH100m June 2009)
  - Enhance instrumentation PH100
  - Coastal mooring off Batemans Bay / Edlen July 2009;
  - AATAMS Line off Sydney and off Coffs Harbour.
  - Deploy HF Radar ~100 km range 1.5km resolution through ACORN (Dec 2009)
- 2009-2010**
- Hydrographic Sampling -continue,
  - Glider Deployments -continue
- 2010-2011**
- Upgrade moorings to real time HF Radar off Sydney

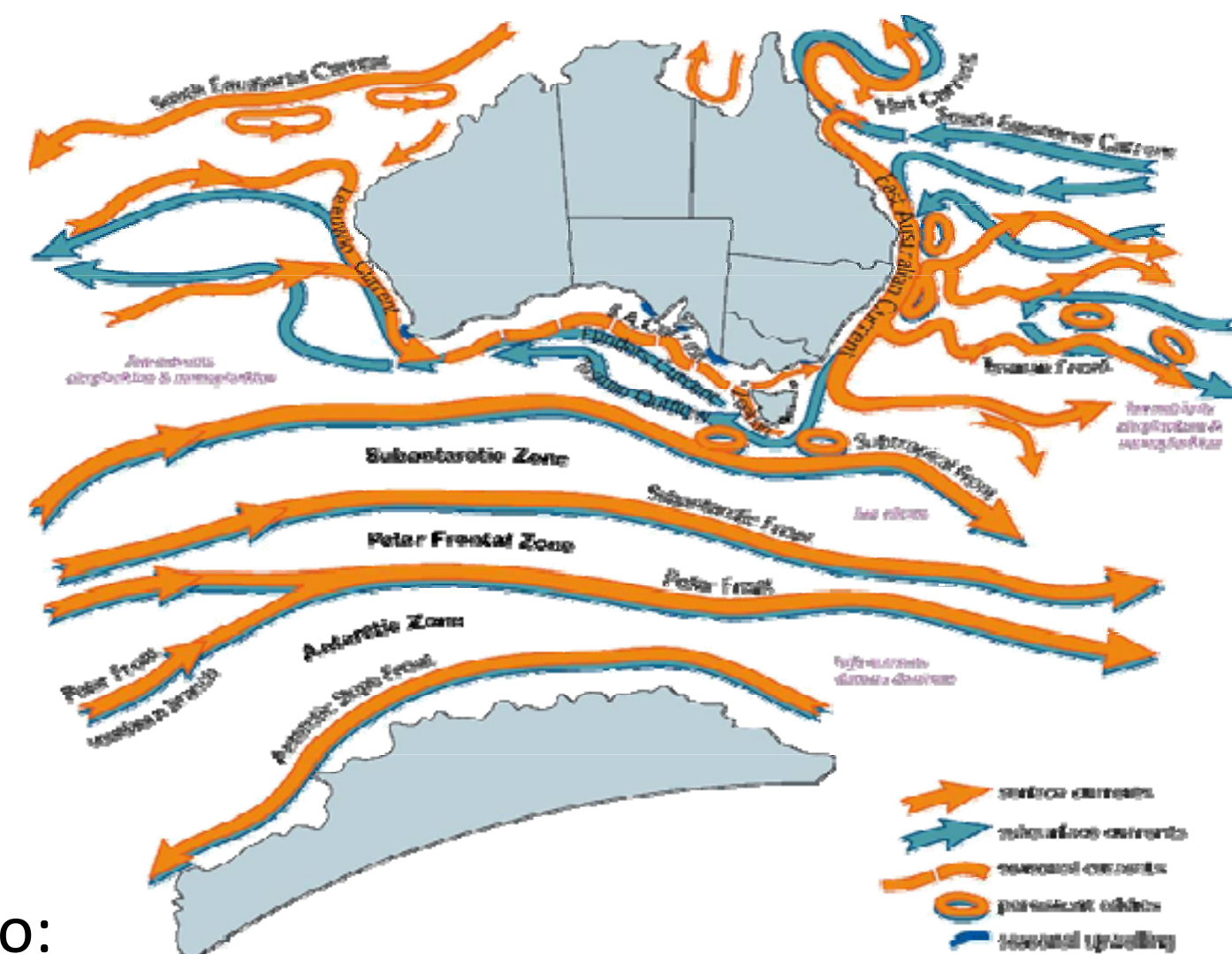
## 3. Science Questions

The oceans play a key role in the variability of Australian climate, the global heat and carbon budgets and variability of marine ecosystems.

Along the coast of NSW the East Australian Current and its eddy field dominates the circulation

The **primary goals** of NSW-IMOS are to:

1. Quantify the seasonal and annual variation in EAC inflow along the coast of south-eastern Australia and to identify key continental shelf processes;
2. Make sustained observations of the coastal separation of the EAC and the resulting eddy dynamics and biological consequences;
3. Determine the biological response to oceanographic and climate effects (eddies, upwelling, rainfall, dust storms), from fish movements, to phytoplankton communities, to benthic habitats.



## 6. Impacts and Outcomes

Our greatest impacts and outcomes will be on the physical and ecological interactions of the East Australian Current with coastal waters, in determining the synergistic impacts of urbanization and climate change. E.g.

- Cross-shelf flows, deep water intrusions and phytoplankton diversity;
- Knowledge of the latitudinal gradient in EAC effects and climate impacts;
- Contributing to improved ocean forecasts by Bluelink;
- Evidence-based prediction of the biophysical response to climate impacts on beaches, coastal lowlands;
- Evidence-based planning for marine parks; estimates of larval connectivity amongst ports, harbours as well as among marine parks;
- Predictions of fish landings based on rainfall and oceanographic variation;
- Extension of NSW-IMOS data products to high schools, the public and the media of temperature and current fields, shark and glider tracks (especially via the internet).

## Acknowledgments

We are grateful for the support of our partners NSW Department of Environment and Climate Change, Oceanographic Field Services, Connell Wagner Consulting, NSW Department of Primary Industries - Manly Hydraulics Laboratory, and Sydney Water.



IMOS is an initiative of the Australian Government being conducted as part of the National Collaborative Research Infrastructure Strategy