# MAPPING LIFE ON THE **DEEP SEA FLOOR**

## At a glance

**Project title**
Great Australian Bight benthic biodiversity characterisation

**Project summary**
To characterise the biological diversity and structure of sea floor communities in the Great Australian Bight and identify 'markers' for measuring any impacts stemming from human activities.

**Project investigators**
CSIRO and SARDI

**Program partners**
CSIRO, BP, SARDI, the University of Adelaide and Flinders University are working on a $20 million research program to better understand the environmental, economic and social value of the Great Australian Bight.

**Project contacts**
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## Overview

The Great Australian Bight is set for an increase in oil and/or gas exploration and development in the next decade. Much of this activity will focus on the sea floor in mid- to lower continental slope depths (1000 to 3000 m).

The sea floor habitats and their associated biological communities in this deep region of the Bight have not been systematically sampled prior to this project. A baseline picture of benthic community diversity, distribution and ecology is fundamental to assessing the potential future impact of human activities.

This project will map benthic communities and corresponding patterns in the physical environment for the first time in selected exploration leases and adjacent continental slope areas of the Bight – including the Great Australian Bight Marine Park.

The project will apply this information to develop innovative, cost-effective ecological monitoring programs to accompany future exploration and development.

**Below:** *A member of the small-bodied sediment-dwelling community collected during a project survey, the amphipod (Cephalophoxoides sp., Phoxocephalidae) from 1000 m depth.*

**Above:** *The Instrumented Corer Platform was designed and built for this project by CSIRO. It enables multiple sediment samples and several environmental data sets to be collected on single deployments.*

## The Challenge

Benthic communities play a vital role in deep ocean ecosystems – engineering habitats and transferring energy up the food chain – but virtually nothing is known about these communities in deep waters of the Bight.

This project will study the diversity, distribution and ecology of the infauna (invertebrates living in the sediment), and epifaunal communities (organisms living on the sea floor such as corals, echinoderms, crustaceans, molluscs and fishes).

The information is needed to help build ecosystem models for the Bight, and to identify suitable locations and informative faunal groups for effective ecological monitoring.

## The Research

Research voyages will be undertaken to conduct field sampling and acoustic surveys in the Bight, as well as analyse existing sediment maps and data from adjacent regions.

Where possible, the sampling will include locations in the Great Australian Bight Marine Park and target features of special interest, including volcanic cones and potential, naturally occurring oil seeps.

The appearance and physical structure of each sample site will be recorded using acoustic mapping, video and still photography, and biological and geological sampling.

Infauna will be recovered from sediment samples, and larger organisms will be collected using a benthic sled. Samples will be photographed, weighed and identified to the lowest practical taxonomic unit.

Information about the composition and distribution of benthic organisms will be related to environmental factors such as sediment composition, bathymetry, surface and water column productivity, and oceanography to enable their distribution to be predicted at a regional scale.

**Above:** *One of many interesting and unusual seabed animals collected during a project survey, the crab Ebalia tuberculosa from 400 m depth.*

## The Impact

Developing a baseline record of deep water marine habitats (deeper than 200 m) in the Great Australian Bight will provide a foundation for assessing any impacts of development in the region.

Characterising the biological diversity and structure of these sea floor communities and identifying 'markers' can assist in measuring any potential impacts stemming from human activities.

This research will provide the basis for innovative, cost-effective ecological monitoring programs to accompany future development in the deep waters of the Great Australian Bight.

## The People

**Dr Alan Williams** is a CSIRO marine ecologist who develops and implements methods for mapping, characterising and monitoring deep sea ecosystems. His research contributes to a better understanding of deep sea ecosystems and the ways in which they are affected by human activities such as fishing and hydrocarbon extraction.

**Dr Jason Tanner** is a SARDI marine ecologist who has a strong interest in the population and community ecology of benthic invertebrates, in particular the dynamics of corals. His research has included extensive field surveys, experimental work and modelling.

**Franzis Althaus** is a CSIRO marine ecologist with particular interest in data management and analysis. Her work contributes to mapping, characterising and monitoring deep sea communities, and understanding the interactions between human activities and deep-sea ecosystems.

**Shirley Sorokin** is a SARDI marine biologist with extensive knowledge of the biodiversity of benthic marine invertebrates of the shallow Great Australian Bight and the South Australian gulfs. She has a particular interest in sponges.

**Above:** *The first major systematic survey of deep benthic biodiversity in the Great Australian Bight was undertaken successfully by the project in 2013.*

**Karen Gowlett-Holmes** is a CSIRO taxonomist with broad knowledge of Australia's marine invertebrates. She contributes skills in taxonomy and photography to the project's field surveys.

**Nick Ellis** is a CSIRO applied mathematician with interests in statistical modelling, simulation, machine learning, management strategy evaluation and quantitative marine ecology. He has worked in a broad range of areas including prawn growth parameter estimation, impacts of trawling, fishery stock assessment and marine biodiversity mapping.


For more information

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