

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

PREPARED BY JESSE VAN DER GRIENT

03/11/2022

VERSION 2



CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT



VERSION CONTROL

VERSION	REVIEWED BY	DATE
1	Al Baylis	28 October 2022
2	Paul Brickle	1 November 2022

Acknowledgements:

This research was funded by: DEFRA Darwin Plus Initiative, Falkland Islands Government Environmental Studies Budget

Example citation:

For more information, please contact The South Atlantic Environmental Research Institute (SAERI) at: info@saeri.ac.fk or visit www.south-atlantic-research.org

Stanley Cottage North
Ross Road
Stanley
FIQQ 1ZZ
Falkland Islands
+500 27374

Falklands House
14 Broadway
London
SW1H 0BH
United Kingdom
+44 (0)203 745 1731

SAERI is a charity registered at the Charities Commission of England and Wales under charity number 1173105 and acknowledged on the Register of Charities in the Falkland Islands under number C47.

Cover photo © SAERI, 2022. Photography by Jesse van der Grient. A hatching squid in the experimental tanks.

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT



ABOUT THE SOUTH ATLANTIC ENVIRONMENTAL RESEARCH INSTITUTE (SAERI)

The South Atlantic Environmental Research Institute (SAERI) is an academic organisation conducting research in the South Atlantic from the tropics down to the ice in Antarctica. SAERI's remit includes the natural and physical sciences. It aims to conduct world class research, teach students, and build capacity within and between the United Kingdom's South Atlantic Overseas Territories. Its mission is to advance environmental understanding in the South Atlantic through research excellence and innovative scientific leadership. SAERI was a Falkland Islands Government initiative and operated as an arm's length government department from 2012 in July 2017.

Our vision is to be an internationally recognised academic institute with its main base in the Falkland Islands, operating in the South Atlantic from the equator down to the ice in Antarctica, conducting world class natural and physical science research, teaching students, and building capacity within and between the UK South Atlantic Overseas Territories.

Strategically, SAERI aims to be a world-class research institute that teaches students and builds capacity within and between the South Atlantic Overseas Territories. In order to achieve that it must be:

1. Project optimised – by operating as a streamlined and efficient organisation through the Focal Areas;
2. Fully funded – Falklands registered limited company is able to fund SAERI overheads, ensuring SAERI ultimately becomes fully financially independent from Falkland Islands Government and by ensuring that all grant applications (where possible) contain cost of seat coverage; and
3. The holder of proprietary environmental knowledge of the South Atlantic – by continuing to provide the research expertise offered to date.

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT



TABLE OF CONTENTS

1.	Project Report.....	1
1.1.	Project progress	1
1.2.	Key activities planned for the next project year.....	3

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT



CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

The climate change resilience in Falkland Islands fisheries and marine ecosystem project aims to understand the potential effects of climate change on the marine ecosystem of the Falkland Islands, and what consequences this could have for the Falkland Islands fisheries. The project approaches this work in various angles: through observation and data collection to understand baseline conditions, experimental work to understand how key species in the environment respond to ocean warming, and ecosystem modelling incorporating peer-reviewed data from the literature with the observational and experimental data collected during this project to model future ecosystem responses. These results will form the basis to discuss potential policy options with stakeholders including FIFD, DEPD and FIFCA. Through regular social posts about our fieldwork and experimental work we aim to engage the community. The project manager has given a talk about climate resilience in the Falkland Islands to the Falkland Islands Women Association and our project partner Dr Simon Morley talked about his Antarctic ecophysiology work to the schools. Our work on measuring respiration rates in shallow-water marine animals was featured on Falkland Islands TV.



1.1. PROJECT PROGRESS

The Falkland Islands marine ecosystem may be affected by climate change in the future as oceans are warming. To understand potential impacts, it is important what the current baseline of the ecosystem is. This can be done via reviewing the published peer-review literature and collecting observational data. This project has reviewed the literature of the Falkland marine ecosystem, focusing on migration and



food-web interactions from fauna ranging from phytoplankton to whales and seabirds. This literature review has been written and is currently being prepared for submission to a scientific journal. The report will be made freely available when published.

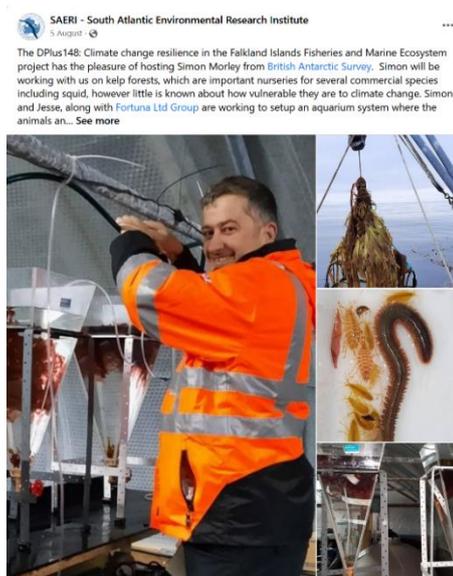
During the literature review, datasets on dietary information for various marine functional groups were collected (N = 49, covering a range of fauna, ranging from zooplankton, cephalopods, fishes to penguins and albatross), which has been collated and the data are hosted on the SAERI IMS-GIS/FIG data portal, indicating the geographical location or areas of the samples on the public webGIS.

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS



03/11/2022 - JESSE VAN DER GRIENT

Observational data from the zooplankton, including fish larvae, have been taken this year. We are surveying the surface waters around Berkeley Sound and Port William and are currently sampling the spring bloom, aiming to collect data every 2-3 weeks to capture this bloom. In addition, a PhD student with the University of Aberdeen was recruited to work further on these data to support this project. She will investigate community composition using genetic techniques, quantify inshore-offshore connections, and create a fish larval atlas.



Physiological experiments investigating temperature responses of various marine animals have been set up at the local aquacultural facilities of Falklands Fish Farming Ltd, owned by Fortuna Ltd.

As part of this work, our British Antarctic Survey partner (Dr Simon Morley) visited the Falkland Islands for 6 weeks and he will be returning in January and February to further help develop the project. A tank system has been built with help from Fortuna to ensure proper water treatment and heating. The animals we have investigated include *Doryteuthis* (formerly known as *Loligo*) *gahi* eggs, two amphipod species that are currently not identified, but which have been sampled for specialist identification, and serolid isopods. Respiration rates have been measured in response to warming for the squid eggs, squid hatchlings and



CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT



FITV

Current Affairs Court Environment History Lifestyle Sport Features More...

Environment

How Climate Change Could Affect the Falklands' Marine Ecosystems

September 4, 2022 12:27 by Charles Kershaw



A new scientific project aimed at understanding the effects of climate change on local aquatic life is currently underway in the Falklands. The experiment is the first of its kind in the islands and hopes to uncover new data on the resilience of species in warming waters. It is hoped that the new information will help to inform decisions on the management of the Falklands' fisheries.

amphipods. These responses will allow us to understand temperature tolerance capacity of the study animals.

The physiological experiments were recently shown on the Falkland Islands TV. Further, FIFCA members came around for a visit to the aquaculture facilities to see the experiments and discuss the reasons of why this work is done and how the scientific results could be beneficial for them.

An ecosystem framework has been designed based on the literature review. The aim for the modelling is to use the well-known Ecopath with Ecosim, but instead of the framework's standard platform the

R version will be used to allow for the incorporation of temperature-dependent metabolic responses (that is, the respiration rates), that are currently being estimated. FIG DNR-Fisheries are developing an Ecopath model of the Falkland marine ecosystem as part of a different project. Through our collaboration, we will use this model as a baseline for the work in this package, as well as offer modelling support to DNR-Fisheries. For the project aims, the Ecopath will be redesigned to match the ecosystem framework we have, and develop the Ecopath to an Ecopath with Ecosim model in R. The DNR-Fisheries model, which builds onwards from a Falkland Islands Ecopath model published in 2005, and our upcoming model will allow for a legacy of ecosystem modelling in the Falkland Islands. As this work moves along, our project partner Oregon State University (Dr Will White, Dr Michael Harte) will also be further engaged to aid in model development. Note that this work is ahead of schedule, as the work for this work package is scheduled to start in April 2023.

We will continue to acknowledge ESB funding in reports and project outreach.

1.2. KEY ACTIVITIES PLANNED FOR THE NEXT PROJECT YEAR

- Continue physiology experiments to test and quantify the capacity of key species to cope with and acclimatise to projected rates of climate change.
- Hosting a first workshop with local and international experts (ecologists and modellers) to create a framework for the Falkland Islands ecosystem model.
- Work with partners to further develop a Falkland Islands ecosystem model to investigate potential climate change responses.
- Continue to conduct inshore zooplankton/ichthyoplankton surveys to better understand the role of nearshore-offshore connectivity, and spatial and temporal dynamics.
- Conduct inshore *loligo* egg surveys on eastern coasts to determine the spatial (bathymetric) extent of *loligo* spawning areas.
- Host a second project workshop to explore potential ways to mitigate or adapt to climate change effects on fisheries and ocean management.

CLIMATE CHANGE RESILIENCE IN FALKLAND ISLANDS FISHERIES AND MARINE ECOSYSTEMS

03/11/2022 - JESSE VAN DER GRIENT





**SOUTH ATLANTIC
ENVIRONMENTAL RESEARCH
INSTITUTE**

www.south-atlantic-research.org



@SAERI_FI

FALKLAND ISLANDS OFFICE

Stanley Cottage North, Stanley, Falkland Islands. FIQQ 1ZZ
Tel: +500 27374 Email: info@saeri.ac.fk

UK REGISTERED OFFICE

Falkland House, 14 Broadway, Westminster, London, United Kingdom, SW1H 0BH Tel. +44 (0)203 745 1731

SAERI is a Charitable Incorporated Organisation (CIO) registered with the Charity Commission in England under Charity number 1173105. It is also entered on the register of Charities in the Falkland Islands with registration number C47.