Senate Inquiry into Algal Blooms in South Australia

Document prepared by A./Prof. Jochen Kaempf, Flinders University, 7 August 2025

This document outlines scientific work that I devoted to improving the understanding of the development and spreading of the toxic algae of *Karenia mimimotoi* in South Australian waters. This includes two key scientific reports (attached) that are summarized in the following. This document exclusively expresses the view of its author, not that of Flinders University.

1. Prediction of the spreading of an unprecedented *Karenia mikimotoi* bloom in South Australian gulfs (https://doi.org/10.13140/RG.2.2.28102.59207)

This manuscript (see attachment 1) is currently under review at Continental Shelf Research. Using a coupled physical-biological model, this work reproduces the initial spreading of the algae bloom. Future predictions include the worst-case scenario of a dramatic *reappearance* of this algae bloom in both gulfs in the next summer period. Key findings of this work are also featured in an article in The Conversation https://theconversation.com/south-australias-algal-bloom-may-shrink-over-winter-but-this-model-suggests-it-will-spread-to-new-areas-in-summer-261549.

The manuscript contains a comprehensive literature review of the latest scientific knowledge of Karenia mikimotoi blooms, and a detailed description of a refined algae prediction model, that other modellers (e.g. from SARDI) could adopt for their own predictions.

This manuscript also discusses the *unsuitability* of satellite data of chlorophyll-*a* to predict the agal bloom in the shallow waters of South Australian gulfs, and I call for the urgent need of *in-situ* water sampling across both gulfs to monitor the spreading of the algae bloom.

2. Karenia mikimotoi: Key Lessons on the Toxic Algae Bloom in South Australian Waters (https://doi.org/10.13140/RG.2.2.13517.55522).

This short scientific note (see attachment 2) focusses on the growth rate of Karenia mikimotoi, which is key to understanding the development of the algal bloom in South Australian waters. The scientific description of this growth rate, which has been well established through previous international research, provides powerful scientific arguments to *debunking* several speculations and myths that claimed that the algae bloom has been caused by a) the Murray River flood in 2023, b) strong upwelling in 2024 and/or c) a marine heatwave in 2025.

These two scientific reports are publicly available on ResearchGate and they have been shared with SARDI scientists early on. Despite this, the findings and interpretations contained in the reports, which I deem highly relevant, have been largely ignored by decision makers and government scientists, which is professionally disappointing.

I hope that the information contained in this letter helps this senate inquiry. If required, I am willing to answer follow-up questions regarding my work per email or in person.

Sincerely, Jochen Kaempf

Short Biography

Associate Professor Jochen Kaempf is a physical oceanographer and world-leading upwelling expert. His research has led to the discovery of the Great South Australian Coastal Upwelling System, for which he was nominated finalist of the prestigious Australian Museum Eureka Award in the Environment category in 2011. He was the first scientist who has comprehensively described the oceanography of large inverse estuaries including South Australian gulfs using three-dimensional circulation models. In recent years, he became an expert in the modelling of plankton blooms. He has published 3 textbooks, numerous book chapters, and more than 60 peer-reviewed papers.