



10th Annual Meeting of the Scientific Committee (SC10)

Concarneau, France, 17-26 March 2025

SC-10-INFO-21

Preparing for and Responding to Climate Change Impacts

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Document type	Working paper Information paper ✓
Distribution	Public ✓ Restricted ¹ <input type="checkbox"/> Closed session document ² <input type="checkbox"/>
Abstract	<p>Global climate change impacts, including ocean acidification, continue to be identified, underscoring the need to acknowledge and address the uncertainties surrounding the intensity and direction of climate change feedbacks. The 2024 SIOFA MoP agreed to list Climate Change as a standing agenda item, and to identify the SC advice needed on the potential implications of climate change. However, the MoP did not undertake substantive discussions on the latter point and did not make funding available to progress climate research on existing and projected impacts of climate change on the Convention Area.</p> <p>The DSCC reiterates its call for the Scientific Committee to:</p> <ul style="list-style-type: none">● Progress efforts to integrate Climate Change into its Advice<ul style="list-style-type: none">○ Assess where climate change impacts, both observed and potential, should be incorporated into its advice to the Meeting of the (MoP).○ Request the Secretariat to identify existing climate change information and knowledge gaps.● Advance Climate-Responsive Scientific Processes<ul style="list-style-type: none">○ Identify scientific processes where climate change information should be integrated.

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- Determine the data and methodologies required to incorporate climate change factors.
- Assess what climate change information is necessary to provide informed advice.
- Establish mechanisms for the routine collection of relevant climate data.
- Conduct a systematic assessment of species and habitats particularly vulnerable to climate change impacts.
- **Provide ongoing advice to the MoP**
 - On the implications of climate change for science-based decision-making.
- **Recommend that the MoP:**
 - Develop a strategy for climate-resilient fisheries management.
 - Define the scope and frequency of climate-related advice required from the SC.
 - Consider amendments to existing Conservation and Management Measures (CMMs) based on climate change data.
 - Mandate Climate Considerations in Fisheries Management:
 - Ensure that climate change factors are integrated into fisheries and ecosystem reports, including BFIA (both existing and new) and proposals for new or exploratory fisheries.
 - **Secure Resources for Climate Research**
 - Allocate dedicated funding for climate research starting in 2025.
 - Incorporate climate change considerations into discussions on VMEs and marine protected areas.

Preparing for and Responding to Climate Change Impacts

Introduction

The 2024 SIOFA MoP adopted the SC recommendations to list Climate Change as a standing agenda item, and to identify the SC advice needed on the potential implications of climate change.

However, the MoP did not undertake substantive discussions on the latter point and did not make funding available to progress climate research on existing and projected impacts of climate change on the Convention Area.

The deep ocean plays a vital role in regulating the Earth's climate, acting as a major carbon sink and heat absorber. Deep-sea ecosystems, including seamounts, are critical for carbon cycling, long-term carbon storage, and biodiversity resilience. Over centuries, these ecosystems contribute to carbon sequestration, helping to mitigate climate change. Human induced climate change is projected to create and exacerbate existing stressors on the health and productivity of the global ocean, marine biodiversity and fisheries production and is expected to impact on the age, size, distribution and geographic diversity of marine species (Meridith et al., 2019; Phillips & Perez-Ramirez, 2018; Sumaila et al 2011; IPCC, 2022).

Deep-sea habitats are not immune from these changes. Sweetman et al. (2017) suggest that benthic habitats can experience rising ocean temperatures, acidification, declining oxygen levels, and reduced nutrient availability, leading to significantly deleterious impacts on deep-sea benthic ecosystems. Zelli et al. (2025) suggests that vulnerable marine ecosystems (VMEs) will experience significant losses in density (54%) and habitat extent (61%) under climate change in areas around New Zealand. Climate change driven stressors threaten the stability and ecological functions of these critical habitats, potentially disrupting their role in carbon storage and biodiversity support.

Climate-driven impacts are further compounded by destructive fishing practices like bottom trawling which not only devastate deep-sea habitats but also release stored carbon from sediments, exacerbating climate change impacts. Research has identified bottom trawling as a significant source of carbon emissions to the atmosphere and a driver of localised ocean acidification in heavily trawled areas (Atwood et al., 2024). Studies highlight the crucial role of deep-sea ecosystems in buffering the effects of climate change, underscoring the urgent need for stronger precautionary measures to manage the cumulative impacts of deep-sea fishing and climate change (Levin et al., 2020). Moreover, continued bottom trawling threatens the viability of areas that could serve as natural climate refugia for VMEs, further undermining their resilience (Zelli et al., 2025). Halting bottom trawling could be a significant climate solution, helping to prevent further carbon release and ecosystem degradation (Atwood et al., 2024).

In the high seas, seamounts are biodiversity hotspots, hosting rich and unique marine ecosystems, many of which are ancient and represent some of the oldest living organisms on Earth. However, they are also prime targets for deep-sea fisheries, particularly intensive bottom trawling, which threatens their ecological integrity. Protecting VMEs is essential for preserving vast amounts of deep-sea biodiversity, maintaining ocean health, and ensuring climate stability. However, scientific evidence suggests that seamounts may be experiencing the impacts of climate change at an accelerated rate, underscoring the urgent need for conservation efforts (Jones et al., 2014; Ross et al., 2020). Seamount

communities have been shown to recover extremely slowly from the impacts of bottom trawling with full recovery potentially taking centuries (Goode et al., 2020).

Many policy frameworks have recognised the urgent need to address the growing concerns about human-induced climate change and its impact on Earth's ecosystems. Key initiatives include the UN Framework Convention on Climate Change (UNFCCC), the Food and Agriculture Organization's Strategy on Climate Change 2022–2031, and the recently adopted ocean-based climate action plan by the 17-nation High Level Panel for a Sustainable Ocean Economy Ocean Panel (<https://oceanpanel.org/>)

Given these threats and ongoing global policy initiatives, climate considerations further underscore the urgency of precautionary management and stronger protections for seamounts. Implementing robust conservation measures —particularly to prevent destructive activities like bottom trawling— is crucial for protecting deep-sea ecosystems, preserving biodiversity, and strengthening global efforts to mitigate climate change.

The integration of climate change considerations into the decision-making processes of Regional Fisheries Management Organizations (RFMOs) is fundamental to support sustainable and conservation-oriented management of human activities in oceans.

The DSCC draws the attention of the SIOFA SC to its 2024 paper SC-09-INFO-26 which noted growing scientific concerns about the impacts of human-induced climate changes on the Earth's ecosystems, including the marine environment and outlined actions necessary to address climate change. Since then, global climate change impacts have continued to be identified. There is also a strengthening recognition of the uncertainties arising from the feedback mechanisms generated by such impacts. The DSCC would like to underscore the critical importance of protection measures and precautionary frameworks, both for sustainable fishing practices and vulnerable ecosystems, including seamounts. Their conservation is essential for halting and reversing biodiversity loss in the deep ocean, enhancing resilience for deep-sea ecosystems, and strengthening the ocean's role as a carbon sink.

Despite the urgency to act, the absence of SC Working Papers on the potential implications of climate change on SIOFA fisheries highlights a critical gap. The DSCC therefore urges the SC to establish a dedicated, ongoing program to address this issue proactively.

Recommendations

The DSCC reiterates its call for the Scientific Committee to:

- **Progress efforts to integrate Climate Change into its Advice**
- **Advance Climate-Responsive Scientific Processes**
- **Provide ongoing advice to the MoP**
 - On the implications of climate change for science-based decision-making.
- **Recommend that the MoP:**
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Acknowledgments

DSCC would like to acknowledge the input of Dr. Lyn Goldsworthy AM

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