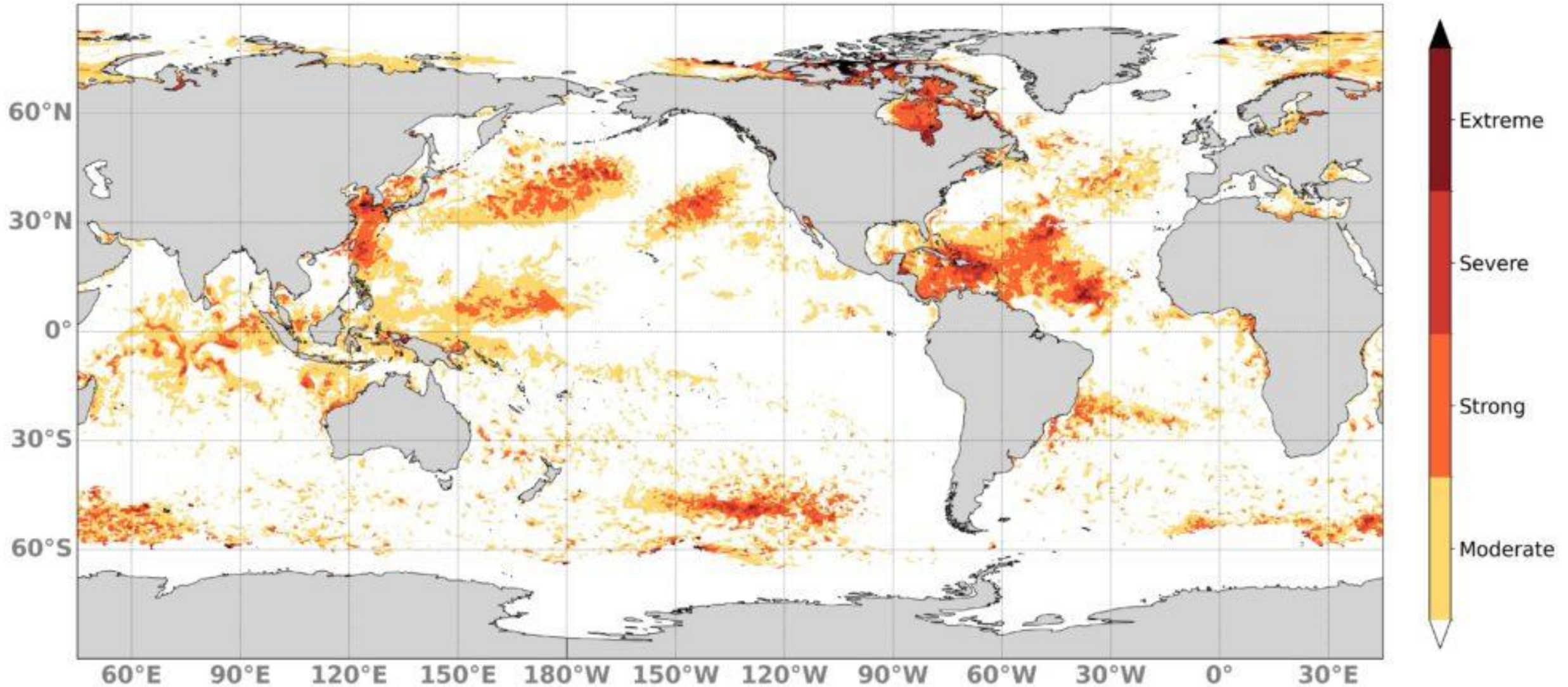




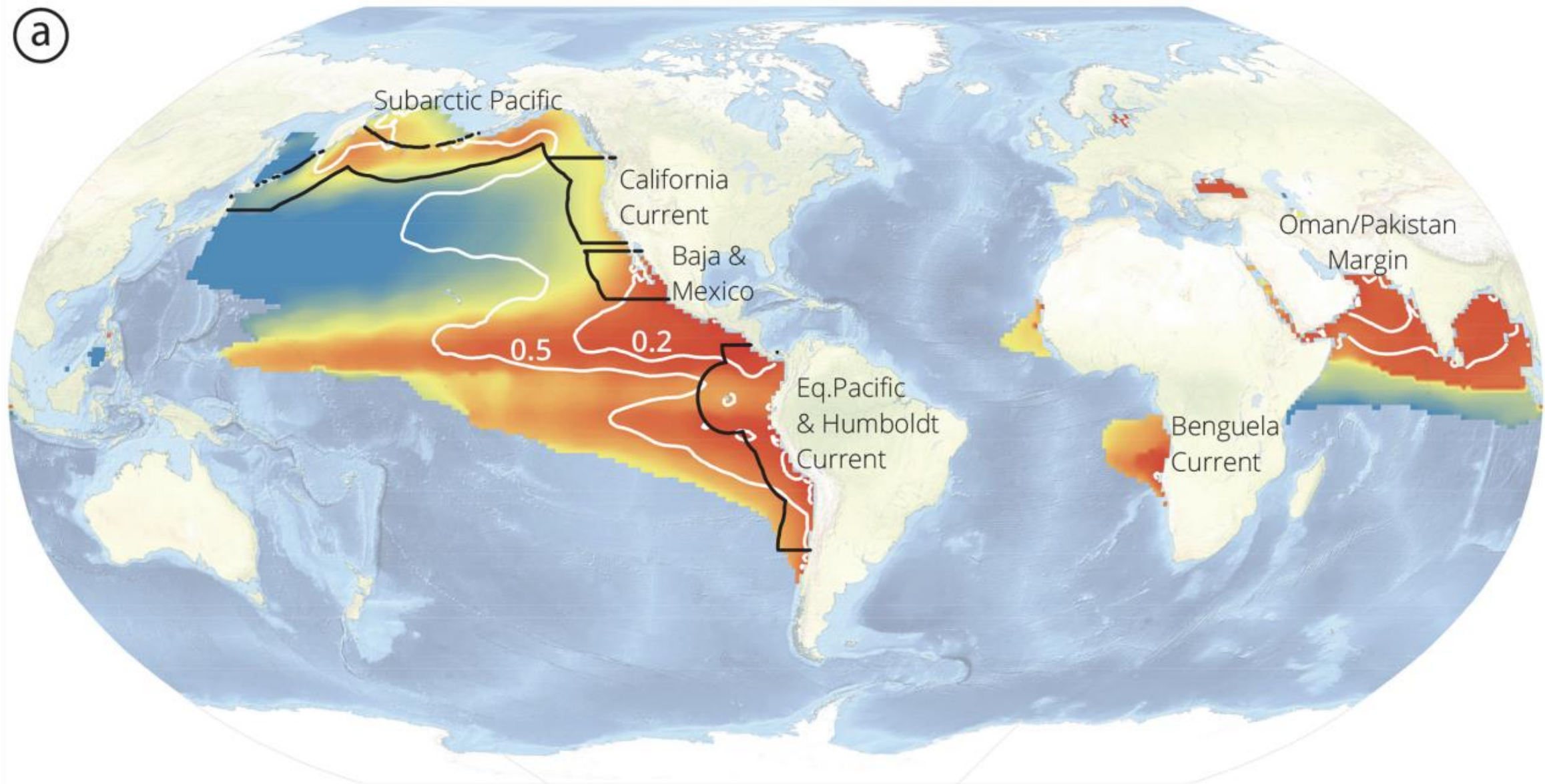
ABC News, Hurricane Milton

Marine Heatwave Category Map - 2024-09-28

Data: GLO12V4 forecast



a



Upper depth (m) of 1.4 ml L⁻¹ O₂ isobath



Myhre et al. 2015 PLOS



FUTURE
Science Program



Working Group 49:

Climate Extremes and Coastal Impacts in the Pacific



Hiroki Wakamatsu, Helen Killeen,
Karen Hunter, Chan Joo Jang, Antonietta Capotondi
28 October 2024 | FUTURE Symposium
Honolulu, Hawaii, USA





Terms of Reference

1



Develop a census of historical climate extreme events around the Pacific Rim to describe their characteristics, identify potential climate and ocean drivers, and catalog the ecological and socioeconomic consequences.

2



Focus on **case studies (e.g., MHWs) for full exploration**: drivers, predictability, ecological and societal impacts, and dissemination of information for actionable solutions.

3



Assess the predictability of climate extremes and establish leading indicators to mitigate impacts on coastal communities.

4



Develop models to **predict how existing ecosystem services may be affected** by climate extremes and what effects those would have on different human communities.

5



Identify a set of social, economic, and cultural indicators that account for the suite of human dimension impacts from climate extremes.

6



Work with experts in science communications and participants in the UN Decade of Ocean Science (e.g., SMARTNET) to develop and disseminate information and products related to the drivers, predictability and impacts of climate extremes.

7



Identify and engage partners in the prioritization of activities and deliverables.

Progress of WG 49

Pacific Extremes Community Survey

- Understand who we are
 - Our diverse expertise is associated around MHW
- Understand how we think about CEEs
 - Definition
 - Category
 - Examples of representative CEEs

➔ Not thorough to census the events

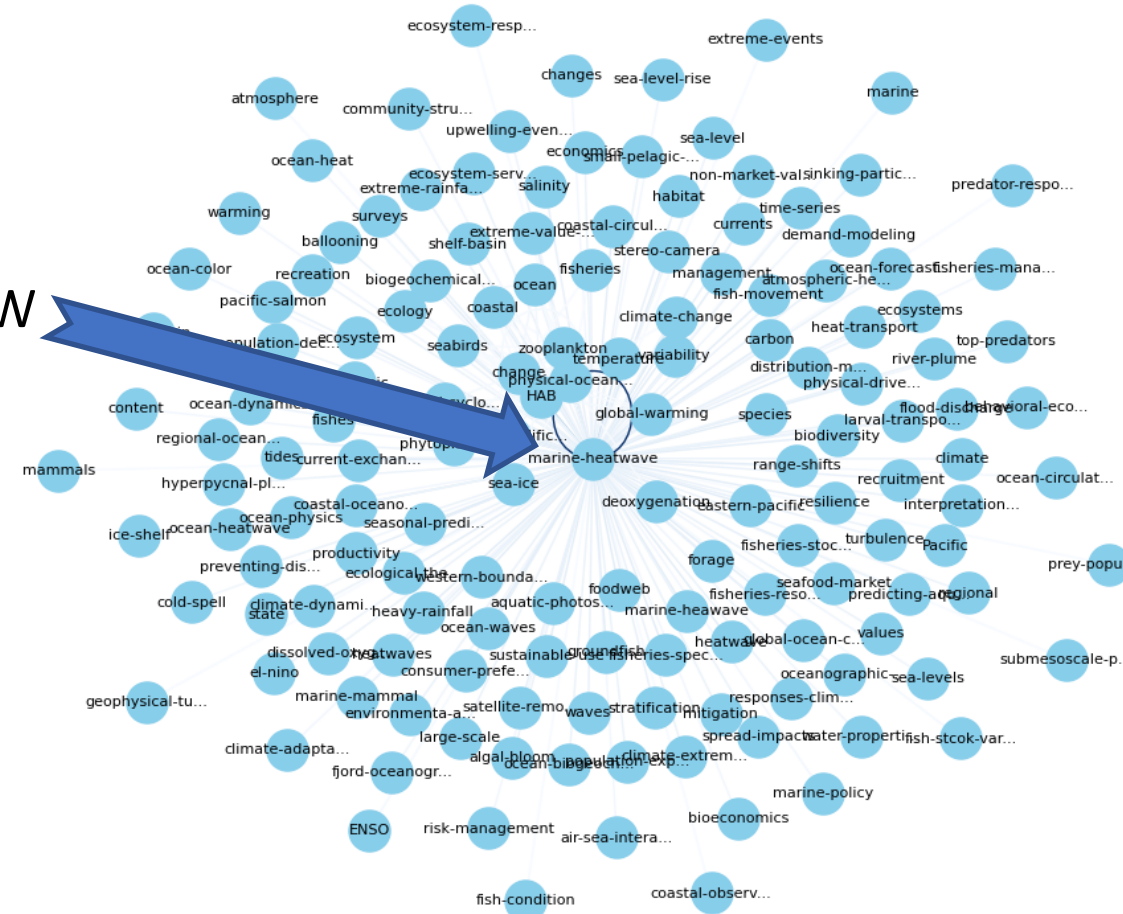


Fig. 1 Expertise of WG 49 Community

Ongoing Projects and Events to Pursue ToRs

1. **Task force team 1 (ToRs 1, 2, 3, 5)**
→ Bibliometric analysis
2. **Task force team 2 (ToRs 2, 3)**
→ Physical drivers and implication for predictability
→ Topic Session in 2024 & 2025
3. **Special Sessions and Workshop in 2025**

1. Bibliometric analysis

Objective:

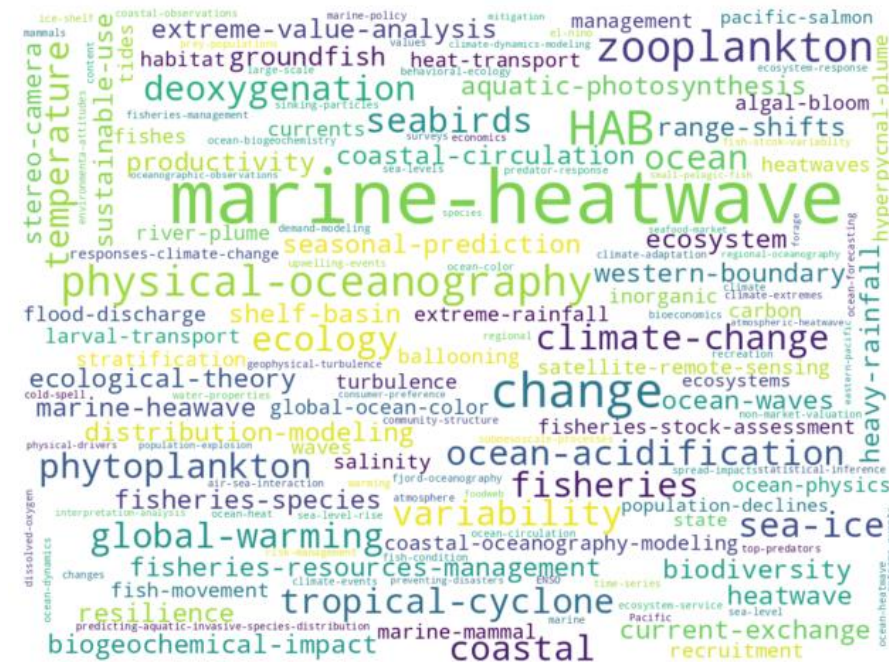
- Develop a **CEE Database** across the North Pacific, focusing on their **drivers, impacts, and indicators**.

Method:

- **Systematic Review**
- **Content analysis**
(Text metrics, Topic-sp. dictionaries, Topic modeling)

Expected Outcomes

1. **Census** historical CEEs in the North Pacific. (ToR 1)
2. Understand **drivers, impacts, and indicators**. (ToR 2, 4, 5)
3. Enhance **predictability** and **monitoring approaches**. (ToR 3)



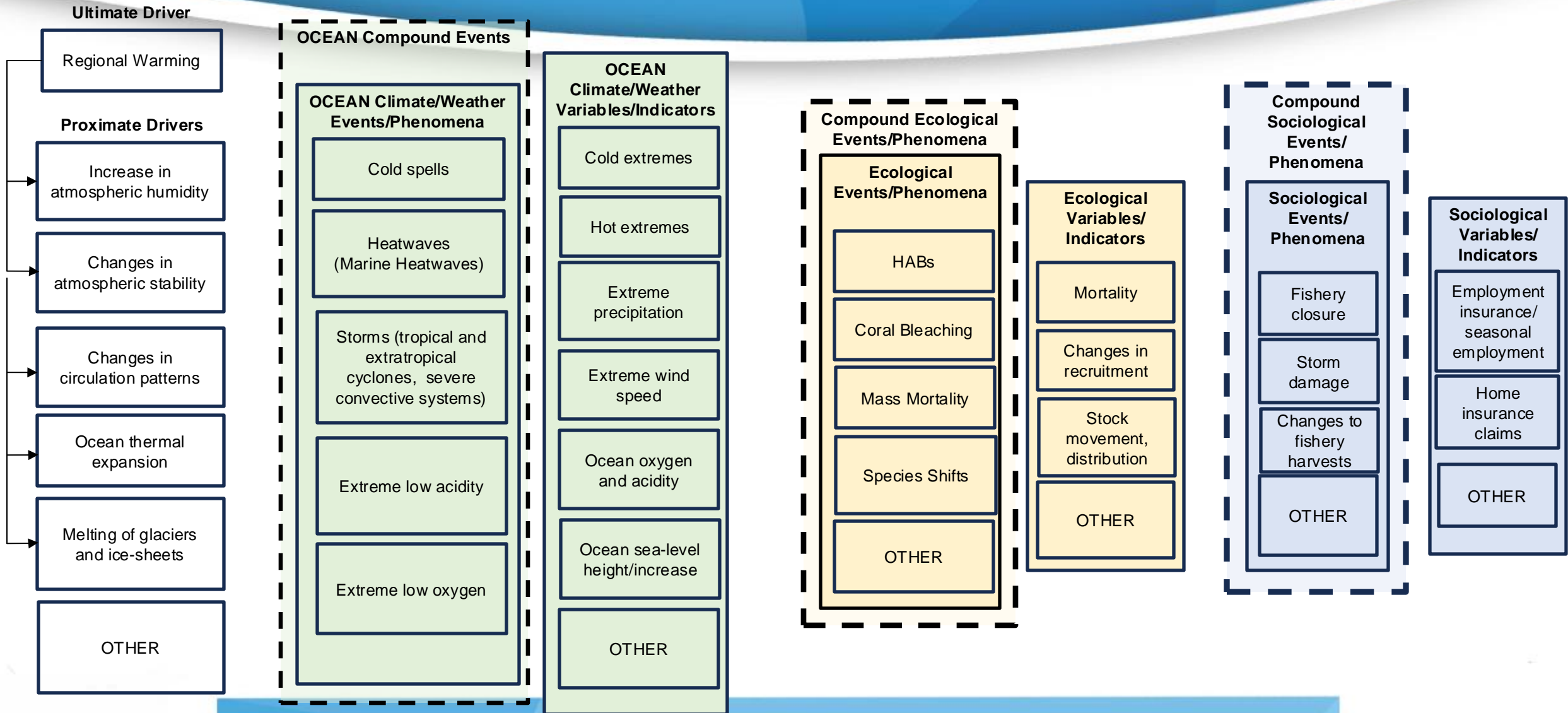
Drivers

Pressures

Impacts/Pressures

Impacts

Causal Progression



2. Physical Drivers

Objectives: Assess the predictability of climate extremes

1. Select case studies for analysis
2. Assess leading local drivers and remote influences
3. Characterize internal and forced variability
4. Explore surface and subsurface conditions associated with events
5. Describe the presence of overlapping biogeochemical extremes (compound events)
6. Define suitable indicators

3. Topic session in 2024 and 2025

Objectives: to enhance

- understanding of CEEs,
- predicting future changes, and
- discussing ways to mitigate their impacts

Contents (2024 has 17 presentations including 10 by ECOPs, 2 by invited speakers) include,

1. Physical and biogeochemical processes of climate extreme events
2. Statistical assessment
3. Complex events of climate extremes
4. Ecological and socio-economic impacts
5. Future projections and forecasting models
6. Recent unprecedented conditions (adding to 2025 session)

4. Planning Workshop

- **A need of actionable solutions (ToR 2)**
 - Current management frameworks struggle to handle the adverse impacts caused by CEEs efficiently
- **Workshop Focus:**
 - **DSPIR Framework: Drivers, Pressures, States, Impacts, Responses**
- **Integrating SEES Framework:**
 - PICES SEES (Social-Ecological Environmental System) framework
 - Streamline science and solutions for the North Pacific
- **Outcome:**
 - Actionable solutions to researchers and decision-makers
 - Understanding of similarities and differences across CEE outcomes

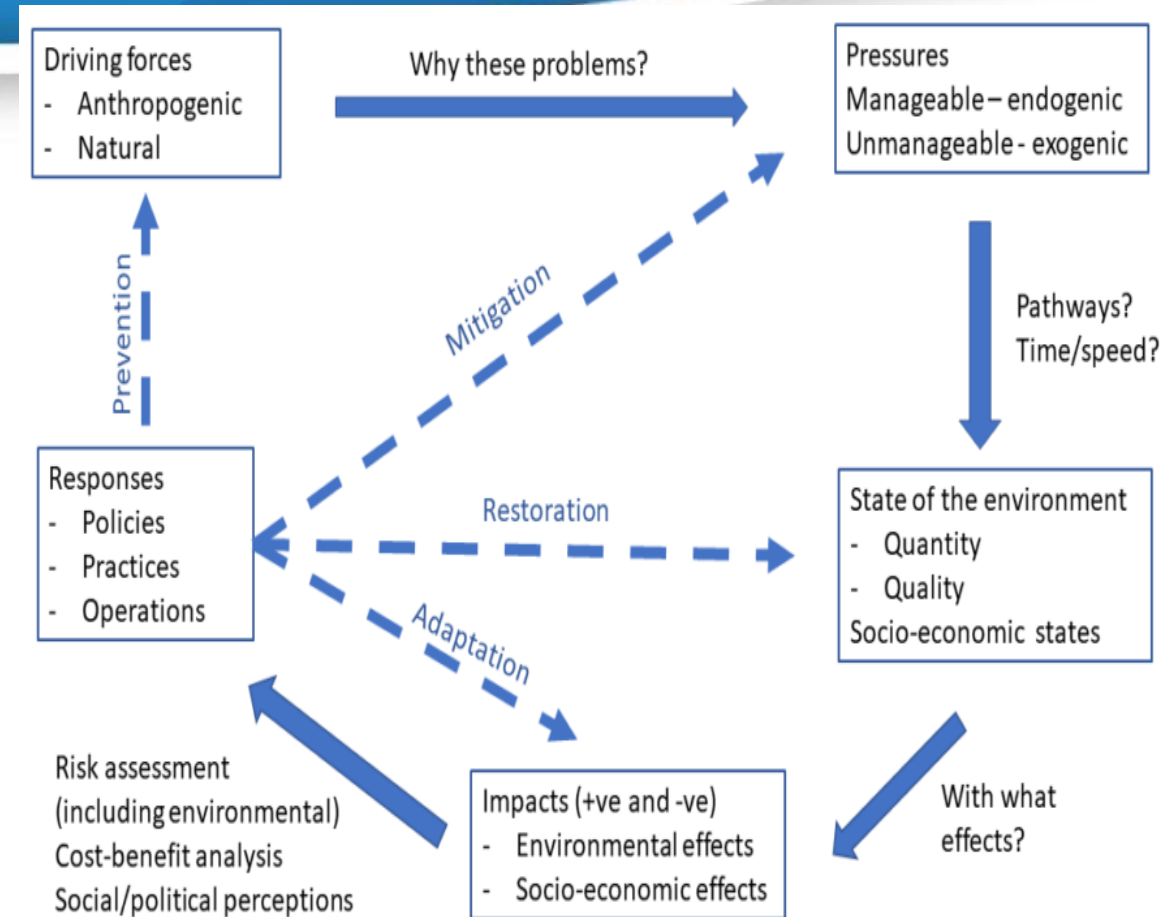


Fig. 2 DSPIR Framework

source: <https://learningforsustainability.net/post/extended-dpsir/>

2023

2024

2025

2026

2027

Activities

Pacific extremes
community survey

Bibliometric review

Physical Drivers

PICES Workshop:
Case studies
PICES Workshop:
Physical Drivers
PICES Session

PICES Session

Final Report

TORs



1



2



3



4



5



6



7



Climate Extremes & Coastal Impacts



Charles Hannah, Karen Hunter,
Jennifer Jackson, Hiroshi Kuroda,
Shoshiro Minobe, Haruka
Nishikawa, Hiroki Wakamatsu,
Changming Dong, Jian Tony Ma,
Yajuan Song, Chan Joo Jang, Chun
Ok Jo, Sukgeun Jung, Changsin
Kim, Sung Yong Kim, Hyeon Oh,
Jongseong Ryu, Steven Bograd,
Antonietta Capotondi, Emanuele Di
Lorenzo, Helen Killeen, Dan Lew,
Robert Suryan

Thank You
Questions?

