OCEAN CANADA

The Nippon Foundation - University of British Columbia NEREUS PROGRAM Predicting Future Oceans

Fisheries and Oceans Canada

University of Manitoba

LIVING OCEANS

vancouver aquarium

# Wellbeing of Canadian coastal communities under global change


**William W. L. Cheung**

**and the NDIS team**

**National Data and Integrated Scenario (NDIS) Working Group**

**OCEAN CANADA**


24 May 2016, Vancouver, Canada

# NDIS Team














**(in alphabetical order)**

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# Goals of NDIS

- **Data integration**: To develop a searchable 'living' **online database** for use by researchers, policymakers and the public;

- **Taking stock**: Collects and integrates secondary data to assess **status and trends** and identify **knowledge gaps**;

- **Scenario building**: To project qualitative and quantitative **scenarios** for Canada's oceans under different socio-economic and biophysical changes, particularly as they relate to distinct policy pathways.

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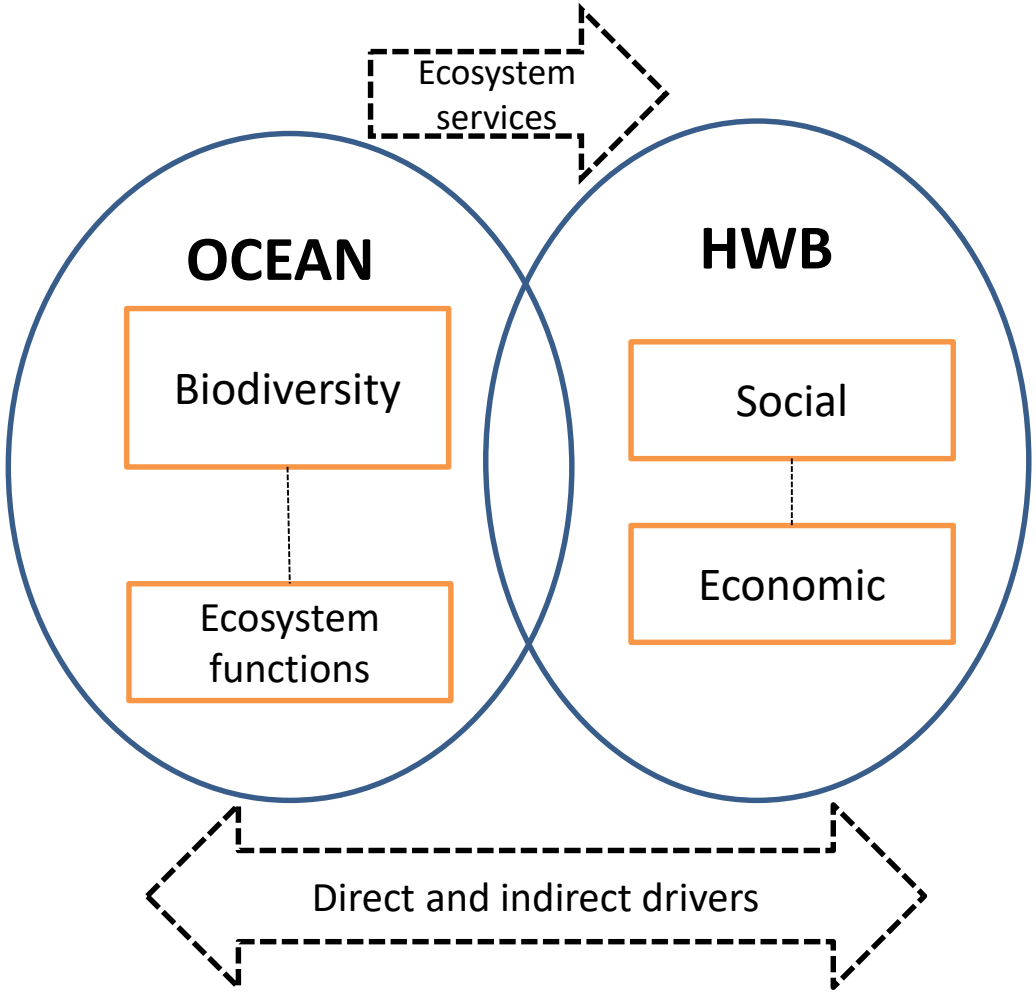
# Specific questions

- What are the current contributions of the oceans to goods, services and wellbeing of coastal communities?
- What are the risks of global change to sustain wellbeing contributions from the oceans?
- How could Canada and coastal communities adapt to these risks?

# What are the current contributions of the oceans to goods, services and wellbeing of coastal communities?

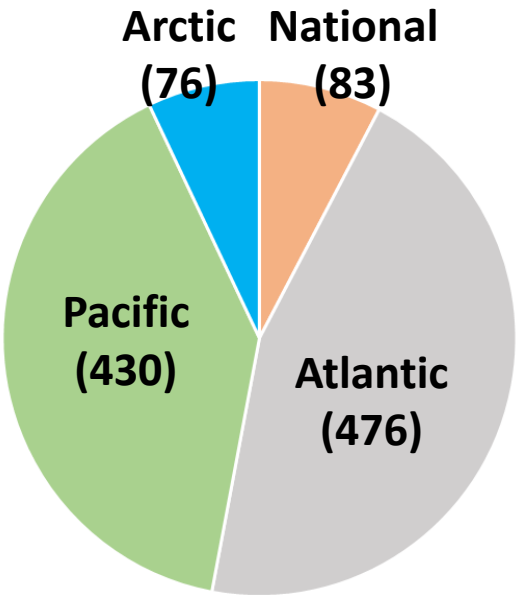
# The Ocean's Contribution to Human Wellbeing (HWB)

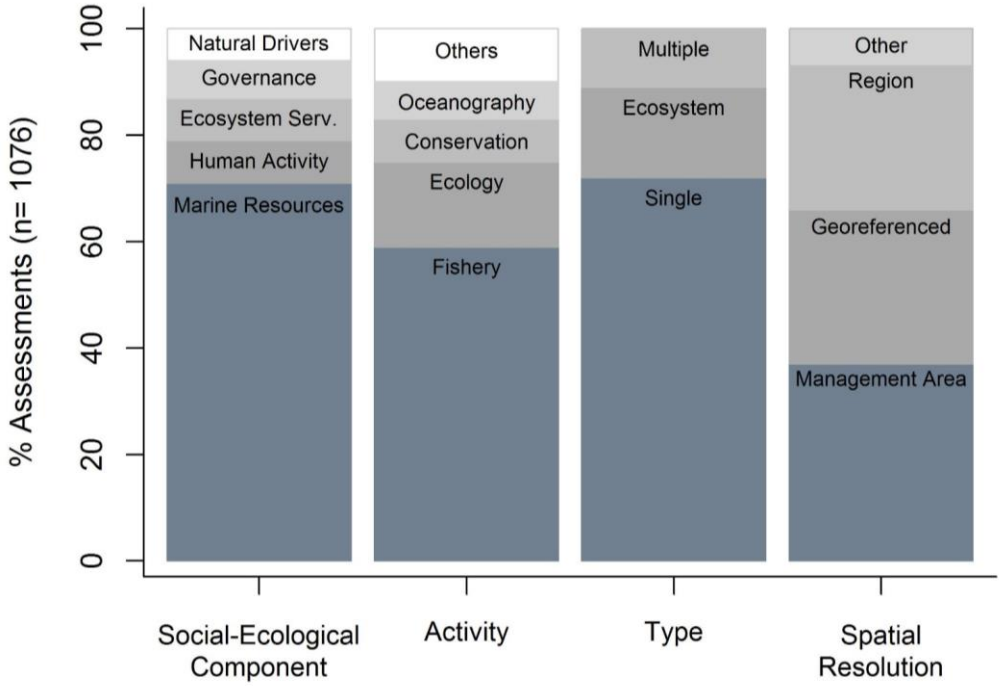


# Taking stock of available data about Canadian Oceans

(Cisneros-Montemayor, Cheung, Bailey, Bodtker, Hoover, Steiner, Teh, Sumaila, in press. CJFAS)
(See poster)

## Metadata records




**Next step:**

- Indicators, fuzzy logic system and assessment of trends towards achieving Convention of Biological Diversity 2020 Aichi Targets – critical to Canada's Biodiversity Strategy.

# Contribution of the oceans to human wellbeing

(led by Lydia Teh)

| Exampe | Metric | Evaluation |
|---|---|---|
| Social<br>• Environmental quality | Temporal trend in human demand for the ocean's services | The greater the demand, the greater is the value of the service provided by the ocean |
| • Food security<br>• Recreation | Proportional contribution of marine goods & services | The higher the relative contribution of marine goods & services, the higher is the ocean's value |
| Economic stability | Temporal trend in quantified value of marine based activities (# of jobs, $) | The closer marine sector activities come to meeting basic needs (sufficient and sustainable), the greater is the ocean's value |

**Next steps:**

- Acquire, enrich and extract data from OCP database
- Adapt the fuzzy logic approach for developed for Aichi Targets to assess trends of contribution of oceans to human wellbeing.

# Private governance of Canada's oceans for biodiversity conservation?

(led Megan Bailey)

Much of Canada's seafood is labeled (and thus governed) by private mechanisms (71% by volume in the Pacific, 74% by volume in the Atlantic)

The relevance of this for helping Canada meet its biodiversity targets is unclear:

- Target A: Mainstreaming biodiversity – improves awareness
- Target B: Reduce pressure – no improvement in Canada's COSEWIC status for marine species
- Target C: Safeguard ecosystems – questionable certification of P3s Cod, certification of species (lobster) that resulted from collapse
- Target D: Enhance benefits to all – lack of accessibility for small-scale and Indigenous fisheries in Canada? Export of products
- Target E: Enhance participatory planning – Some approaches (community supported fisheries) may enhance, others may disempower

Part of "**OCP: Taking Stock**"; submitted to *IUCN Policy Matters special issue*

# How would global change affect the future wellbeing of Canadian coastal communities?

# What does meeting (or not) the Paris Agreement target mean to Canadian oceans and coastal communities?


*"Holding the increase in the global average temperature to **well below 2 °C** above pre-industrial levels and to pursue efforts to limit the temperature increase to **1.5 °C** above pre-industrial levels…"* (UNFCCC 2015)

# Review of scenarios on Canadian oceans

(Teh, Cheung, Steiner, Sumaila (in revision). Regional Environmental Change)

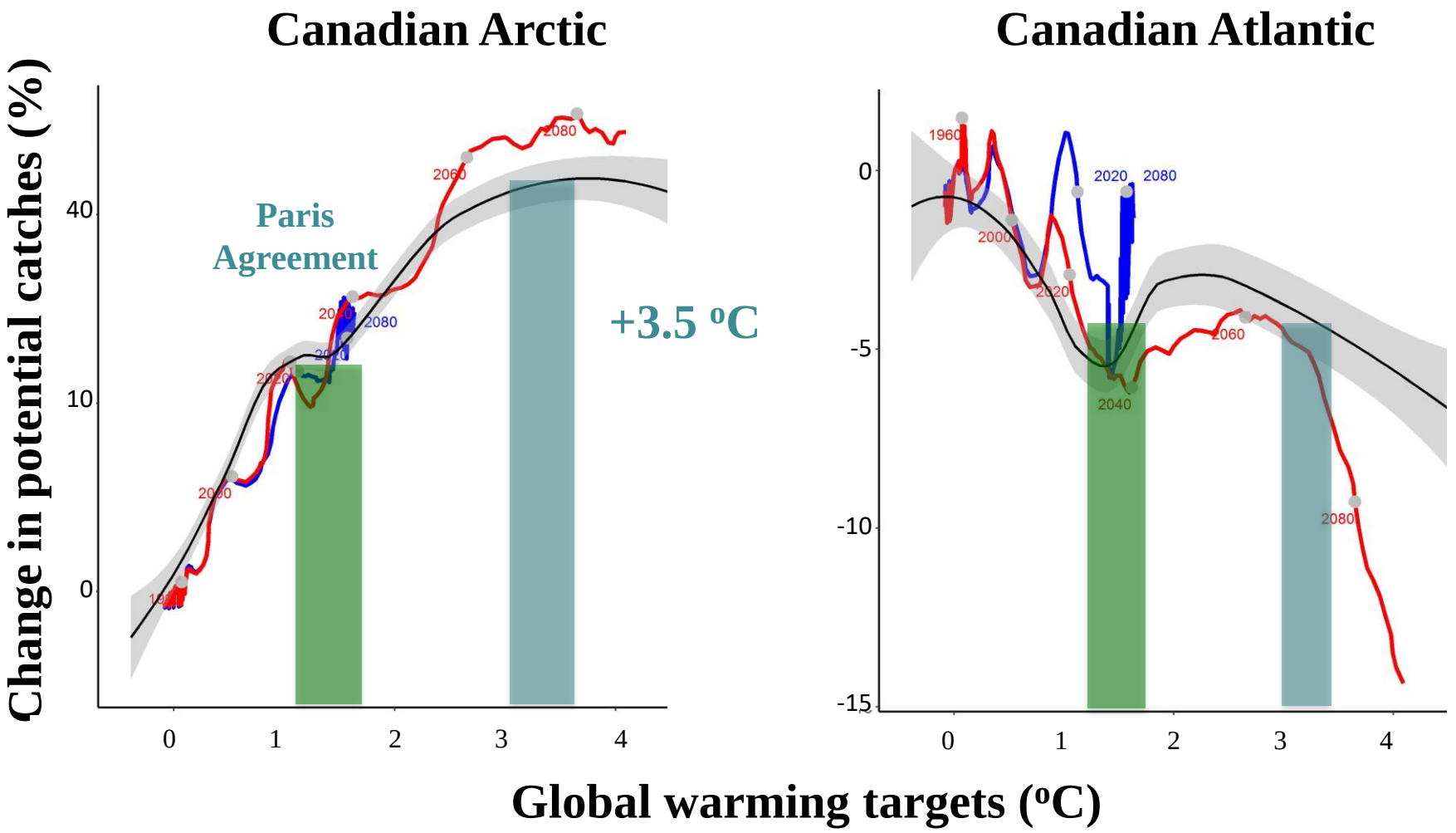
## Key findings:

1. Sufficient data and quantitative methods to draw upon for modelling climate impact on marine ecosystems
2. Lack of integrative approach to scenarios
3. Limited focus on societal and economic impacts arising from future environmental and socio-economic change
4. No scenarios that looked at all 3 Canadian coasts simultaneously

## Next steps:

- Refine national scale scenario framework for addressing gaps identified in the review
- Apply framework, models, and data
- Establish linkages between national and regional scale scenarios
- **NDIS Scenario Workshop on Day 3.**

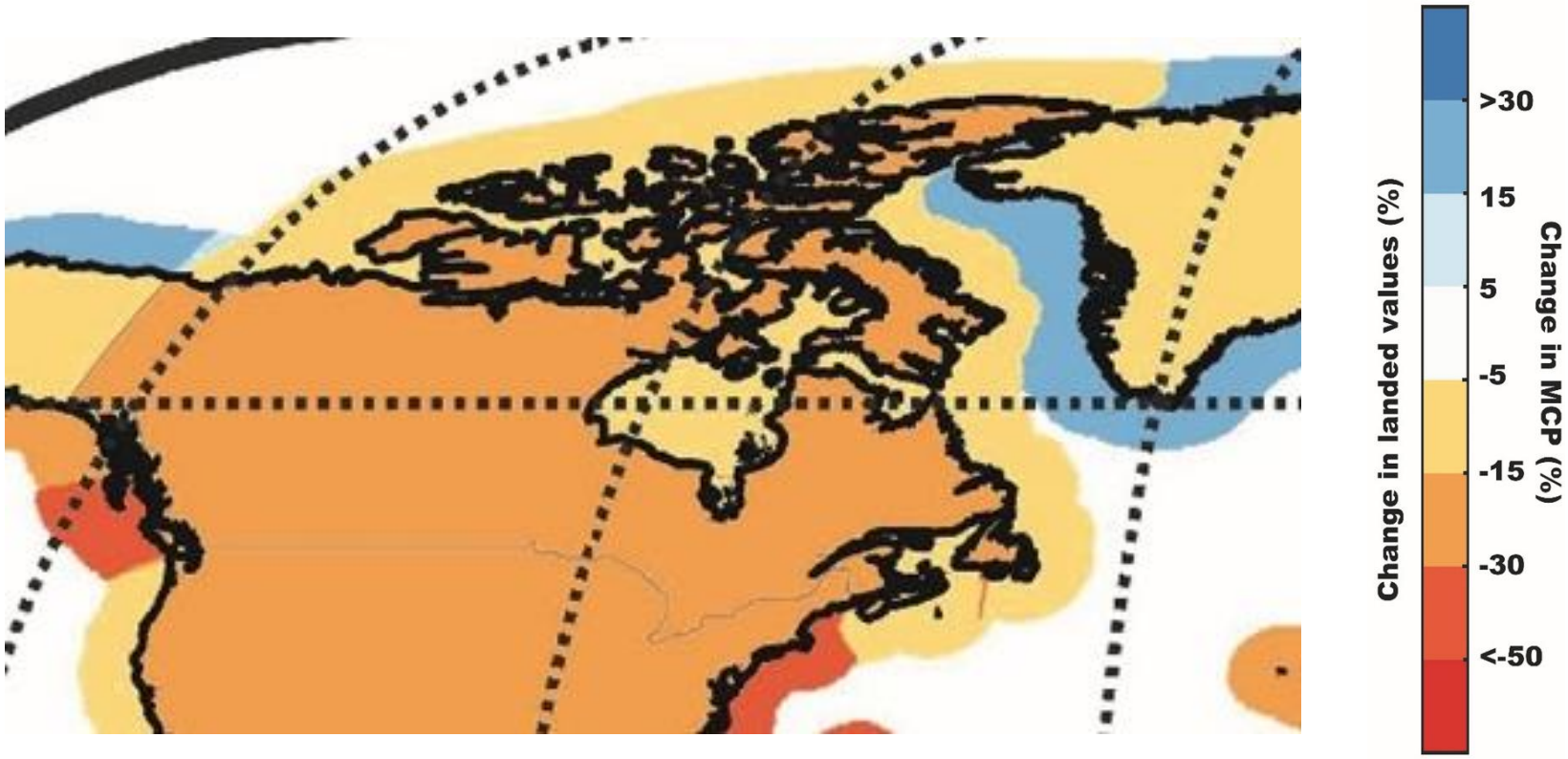
# Translating global warming targets to policy-relevant impact indicators




Adapted from Cheung, Reygondeau, Froelicher (in revision)

# Climate change impacts on fisheries revenues

Percentage change in revenues in the 2050s relative to current status under high $CO_2$ scenario




**Next steps:**

- Exploring the interactions with fishing and management policies.

Lam, Cheung, Reygondeau, Sumaila. (in revision) Nature Scientific Report

# Charting a course for Gulf of Maine fisheries: Static institutions in a world of shifting ecosystems

NDIS, Law and Policy and DFO (Bailey, VanderZwaag and Shackleton)

To what extent do and can the US and Canada jointly manage Gulf of Maine fisheries in light of shifting ecosystems/climate change?

Key results:

- Several species exist in both EEZs, and potentially redistributing due to climate change
- Yet, only key harvestable species tracked
- Limited unilateral institutional plans to incorporate climate change in domestic management
- Almost non-existent institutional ability to incorporate climate change in transboundary management

Part of "**OCP: Taking Stock *and* qualitative scenarios**"; due to *International Ocean Yearbook* July 2016

# Specific issues and case studies

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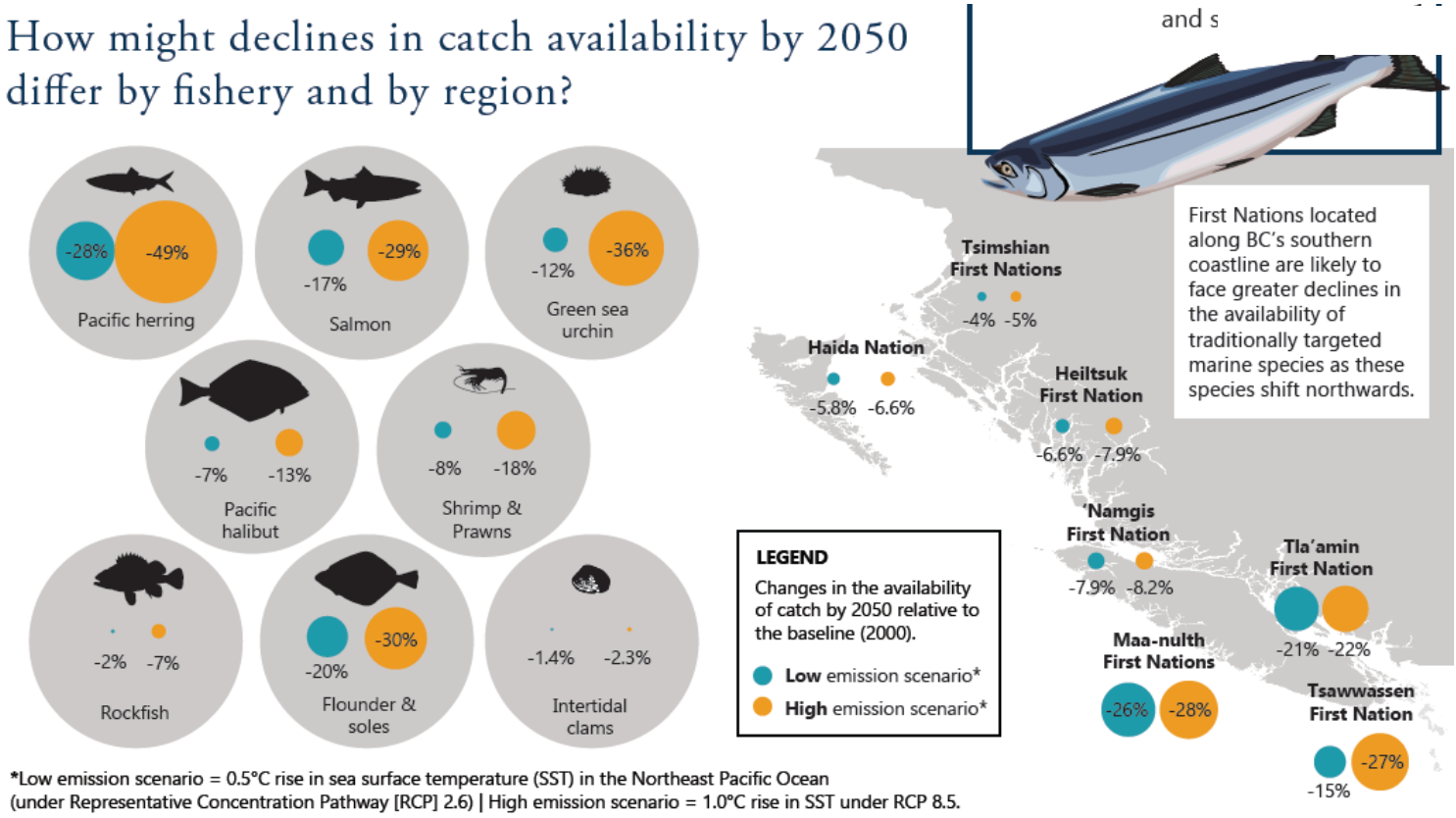
INTERGOVERNMENTAL PANEL ON Climate Change

# Impacts on nutritional security of coastal First Nations




Weatherdon, Ota, Close, Cheung (2016) PLoS One

## Next step (linkages to food security)

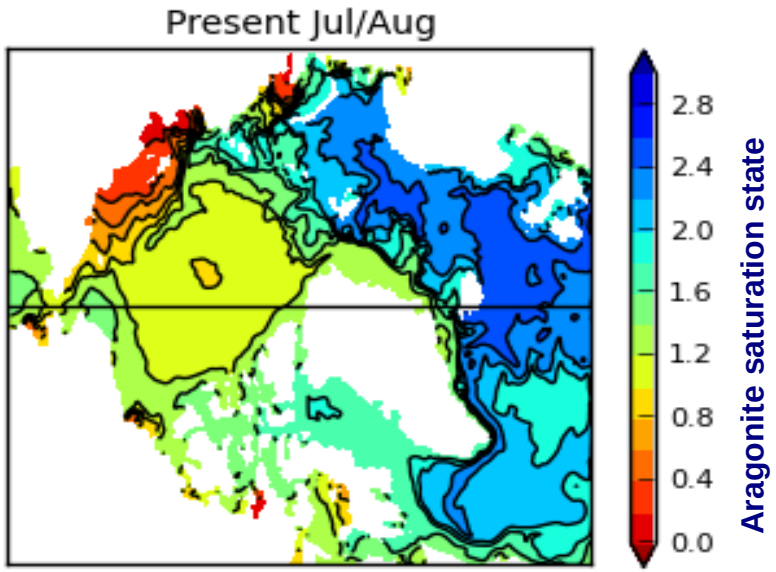
- Submitted CIHR-NSERC collaborative grant LOI to study impacts of climate change on nutritional health and develop adaptation plans (with Laurie Chan and Anne Solomon, in collaboration with First Nations Health Authority and Coastal First Nations)

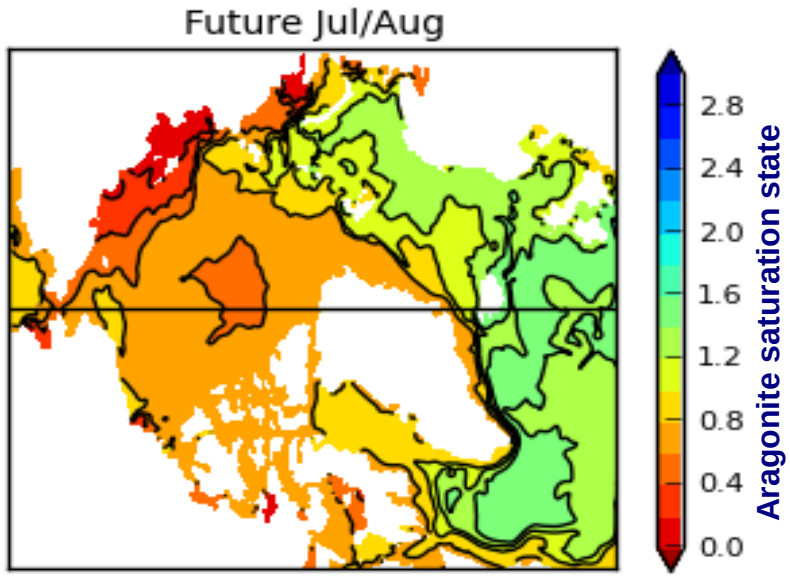
# AMAP-Ocean Canada Case Study

(led by Nadja Steiner)

Goal: Link climate change projections of Canadian Arctic waters to effects on marine species and socio-economic impacts on people.

- Modelling future biophysical changes;
- Assess socio-economic impacts;
- Initial case study in the Beaufort Sea, as part of Ocean Canada & AMAP with focus on acidification impacts (link to Travis' study).

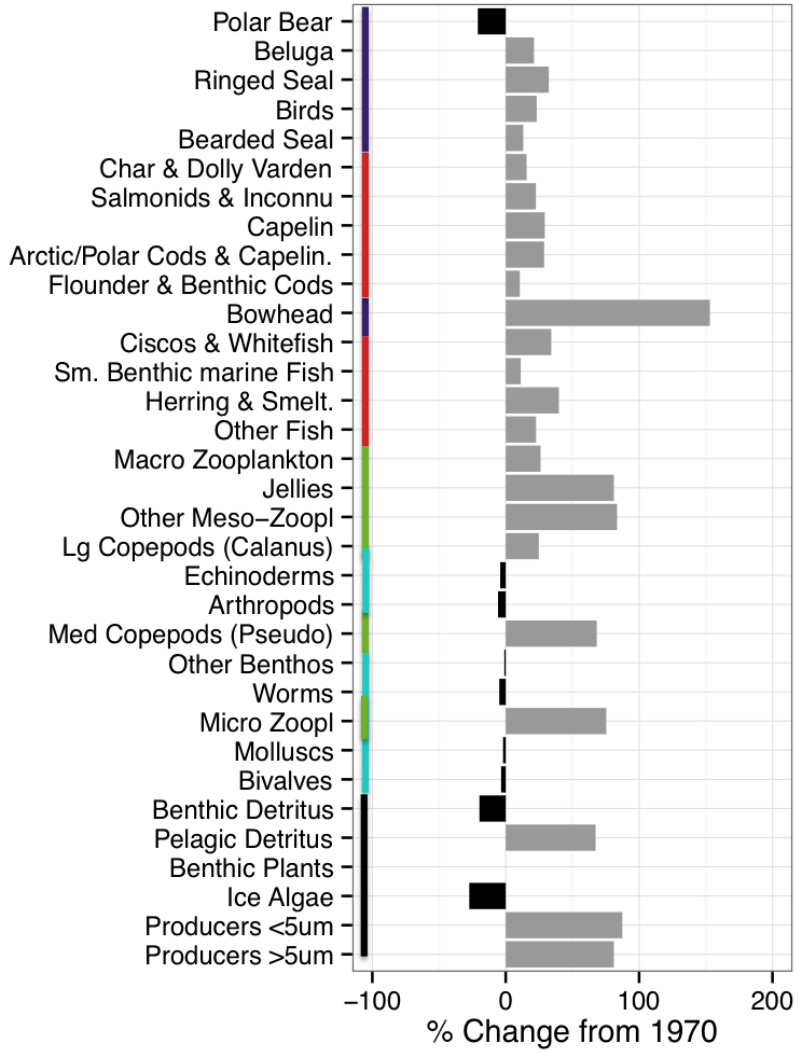


# Case study - Beaufort Sea

**(led by Carie Hoover, see poster)**

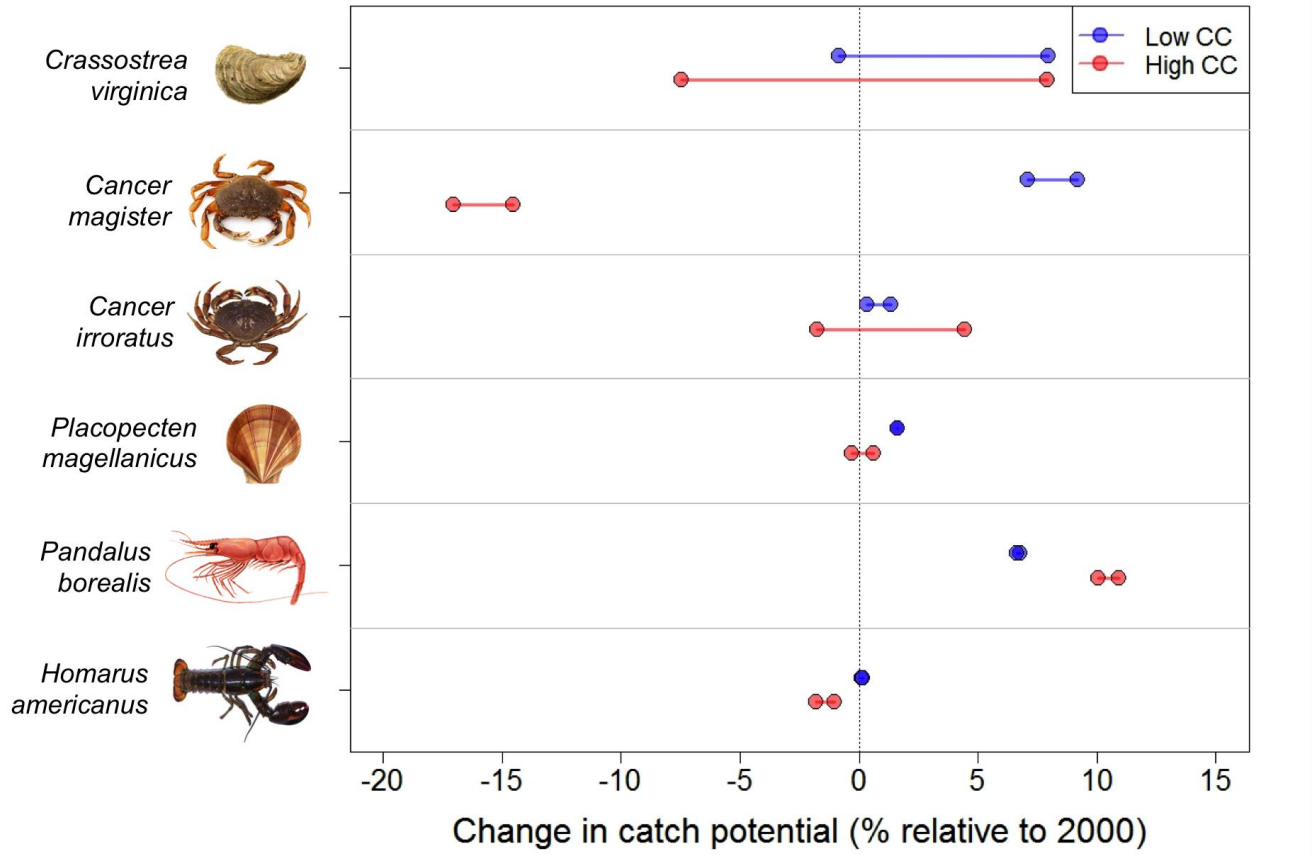
- Identify changes of biodiversity and ecosystem functions over time (e.g., species, harvest);
- Use of indicators and ecosystem models;
- Working towards future changes- climate change scenarios.




University of Manitoba (Carie Hoover), DFO (Lisa Loseto, Wojciech Walkusz, Shannon Macphee)

# Effects of ocean acidification on Canadian shellfish fisheries

(led by Travis Tai, see poster)

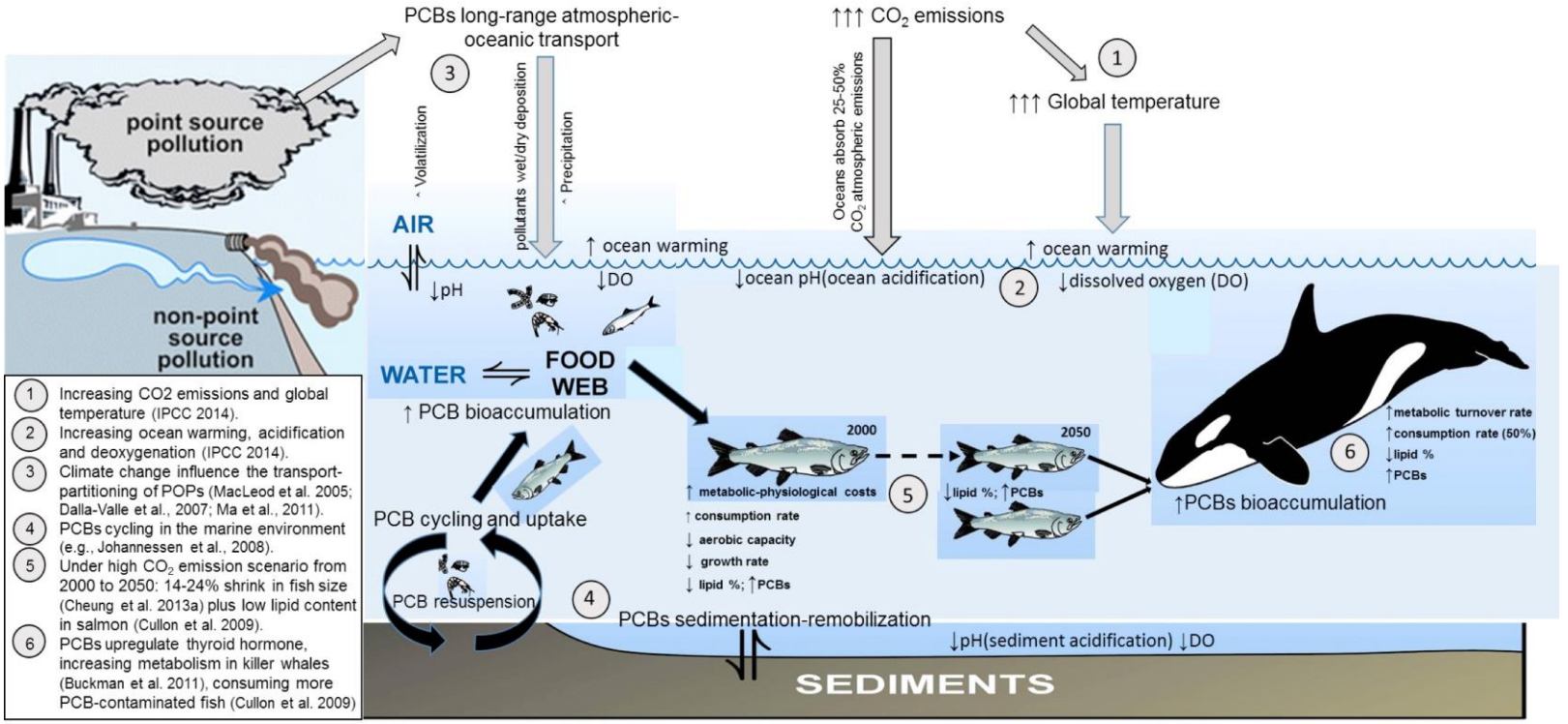



**Next steps**

- Linking this to Nadja's modelling works
- Assess socio-economic risk of coastal communities.

# Interactions of pollutants and climate change on ecosystem and human health in the Pacific Ocean

(led by Juan Jose Alava)

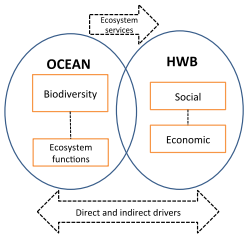



Alava, Cheung, Ross, Sumaila (in prep.)

## Next step (case study in the Pacific coast)

- Taking stock: Marine Pollution Index
- Scenario: Modelling future scenarios of PCBs and methyl-mercury effects on the Georgia Strait ecosystem and fisheries;

The Ocean's Contribution to Human Wellbeing (HWB)




# Summary

## Taking stock

- Available data about Canadian oceans;
- Status of achieving biodiversity targets;
- Contribution of oceans to coastal wellbeing;

## Scenarios

- Review of information for scenarios of Canadian Oceans;
- Country/ocean-scale scenario development;
- Modelling of scenarios to assess climate change and ocean acidification impacts on Canadian coastal wellbeing, with case studies in the Arctic and Pacific.

# Thank you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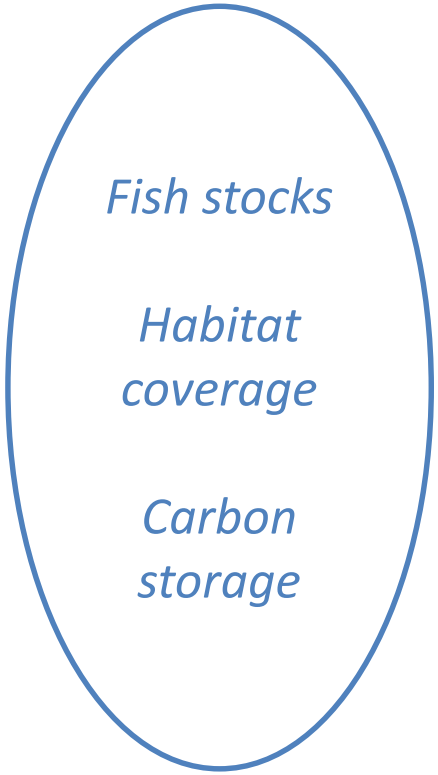


| HWB Dimensions | Attributes | Indicators |
|---|---|---|
| Environmental quality | Clean air<br>Storm protection | - Estuarine habitat coverage<br>- Vegetation type<br>- Per capita carbon emission<br>- Population density |
| Social wellbeing | Security (food, health)<br>Recreation<br>Cultural<br>Sense of place | - Fish consumption<br>- Malnourishment<br>- Park visitation<br>- Leisure time<br>- Personal watercraft sales |
| Economic stability | Livelihood<br>Financial security | - Economic diversity<br>- Fishing income<br>- Marine based employment<br>- Poverty rate<br>- % population with savings |