Rebuilding exploited stocks under climate change

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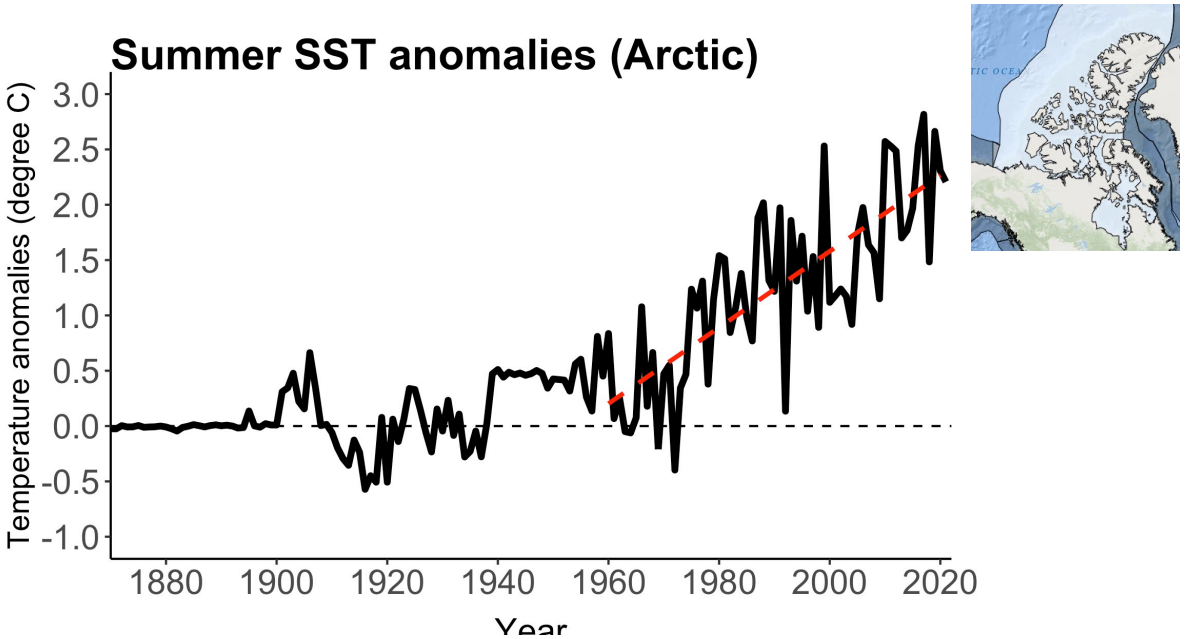
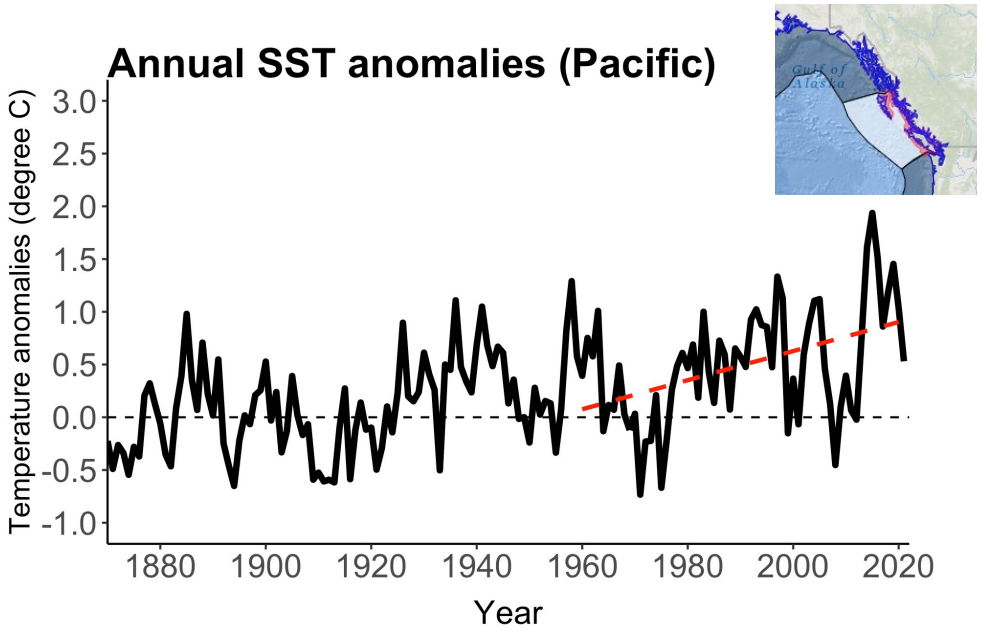
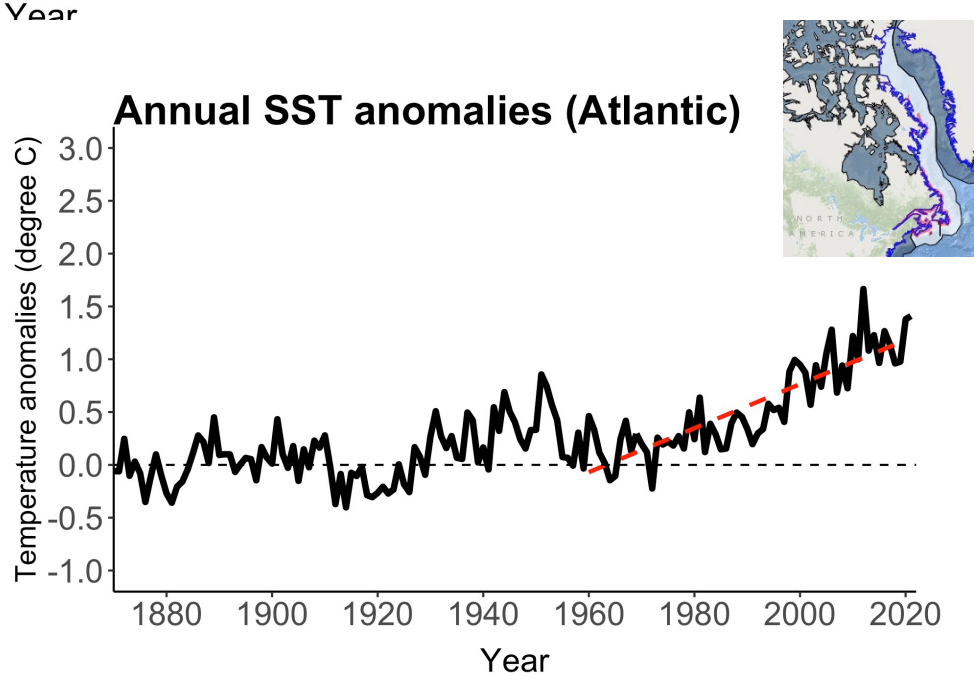
“The ocean around us is changing…”

Canada's three oceans are warming rapidly, especially the Arctic

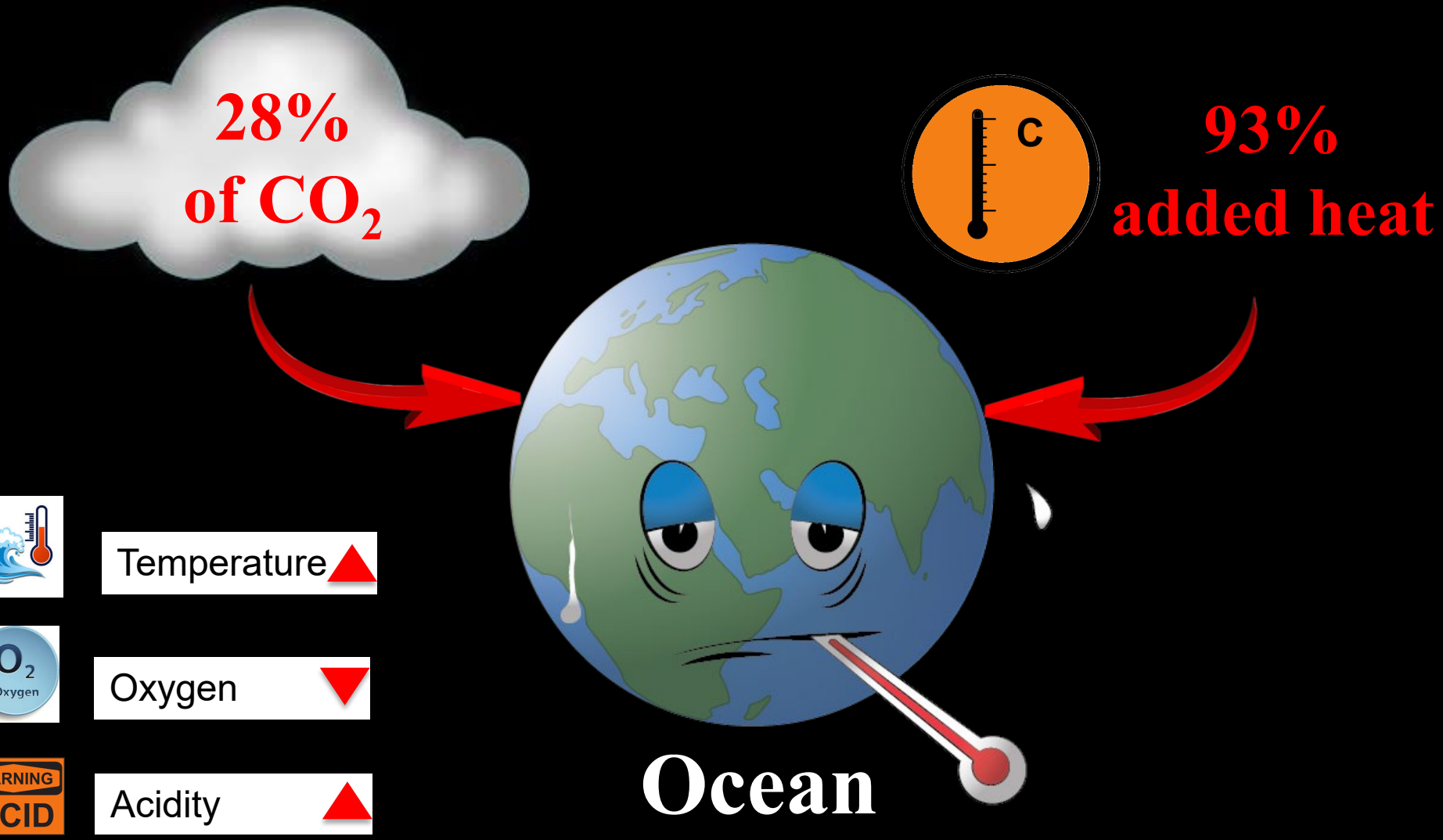






Data source: Hadley Centre SST

Human-induced climate change effects on ocean



Intensifying climate climate is increasingly and adversely impacting many fish stocks and their catches while some are affected positively

	North America	Arctic
Shifts in ecosystem structure	●	●
Species range shift	●	●
Change in timing (phenology)	●	●
Fisheries yield and aquaculture production	±	−

Confidence in attribution to climate change

- ● High or very high
- ● Medium

Impacts

- ± Adverse and positive
- − Adverse

From IPCC (2022) Climate Change 2022: Impacts, Adaptation and Vulnerability. Summary for Policymakers

Projecting the future of stock rebuilding under climate change

Source: https://www.techrepublic.com/article/why-your-data-analysis-may-be-doomed-from-the-start/

RESEARCH ARTICLE

Global Change Biology WILEY

Rebuilding fish biomass for the world's marine ecoregions under climate change

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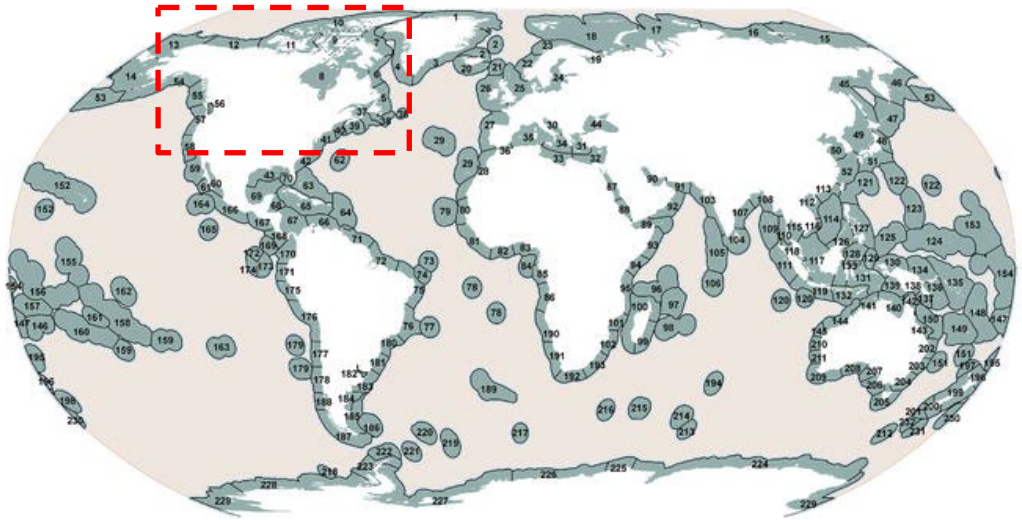
Many exploited fish stocks in the 9 marine ecoregions around Canada need to be rebuilt

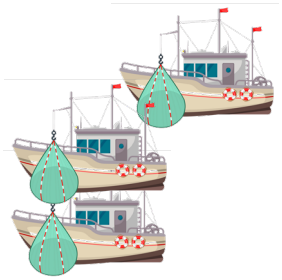
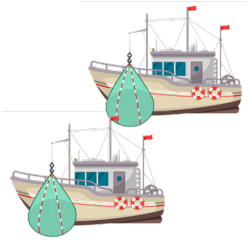
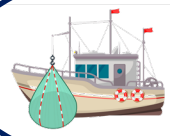


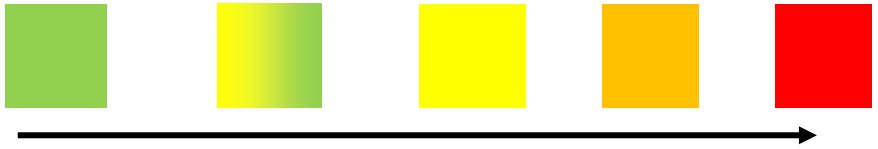
Source: Spalding et al. (2007) BioOne

- 42 out of the 58 assessed stocks (Palomares et al. 2020) are estimated to have current fishing above the level required to achieve maximum sustainable yield (MSY);
- All the assessed stocks are estimated to have biomass below MSY target.

Based on data from Palomares et al. (2020) Estuarine, Coastal and Shelf Science.

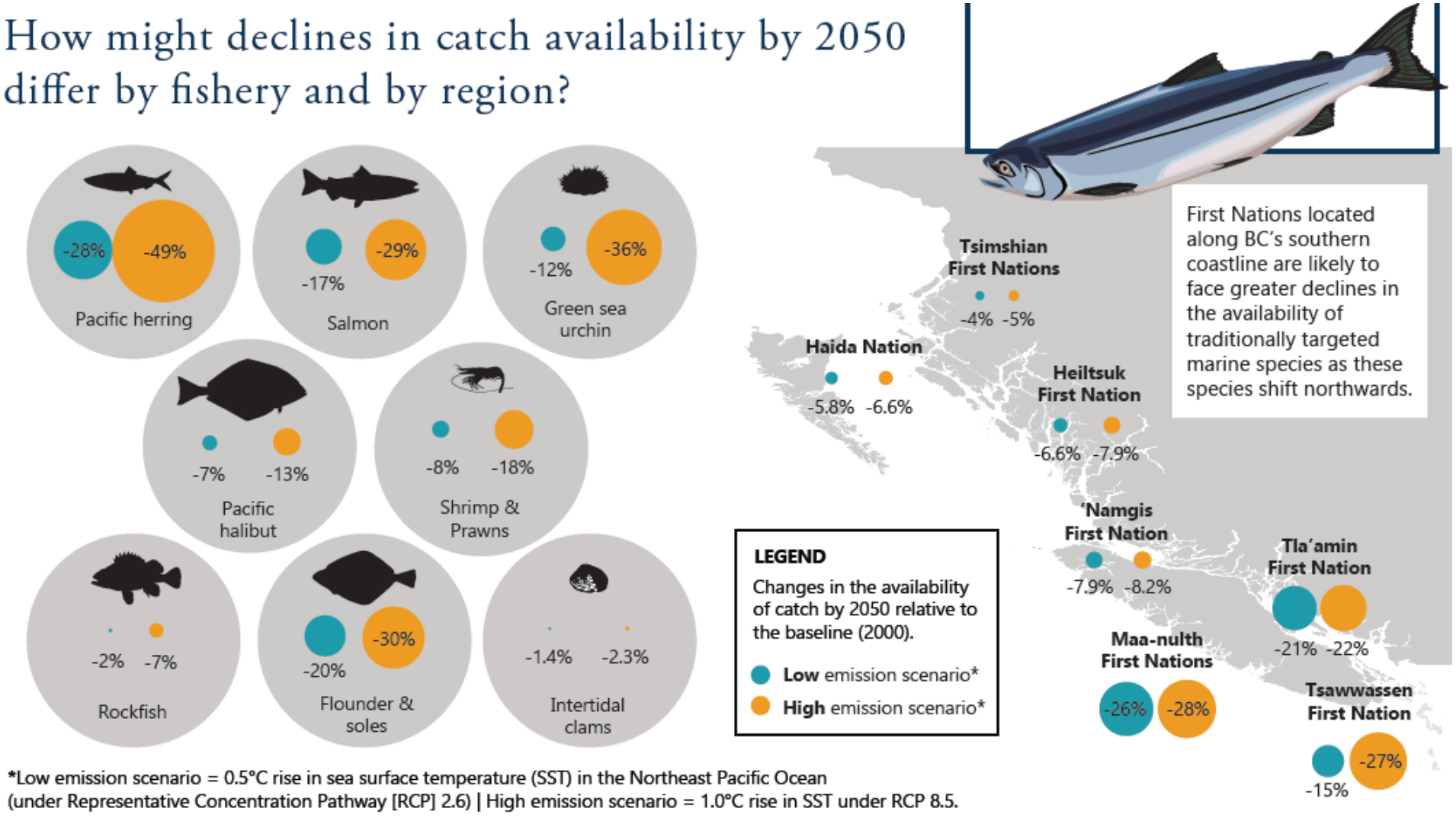
Stock biomass of the 9 Canada's marine regions (relative to pre-industrial unexploited level)

	Weak carbon mitigation (+ 3.5 °C)	Strong carbon mitigation (+1.5 °C)
 Over-exploited	19 (18 – 32)%	21 (20 – 29)%
 Maximum sustainable yield as target	42 (39 – 86)%	48 (45 – 62)%
 Conservation-focused target	56 (54 – 99)%	64 (57 – 90)%



Cheung *et al*. (2022) GCB

Stock rebuilding helps build climate-resilience for coastal fishing communities



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

Summary

- Conservation-focused biomass rebuilding plan, including managing fishing effort is needed to achieve rebuilding targets under climate change;

- Health fish stocks facilitate species and fisheries to adapt to climate change;

- Portfolio of ocean-based solutions are necessary, including sustainable fisheries management, transformation to low carbon ocean economy, and other ecosystem-based solutions.

Thank you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