

Indicators, Expert Surveys, and the LEO Network

Tom Okey

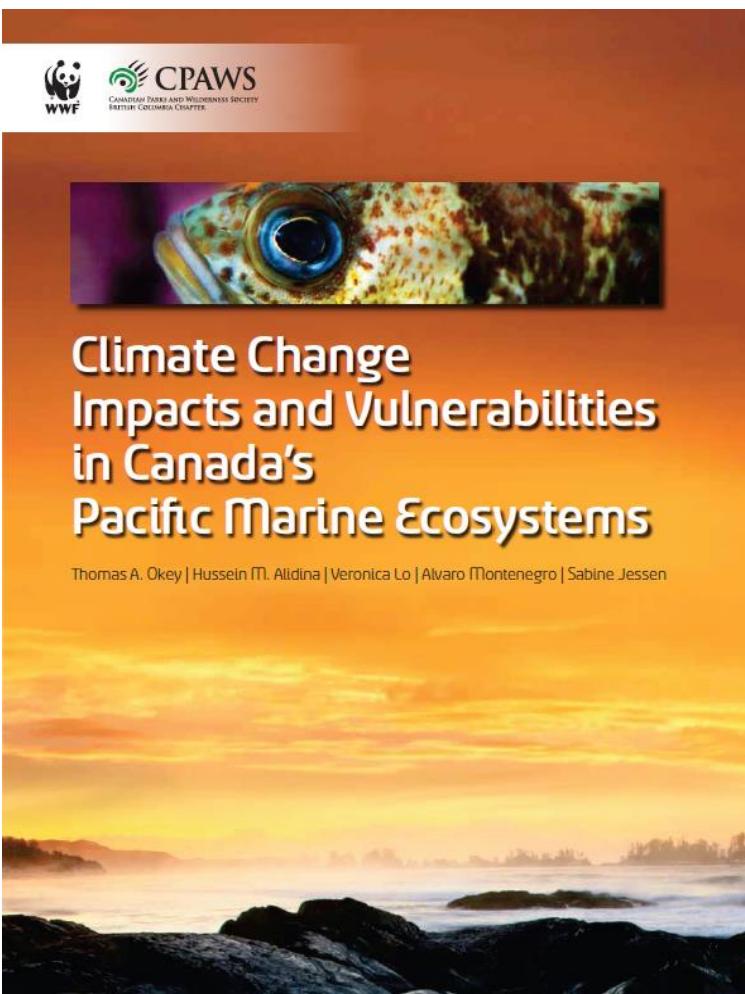
Uvic School of Environmental Studies

Ocean Integrity Research, Victoria

24 May 2016



Taking Stock:



Rev Fish Biol Fisheries (2014) 24:519–559
DOI 10.1007/s11160-014-9342-1

RESEARCH PAPER

Effects of climate change on Canada's Pacific marine ecosystems: a summary of scientific knowledge

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Veronica Lo · Sabine Jessen

Ocean & Coastal Management 106 (2015) 35–48

Contents lists available at ScienceDirect



Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman



Mapping ecological vulnerability to recent climate change in Canada's Pacific marine ecosystems

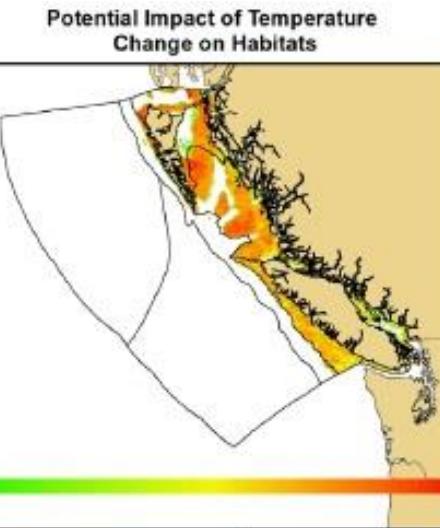
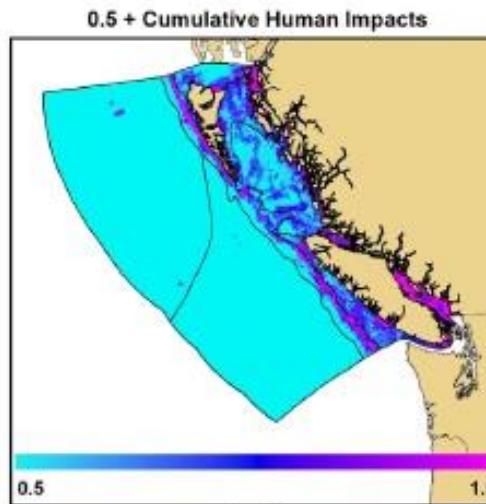
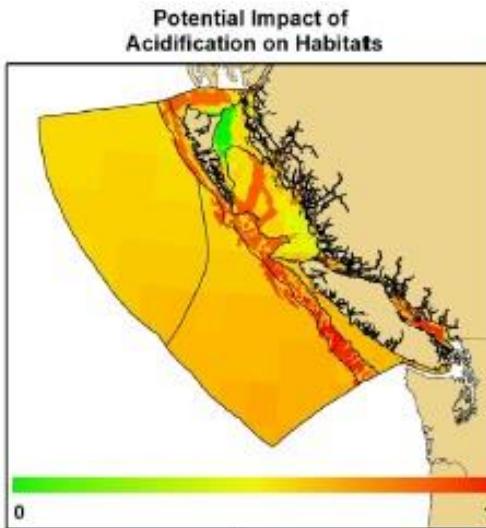
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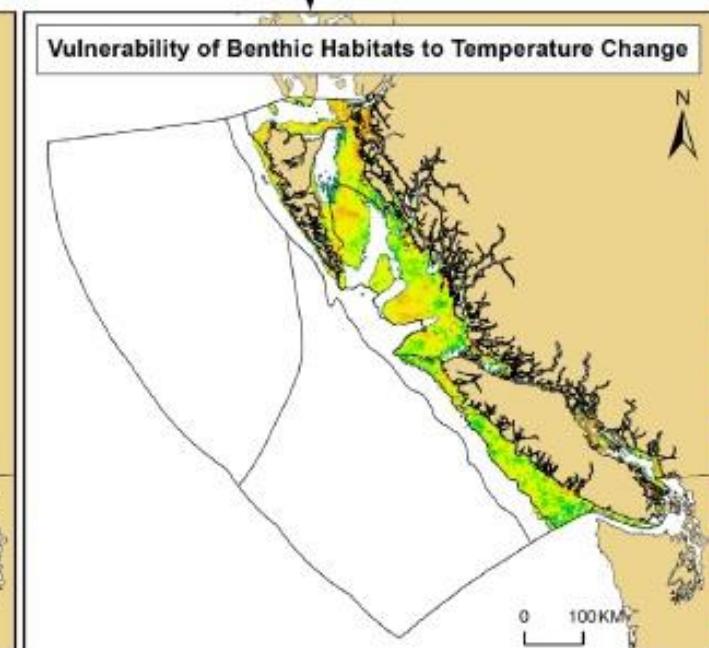
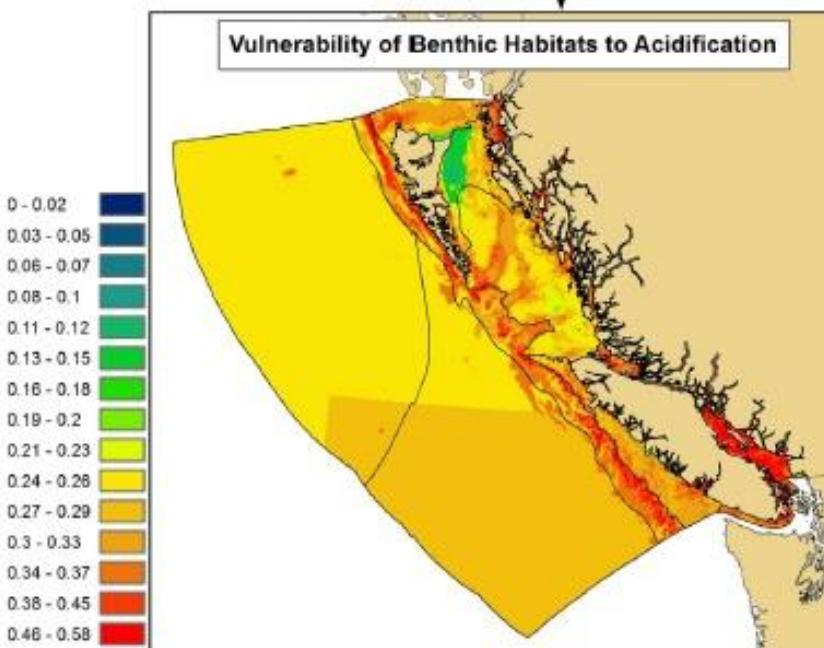
^c WWF-Canada, 409 Granville Street, Suite 1588, Vancouver, BC V6C 1T2, Canada





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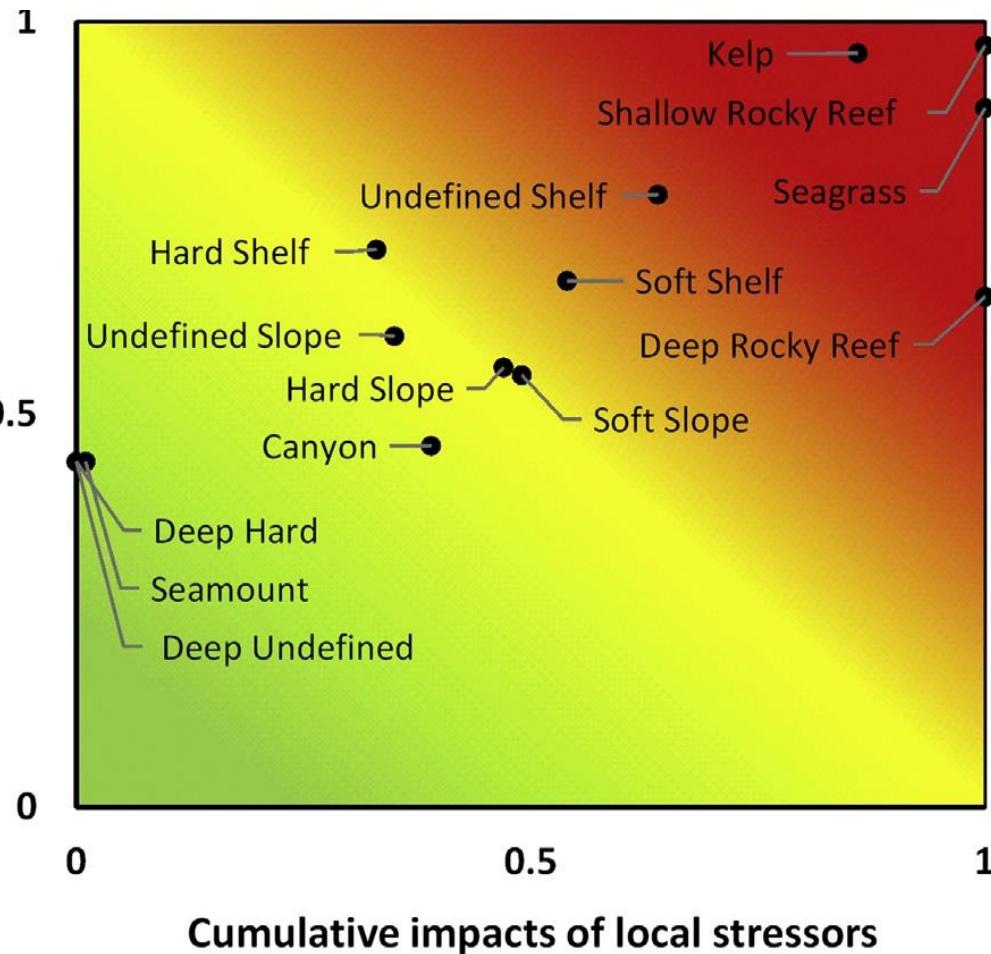
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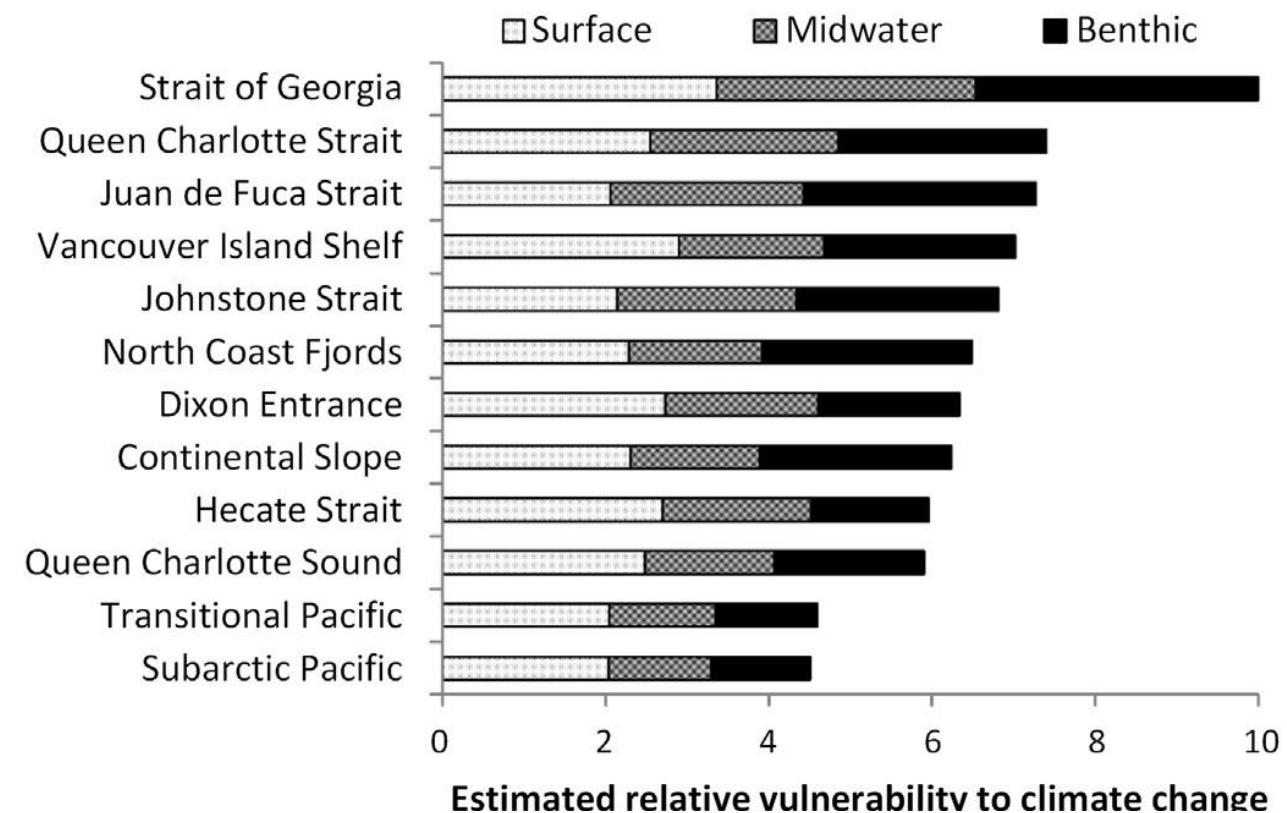
Vulnerability to Climate Change

Habitats

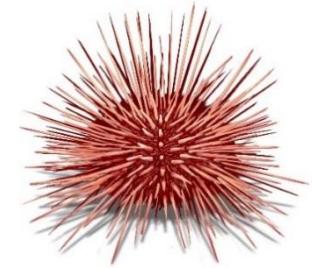
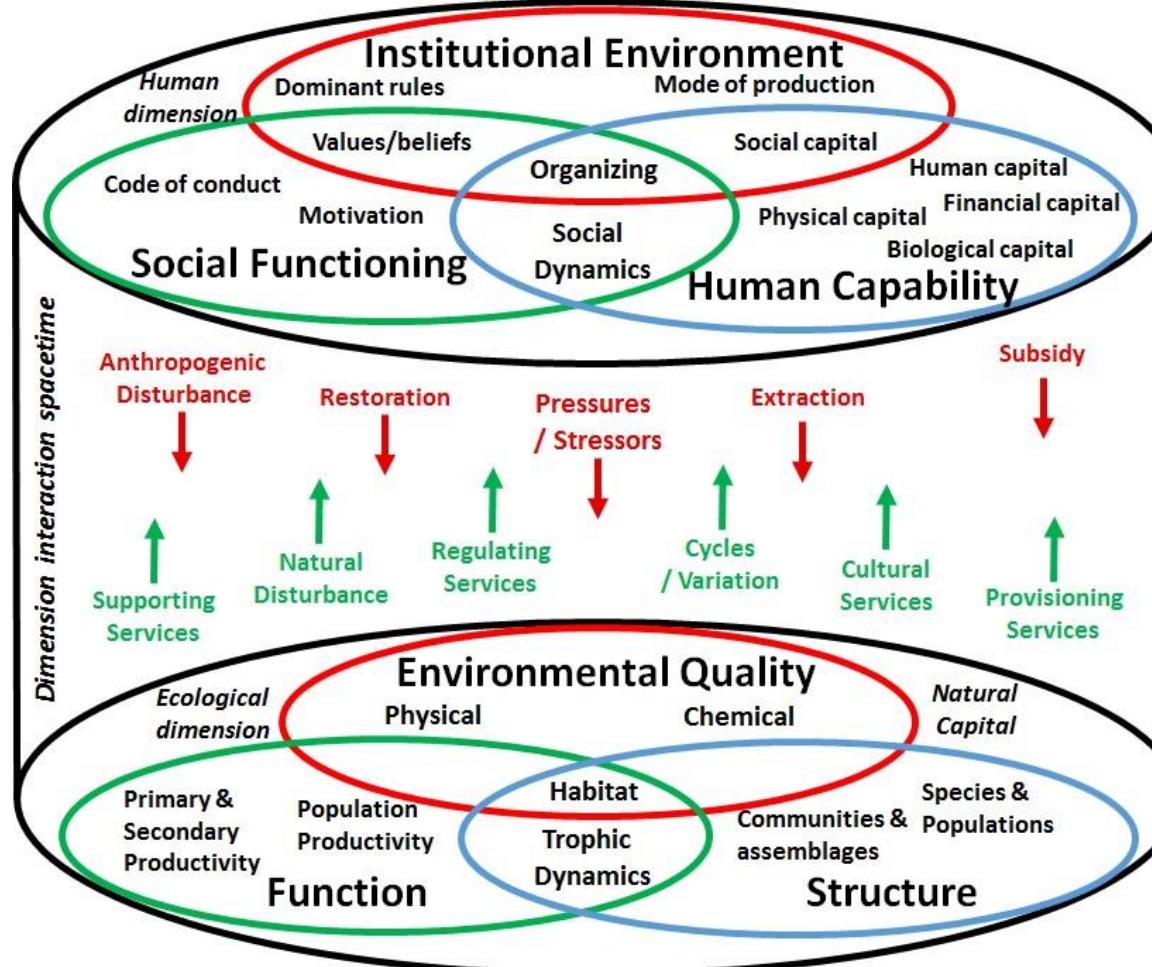
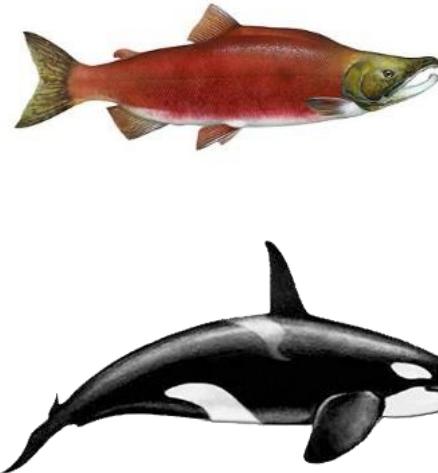
Potential climate impacts



Ecosections



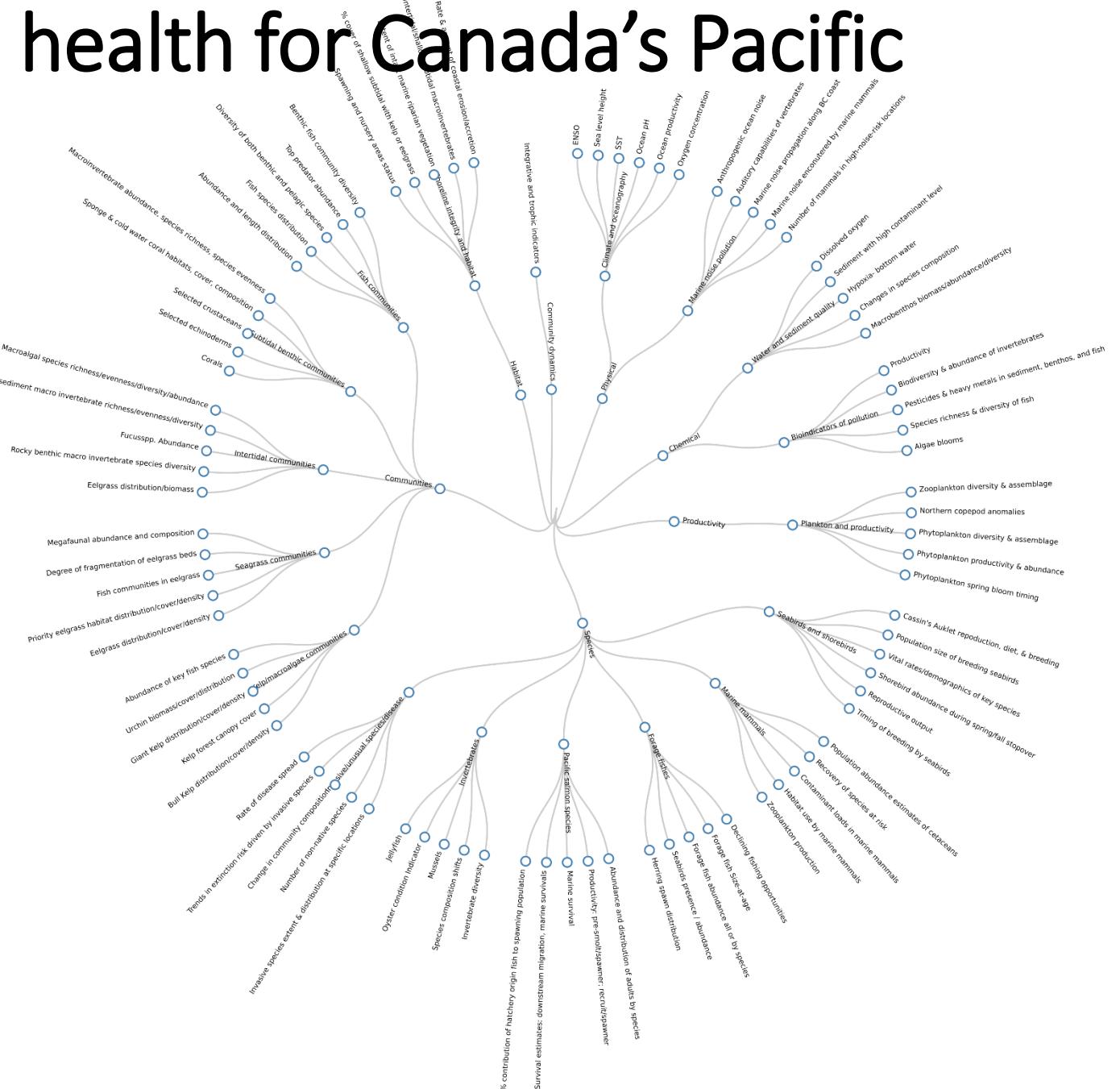
Identifying Indicators using the Drum of Health



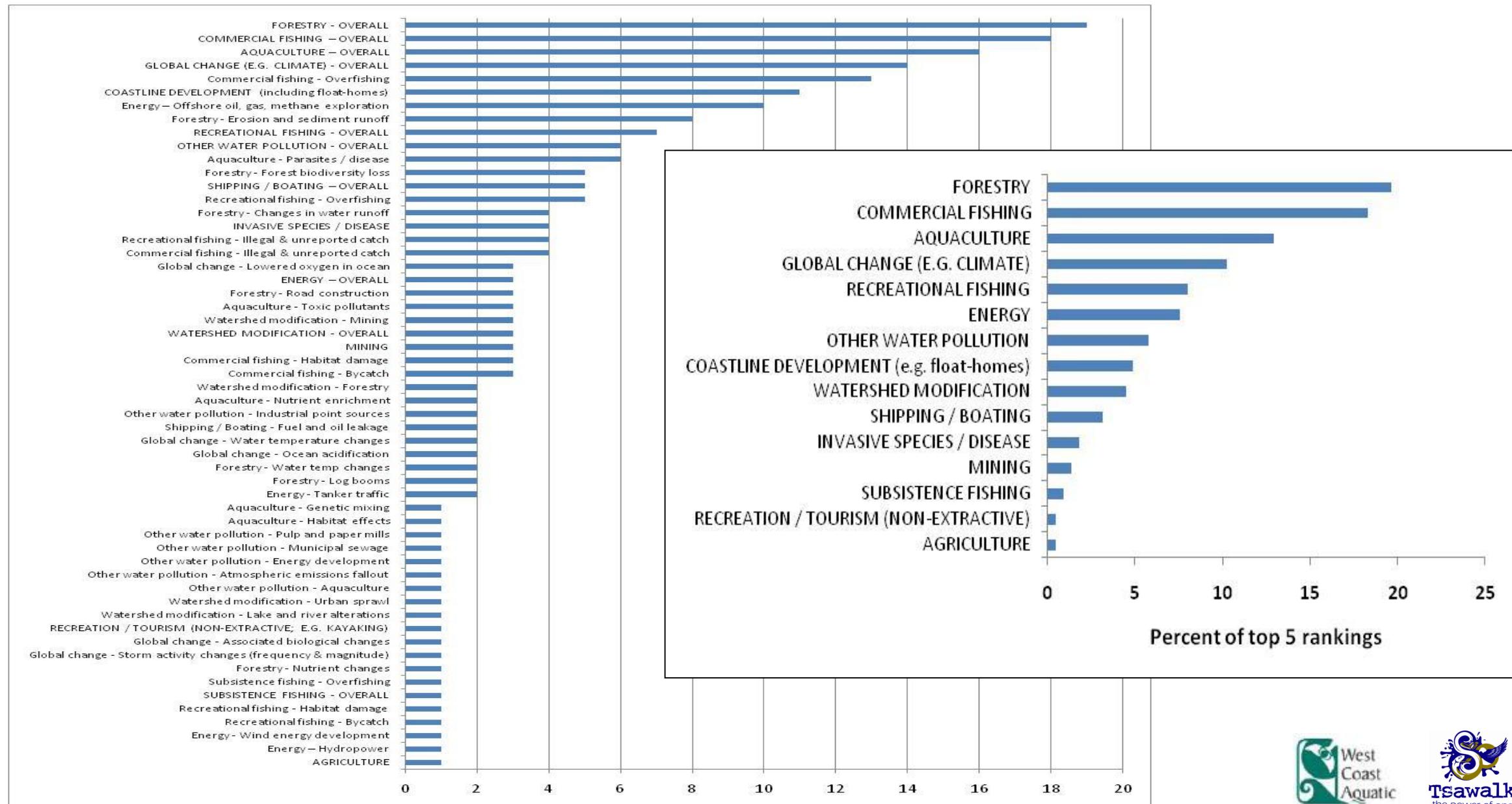
Modified from the ESSIM Framework

Indicators of ecosystem health for Canada's Pacific

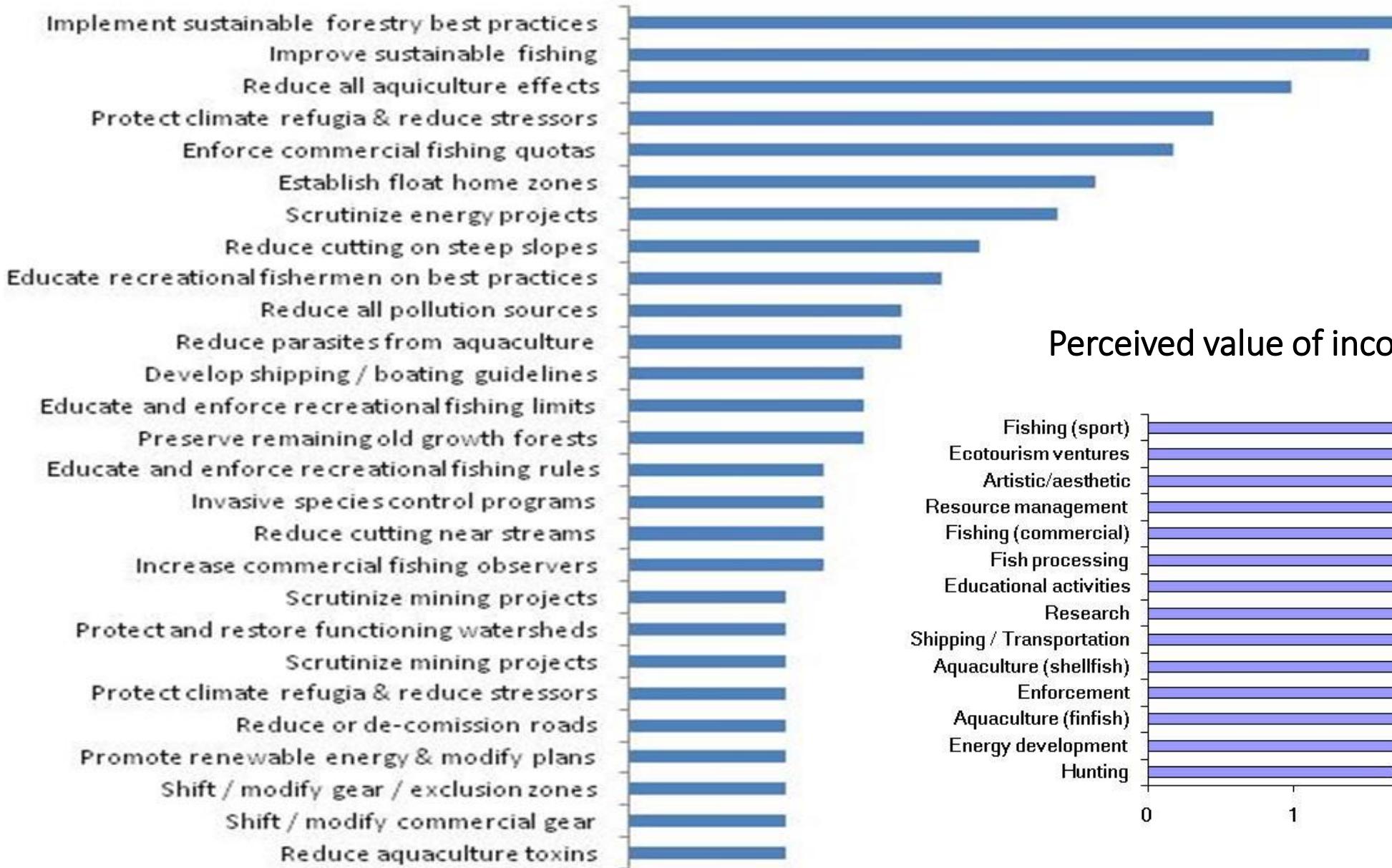
Element	Feature	Aspect			
		Habitat	Comm. dynamics	Functions	Structure
	Env. quality				
Physical	1. Climate and oceanography	Y		Y	
	2. Marine noise pollution	Y		Y	
Chemical	3. Water and sediment quality	Y		Y	
	4. Bioindicators of pollution	Y	Y	Y	Y
Productivity	5. Plankton and productivity	Y	Y		Y
Species / Populations / Population Productivity	6. Seabirds and shorebirds	Y	Y		Y
	7. Marine mammals	Y	Y		Y
	8. Forage fishes	Y	Y		Y
	9. Pacific salmon species	Y	Y		Y
	10. Invertebrates	Y	Y		Y
Communities / Assemblages	11. Invasive / unusual species / disease	Y	Y	Y	Y
	12. Kelp / macroalgae communities	Y	Y	Y	Y
	13. Seagrass communities	Y	Y	Y	Y
	14. Intertidal communities	Y	Y	Y	Y
	15. Subtidal benthic communities	Y	Y	Y	Y
	16. Fish communities	Y	Y		Y
	17. Shoreline integrity and habitat	Y		Y	
Community dynamics	Integrative and trophic indicators	Y	Y	Y	Y



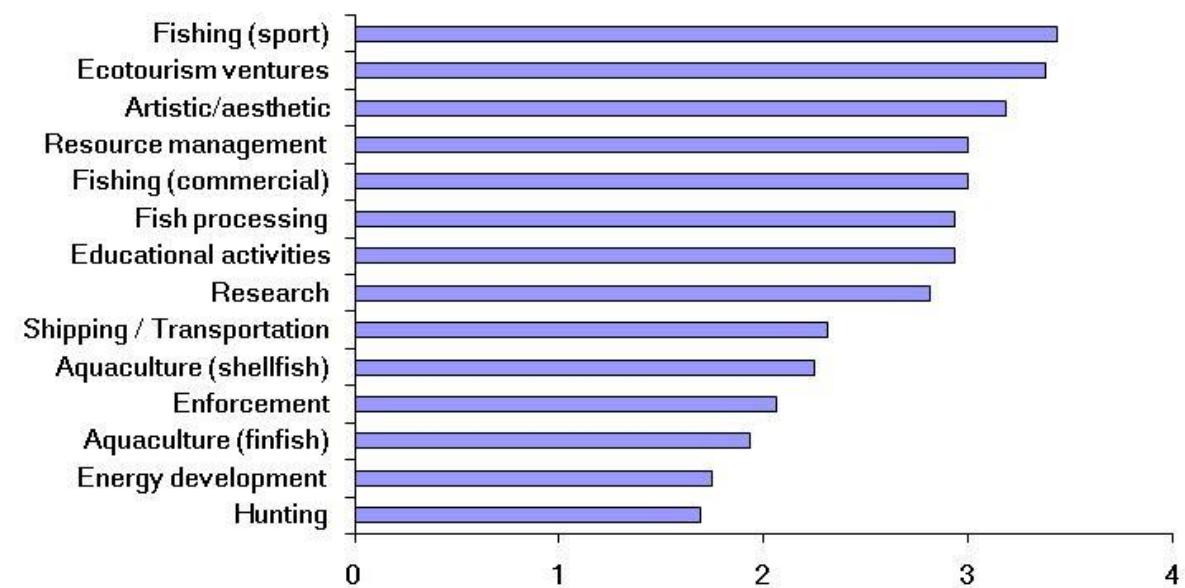
Expert knowledge: Frequency of marine stressors ranked as top five



Prioritizing management strategies



Perceived value of income-related activities



The Local Environmental Observer (LEO) Network

Map Explore About



For Members Make Observation Sign Out

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search observations

-  **River Watch**
Mar 31, 2016
Anchorage, Alaska, USA
-  **Beaver (*Castor canadensis*) activity near community**
Mar 30, 2016
Chignik Lake, Alaska, United States
-  **March Rainbow**
Mar 29, 2016
Anchorage, Alaska, USA
-  **Chickadee (*Poecile atricapillus*) with Elongated Bill**
Mar 29, 2016
Anchorage, Alaska, USA
-  **Salmonberry (*Rubus spectabilis*) bloomers**
Mar 29, 2016
Nanwalek, Alaska, USA
-  **Dead Birds on Spit Beach**
Mar 28, 2016
Sand Point, Alaska, United States
-  **Volcano Spewing Ash and Lava**
Mar 28, 2016
-  **First mosquito (*Culicidae*) of spring**
Mar 25, 2016
Palmer, Alaska, United States
-  **Dandelions (*Taraxacum*) in Bloom**
Mar 25, 2016

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