Challenges in Canadian Marine Conservation Policy

Gio Pomares, Jessica Winton, Laura Apblett,
Laurelyne Barbier, & Zach Hynna

Table of Contents

01

Introductio n

Introduction

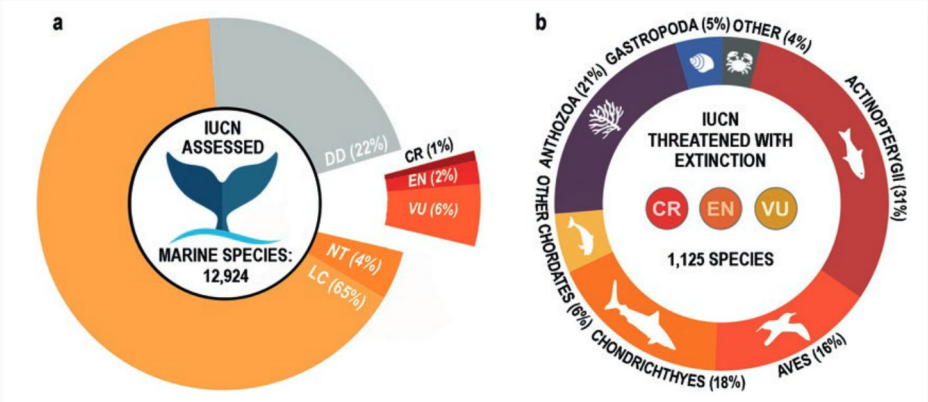
Marine Biodiversity

- Supports ecosystem functions
- Provides ecosystem services

But…

- Current trends are concerning

(Luypaert et al., 2020; O'Hara et al., 2019)



(IUCN 2018 in Luypaert et al., 2020)

Conservation as a response

- Kunming-Montréal Global Biodiversity Framework (2022)
- 30 x 30 target

In Canada

- Marine conservation overseen by multiple agencies under different Acts
- Mostly area-based
  - Marine Protected Areas (MPAs: Oceans Act, DFO standards)
  - Other Effective area-based Conservation Measures (OECMs)

(Government of Canada, 2023, 2025; Keen et al., 2024; Langhammer et al., 2024; Lotze, 2021; UNEP 2022)

- Conservation efforts do not always yield conclusive results

- Conservation traps:

  > “situations where the application of reactive approaches based on biologically focused solutions results in the need to perpetuate its implementation and its associated costs”
  > (Cardador et al., 2015, p. 457)

- We investigated challenges to efficient and sustainable marine conservation in Canada

- By opposition to conservation traps, we define efficient conservation as

  > Conservation that leads to self-sustaining positive biodiversity outcomes in the long-run at lower input costs

(Cardador et al., 2015)

02

Methods

Research Strategy

Web of Science Query

- TITLE(conservation OR biodiversity) +
- TITLE(marine) +
- ALL(failure OR success OR effectiveness OR reporting OR efficiency OR efficient) +
- ALL(canada*)

Inclusion Parameters

- Needed to discuss marine conservation
- Needed to relate to policy
- Case studies needed to be relevant to Canada specifically

Definition of Factors

Biological Factors

Robust biological understanding enables effective conservation

Political Factors

Focusing on other government interests at the expense of MPAs

Social Equity

Distribution of costs and benefits of the conservation policy

Mismanagement & Non-Compliance

Institutional and policy driven systemic failures

03 Results: Biological Factors

Biological Factors: Species-level Conservation

- Extensive biological knowledge required:
  - Population distribution
  - Genetics
  - Geographical range
  - Migration patterns
  - Abiotic stressors
- Limitations:
  - Limited to large/commercialized species
  - Complex marine systems
  - Monitoring

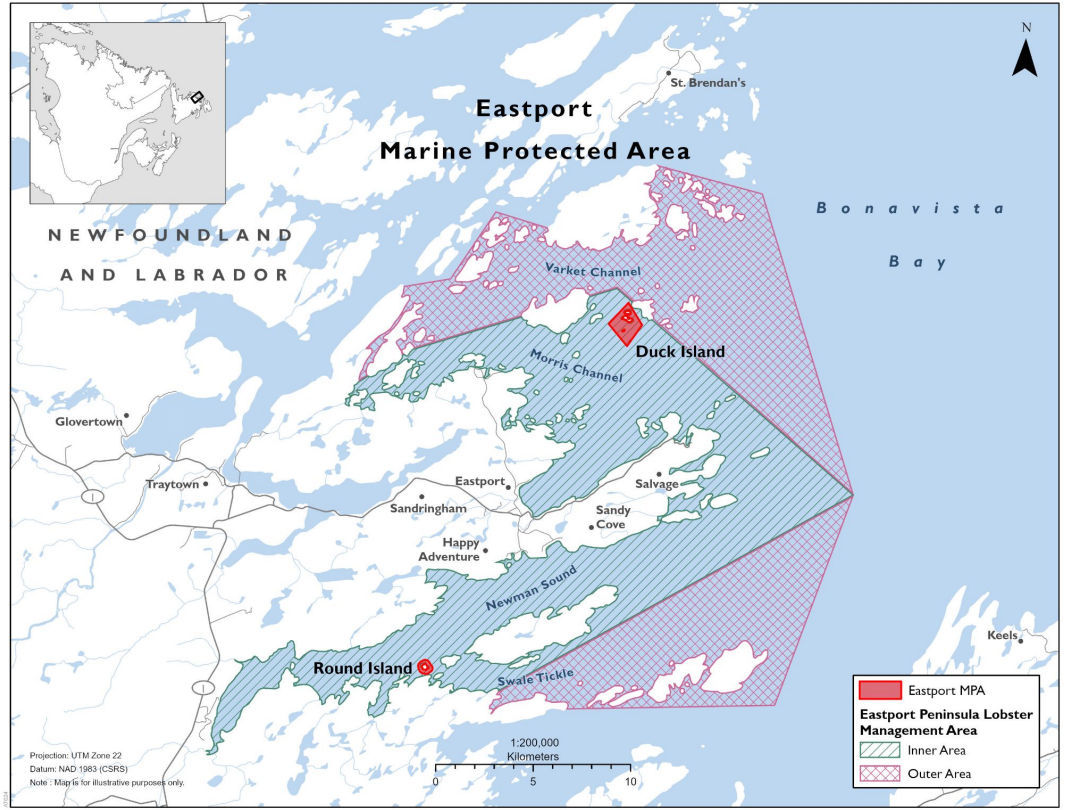
Biological Factors: Area-based Conservation

- Ecological Representativity
  - Kunming-Montreal, 2030 Nature Strategy
- Biogeographic Regionalization
  - What species are present?
  - What abiotic factors determine distribution?
  - Design protected area to capture a maximum set of local bioregions.

Newport MPA, Newfoundland

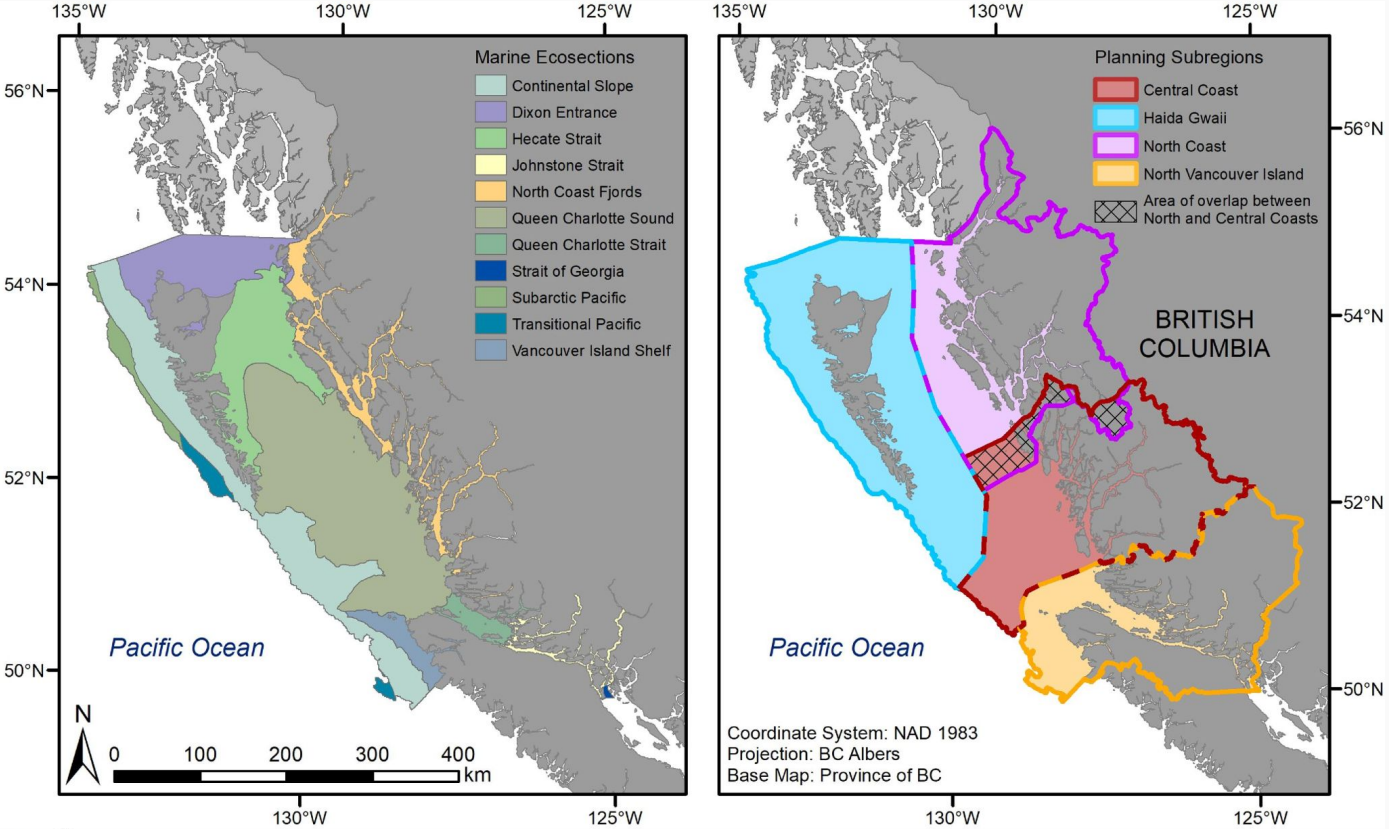
- Ecologically Representative?
  - 36% species richness
  - No species at risk
  - No eelgrass habitat
  - 3 of 13 coastal marine habitats in the region
- Conservation trap?

(Novaczek et al., 2017.)



Department of Fisheries and Oceans Canada, https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/eastport/index-eng.h

Example: Northern Shelf Bioregion MPA Network



(Rubidge et al., 2024.)

04 Results: Political Factors

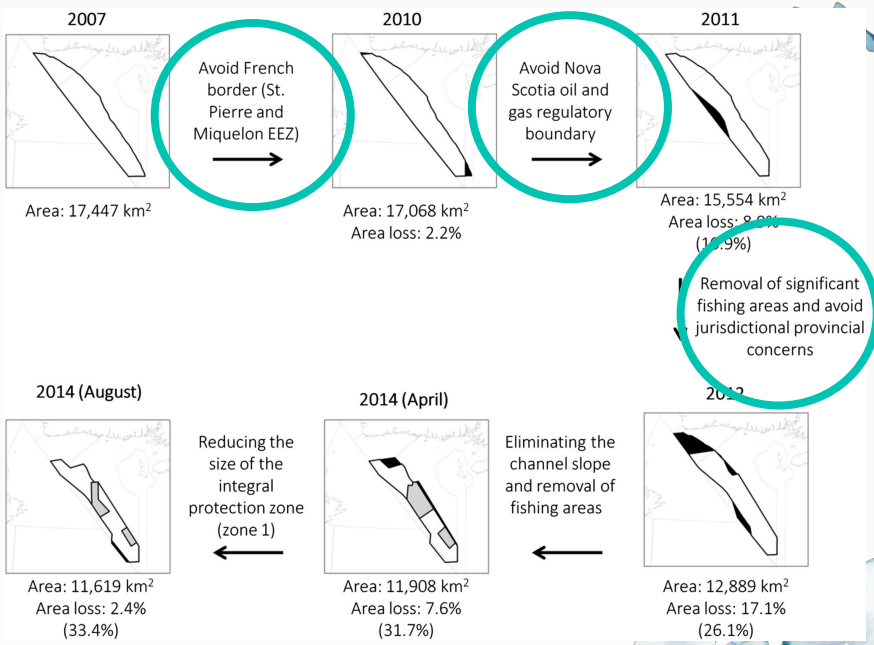
Political Factors: Analysis

- Who manages MPAs?
  - Provinces or Canada?
  - BC MPA patterns
- Are all MPAs doomed?
  - Political points: great motivation, poor outcome
  - Backfire: international standards

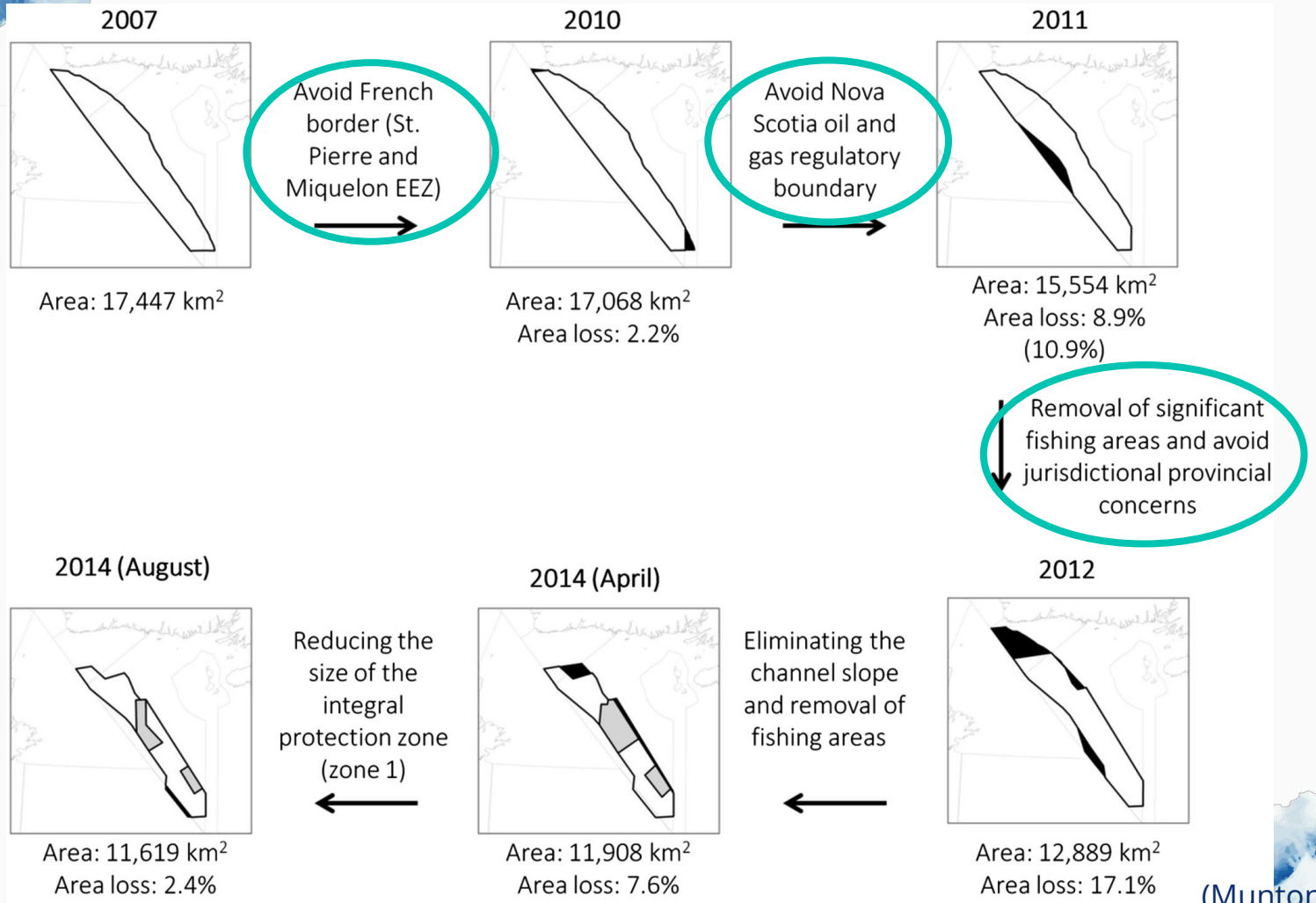
(Heck et al. 2012; Lemieux & Gray, 2020)

Types of Political Factors Case Study: Laurentian Channel MPA

- Canadian Laurentian Channel MPA
- 33% decrease in perimeter from proposed EBSA to final MPA
- 3 major political considerations
  - Respect for international sovereignty
  - Economic interests
  - Respect for provincial jurisdiction



(Muntoni et al. 2019)



(Muntoni et al. 2019)

05

Results: Social Inequity Factors

The Trap of Social Inequity

Google Stock Image

- Occurs when local needs are not considered in decision-making
- Drives up the costs of administration and enforcement
- Leads to increased non-compliance
- Increases the risk of conservation failure

(Bennett et al. 2021; Heck et al. 2012; Ward et al. 2018)

Social Equity in Practice

"If you are... prohibited from fishing, hunting, walking, swimming and boating then you have no other purpose on earth to live"

— Local resident in regard to a proposed NMCA

Under the Kunming-Montreal Biodiversity Framework, Canada hopes to conserve 30% of its oceans by 2030

Over 6 million Canadians could be impacted by this commitment

(Ward et al. 2018; Government of Canada, 2023)

Ways to Improve Social Equity

Stakeholder recognition and engagement

People's voices are heard and understood

Accommodating decision-making processes

Stakeholders are included in decision-making

Acknowledgement of local connections to the marine environment

People's relationships to the seascape are respected

Open channels of communication and idea transmission

Information is accessible and reciprocal

(Bennett et al. 2021; Pörtner et al. 2023; Ward et al. 2018)

06
Results: Mismanagement + Noncompliance

Mismanagement Traps

Google Stock Image

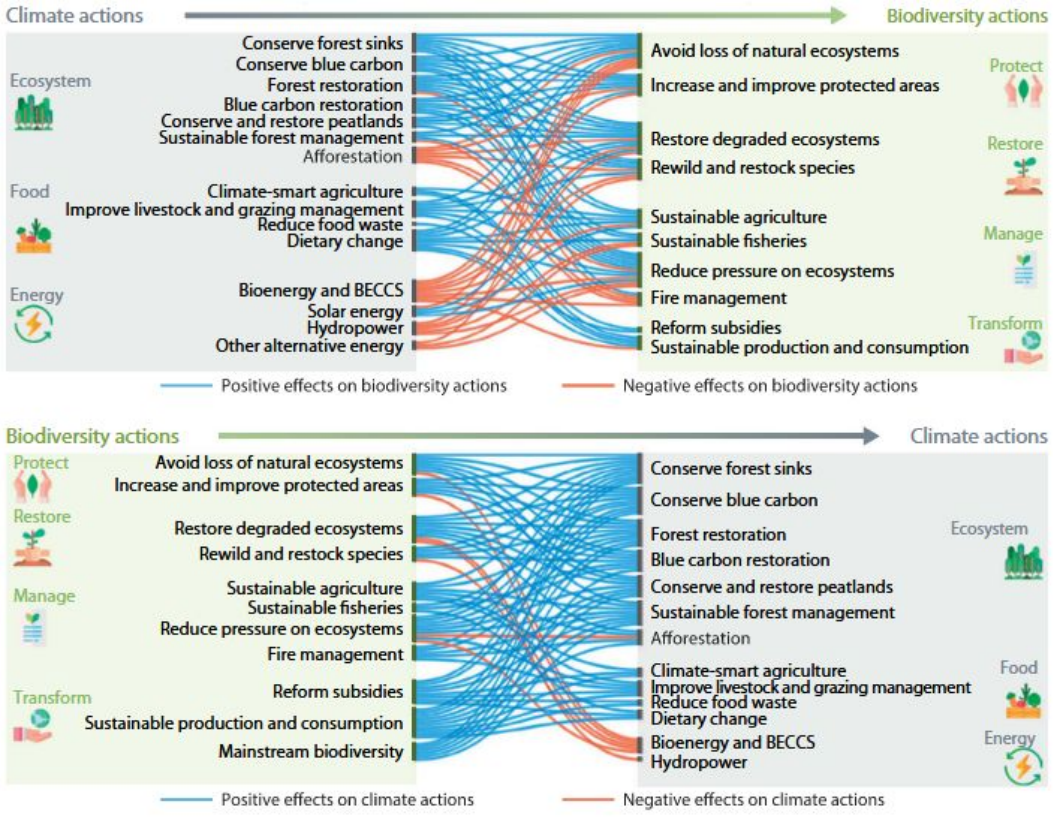
- Occurs during the establishment or operations of the MPA
- Local needs are not considered in decision-making
- Solely looking at biological outcomes
- Increases the risk of conservation failures

(Iacarella et al. 2023); Giakoumi et al. (2023) Pörtner et al. 2023; Swan et al. (2015)

Interlinkages of Actions

Pörtner et al. (2023)

- Climate actions can be at odds with biodiversity actions
  - Energy is most conflicting
  - Biodiversity centered actions less negative on climate
- Misalignment of objectives can stall meaningful outcomes
  - Manage non-marine factors simultaneously



(Pörtner et al. 2023, Figure 3)

Non-compliance Issues

Google Stock Image

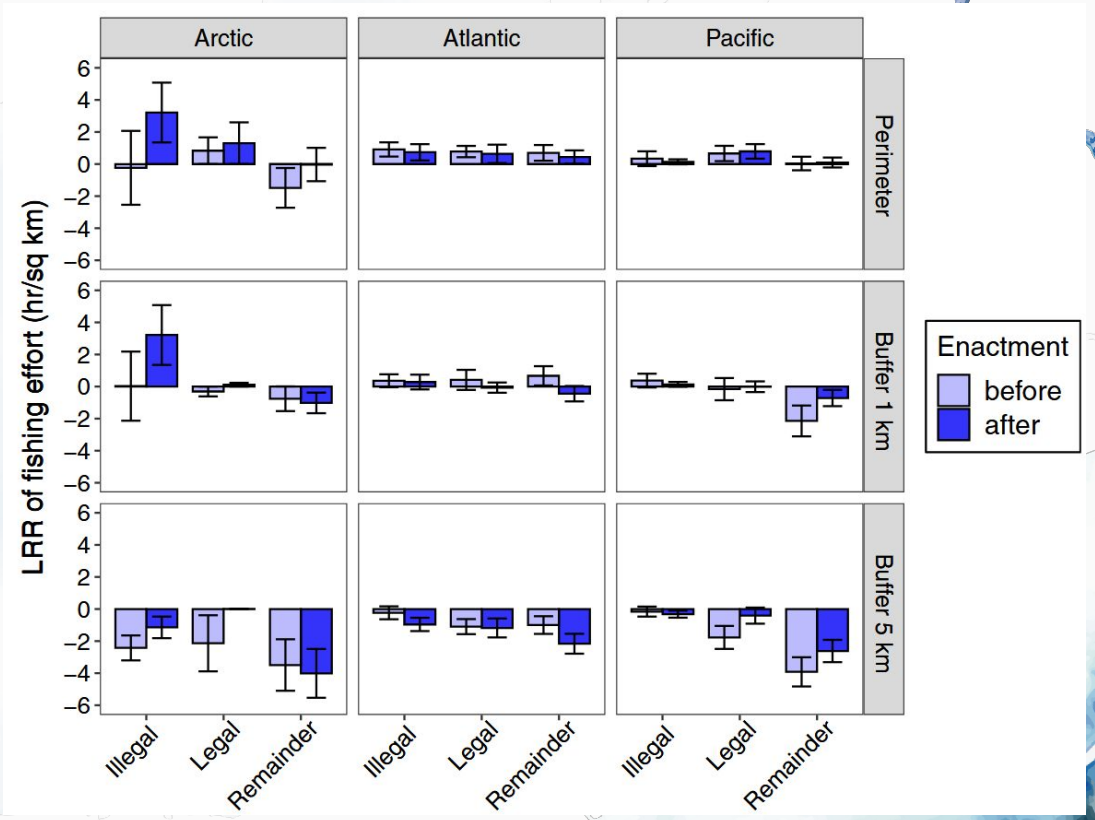
- MPAs require monitoring tools that are costly to implement
- Can be mitigated with policy measures
- Often a result of ignoring stakeholder engagement
- Unavoidable as a whole but can be influenced

(Iacarella et al., 2023; Pörtner et al. 2023)

Pre/Post Fishing Activities of MPAs

Iacarella et al. (2023)

- Before and after MPA enactment
  - LRR - logarithmic response ratio
  - Fishing Effort in hours/sq km/year
- Buffer zones play a massive role in compliance



(Iacarella et al. 2023)

MPA Success and Failure Mapping

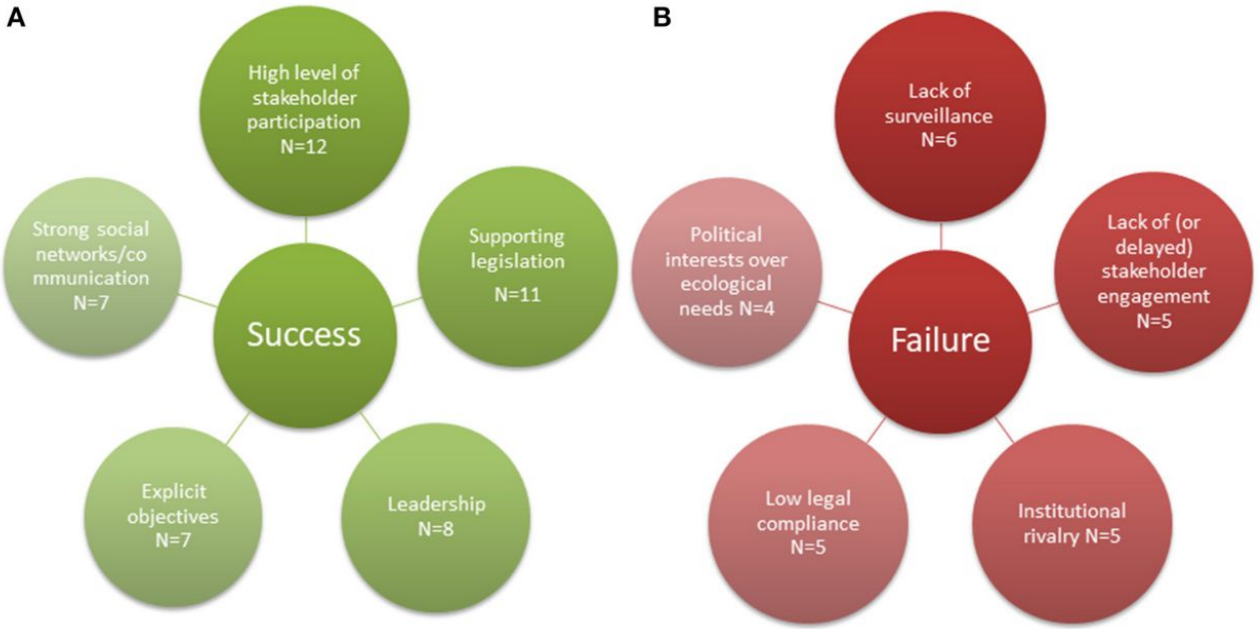


FIGURE 2 | Five top factors determining the **(A)** success of 16 and **(B)** failure of 11 MPAs across the world according to expert judgment.

(Giakoumi et al., 2018)

Multiple Knowledge Sources

Google Stock Image

- Experts often rely on certain types of scientific data
- Can lead to inefficient processes when forming the MPA when ignored
- Leads to more holistic policy when considered
- Expands the accessibility of information beyond academic uses

(Bennett et al. 2021; Heck et al. 2012; Ward et al. 2018)

Ways to Improve Mismanagement and Non-Compliance

Enact holistic legislation

Automatic Identification Systems ease the administrative burden of monitoring as an example

Using multiple knowledge sources

Cuts down on inefficiencies while increasing engagement and the holistic aspects of policy

Create community buy-in through engagement tactics

People must feel ready to comply with MPA measures

Incorporate all influencing systems in creation of MPA

Most MPAs fail to account for other influences such as climate change

(Bennett et al. 2021; Pörtner et al. 2023; Ward et al. 2018)

07

Lessons Learned: Guidelines for Effective Conservation

In conclusion...

- Several lessons/guidelines to avoid traps and ensure efficient and sustainable conservation
  - Centralized authority
  - Ecological representativity, connectivity, size, scale, replication
  - Taking into account non-marine factors, non-compliance, expectations, climate change, governance ... etc.
  - Multiple knowledge sources

And so much more!

Thank You!

Does anyone have any questions?

References

Bennett, N. J., Katz, L., Yadao-Evans, W., Ahmadia, G. N., Atkinson, S., Ban, N. C., Dawson, N. M., de Vos, A., Fitzpatrick, J., Gill, D., Imirizaldu, M., Lewis, N., Mangubhai, S., Meth, L., Muhl, E.-K., Obura, D., Spalding, A. K., Villagomez, A., Wagner, D., … Wilhelm, A. (2021). Advancing Social Equity in and Through Marine Conservation. *Frontiers in Marine Science, 8*. https://doi.org/10.3389/fmars.2021.711538

Cardador, L., Brotons, L., Mougeot, F., Giralt, D., Bota, G., Pomarol, M., & Arroyo, B. (2015). Conservation Traps and Long-Term Species Persistence in Human-Dominated Systems. *Conservation Letters*, *8*(6), 456–462. https://doi.org/10.1111/conl.12160

Government of Canada. (2023, December 8). *Canada's 2030 National Biodiversity Strategy*. https://www.canada.ca/en/environment-climate-change/services/biodiversity/2030-nature-strategy.html

Government of Canada. (2025, July 15). *About federal marine conservation tools* [Government]. Fisheries and Oceans Canada, Public Affairs, Digital and Creative Services. https://www.dfo-mpo.gc.ca/oceans/protection-conservation/tools-outils/index-eng.html

Keen, L. H., Stortini, C. H., Boyce, D. G., & Stanley, R. R. E. (2024). Assessing climate change vulnerability in Canadian marine conservation networks: Implications for conservation planning and resilience. *FACETS*, *9*, 1–15. https://doi.org/10.1139/facets-2023-0124

Heck, N., Dearden, P., & McDonald, A. (2012). Insights into marine conservation efforts in temperate regions: Marine protected areas on Canada's West Coast. *Ocean & Coastal Management, 57*, 10–20. https://doi.org/10.1016/j.ocecoaman.2011.11.008

Langhammer, P. F., Bull, J. W., Bicknell, J. E., Oakley, J. L., Brown, M. H., Bruford, M. W., Butchart, S. H. M., Carr, J. A., Church, D., Cooney, R., Cutajar, S., Foden, W., Foster, M. N., Gascon, C., Geldmann, J., Genovesi, P., Hoffmann, M., Howard-McCombe, J., Lewis, T., … Brooks, T. M. (2024). The positive impact of conservation action. *Science*, *384*(6694), 453–458. https://doi.org/10.1126/science.adj6598

References

Lotze, H. K. (2021). Marine biodiversity conservation. *Current Biology*, *31*(19), R1190–R1195. https://doi.org/10.1016/j.cub.2021.06.084

Luypaert, T., Hagan, J. G., McCarthy, M. L., & Poti, M. (2020). Status of Marine Biodiversity in the Anthropocene. In S. Jungblut, V. Liebich, & M. Bode-Dalby (Eds), *YOUMARES 9—The Oceans: Our Research, Our Future: Proceedings of the 2018 conference for YOUng MArine RESearcher in Oldenburg, Germany* (pp. 57–82). Springer International Publishing. https://doi.org/10.1007/978-3-030-20389-4_4

Novaczek, E., Howse, V., Pretty, C., Devillers, R., Edinger, E., & Copeland, A. (2017). Limited Contribution of Small Marine Protected Areas to Regional Biodiversity: The Example of a Small Canadian No-Take MPA. *Frontiers in Marine Science*, *4*. https://doi.org/10.3389/fmars.2017.00174

O'Hara, C. C., Villaseñor-Derbez, J. C., Ralph, G. M., & Halpern, B. S. (2019). Mapping status and conservation of global at-risk marine biodiversity. *Conservation Letters*, *12*(4), e12651. https://doi.org/10.1111/conl.12651

Pörtner, H.-O., Scholes, R. J., Arneth, A., Barnes, D. K. A., Burrows, M. T., Diamond, S. E., Duarte, C. M., Kiessling, W., Leadley, P., Managi, S., McElwee, P., Midgley, G., Ngo, H. T., Obura, D., Pascual, U., Sankaran, M., Shin, Y. J., & Val, A. L. (2023). Overcoming the coupled climate and biodiversity crises and their societal impacts. Science, 380(6642), eabl4881. https://doi.org/10.1126/science.abl4881

UNEP. (2022). *Kunming-Montreal Global Biodiversity Framework*. https://www.cbd.int/gbf

Ward, B. M., Doney, E. D., Vodden, K., & Bath, A. J. (2018). The importance of beliefs in predicting support for a South Coast National Marine Conservation Area in Newfoundland and Labrador, Canada. *Ocean & Coastal Management, 162,* 6–12. https://doi.org/10.1016/j.ocecoaman.2017.12.021