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Human Networks (i.e. human connection) are the engines of resilience for the ocean we want

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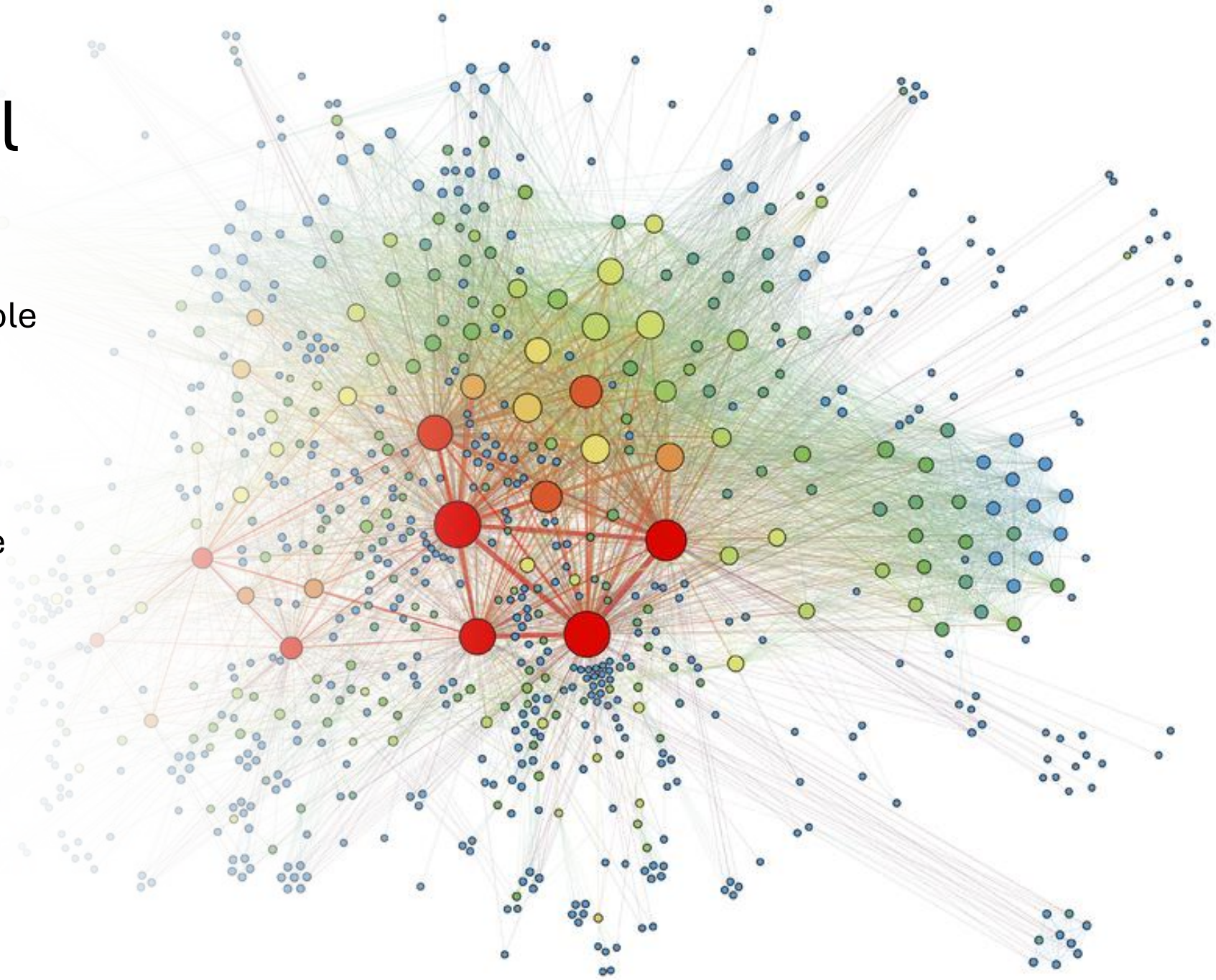
CANADA

Human / Social Networks

- Networks play a central role in all human endeavours, including ocean, coastal, and fisheries science and management.
- How do network structure and behaviour enable resilience?
- What role might scientific research networks play in improving resilience outcomes for nature including humans?





Why Human Networks Matter

1. Relationship building
2. Knowledge-sharing
3. Integration and collaboration
4. Resilience

The importance of Knowledge Sharing

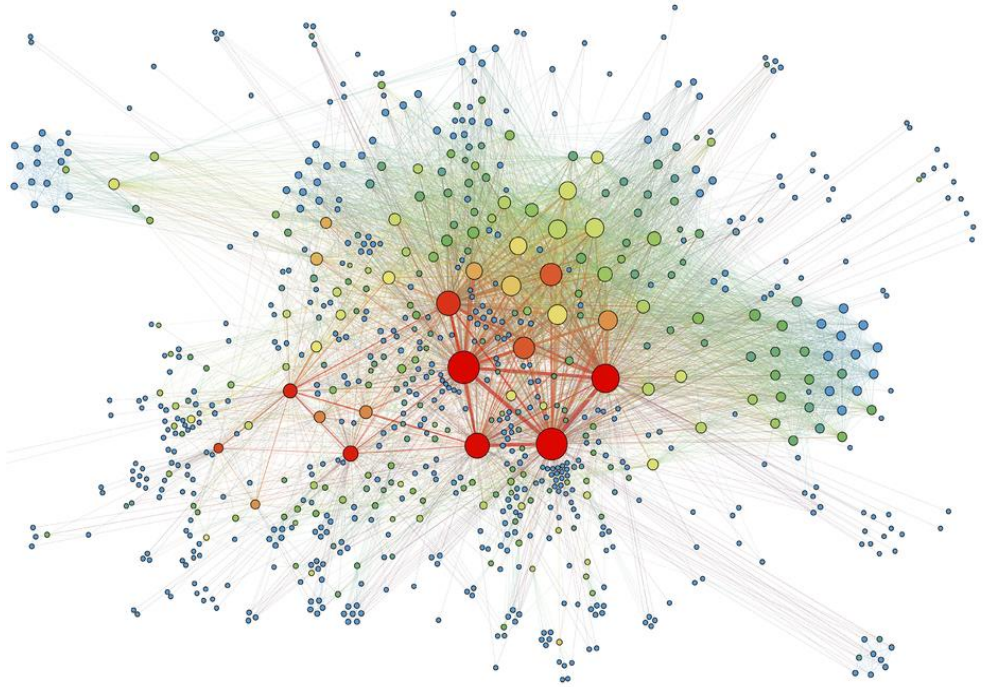
- Trust and relational closeness within networks are consistently positive and significant predictors of knowledge sharing
- Support received from others positively influences knowledge sharing, particularly in low-trust contexts, where knowledge-sharing compensates for weak relational ties
- Underpins collaboration, integration, resilience, and reconciliation



Adger 2003; Martinez-Baron et al. 2026

Human network characteristics

Network Structure



Measured quantitatively;

- Maps *who* is connected to *whom* and the patterns of interaction, allowing for statistical modeling of how information or resources move through the network.

Network Behaviour



Measured qualitatively ;

- Asks *why* connections exist, how trust is formed, what the emotional tone is, and how cultural or historical factors shape those relationships.

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Qualitative social network analysis

Qualitative evaluation focuses on the **meaning, content, and quality** of the relationships

Methodology: interviews, focus groups, participant observation, and narrative analysis to understand the nature of the bonds.

- It emphasizes **context** and **agency**.
- It asks *why* connections exist, how trust is formed, what the emotional tone is, and how cultural or historical factors shape those relationships.
- It reveals the "hidden" aspects of a network, such as the willingness of actors to mobilize resources for others during crises.

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Social ecological resilience

- Network structure and behaviour play core roles in stability
- Disruptions in structure or behaviour away from norms tests resilience, including change in social and ecological norms

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Quantitative Resilience: Social Network Analysis helps identify **vulnerabilities and redundancies**

- By quantifying structural robustness, analysts can determine if a system has a "single point of failure" (e.g., an over-reliance on one hub node) or if it possesses high connectivity that allows for rapid recovery after nodes are disrupted.
- It maps pathways for resource distribution, ensuring that human systems (like supply chains) or ecosystems (like ecological corridors) can maintain functionality even if parts of the network are lost.

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Qualitative Resilience: Fosters resilience by enhancing **social capital, trust, and adaptive capacity**.

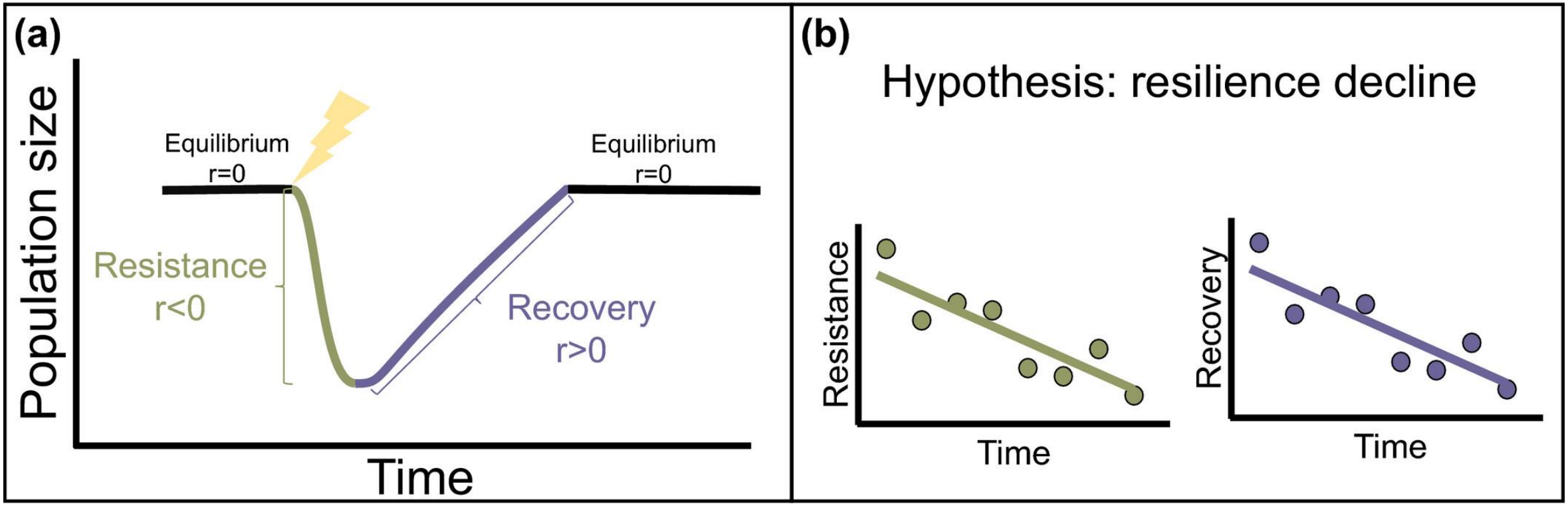
Qualitative research uncovers the mechanisms of solidarity and shared belief systems.

In human systems, this translates to the ability of communities to organize spontaneously during disasters because they trust one another, not just because they are structurally linked.

It builds the "invisible" infrastructure of cooperation required for collective action to manage ecological or social threats.

Ecological resilience is connected to human networks underpinning policy, management and science

Declining resilience in global vertebrate populations via effects on recovery



Capdevila et al. 2021

Fine.
Human Networks are interesting.

- **How do they actually function**?
- What are we relying on in these systems so that resilience as a whole is supported?
- Marine systems reveal “integrators and collaborators”, i.e. bridging organizations and boundary spanners are important
- Difference between collaboration and integration



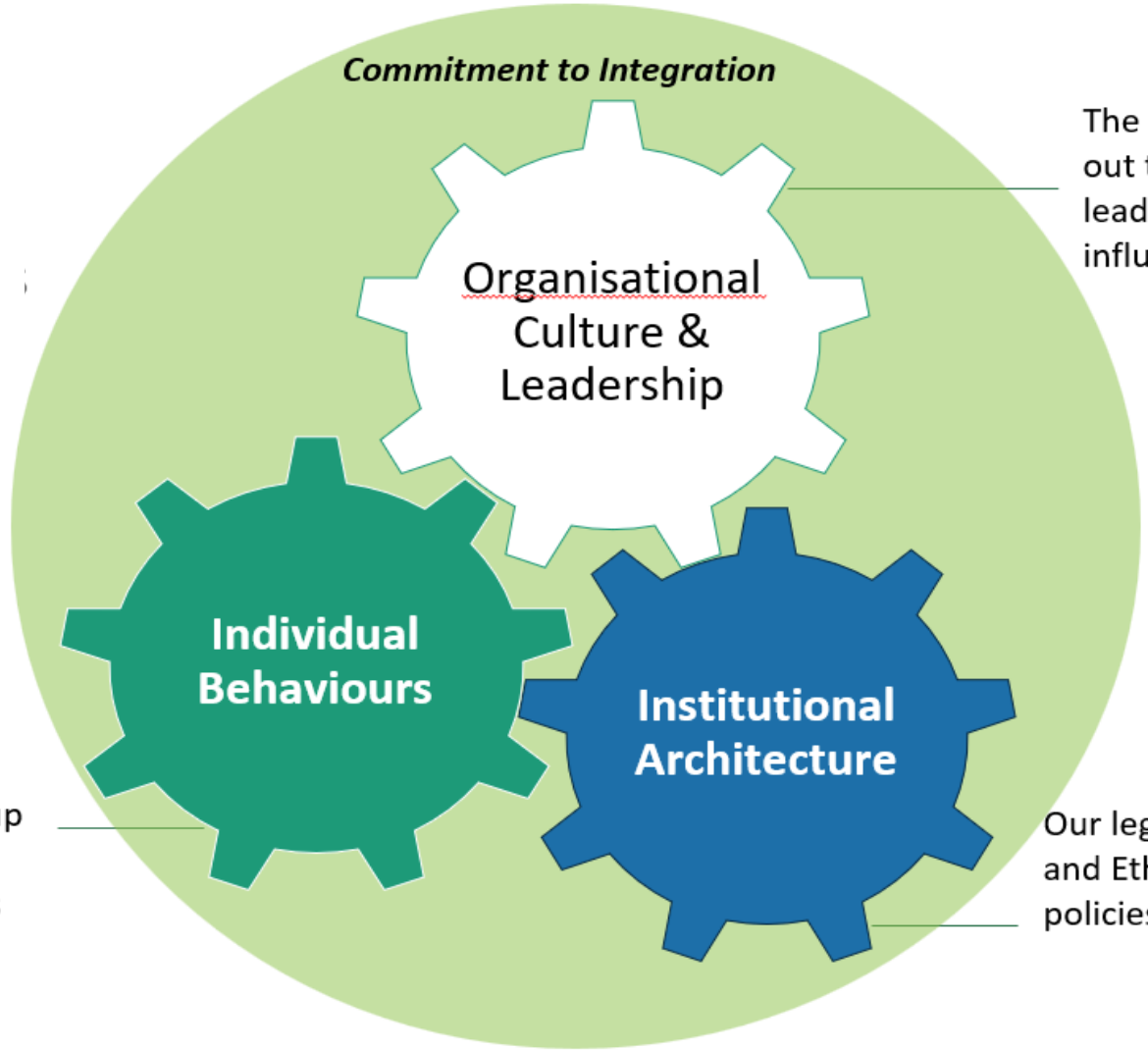
Collaboration and Integration

Collaboration is the act of working together toward shared goals, while integration is the process of combining systems, processes, or functions to operate as a unified whole.

- **Collaboration** is ideal for situations requiring shared decision-making, brainstorming, or cross-functional teamwork. It focuses on human interaction and the alignment of goals across teams
- **Integration** is essential for ensuring that collaborative efforts are supported by compatible systems, data sharing, and streamlined workflows. It allows teams to work together efficiently without duplicating efforts or encountering technical barriers

Collaboration……Integration (i.e. practical network structure and behaviour) influences resilience

Core elements of a collaborative / integrated network and why all three are needed:



Canada

Belzile and McCarthy, unpublished



Collaboration and integration are connection

Culture and Leadership: social norms and values

Individual Behaviour: how we show up and interact with others

Infrastructure: processes and policies

Improving social-ecological resilience

- Consider all the factors that determine the strength of human resilience
- Consider our own behaviour
- Consider how understanding “social science” elements may facilitate resilience outcomes



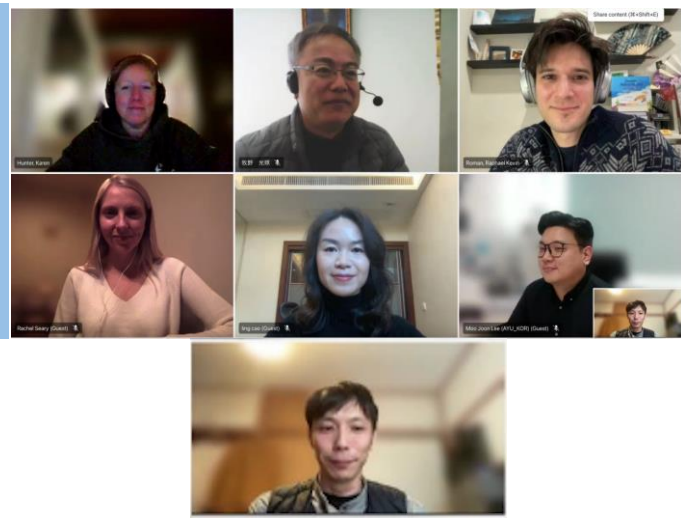
Does collaborative science facilitate resilience?

- Show change in PICES moving towards resolving big global problems
- Canada Analysis

WG-51 Project

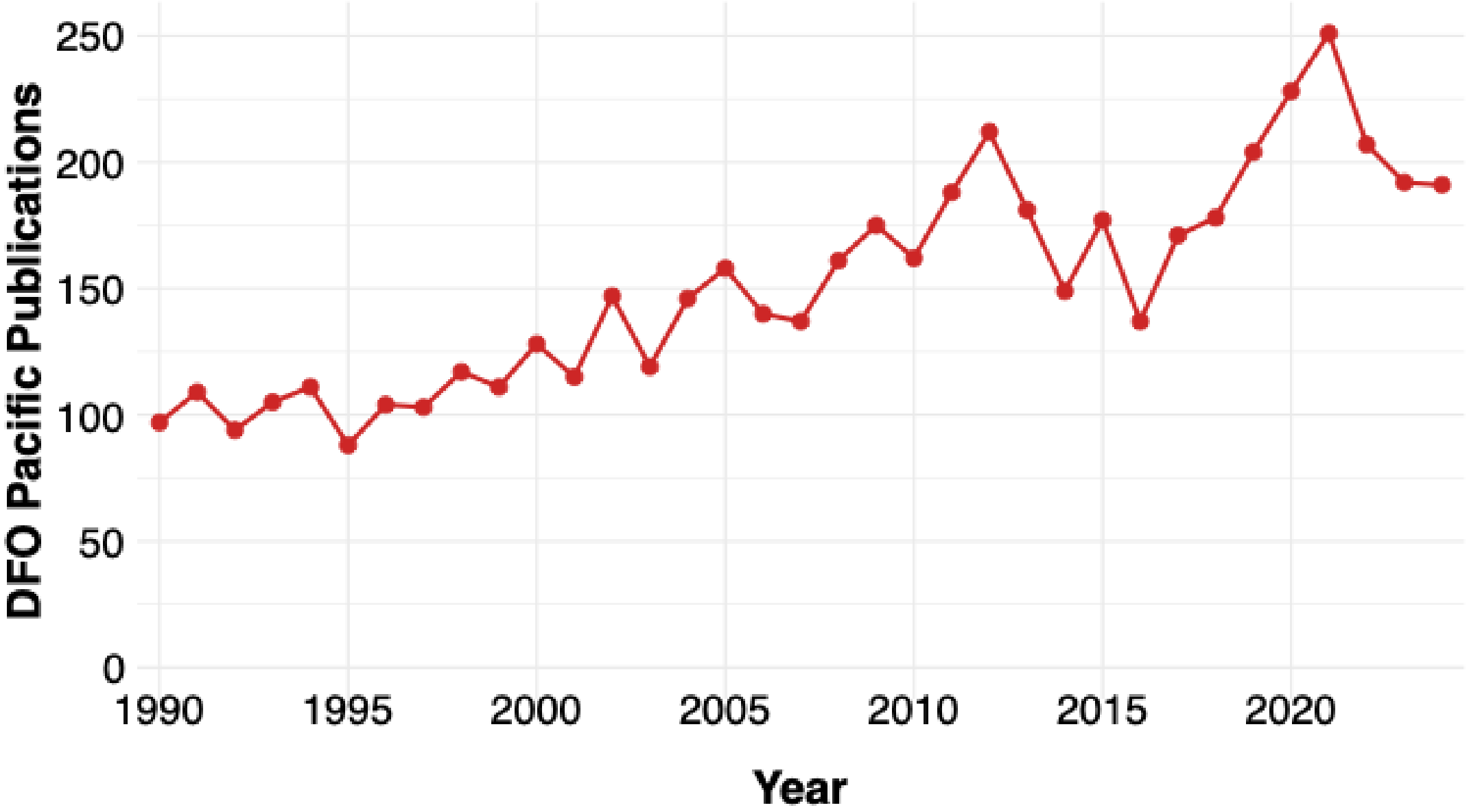
CANADA Case study

PICES Working Group 51:
"Exploring Human Networks to Power Sustainability"

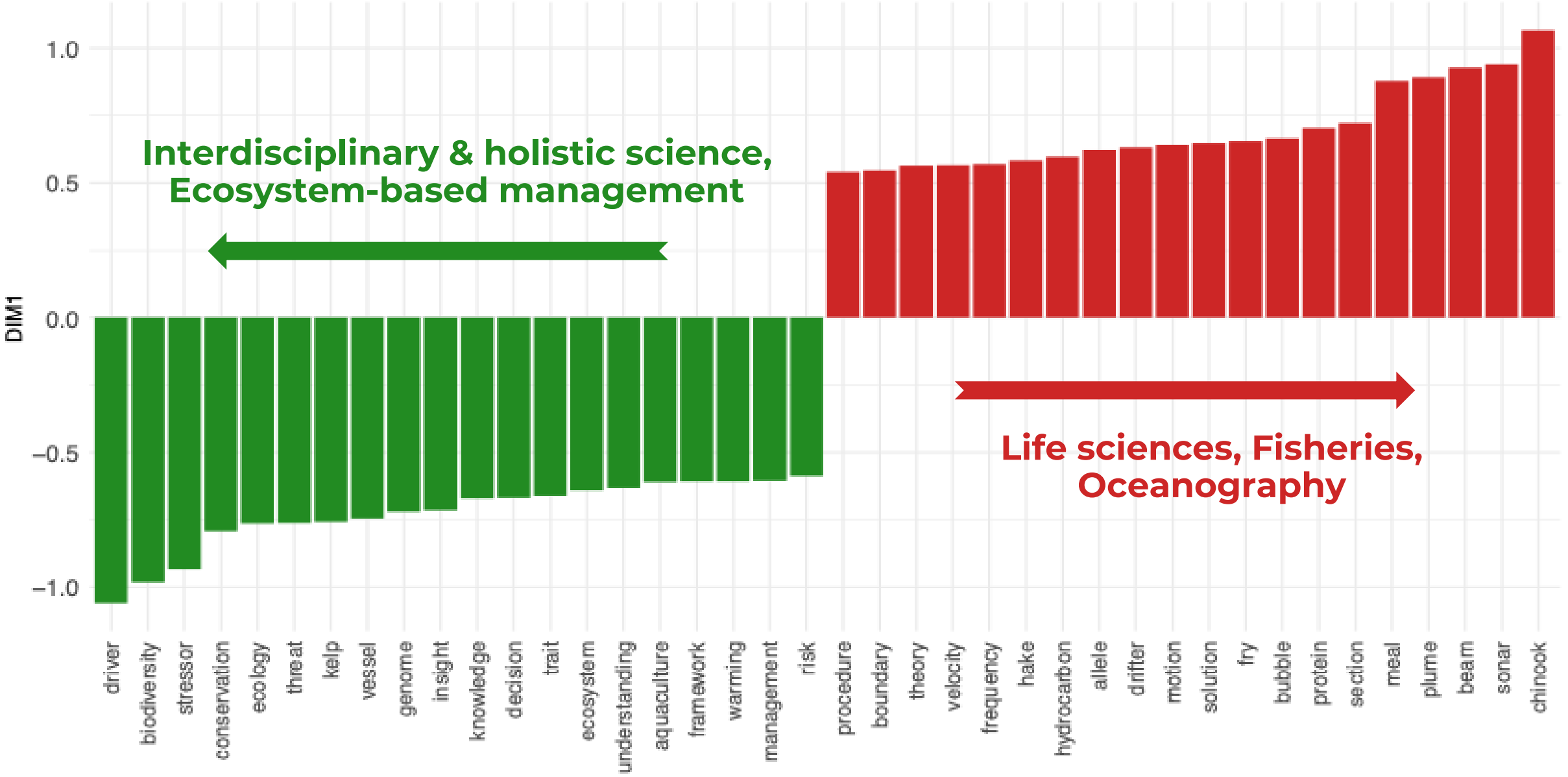


- ❑ Increase our understanding of **characteristics and gaps in ocean science** between the northeast and northwest Pacific Ocean,
- ❑ Develop a **methodology** to evaluate how the **human networks** can power sustainability (aka resilience)

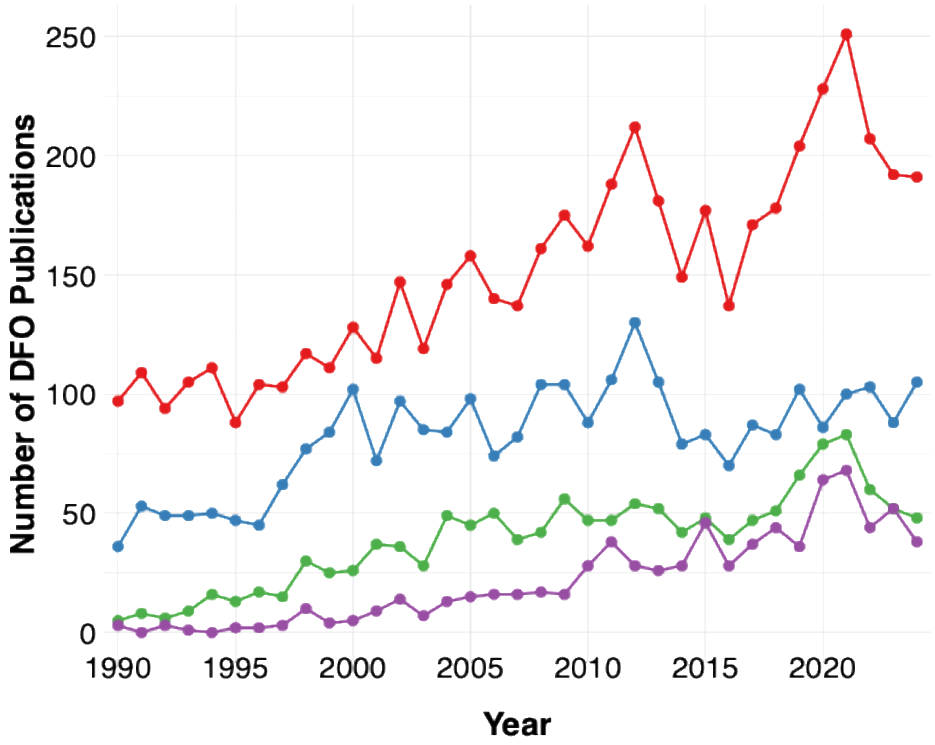
Pacific Canada Publications Time Series (1990-2024)

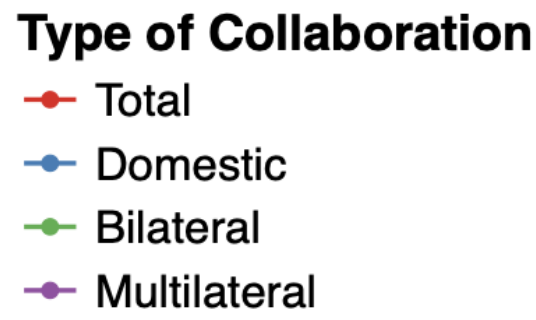


(prelim) Top Keywords of Correspondence Analysis Output

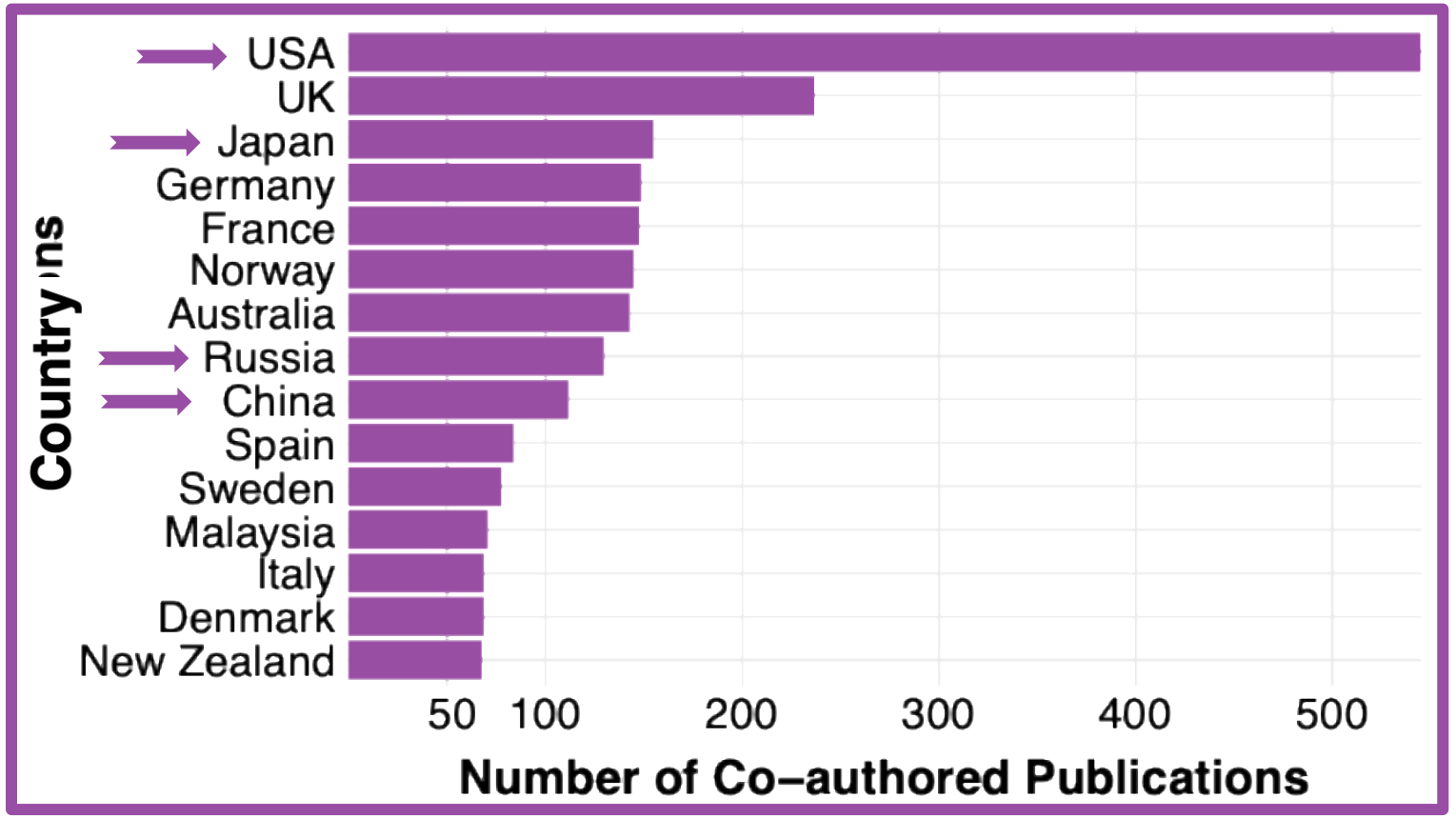


Multilateral Collaborations (1990-2024)





Top 10 Countries in Multilateral Collaborations



Pacific Fisheries and Oceans Canada's marine science collaboration story

- More collaborative / multilateral publications
- Shifted main focus to global issues and interdisciplinary science
- Facilitating integration / resilience?
  - More work to understand if, how and where research is translating into change in management and policy
  - explore other PICES countries to reflect on whether Canadian patterns are similar, and identify where we are more likely to develop integration

Improving resilience through science networks

- Knowledge sharing and collaboration are necessary, but integration is perhaps where resilience could be more supported domestically and globally
- Some science “infrastructure” is already relatively integrated: monitoring / standardization of measurement, stock assessment procedures, etc.
- Integrating organizational culture and individual behaviour more challenging across geographical and ideological boundaries, but what do we have to lose?



remember that individual resilience matters too



PICES
Human Dimensions Committee

Supporting resilience in PICES

- HD Topic Session and other to promote connection across a diverse HD expertise in PICES
- Human Dimensions Nodes to expand our country-based networks into previously under-explored areas / “strengthen our strengths”
- WG51 Exploring human networks to power sustainability
- New proposals to support interdisciplinary ocean and coastal management and SSH integration for the North Pacific

