INSTITUTE *for* RESPONSIBLE CARBON REMOVAL

What does social science tell us about responsibly researching mCDR and OIF?

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Based on unceded Sḵwx̱wú7mesh (Squamish) and Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh) territory, in Squamish, BC, Canada

For discussion today

1. What kinds of **things can social science tell us** re: mCDR?
2. What are some of the **key social and governance issues** regarding CDR, mCDR, and OIF?
3. What do we know so far re: **how people think about** mCDR & OIF?
4. What does any of this tell us about how to **make mCDR research more just and responsible?**
5. What are some **specific research proposals** for social science **to accompany OIF field trials—and what are the challenges in undertaking these**?

Some things that social science can do

- Tell us about what makes a technology more or less **likely to be publicly supported**—amongst general public but also specific communities
- Help us **avoid perpetuating injustices** by developing technologies in ways and at locations where they are truly wanted, especially by historically oppressed groups
- Identify **issues that experts have missed**
- Bring to light experts' **value-based assumptions** that shape scientific research
- Make oceanographic (and other) **model inputs more attuned to preferences** of coastal communities
- Characterize how environmental changes will actually **impact people**

Findings from interviews with mCDR experts on their unstated assumptions

1. Tendencies to liken mCDR to natural processes, but disagreement on when the 'natural' line is crossed
2. Research on climate solutions is urgent, but different ideas of how fast is too fast for moving forward with solutions
3. mCDR can be understood as waste management, but lack of attention to/clarity on what to do with other byproducts and life cycle dimensions that need to be managed
4. Publics and communities need to participate in decision-making, but a lack of clarity on who 'counts' as relevant and what are best ways to involve them

Nawaz, S., Lezaun, J., 2024. Grappling with a sea change: Tensions in expert imaginaries of marine carbon dioxide removal. Global Environmental Change 85, 102806. https://doi.org/10.1016/j.gloenvcha.2024.102806

Why think about social questions early (*now*)?

- When decision get ‘baked in’ it becomes a lot **harder to change course** later
- Technical (and policy) **decisions are getting made *now*** + these drive social impacts, perceptions

Image credit: Sara Nawaz

What are important social & governance issues for CDR, mCDR & OIF?

Uncertainties about impacts to ecosystems

- How will this affect local ecosystems—and people who depend on them?

Local participation in decision making

- Key aspect of good, responsible, just implementation: involving people in decision making!
- How to define ‘who’ are affected communities when…
  - These techniques are open-system?
  - We don’t know where they will be sited yet?

Environmental justice

- Will impacts (ecological, social, etc) fall on already marginalized communities and exacerbate past harms?
- Will these communities get to participate fully in decisionmaking?
- Will rightsholders (Tribes, First Nations) have sovereignty over decisions made in their territories?
- Will the Global South get to participate in designing, and benefit from, carbon removal projects?

Greenwashing

- Will fossil fuel companies do this as PR to continue business as usual?

‘Moral hazard’, ‘mitigation deterrence’

- If we do carbon removal, will that cause us to do less in the way of emissions reductions?
- Will fossil fuel companies buy up this sector?

Carbon markets—are they the only way?

- MANY issues with this re: ‘offsets’ (e.g., forestry-based)
- Yet almost all conversations about carbon removal assume markets
- Might there be other ways of incentivizing/generating carbon removal?

Public support

- Will there be a broad base of public support for these technologies, or will concerns (about all of the above) make these untenable?

How do people think about mCDR and OIF?

Re: OIF, we actually know the most (and it's not good news)

- **Low support** (Bertram and Merk 2020, Cox et al. 2021)
- Perceived **more negatively than any terrestrial CDR** (Ipsos MORI 2010, Jobin and Siegrist 2020)
- **Similar** levels of **support to stratospheric aerosol injection** (Ipsos MORI 2010, Jobin and Siegrist 2020)
- **High perceived risks** (Amelung and Funke 2015)
- Some evidence that **climate vulnerable populations would accept it**—but acceptance is "**deeply reluctant and highly conditional**" (Carr and Young 2018)

Factors that affect support + comfort with mCDR

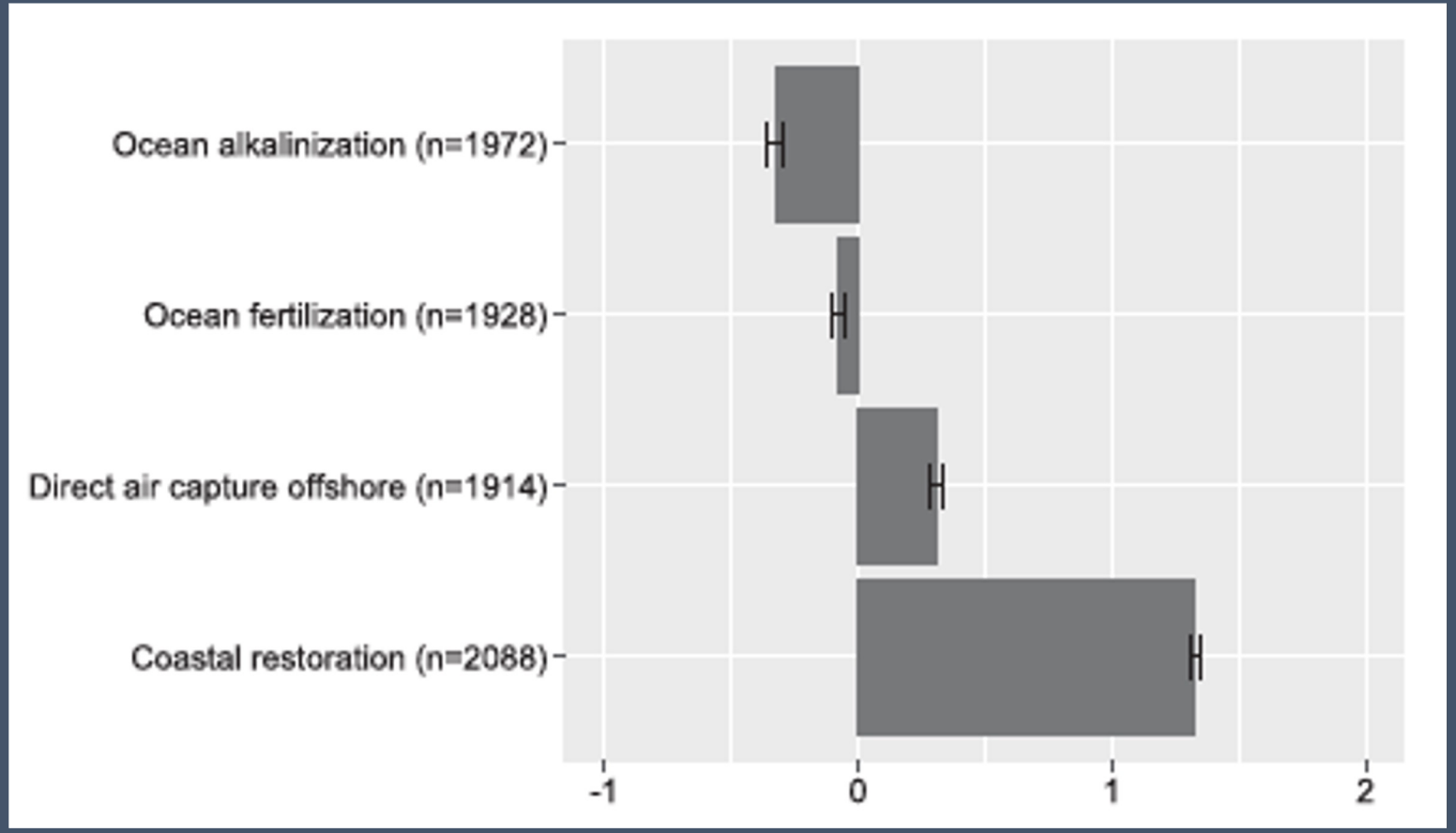
- Perceived controllability
- Perceived naturalness
- Perceptions of the ocean as fragile, pristine
- Concern about overstepping limits of human ability to understand and control the environment (Macnaghten et al., 2015; Wibeck et al., 2017)
- Lack of confidence in abilities of management to protect the ocean (Ankamah-Yeboah et al 2020)
- Positive emotional connection to the ocean (McMahan and Estes 2015)—amongst coastal and inland populations (Cox et al 2020)
- Concern about ‘quick fixes’ that don’t address real causes of climate change (Carr and Young 2018, Wickinoff et al 2015)

What about other types of mCDR? Some recent survey research in WA + BC

Participants were asked to indicate whether they were:

- ‘Very uncomfortable’ (−2),
- ‘uncomfortable’ (−1),
- ‘neutral’ (0),
- ‘comfortable’ (+1),
- or ‘very comfortable’ (+2)

with each of the following technologies.



Nawaz, Sara, Guillaume Peterson St-Laurent, and Terre Satterfield. "Public evaluations of four approaches to ocean-based carbon dioxide removal." *Climate Policy* (2023): 1-16.

Predictors of comfort with different mCDR approaches

Select predictors of comfort	OAE	OIF	DACCS	Coastal restoration
Trust	*** (+)	*** (+)	*** (+)	
Relationships and responsibility to nature				*** (+)
Techno-optimism	*** (+)		* (-)	*** (-)
Climate severity and urgency	*** (+)	*** (+)	*** (+)	*** (+)
Marine environments as adaptable	*** (+)	*** (+)		** (-)
Marine environments as manageable		** (+)	*** (+)	*** (+)
Marine environments as fragile	* (-)	** (-)	* (-)	*** (+)

Nawaz, Sara, Guillaume Peterson St-Laurent, and Terre Satterfield. "Public evaluations of four approaches to ocean-based carbon dioxide removal." *Climate Policy* (2023): 1-16.

Gannon and Hulme (2018): Perceptions of OIF in Haida Gwaii

- Locally situated perceptions
- Case of HSRC project
- Q method (hybrid quant-qual approach)
- Three sets of views:
  - “OIF is morally wrong (need to preserve the natural order)”
  - “OIF should be urgently explored (science can help us address climate change)”
  - “OIF is very risky (Climate and ocean systems are dynamic and interconnected)”

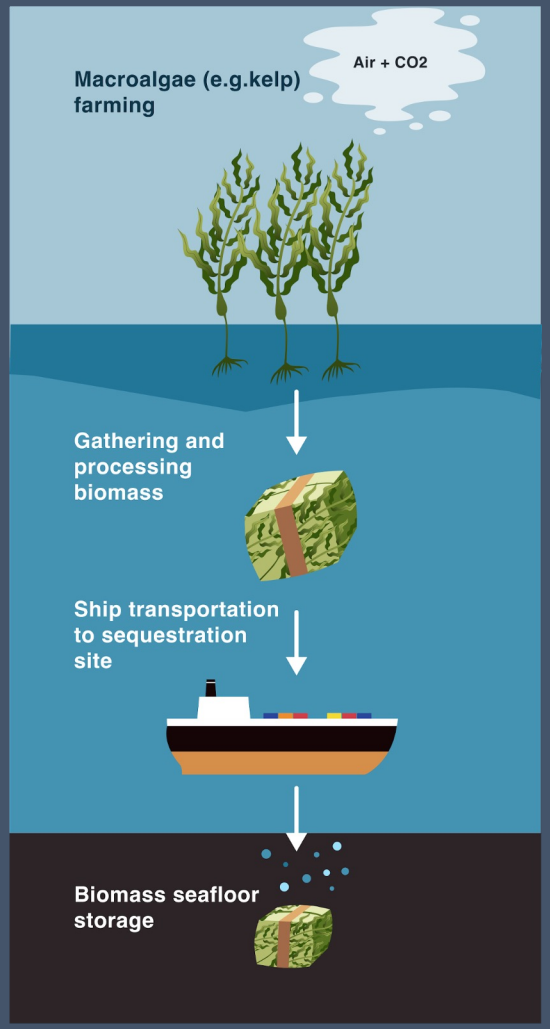
Image credit: David Stanley Flickr

Gannon, K.E., Hulme, M., 2018. Geoengineering at the “Edge of the World”: Exploring perceptions of ocean fertilisation through the Haida Salmon Restoration Corporation. Geo: Geography and Environment 5, e00054. https://doi.org/10.1002/geo2.54

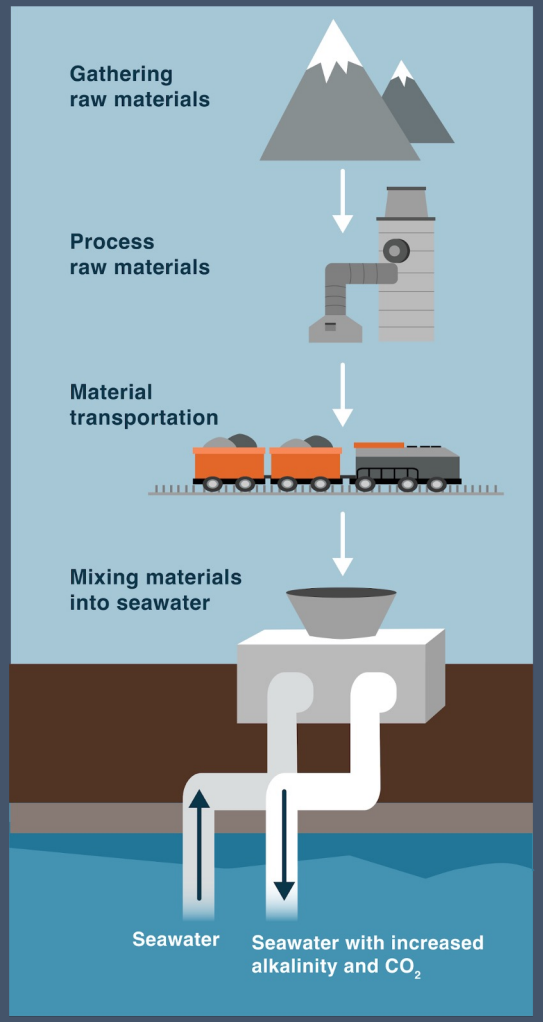
Satterfield and Nawaz, forthcoming

Workshops in Victoria, BC

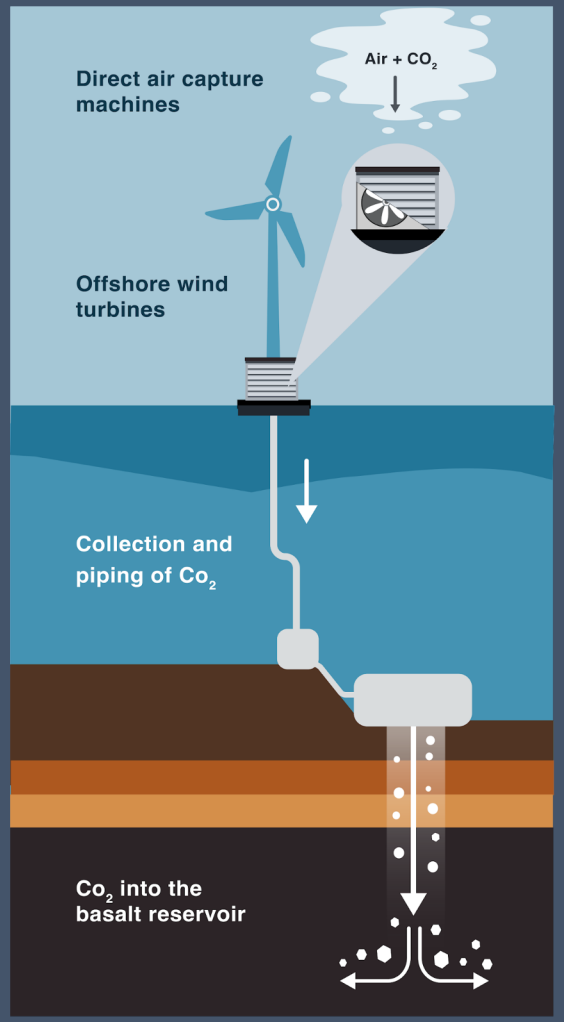
2 million tons, 10% of BC's anticipated annual removal within next few decades



Growing, bundling and sinking bundles of kelp



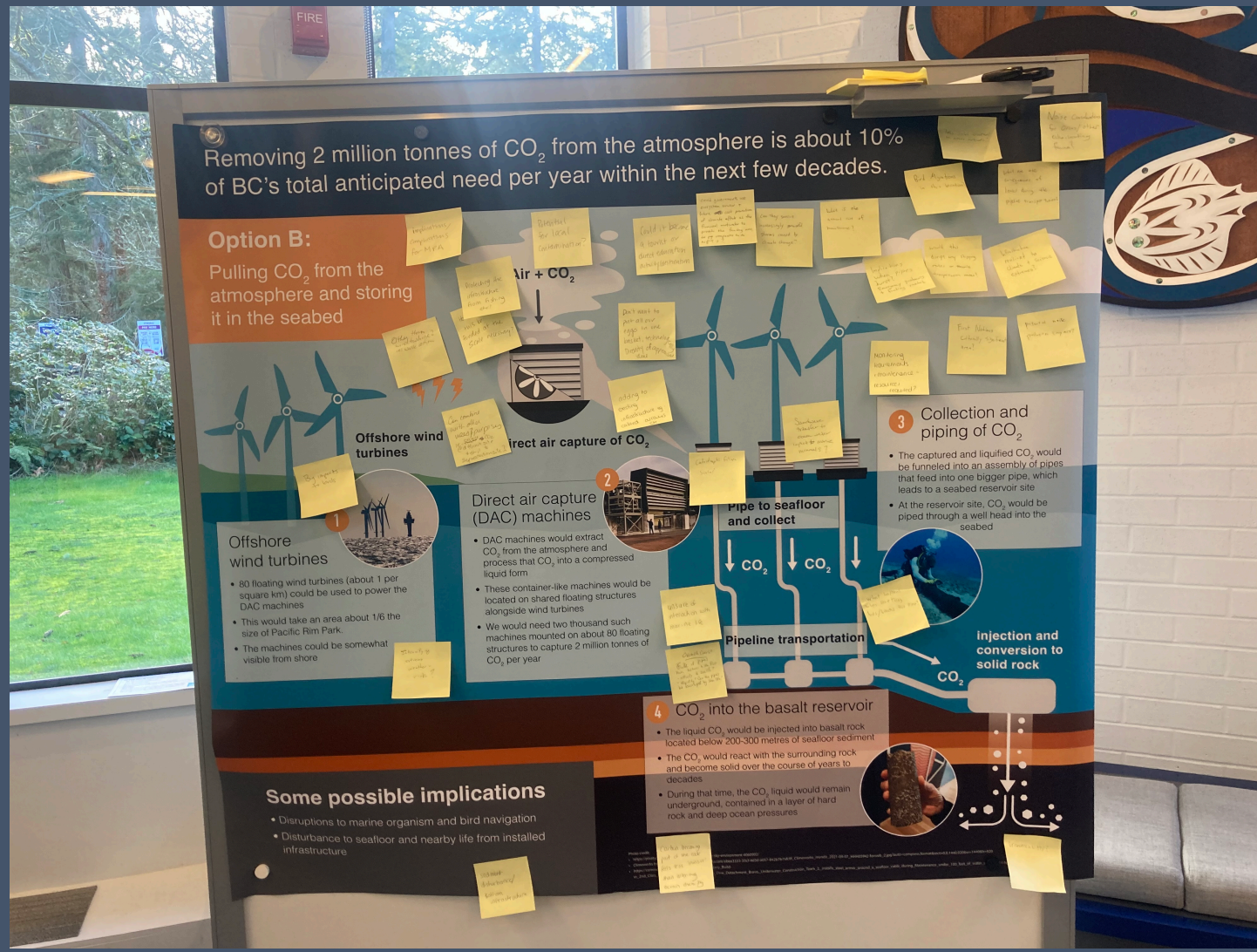
Adding minerals that help the Ocean store CO2



Pulling CO2 from the atmosphere and storing it in the seabed

Some results from Victoria workshops

- **All approaches:** Ecological impacts, Tipping points, spatial scale, naturalness, morality of (in)action, who benefits and controls this?
- **OAE:** Toxicity, mining considerations



Satterfield and Nawaz, forthcoming

Image credit: Sara Nawaz

Workshops in Sequim, WA

- Research workshops on ocean alkalinity enhancement in June 2024
- Funded by ClimateWorks Foundation, not in collaboration with any field trial or other proposed physical science research
- Participants: n=38, staff and members of marine and coastal resources groups, NGOs, Tribes, government, ports, shellfish farmers, recreational groups, etc. – from broader Olympic Peninsula region

Image credit: Ken Lund, Flickr

Nawaz and Belotti, forthcoming

Results from the Sequim workshops

- Ecological impacts
- Mix of **hope/optimism and grief/despair**
- **Scale**—e.g., at what volume is it 'too much'?
- Discussions around how **fast vs. slow** to proceed with research
- Questions about whether we should just double down on **reducing consumption**
- Political specifics of both project AND broader governance context matter:
  - e.g., Fears of monopoly operations of these projects; **funding and ownership** key considerations; mitigation deterrence concerns

Nawaz and Belotti, forthcoming

Ideas for more just & responsible mCDR research & early deployments

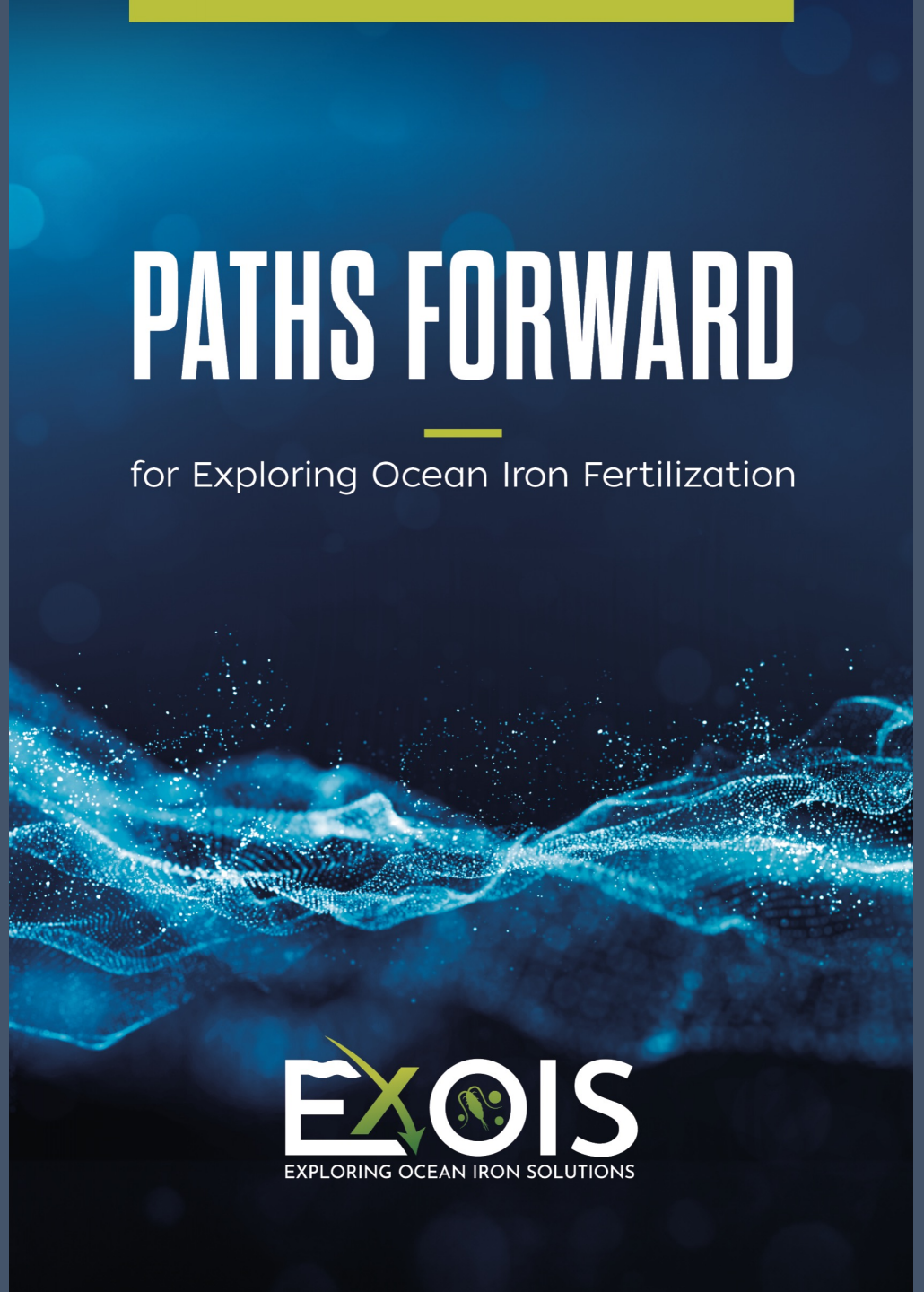
Social science and engagement work

- **Funding for social science** and engagement work
- Shift from project-based to **sector-level engagement** on mCDR
- Rigorous and **EARLY engagement**—e.g., well before permitting processes
- Transparent plans for **what projects will do with engagement findings**
- Explicit commitment to **Indigenous self-determination**
- Interdisciplinary research to **support communities participating in the science itself**—not just being recipients of 'the science'

Governance & policy

- Policy support/funding prioritization & incentivization for **not-for-profit, community-led, and community co-designed projects**
- Explore **alternatives to offset models**

Research proposals for social science work to accompany OIF field trials



Paths Forward: Ideas to advance understanding of **social science** considerations for OIF

1. **Qualitative community engagement research** to explore social viability of OIF and align research with local priorities and needs
2. **Public perceptions research on OIF** to evaluate social viability and inform next research steps
3. Assessment of **socio-ecological impacts** of OIF
4. Decision research on OIF **tradeoffs** to inform scaling pilot studies

Challenges in undertaking this work

- Lack of social scientists who want to work on OIF
- Difficulty in scoping of who to include--how broad or narrow to go?—especially re: Indigenous sovereignty and self-determination
- A LOT of work/funding/staffing needed

Thank you, and please reach out!

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