**Guiding Recommendations on Collaborative Research Governance,
Community Engagement, and Social Science for the
'Exploring Ocean Iron Solutions' (ExOIS) Project Office:
A Focus on the First 12 months of Field Trial Planning**

<u>**Prepared by the ExOIS Social Science and Governance Advisory Board**</u>

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April 2025

1. Introduction

The ExOIS Project Office is [preparing to conduct ocean iron fertilization (OIF) field trials](#)[1] in the Northeast Pacific Ocean. The proposed field site lies beyond national jurisdiction, approximately 1,000 km offshore from British Columbia and Alaska, near [Ocean Station Papa](#).[2] These planned field trials present an early opportunity to incorporate governance and social considerations into research approaches and activities and to advance knowledge on governance, public perceptions, and other human dimensions of OIF.

To support this effort, the ExOIS Social Science and Governance Working Group convened an eleven-member Social Science and Governance Advisory Board to inform research planning, **with emphasis on the first twelve months of planning in advance of field trials**. During three working meetings in January, February, and March 2025, the Board identified opportunities for project operations to account for governance and social science considerations to both facilitate effective and responsible near-term OIF trials and to contribute scholarly knowledge in these areas. This guidance is the outcome of these discussions and will inform the identification and design of ExOIS research and engagement activities in the first year of planning in advance of field trials.

The purpose of this document is to **inform planning** over the next year (2025-26) of the ExOIS field trials in the NE Pacific Ocean, ensuring that this planning (e.g., permitting activities, community engagement, and establishment of social science research collaborations) does the following:

a) **Fully attends to social and research governance dimensions,** and
b) Supports and **advances scholarly understanding and insight** into social and governance issues pertaining to OIF.

We note here that legal and regulatory aspects of governance are not covered in this document. A more detailed consideration of planning needs on legal and regulatory aspects of these OIF field trials will be elaborated in more detail in the future.

2. Guiding Recommendations

The below Guiding Recommendations outline the key activities and considerations identified by the Advisory Board.

A. Collaborative Research Governance

The ExOIS Project Office should undertake the following practices to ensure that any activities involving external participants or collaborators—e.g., research, engagement activities, environmental monitoring—respects parties involved, particularly Indigenous partners.

1. Adopt collaborative research governance approaches, such as responsible knowledge co-production[3] or responsible innovation,[4] that proactively respect and protect the sovereignty and rights of Northeast Pacific Indigenous communities—including Alaska Native Corporations and First Nations in Canada—as well as other local communities whose collaboration will be necessary for successful research. This includes recognizing Indigenous peoples' rights to their waters and resources and ensuring that project-related decisions that may impact them socially, culturally, economically, or in matters of intellectual property (IP) and data sovereignty are informed by their meaningful engagement, even if these impacts are indirect or occur outside of their legally recognized territory.

   Where activities may affect Aboriginal or treaty rights—as asserted or established under relevant legal frameworks—appropriate processes for consultation, and where applicable, consent, should be undertaken. Even where these legal obligations do not apply, the Project Office should strive to recognize Indigenous interests, worldviews, and knowledge systems, and strive to explore opportunities for co-development of research.

2. Align data governance with the Collective Benefit, Authority to Control, Responsibility, and Ethics (CARE) principles,[5] which reflect the role of data in advancing Indigenous self-determination and innovation, including on ecologically related research and topics.[6] These principles complement the FAIR (Findable, Accessible, Interoperable, and Reusable) framework,[7] which outline principles for using, storing, and making data available for future reuse. The First Nation Principles of OCAP[8] (Ownership, Control, Access and Possession) might also be an important framework to work within.

3. Consider how risks to Indigenous peoples posed by project activities might be assessed and managed by learning from existing approaches to environmental and social safeguards frameworks, such as the UNEP Environmental and Social Sustainability Framework (ESSF).[9] Also learn from approaches to processes of environmental assessment that center Indigenous self-determination, known as Indigenous-led Impact Assessment.[10]

B. Community, Rightsholder, and Stakeholder Engagement

The development of a strategy, initial mapping activity, and detailed plan for carrying out engagement activities should be considered a centrally important effort that the ExOIS Project

Office should undertake as part of its OIF field trials in the NE Pacific Ocean. Recommended activities are described below.

1. Articulate the goals, intended extent of influence, and principles for community, rightsholder, and stakeholder engagement.

   Before engaging the diverse groups potentially affected or interested in these field trials, the Project Office should agree upon and articulate overarching goals and ethical underpinnings guiding engagement activities. This will ensure that activities support stated goals, facilitate clear communication of intended outcomes, and manage expectations of a range of internal and external actors.

   1.1. Articulate the goals, scope, and intended outcomes of engagement efforts by reflecting on:
      ● What the project envisions and the extent to which it is prepared to invest in long-term relational approaches relative to near-term activities driven by concrete project needs.
      ● The engagement efforts the project hopes to undertake, alongside what won't be undertaken as part of engagement efforts, to manage expectations.

      The orientation of these efforts should not be to seek a referendum on OIF or marine carbon dioxide removal (mCDR), but rather to explore the extent to which different groups support (or not) future research and deployment (which are different in their intent and purpose) of OIF in the Northeast Pacific Ocean, as well as the conditions under which they wish to see any further research or deployment occur.

   1.2. Articulate the extent to which community input will influence project decisions, and clarify how findings from engagement activities will be shared out with participating communities and the broader public. This articulation should aim to shift towards more collaborative and empowerment-oriented models of engagement, as laid out by the [International Association for Public Participation's Spectrum of Public Participation](#).[11]

   1.3. Describe how the project will respond if opposition arises, whether during or outside of formal engagement activities (e.g., via media, community mobilization, or other channels). Opposition should not be viewed as something to sweep under the rug, but rather as a critical input into assessing the social acceptability of the project, and as an important opportunity to learn and build trust. The Project Office should define:
      ● What forms of opposition will warrant action, for example, distinctions between questions/concerns, organized objection, or formal assertions of opposition.
      ● Potential mechanisms of resolution or processes for co-developed decision-making pathways to assess and resolve conflict. Mechanisms

should emphasize harm reduction, transparency, trust-building, and respect.
- Who will be responsible for design and implementation of responses and communications with involved parties.
- Any triggers that may prompt a review, temporary pause, or cease-work decision.

1.4. Orient around an underpinning ethical framework, as ExOIS has established via its Guiding Principles[12] (also described in Buesseler et al., 2022[13]). These broadly align with important principles from the following more recent documents: the US National Science and Technology Council's mCDR Research Strategy,[14] the Aspen Institute's mCDR Code of Conduct for mCDR Research,[15] and the American Geophysical Union's Ethical Framework for Climate Intervention.[16]

2. Commission a **mapping study to characterize the landscape of communities, stakeholders, rightsholders, and other parties** with interest in or potential impact by the field trials. Audiences of engagement[17] vary and overlap based on proximity of geography and interest to the project.

The mapping study would be limited to the Northeast Pacific region, but it would trial a methodology that could be adapted and applied in other regions in the future as needed. Its goal would be to provide a comprehensive understanding of the diverse groups with interests in or potentially impacted by the OIF field trials, including communities, rightsholders such as Alaska Native Corporations and First Nations, commercial groups (e.g., fisheries), environmental and natural resource organizations, and labour groups, as well as policymakers, researchers, and industry that might be impacted or interested.

During mapping, consider consulting regional fisheries management organizations, civil society organizations, and industry groups to build out lists of relevant actors to engage, such as:
- North Pacific Fishery Management Council Social Science Planning Team[18]
- North Pacific Marine Science Organization Human Dimensions Committee[19]
- Western & Central Pacific Fisheries Commission[20]

The mapping study should include:

2.1. Identification and prioritization of groups for engagement:
- Identify any groups with whom consultation is legally required.
- Identify groups with geographic proximity and interest proximity who should also be consulted, whether or not it is legally required. Such groups should include those with marine Aboriginal title claims and customary rights relevant to the study site, and those who may experience direct/tangible and indirect/intangible impacts.

- Identify other groups who may not have geographic proximity to the research site but who hold power or influence in broader socio-technical dynamics. This may include individuals operating beyond local levels, including relevant county, state, regional, or national decision-makers or influential actors in public or private sectors, and those with interest, impact, or influence who may not be proximal or adjacent to the project site (e.g., those in other geographies who may be influential).

2.2. Baseline characterization. This involves:
- Conducting a desk review of the identified groups and individuals, in order to generate a matrix of their roles and influence. The matrix could also include the extent of interconnectivity, key relationships, scales of operation and impact, collaboration potential, and preliminary engagement preferences. Insights from literature should be complemented by feedback from subject matter experts, including representatives or members of identified groups, with knowledge of relevant local and regional context.
- Adapting the matrix and associated engagement strategy over time to account for changes through iterative engagement with affected and interested groups.

3. Develop an **engagement plan** that describes how priority groups can be involved in informing project operations. The plan should describe clearly how engagement activities link to the goals and outcomes of the overall 'strategy for engagement' described above in section 4. It should be designed to support inclusivity, two-way conversation and deep deliberation on ExOIS field trials, and adaptability and reflexive iteration (allowing for change as the project evolves). This engagement plan should, specifically:

3.1. Determine who should lead engagement work, considering:
- The extent to which candidate individuals' and teams' experience with and past approaches to engagement align with the vision, goals, and ethical principles under which the Project Office intends to work.
- The extent of their knowledge about, relationships with, and existing trust with groups and individuals identified in the mapping study.
- The extent to which candidates have the ability to build trust with priority groups and be perceived as independent actors in conducting this engagement work.

3.2. Do the following additional things:
- Respond directly to the mapping study by identifying community preferences for engagement methods and aligning engagement activities accordingly. The type and extent of planned engagement should be tailored to reflect the specific preferences and needs of different groups.
- Recognize that the nature of communication will differ among stakeholders, and consider strategic instrumental and normative engagement,[21] as appropriate, based on stakeholder characteristics and interests.

- Describe priority questions to be addressed by engagement efforts, both regarding views on the trial and regarding views on what further experiments and/or deployments could entail.
- Align engagement activities with key project decision-points so that community feedback can inform decision-making.
- Create opportunities for local individuals with experiential knowledge to participate in project co-design and decision-making (e.g., join the internal ExOIS SS&G Working Group).
- Consider if/how the project could ensure that oppositional voices are welcomed into the discussion (e.g., inclusion of skeptics on a community advisory board[22]).
- Include a monitoring, evaluation, and learning (MEL) component with clear feedback loops for the incorporation of community and stakeholder input. This would involve ensuring that there is a clear structure and process for collecting and implementing feedback on engagement.

The plan should be designed with the understanding that building relationships and conducting engagement with Indigenous communities, a priority for this work, requires extensive effort and long timelines. As such, it will be important that the engagement strategy builds in as much time as possible, and does not plan to have definitive 'findings' by specific dates.

C. Social Science Research Priorities

Social science research alongside OIF trials can and should advance understanding to assess various dimensions of both OIF and mCDR more generally. While the first 12 months of planning around the NE Pacific Ocean trials are too short a timeframe to establish and undertake a full social science research program, there are a number of priorities that can and should be advanced. This is, in large part, because social science is intertwined with engagement work and any early efforts to establish scientific research collaborations. Thus, we recommend that this 12-month period be used to advance planning on the key social science to be undertaken alongside the field trials.

Specific approaches to develop and execute a social science research program are likely to depend on the interest areas and epistemological and methodological approaches of scholars involved in leading this work. As a starting point, we recommend considering the following social science research areas and questions in tandem with the collaborative research governance principles and activities and community engagement activities described above. For example, all suggested research areas present opportunities to explore how different knowledge types (e.g., Indigenous knowledges) can be integrated into OIF research and decision-making.

Amongst the research areas that we view as most relevant are the following:

- **Community and public perceptions research.** This research should prioritize perceptions of potentially affected communities and the broader public. This may include:

- ○ the extent of public support or acceptability of OIF across different geographies (e.g., coastal vs. open ocean), volumetric scales of deployment, and technical configurations (e.g., are there differences in perceptions of different materials used?)
- ○ perceptions of OIF's benefits, costs, and risks; their scope; and what processes and outcomes constitute their equitable (or inequitable) distribution
- ○ perceptions of uncertainty about outcomes of OIF and its relationship to support for research and deployment

These questions could be explored through several methods. Surveys may provide useful insights into both local community and broader public perceptions, and can support development of more generalizable results regarding views on these trials and follow-on work. However, it should be noted that surveys alone are often insufficient in the context of emerging technologies, and they should also not be taken as 'referenda' on OIF, similar to the note above on engagement activities. Survey work can and should utilize qualitative work to inform its conclusions. For example, a **participatory perceived effects mapping study** could work with priority groups for an in-depth understanding of **anticipated positive and negative impacts**, responses, and perceived systems dynamics.

- ● **Trade-offs analysis.** Analysis of trade-offs associated with OIF research, deployment, and related policy alternatives could be used to assess the multidimensional (social, environmental, relational, and temporal, among others) benefits and costs "with" and "without" intervention, as well as associated social acceptability or preferences. Understanding multidimensional trade-offs can help identify key impacts of concern to community members and the public and their acceptability (or not) in relation to the range of other anticipated impacts and system dynamics, supporting decision-making that aligns with preferences and avoids unacceptable trade-offs. The outputs of these studies could also summarize preferences for intervention attributes in a tractable "language" that is ideal for policy discussions, e.g., where applicable, monetary valuation of social gains or avoided costs from intervention.

  Methodological approaches could include experimental studies such as contingent behavior, contingent valuation, choice experiments, or (participatory) multicriteria decision analysis, alongside in-depth qualitative approaches examining perceptions and preferences.

3. Recommended staffing and resources

Below is a description of recommended staffing and resource estimates that might be needed over 12 months and beyond to support planning for ExOIS' NE Pacific Ocean field trials.

We recommend that the Project Office hire multiple roles to build out planning for further social and governance work associated with the field trials. This could be arranged in a number of different ways, including via hiring internal staff members or external consultants. Opportunities to involve students and early-career scholars, including graduate students and postdoctoral fellows whose expertise would support project objectives, should also be explored. Each role is ideally staffed by at least one single full-time equivalent (FTE), though responsibilities may be fulfilled by multiple individuals with equivalent combined effort.

We suggest funding staffing for the following specific roles and functions:

- One full-time engagement director (ideally based in Alaska or British Columbia), who would lead work on engagement with Indigenous communities (Sections B2-3), be responsible for designing and initiating an approach to collaborative research governance (Sections A1-3), facilitate high-level engagement strategy planning with the Project Office (Section B1), collaborate with the social science research director to support in planning social science research, and oversee needed support staff. This person should be an Indigenous engagement expert, a mid-career scholar or professional with extensive experience and connections to Indigenous communities in British Columbia and/or Alaska.
- One full-time social science research director or manager, who would be responsible for defining and planning a social science research program (Section C), contribute to development of collaborative research governance and Indigenous engagement approaches led by the Indigenous engagement expert, contribute to community engagement (including, but not limited to, the work described in Section B2), and oversee support staff. This person should be an early- to mid-career scholar, postdoctoral fellow, or academically oriented professional with experience in carbon dioxide removal, novel environmental technologies, marine resource management, or other topic areas, and with expertise that includes public perceptions, science and technology studies, human geography, political ecology, judgment and decision making, or related fields.
- Two full-time community engagement managers or associates (ideally based in Alaska or British Columbia), to lead engagement activities with a range of communities (Sections B2-3), support on Indigenous engagement activities (Sections B2-3), contribute to designing and initiating an approach to collaborative research governance led by the Indigenous engagement expert, and support in planning social science research led by the social science research director. Those in this role should be early-to mid-career professionals with formal academic training who have experience designing and undertaking community engagement and/or participatory research activities on novel technologies, environmental or marine resource issues, infrastructure projects, and/or other topics.
- 2 social science research support staff, as needed, who might support in undertaking a range of social science research planning and execution (Section C), and, where needed, engagement activities. These might be PhD students, postdoctoral fellows, or others.

In addition to the staff time described (at least 4 FTE staff people) we anticipate additional budget needed for engagement-related travel, conference fees, and convenings.

The below table summarizes the recommended staffing and resources.

Staff/Item	Recommended Experience Level	Recommendations Addressed	Recommended Resourcing
Engagement Director	mid-career scholar or professional and Indigenous engagement expert with extensive experience and connections to Indigenous communities in British Columbia and/or Alaska	The Engagement Director would lead the work described in Sections A1-3 and B1-3. They would support the work described in Section C.	1 FTE throughout years 1-5
Social Science Research Director	early-to mid-career scholar or academically oriented professional with experience in carbon dioxide removal, novel environmental technologies, marine resource management, or other topic areas, and with expertise that includes public perceptions, science and technology studies, human geography, political ecology, judgment and decision making, or related fields	The Social Science Research Director would lead the work described in Section C. They would support the work described in Section B2.	1 FTE throughout years 1-5
Community engagement support staff	early-to mid-career professionals with formal academic training who have experience designing and undertaking community engagement and/or participatory research activities on novel technologies, environmental or marine resource issues, infrastructure projects, and/or other topics	Community engagement support staff would support the work described in Sections B2-3 and Section C.	1 FTE in year 1, and then 2 FTE in years 2-5
Social science research support staff	early- to mid-career scholars (or, as appropriate, postdoctoral fellows or graduate students) with experience designing and undertaking participatory social science research and with substantive knowledge of novel technologies, environmental or marine resource issues, infrastructure projects, and/or other topics	Social science research support staff would support the work described in Section C and, as needed, Section B2-3.	1 FTE in year 1, and then 2 FTE in years 2-5
Engagement-related travel, conference fees, convenings, supplies, software licenses, etc.	Not applicable	These additional expenses would support the work described in Sections B2-3 and in Section C during years 2-5.	$60k in year 1 for one-time, up-front costs such as supplies and software licenses, as needed, and then $50k per year in years 2-5

Acknowledgments

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