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RESEARCH ARTICLE

Stakeholder and rightsholder engagement in environmental research: Lessons from Canadian scholars engaging diverse groups

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Abstract

1. To promote inclusivity, relevance and actionability of environmental research, scholars are engaging with rightsholders and stakeholders (Indigenous groups, governments and individuals) to co-produce research. These transdisciplinary approaches represent diverse forms of 'engaged' research (e.g. community-engaged research, braiding Indigenous science and knowledge and Western science-based knowledge, workshops with decision-makers).
2. Acknowledging the diversity in aims and approaches to transdisciplinary research, this study surveyed a broad group of Canadian environmental researchers ($n = 61$) to understand: their motivations and objectives for engagement, how they manage engagement processes, how they assess the success of engagement, and the insights they would highlight for others interested in engaging in various forms of knowledge co-production. We used qualitative methods to identify key themes and supported our findings with quantitative measures (i.e. frequency and proportion of participants who gave particular responses).
3. We found that the motivations, geographic context, and practical experiences of researchers were diverse. A strong theme was the value of reciprocity. Recurring advice included the importance of understanding the research context and actor landscape prior to contacting collaborators, conducting iterative discussions with research collaborators to scope and plan the project, and being sure to locate the individuals or entities that may hold key knowledge or the ability to grant permissions.

For affiliations refer to page 2331.

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4. We note the importance of paying close attention to power asymmetries during the research process. Dialogue with stakeholders, rightsholders and communities is time-consuming. Devoting adequate time for building and maintaining relationships to achieve a requisite level of trust is essential, but can be challenging for all parties.
5. We conclude that there is no substitute for one-on-one mentoring for learning and understanding how to lead ethical and effective knowledge co-production processes. Researchers setting out to collaborate with stakeholders, rightsholders, and communities must learn the norms, rules, and social dynamics of a given context and culture—and they should seek out experienced counsel for preparation and coaching before engaging in collaborations.

KEYWORDS
community-engaged research, human–nature relationships, Indigenous and local knowledge, knowledge co-production, power asymmetries, stakeholder and rightsholder engagement, transdisciplinary research

1 | INTRODUCTION

1.1 | Positionality statement

This study represents a peer knowledge exchange of Western-trained researchers conducting environmental research in Canada that engages with stakeholders, rightsholders, policy makers, practitioners, and communities. This project was conceived at the 2022 Annual General Meeting of ResNet, a large Canadian research project (2019–2025) with the aim of advancing monitoring, modelling and management of ecosystem services in Canada's working landscapes and seascapes (Bennett et al., 2021). The inspiration for this project came from an emerging scholar who recognized the importance of engaging local communities in their research in remote locations, but said, 'I wouldn't know where to start'. In response to this sentiment, this project aimed to synthesize the insights of scholars experienced in engaged research to distil lessons for those wishing to better understand and undertake this type of research. Although we advocate for researchers to build relationships with stakeholders, rightsholders and communities, in this paper, we focus on the perspectives of settler (non-Indigenous) scientists. We provide guidance for novices in this area so that readers can benefit from our collective experience of building relationships in research.

The urgency and complexity of socio-environmental challenges facing the planet and humanity require an all-hands-on-deck approach (Díaz et al., 2019; Martin et al., 2016; Ruckelshaus et al., 2020). Major threats posed by climate change, biodiversity loss and humanitarian crises extend to human and societal well-being (IPCC, 2023; Jaureguiberry et al., 2022; Shivanna, 2020). Solving, mitigating and adapting to these challenges requires the collaboration, cooperation and commitment of many sectors of society (Kok et al., 2014).

A social-ecological systems approach views environmental change as inextricably linked with human societies, taking into consideration human well-being and the agency of individuals and societies to take action (Biggs et al., 2021; Virapongse et al., 2016). The concept of the social-ecological system represents a holistic view of intertwined human and natural systems (Biggs et al., 2021; Schoon & Van Der Leeuw, 2015). Since researchers of social-ecological systems aim to produce cross-disciplinary, actionable research, a unique approach is required and, for this reason, researchers are increasingly recognizing a need to conduct their work in modes that are transdisciplinary (i.e. where diverse academic and non-academic actors are engaged in knowledge production; Brandt et al., 2013; Brunet et al., 2025; Nyboer et al., 2023). This study synthesizes knowledge from Western-trained researchers experienced in leading transdisciplinary research to provide guidance to those seeking to initiate such research projects.

1.2 | Transdisciplinary research

Transdisciplinarity is a collaborative, action-oriented approach developed to address social-environmental challenges and sustainability issues (Brandt et al., 2013; Caniglia et al., 2021; Kruijf et al., 2022; Lang et al., 2012; Pohl et al., 2017). In this paper, we define it as a reflexive, collaborative approach to knowledge co-production, including academic and non-academic actors to generate practical solutions to societal problems (following Holzer et al., 2018). Transdisciplinary research negotiates across the norms of a single field and is inclusive of multiple perspectives and positionalities aiming to understand societal problems in a critical and reflexive way (Holzer et al., 2018; Kelly et al., 2019). Transdisciplinary work is action-oriented, producing knowledge meant to directly inform decisions.

These approaches can be traced to Kurt Lewin's development of 'action research' in the 1940s that engaged marginalized people in

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research about issues that directly affected them (Adelman, 1993). Over time, participatory action research became popularized as an 'emancipatory form of scholarship' that 'brings together community members, activists and scholars to co-create knowledge and social change in tandem' (Cornish et al., 2023). Research processes and outcomes developed in this way integrate the needs and values of diverse stakeholders, rightsholders, communities, practitioners and decision-makers, arguably making them more successful in finding solutions, for example, to planetary sustainability crises (Sterling et al., 2017). This is true for environmental and climate research, where the value of local community engagement has gained traction as researchers increasingly seek to influence regulatory regimes while providing tangible benefits to those most impacted by the research outcomes (Pohl, 2008). Alongside the shift towards transdisciplinary research, there has also been a recent movement to increase diversity, equity and inclusivity in academic research more broadly (Holzer et al., 2022; Kaikkonen et al., 2024).

1.3 | Community-engaged environmental research

Community-engaged research is one form of transdisciplinarity whereby local actors have diverse roles and responsibilities within environmental research projects (Chambers et al., 2021; Sadowsky et al., 2024). Many terms are used, such as 'community engagement', 'community-engaged research', 'community-based research', 'participatory research', 'knowledge co-production', 'community-led research' (Brunet et al., 2025; Muhl et al., 2023) and related domains of 'co-assessment' (Sutherland et al., 2017) and 'co-evolution' (Chapman & Schott, 2020). These terms refer to different forms of participation in research by local stakeholders (i.e. actors with a vested interest in, or who are affected by an issue, programme, action, objective or decision; Haddaway et al., 2017; Kadykalo et al., 2021; Reed et al., 2018) and rightsholders (i.e. Indigenous groups, governments and individuals who have inherent Indigenous rights to the land, practices, traditions and customs that date back to time immemorial, and which are recognized and reaffirmed within colonial legal frameworks, including constitutions and court decisions, but are not granted by them; Artelle et al., 2019; Darling et al., 2023; Kobluk et al., 2024; Latulippe & Klenk, 2020).

The imperative to respectfully include or centre Indigenous knowledge in environmental management and governance calls upon researchers to educate students and trainees to ethically engage with Indigenous Peoples beyond having some background knowledge of Indigenous culture and history (Littlechild et al., 2021; Wong et al., 2020). Approaches that centre Indigenous governance systems as a starting point for respectful collaborations that weave knowledge from multiple systems may be helpful to avoid superficial or tokenistic approaches (White et al., 2024). The type of co-production discussed in this paper does not always involve Indigenous collaborators, but when relevant, we refer the reader to a rich and expanding literature on braiding Indigenous and Western knowledge (e.g., Littlechild et al., 2021; White et al., 2024). Key terms used throughout this paper are defined in Table 1.

Research on 'engaged research' or 'co-production' approaches has become a field of study in its own right. Co-production research developed in the fields of public administration, science and technology studies, and sustainability science since the 1970s (Alexander et al., 2019; Miller & Wyborn, 2020). Within environmental and sustainability research, this includes studying how researchers can address: (a) equity, diversity and inclusion interests through engagement, (b) gaps between research and practice and the ethical implications of these gaps, (c) how engagement processes can influence thinking, behaviour and decision-making (Eaton et al., 2022), and (d) the power dynamics inherent in Western scientific research and its links to environmental policy and governance (Chambers et al., 2021; Salomon et al., 2023; Silver et al., 2022). As engaged research has proliferated, there has been an accompanying wave of analysis and reflection on the braiding of local, community and Indigenous knowledges with Western-centric scientific knowledge as co-production (e.g. Brunet et al., 2025; Brunet & Fletcher, 2025; Drake et al., 2022; Ferguson et al., 2022; Gerlak et al., 2023; Latulippe & Klenk, 2020; Westwood et al., 2020; Wilcox et al., 2023; Zurba et al., 2022). These types of studies have helped the development and exploration of engaged research by presenting case studies to showcase successful efforts in co-production. In this paper, we discuss projects that took place in collaboration with stakeholders and/or rightsholders. This framing of braiding knowledges is globally relevant, and particularly so in the Canadian context, as discussed further below.

Defining stakeholders and rightsholders vis-a-vis a project or initiative is typically done on a case-by-case basis, requiring local knowledge of relationships. Cultivating relationships by becoming acquainted, collaborating on research tasks and spending time together, whether involved in research or in other personal and communal contexts, is a centrepiece of this type of work, with a need for continuous engagement and careful attention to ethics as work progresses (Johnson et al., 2023). Building and sustaining such relationships based on mutual trust among collaborators can help set critical foundations for engaged research (Boschetti et al., 2016; Cvitanovic et al., 2021; Gordon, 2017; Harris & Lyon, 2013; Menzies et al., 2024), including how to establish working practices and how to make observations, gather data and generate outputs (Cornish et al., 2023). The trust required for non-academics to participate and persist in the research process is shaped by interpersonal (i.e. personalities, behaviour and values) and institutional factors and dynamics (i.e. history of good faith, familiarity and reputation) as well as the legacy of past research (Armstrong et al., 2023). The success of engaged research is also significantly shaped by relational features (e.g. leadership styles) and systemic features (e.g. work culture) in which the research is situated (Cundill et al., 2019).

Supported by survey data from scientists across Canada, we offer wisdom gleaned from our experiences conducting research in Canada, in many cases working to braid Indigenous knowledge with Western science. While not all of the projects we reflect on

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TABLE 1 Definitions of terms as we use them in this paper.

Key definitions
Bottom-up engagement: Outreach and/or involvement initiated and/or led by citizen, public, or special interest groups with limited formal decision-making power (Reed et al., 2018).
Braiding: The intertwining of knowledge systems for a more comprehensive understanding, usually referring to the braiding of Indigenous and Western knowledges (Chaulk et al., 2025).
Community engagement: Refers broadly to the process of working collaboratively with groups of people related by geographic proximity, interest or similar situations in decision-making and action to address issues affecting their well-being. The collaboration is typically between an external organization (such as a government body, NGO, or research institution) and the community, with a focus on improving outcomes for the community (Ahmed & Palermo, 2010; Head, 2007). Community engagement is a broader concept that can apply outside of research.
Decolonize research: A shift in thought and behaviour towards inclusion and respect for Indigenous ways of knowing in academia, valuing them equally alongside Western approaches, centring them in education and research, and grappling with how to braid knowledge systems that may be incongruous or even contradictory (Held, 2019; Tuck & Yang, 2012).
Knowledge co-production: The collaborative process where diverse stakeholders and rightsholders—including scientists, Indigenous and local communities, policymakers and other relevant actors—work together to create new knowledge that is both scientifically robust and practically relevant (Norström et al., 2020; Reed et al., 2018; Tengö et al., 2014). This process can apply to the contexts of transdisciplinary research as well as community-engaged /community-based participatory research.
Participatory research: A methodological approach in which researchers and participants collaborate actively throughout the research process. This approach is typically characterized by the involvement of non-academic participants—such as practitioners, local stakeholders, community representatives or rightsholders—in the design, execution, analysis and dissemination of research (Bergold & Thomas, 2012; Cornwall & Jewkes, 1995; Reason & Bradbury, 2001).
Social-ecological system: Systems where humans and nature are intricately linked by their impacts on each other, feedback loops and dynamics (Colding & Barthel, 2019).
Stakeholders: Actors (an individual, group organization or entity) with a vested interest in, or who are affected by an issue, project, action, decision, or research process (Haddaway et al., 2017; Kadykalo et al., 2021). In our definition, this excludes Indigenous rightsholders who warrant a unique categorization in Canadian research contexts.
Rightsholders: Indigenous actors (an individual, group, government organization or entity) who have Indigenous rights and title to practices, traditions, customs and land that date back to time immemorial and are enshrined and reaffirmed in various colonial constitutions and legal positions (Artelle et al., 2019; Darling et al., 2023; Kobluk et al., 2024).
Top-down engagement: Outreach or involvement initiated or led by those with formal decision-making power who wish to empower interested parties with less power and diverse perspectives to contribute towards decisions (Reed et al., 2018).
Transdisciplinarity: A reflexive, collaborative approach to knowledge co-production, inclusive of academic and non-academic actors' stakeholders and rightsholders, to weave together diverse types of knowledge, consider risks and consequences, and generate practical solutions to societal problems, including, but not limited to community engagement (Holzer et al., 2018).

involve Indigenous participation, the prevalence of Indigenous sovereignty, governance and knowledge in Canada offers special lessons we believe can be applied more broadly to other forms of co-production and to transdisciplinary research in general. This paper addresses a key question: What practices do academic researchers employ to engage local stakeholders and rightsholders in environmental research in Canada and what contributes to successful engagement?

1.4 | The need for practical knowledge about engaged science for trainees

Recently, researchers have proposed that practical wisdom and virtue ethics, as defined by ancient Greek philosophy, can strengthen researchers' capacity to lead collaborative sustainability-related research (Caniglia et al., 2023). Practical wisdom (Aristotle's *phrónēsis*) is the capacity to make decisions and act vis-à-vis practical issues that matter to people, and this is just the skill set needed to lead knowledge co-production processes (Caniglia et al., 2023). Despite a recognized need to integrate soft skills (e.g. communication, critical thinking, leadership) and social science training for meaningful co-produced research with the capacity to propel real-world change (Caniglia et al., 2021; Thomas-Walters et al., 2024), emerging scholars in the environmental sciences and studies do not typically learn transdisciplinary approaches or other skills necessary for engaged research as part of their education. Although the importance and challenges of stakeholder and rightsholder engagement have become better articulated (Eaton et al., 2022)--and best practices literature has developed (e.g. Steger et al., 2021; Zurba et al., 2022)--training for emerging scholars remains limited (Tengö et al., 2017; Wilmer et al., 2021).

Many researchers with experience in engaged environmental research learned by trial and error and/or from mentors (Nguyen et al., under review; Healy & Booth, 2023). Effective mentorship enhances productivity, career satisfaction and research success of early career researchers through role modelling and developing psychosocial competencies (Diggs-Andrews et al., 2021; Ragins & Kram, 2007). Studies have shown that mentors help early career researchers to advance their careers and support integration into professional cultures by helping mentees develop their professional identities and networks (Diggs-Andrews et al., 2021). In this study, we aim to distill and share some of the practical wisdom held by established environmental researchers. We highlight key

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insights and lessons learned by collecting, synthesizing, and sharing advice so that those just beginning to engage stakeholders and rightsholders in their research may do so in a more informed and prepared way.

The need for skilled facilitation in engaged research has been broadly recognized as a defining feature (Reed & Abernethy, 2018). There remains, however, a gap in understanding the challenges research facilitators face and the competencies necessary for their effectiveness (ibid.). Considerations such as the need for the credibility and competency required to successfully facilitate communication and collaboration and to address power imbalances in the research process (Reed & Abernethy, 2018), along with time and resource constraints (Pigford et al., 2018), pose particular challenges for early career researchers, who are also grappling with academic demands that prioritize outputs like peer-reviewed articles and securing research funding. Time constraints are especially challenging when early career researchers are working within defined degree or project timelines, where there is often a mismatch between institutionally-imposed deadlines and the time it takes to build relationships, seek project consent, validate findings and receive consent from participants to both conduct the research and share results. This can make engaged research seem less attractive. There are also mismatches in funding conditions, academic structures and cultures, and perceived risks of lack of training opportunities for early career researchers doing engaged research (Filyushkina et al., 2022).

Importantly, it has been recognized that researchers conducting engaged research should have competencies that allow them to skilfully engage diverse participants, reflect on diverse worldviews, assumptions and biases, and evaluate impacts of their work (Lawrence et al., 2022). Researchers take on various roles as knowledge intermediaries, observers, facilitators and process evaluators (Karrasch et al., 2022). These roles are very dynamic, often changing dramatically over time (Arnold et al., 2022) and sometimes requiring specialized training. Thus, researchers should ensure that critical questions are addressed at the *onset* of a project and revisited throughout, including those related to stakeholder and rightsholder identities, roles of the researchers, participant expectations, accountability, rewards, sustaining the research and power asymmetries (Long et al., 2016). In addition to promoting good research practice, ensuring quality training of researchers is also essential to minimize harm to communities. A lack of training and preparedness increases risks for communities, as interactions with unprepared researchers may cause (often inadvertent) harm, such as regarding ethical sharing of Indigenous or local knowledge.

We honour the wisdom and knowledge of stakeholders and rightsholders who have contributed to environmental research and from whom the authors have learned a great deal. While their perspectives are fundamentally important to the creation of environmental knowledge, given that the author team and survey respondents are largely settler-researchers based in academic settings (i.e. universities, government agencies), this paper is limited to the perspectives of scholars experienced in co-leading engaged research processes, primarily for the benefit of emerging scholars.

2 | METHODOLOGY

2.1 | Selection of Canada as a case study with broad relevance

We explain here the special considerations regarding engaged research in Canada, which necessarily includes the context of decolonization and the inherent rights of Indigenous peoples. Researchers working in other countries should endeavour to understand their specific governance and cultural contexts in detail before conducting transdisciplinary research. Canada's landscape is vast and diverse in terms of social and ecological systems; many areas of environmental interest are rural and remote, which means researchers need to consider cost and sparsity of travel, accommodation and services (e.g. internet, banking and food). Project administration and logistic considerations, including safety, honoraria, economic situations and recruitment are different than in urban settings and can present challenges (Richard et al., 2023). Furthermore, stakeholders and rightsholders in Canada are highly diverse in worldviews, cultures, values and priorities, and engagement requires considerable time and planning to understand contexts and develop relationships. Governance in Canada is particularly complex, as it is multi-scalar and multi-level with municipal, provincial/territorial, Indigenous and federal governments all having various legal authority and responsibility for different aspects of environmental management and natural resources (Bache et al., 2016; Conteh, 2013; Cooke et al., 2016). Moreover, at a single level of governance (especially provincial/territorial and federal), there can be multiple government agencies, bodies and legislation invoked by a given environmental issue (e.g. Mallory et al., 2025). The relationship between the Crown (the Canadian parliamentary government) and Indigenous governments is complicated and fraught (Truth and Reconciliation Commission of Canada, 2015), with many ongoing treaty negotiations and attempts to reveal truth (acknowledging the historical and ongoing harms of the residential school system and other colonial structures) and achieve reconciliation (e.g. National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019; Truth and Reconciliation Commission of Canada, 2015). Canada is home to many Indigenous Peoples that are Inuit, First Nations or Métis, each of which hold rights and recognition in the Canadian legal framework.

Canada has a mix of traditional treaty rights (11 numbered treaties that were signed between 1871 and 1921), modern lands claims (starting with the James Bay and Northern Québec Agreement in 1975) (Papillon, 2008), and many areas with unceded, unsurrendered territories, including the Nation's capital regions and large areas in British Columbia and the Atlantic Provinces. Some treaty negotiations and agreements have yielded shared governance models and other approaches to provide rightsholders the ability to exercise their sovereign rights in their respective territories (Mallory et al., 2022). For example, the Nunavut Land Claims Agreement (1993) led to the creation of the territory of Nunavut and granted Inuit rights to land, self-government and resource management. Awareness of the Canadian governance system is important when

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thinking about the relevance and application of the findings of this work to other regions. Multi-scale and multi-level governance is common around the globe (Bache et al., 2016), as are ongoing reconciliation efforts with rightsholders in some regions (Datta, 2018). The Canadian experience with different types of treaty rights and modern land claims and the duty to consult (Newman, 2019) can provide insight about governance arrangements, which may be adapted to other governance contexts.

Within Canada, and globally, it is important to understand the history, context, values and protocols of the communities engaged in research (Liboiron, 2021). In Canada, there has been a particular focus on rightsholder engagement in place-based research (Alexander et al., 2019; Saturno et al., 2023), including calls for decolonizing or re-Indigenizing research (e.g. Datta, 2018; Hayward, Sjoblom, et al., 2021; Hayward, Wodtke, et al., 2021; M'sɨt No'kmaq et al., 2021; Wong et al., 2020), increased Indigenous representation and leadership in research (Alexander et al., 2019), and braiding knowledge systems (in which multiple types of knowledge are brought together; Wilcox et al., 2023; Reid et al., 2021; Drake et al., 2023; Singer et al., 2023), such as in the concept of *Etuaptmumk* (the Mi'kmaw word for *two-eyed seeing*; Atleo, 2025; Reid et al., 2021; Marshall et al., 2015).

Some settler governments (e.g. federal, provincial and territorial) in Canada have specific guidelines for conducting research and engaging with Indigenous people, and many Indigenous representative organizations have their own guidance for self-determination in conducting research as well as engaging with researchers (e.g. Kitasso/Xai'xais Stewardship Authority, 2021; Indigenous Circle of Experts, 2018; Inuit Tapiriit Kanatami, 2018; SIKU—the Indigenous Knowledge Social Network; Exchange for Local Organizations and Knowledge of the Arctic [ELOKA]). Canadian research funding programmes recommend that researchers adopt the First Nations Principles of OCAP® (Ownership, Control, Access, Possession; First Nations Information Governance Centre, 2014) principles of data ownership and sovereignty where applicable. There is an ethical responsibility to seek and receive free prior informed consent, support and participation from all Indigenous communities involved in research, and ethical practices are being continuously updated and refined (Bull et al., 2020). Many Indigenous governments issue research licences that need to be renewed on a regular basis (e.g. the Nunavut Research Institute and the Nunatsiavut Government). While specific guidelines may be particular to Canada, considerations for combining diverse types of knowledge, respecting the needs and honouring the time of local research participants are widely applicable in international settings when community-specific cultural norms are accounted for (e.g. Jones et al., 2020; Nyadzi et al., 2022; Rayne et al., 2022). For example, providing honoraria for participation in research is considered good practice to honour cultural knowledge/time/contributions in some instances, but is considered unnecessary or insulting in others. Similarly, tracking wildlife is considered culturally offensive by some community members, while others are supportive of this type of work (e.g. Cooke et al., 2017). Sharing tea, meals, activities or art creation may be seen as appropriate modes of reciprocity and knowledge-sharing (Castleden et al., 2012; Flicker et al., 2014; Mills & Woods, 2023).

2.2 | Study design

Recognizing that many studies have discussed lessons learned in specific contexts but that it can be difficult to extrapolate insights to other cases (Bennett et al., 2021), we used an online questionnaire to collect both quantitative data and qualitative data through write-in responses (Shackleton et al., 2021) to enable the identification of trends across a relatively large sample for exploratory research. Ethics permissions were obtained from Brock University (REB# 22-142). All participants provided written informed consent electronically prior to beginning the survey by selecting one of the options presented after reviewing an online consent form at the start of the questionnaire (see details below). We chose a questionnaire over a purely qualitative method (e.g. interviews and focus groups) because of our limited resources (Duggan et al., 2024), desire for a relatively large sample, and the ability to capture both closed and open-ended responses (Rouder et al., 2021). Questions were iteratively developed based on our literature review and our collective experiences in environmental research.

We employed a snowball approach (Parker et al., 2019) to recruit survey participants starting with ResNet project contacts. The online survey was conducted between August and October 2023. Personalized email invitations were sent out to ResNet members, affiliates and additional contacts referred by them. Two or more follow-up reminders to complete the survey were sent to individuals. Although snowball sampling has been criticized for its sampling bias (Parker et al., 2019), we mitigated this bias and provided legitimacy to quantitative results by seeking a large response rate (Riggs et al., 2023), and we succeeded in recruiting 61 responses. Although we did not consider this number of respondents sufficient for statistical analysis, we quantitatively reported the proportion of particular responses to indicate their prevalence. All survey respondents were invited to join this paper as co-authors, an approach that has been used elsewhere to enable survey respondents an opportunity to expound upon their responses (Cooke et al., 2019; Dick et al., 2018) and to incorporate a reflexive component to the study (Popa et al., 2015; Salmon et al., 2017). To be included as co-authors, respondents were required to attend or review a summary of a meeting in which project plans and scope were explained, respond affirmatively with their intention to participate as a co-author, and contribute to the analysis of the data and development, writing, and/or editing of this paper (see Author Contributions).

Within the survey (File S1), respondents could consent to participation and choose to share or withhold their project's name and location, with consent options provided at the outset of the questionnaire. The first few survey questions established eligibility to participate in the study. Eligibility requirements for survey participants were the following: (a) holding a non-student position as research faculty or postdoctoral fellow and (b) having led an environmental

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research project in the Canadian context between 2018 and 2023 that directly engaged stakeholders and/or rightsholders. We defined 'environmental research' broadly for this study, referring to land and sea-based research, including in agricultural and other human-managed landscapes. Survey questions asked for details about the nature and location of the research project in relation to which the respondent would be answering the survey. Additional questions asked about the researcher's objectives for the project, their motivation for initiating the engagement process, how participants were recruited, how they engaged in research and about the perceived degree of success of the engagement process. Questions then delved into the nature of the successes and challenges of engagement in the project and asked what advice the respondent would give to someone just starting out doing engaged environmental research (see File S1 for questions). The survey was pre-tested by a small group of researchers before being distributed to participants.

We used an integrative, mixed-methods approach to analyse data from the online questionnaire (Small, 2011). We qualitatively coded survey responses into themes (Braun & Clarke, 2006; Saldaña, 2021), while also noting the number of respondents who answered a particular way, a hybrid approach that can be thought of as simultaneously 'quantitizing' qualitative data and 'qualitizing' quantitative data (Small, 2011, p. 72). Below, we report different response rates for some questions, as some respondents chose to skip a subset of the questions. Once these themes were established, we determined, for each question, which themes were more dominant, and grouped responses by themes. This process is sometimes called inductive–deductive coding (Proudfoot, 2022).

Data were cleaned manually in an Excel spreadsheet, with all responses included in analysis; if a respondent answered one question but not another, their response was used but the unanswered question omitted. Analysis was conducted manually in MS Excel, PowerPoint and shared Google Docs. Then, a single analyst (AP) used mixed methods by creating bar charts based on quantitative results as well as conducting preliminary coding on write-in responses (Saldaña, 2011), which were used in a slide presentation to co-authors to aid discussion. Next, groups of co-authors were each assigned to analyse responses to three to four survey questions in greater depth, resulting in graphical and written analyses. Each of these groups used qualitative coding (Saldaña, 2011), with some creating diagrammatic representations of data to facilitate discussions. Lastly, a sub-group of co-authors (JMH, NK and MM) discussed the results from these small-group analyses to identify themes and overall findings, structure the paper and write the results and discussion. The de-identified dataset generated and analysed during this study is publicly available in the Borealis data repository (Carleton University Dataverse) at https://doi.org/10.5683/SP3/KC2KET.

3 | RESULTS AND DISCUSSION

Core areas of insight from scholars experienced in engagement aspects of environmental research address (a) the objectives and motivations for embarking on engaged environmental research; (b) stakeholder and rightsholder engagement experiences; (c) questions of whether to co-produce or not co-produce; (d) learning from failures; and (e) descriptions of success. Each theme comprises multiple insights and guidance synthesized from participants' responses.

3.1 | Objectives and motivations for embarking on engaged environmental research

The three most prevalent motivations for engaged research were the following: the belief that engaged research is an ethical imperative ($n = 32/42$; 76%), the desire for research to have real-world relevance ($n = 29/42$; 69%), and the fact that engagement was important to project goals ($n = 21/42$; 50%). Some researchers indicated that they needed permission from stakeholders and/or rightsholders to conduct research ($n = 12/42$; 29%) or that engagement was mandated by the funder ($n = 5/42$; 12%). Motivations for engaged research often appear to be centred on the value of reciprocity: research being done in response to stakeholder/rightsholder needs while also advancing a field of study or a policy need (which researchers and their institutions need for funding and advancement in their field). This diversity of motivations aligns with recent prominence and implicit expectations in Canada regarding engagement and co-production of science with Indigenous communities (Adams et al., 2014).

Our sample includes representation from all provinces and territories except New Brunswick. The geographic distribution of projects is shown in Figure 1. Most projects are of regional scope ($n = 19/74$; 26%), followed by projects on the local/municipal level ($n = 11/74$; 15%), with all other spatial extents roughly equally represented (Figure 1). The research location was reported to impact the resources required and appropriate timing for project coordination visits and field work. Some respondents found that contacting regional organizations rather than local organizations can help identify key local individuals who might be positioned to engage in a proposed project. On the contrary, one respondent suggested that local organizations can have more updated information and greater legitimacy with community members.

A key recommendation emerging from these results is the need for researchers to familiarize themselves with local experience on the issue or topic of interest, as well as on local history in general, to better understand how collaborative research might fit within the broader context of the region and its potential benefits for stakeholders and rightsholders. Communities can have markedly different experiences with academia, government and industry, both positive and negative; in some cases, these shape community narratives (Baker & Westman, 2018; Senda-Cook, 2020). This is acutely relevant when engaging Indigenous communities (e.g. Adams et al., 2014; Cohen et al., 2021), as there are culturally specific issues, accumulated over decades/centuries of colonialism (Mascarenhas, 2007; Whyte, 2018) that influence community perspectives. The scale of any potential project is important for identifying potential partners, and the mapping of stakeholders and rightsholders can be a

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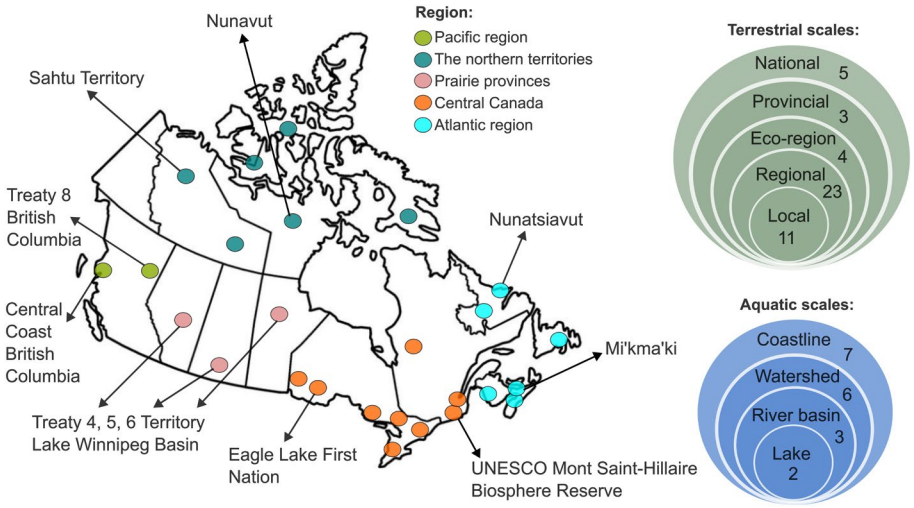

FIGURE 1 Project boundaries as defined by survey responses, grouped by region. Locations are not precisely given, to preserve projects' anonymity. Selected project location names are listed beside arrows as examples of survey responses (e.g., Treaty 8 British Columbia, Nunavut) to illustrate the diversity of project regions and scales. Circled numbers represent the number of responses for each category.

useful tool to understand the governance context of the study (Reed et al., 2009). Researchers should consider that they may need to work with different groups separately, if requested, due to political or other issues that may have originated outside the project but may influence inter-group dynamics. Being unaware of such issues would present a major challenge for a researcher initiating engagement. To avoid this problem, a researcher needs to involve community stakeholders and rightsholders from the start of project planning (if they wish). In most cases, funding and time dedicated to visiting and learning from locals and discussing their aims, hopes, and challenging historical issues or concerns, is required prior to any research design.

An important theme that arose from data about objectives and motivations was to understand the scale of the topic of research in the eyes of the stakeholders and rightsholders and negotiate that with the perspective of the researchers initiating the project. For example, a community's perspective might be very local (e.g. threats from boats to a seabird colony), whereas the researcher may view the issue from a more global perspective (e.g. threats from marine fishing and pollution across a species' range). Scalar mismatch and historically entrenched views can present substantial challenges to effective engagement (Ojha et al., 2016). Thus, the relative project scale should be addressed and discussed at the project outset.

3.2 | Stakeholder and rightsholder engagement experiences

Respondents pointed out the importance of contacting the right person using appropriate cultural and political protocols, since failing to do so can result in setbacks or impact the reputation of the researcher (and the institutions they represent) and their perceived trustworthiness. Most respondents (28/45 or 62%) used a snowball method for participant recruitment based on personal contacts, and only 8/45 (17%) used a formal protocol. Predetermined lists of potential participants were used by 13/45 (28%), as well as online searches and publicly available databases (7/45 or 15%). Many respondents (22/45 or 48%) selected 'other' to describe ways to reach out to actors, some of whom explained the concept of co-led research where research partners are the ones leading and deciding whom to contact and how. For example, a respondent explained: 'The Nunatsiavut Government is a co-lead on the project and often makes recommendations of people to be involved. This isn't a formal protocol, nor is it normal 'snowball' sampling, it's somewhere in between those'. Some respondents also explained that 'predetermined lists' of potential participants were compiled by partners. When respondents followed a 'formal protocol', they referred to different things, from specific methods like snowball sampling, or peer selection and chain referral (Huntington, 2000), to formal protocols for pursuing research within Indigenous territories like that of the Nunatsiavut Government Research Advisory Committee or Anishinaabek Protocols. In other cases, provinces, like Alberta, may have a list of consultation offices/contacts for various Métis and First Nation communities that can serve as an initial point of contact. Learning from experienced community-based researchers is often the best way to avoid making mistakes since it can be difficult to identify appropriate contacts and cultural and political protocols through desk-based research.

Respondents also highlighted the importance of existing relationships in participant/partner recruitment. When asked to describe how important their existing relationships were in recruiting participants, by far the most common responses described very high levels ('extremely important', 'essential') of importance ($n = 28/41$; 65%). Fewer responses to this question fell into categories of 'somewhat' to 'not very' important ($n = 4$; 9%). Some responses were either unclear or suggested that the importance of existing relationships could depend on the aspect of the research project ($n = 6$; 14%). These results align with findings in the literature that co-produced research takes additional time, including

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time spent for relationship building (Castleden et al., 2012; Kadykalo et al., 2021). The results also align with recent findings from Westwood et al. (2023) and Kadykalo et al. (2024), which determined that existing and ongoing relationships played a key enabling role in shaping best practices for knowledge exchange in forest and fisheries science and more generally. The value of existing relationships is a clear benefit to the success of knowledge co-production. However, for early career researchers who may have no prior relationships with communities, these results suggest that, whenever possible, establishing contact through a trusted intermediary who has an established relationship to a community can significantly help the initiation and timeliness of a new project.

The extent of engagement by partners in projects reported by survey respondents spanned the entirety of the project continuum, from initial planning to reporting research results (e.g. co-authorship), to knowledge application, as well as other activities, such as provision of data, data collection, policy analysis and a collaboration 'with policy makers, practitioners and fishers to implement solutions', for example. Open-ended responses revealed that partners have engaged in activities like leading the project, providing training, and sharing results via presentations. Meetings, both in-person and virtual, featured prominently as a form of engagement, reflecting the necessity and value of interaction. Some in-person meetings and interactions were held 'in-situ' (e.g. on a river bank), enhancing place-based connections.

This diversity of geographical settings, local specificities, individual researcher career paths, and institutional settings means that there can be no single 'recipe' that applies in all engaged research projects. However, there are some clear commonalities to all successful approaches, which included the following: (i) respect for culture and differences in knowledges; (ii) thoughtful, repeated and tailored efforts in communications, which include putting in personal time with stakeholders and rightsholders through regular interactions; (iii) being well-prepared in understanding the environmental, cultural, and political system you wish to work in; (iv) being flexible, especially with timetables and deliverables; and (v) motivating oneself and one's team to develop and nurture relationships. Using an example of conducting research with Indigenous groups, an early career researcher may work with bridging organizations that help co-develop research together with communities or spend time attending community events and speaking with locals one-on-one for a period of time. These data show that researchers experienced in engaged environmental research exercise a phronetic research approach that centres practical wisdom and intuition, bolstered by input from trusted mentors and contacts and flexibility to respond to change. Phronetic social science (from the Greek word *phronesis*, defined by Aristotle as 'practical wisdom' or the 'wisdom of action'; Kroll & Mason, 2021) was articulated by Bent Flyvberg: *'Phronetic social scientists rely on public deliberation and the public sphere, not because these set-ups are perfect, but because they are the best we have for collective decision-making. From a phronetic perspective, social science works best not when it tries to give us the unrealizable perfection of expert knowledge…but instead when it strives for the adequation…'* (Flyvbjerg et al., 2012, p. 286).

3.3 | To co-produce or not co-produce: What does this mean?

A large proportion of the responses indicated that knowledge co-production is the dominant model of collaborative research. The term co-production has multiple meanings in environmental studies and sciences, with a recent increase in its use throughout the field (Bremer & Meisch, 2017). A cross-disciplinary systematic review found five meanings of co-production, 'understood as a science-politics relationship, as knowledge democracy, as transdisciplinarity, as boundary management, and as an evidence-use intervention', which represents diverse understandings of the term (Bandola-Gill et al., 2023, p. 275; Chambers et al., 2021); however, we use the term in the sense of the collaborative pursuit of actionable research (see definition in Table 1).

Negotiating and balancing the goals and priorities of co-produced research in a satisfactory way for all involved parties can be complex and compromises may be necessary. In our study, one survey question asked, 'How would you define the nature of stakeholder and/or rightsholder participation in this project?' A possible response was 'co-production', defined as the 'joint formulation of goals and outcomes between researchers and others' (Reed et al., 2018, p. S9). The clear majority of respondents ($n = 33/45$; 73%) indicated they held a co-production relationship with stakeholders. This was complemented by a further 9% ($n = 4/45$) who reported a two-way deliberation relationship, where knowledge flowed reciprocally among scientists and stakeholders/rightsholders. Only a handful ($n < 6/45$, <11%) of respondents reported a primarily consultative relationship with stakeholders and rightsholders in the knowledge creation process. In some cases, the capacity of partners to participate in research limits the nature of the collaboration. Four respondents (9%) indicated that the survey language surrounding engagement did not reflect the complexity of their stakeholder relationships, highlighting the importance of terms like 'co-design' and 'co-decision making' in describing the level of collaboration and reciprocity that defined their experiences. The distribution of project objectives, as reported by respondents, is summarized in Figure 2. Most respondents placed a high value on building and maintaining relationships with stakeholders and rightsholders as a priority in the research project, followed by the importance of braiding Western science and Indigenous knowledge and other important objectives related to the scientific goals of the project (Figure 2). Write-in responses suggested that researchers seek balance between achieving practical outcomes for partners while also fulfilling their professional mandates to address scientific, policy and regulatory gaps. Negotiating this balance is a critical feature of engaged scholarship, requiring discernment to recognize what is relevant to stakeholders and rightsholders that can also be relevant from a research or policy perspective (Klenk & Meehan, 2017).

Knowledge co-production seeks a more even distribution of power between researchers and partners in the research process. Co-production can alter—and, we would argue, is gradually altering—the dominant position of Western science and its methodologies,

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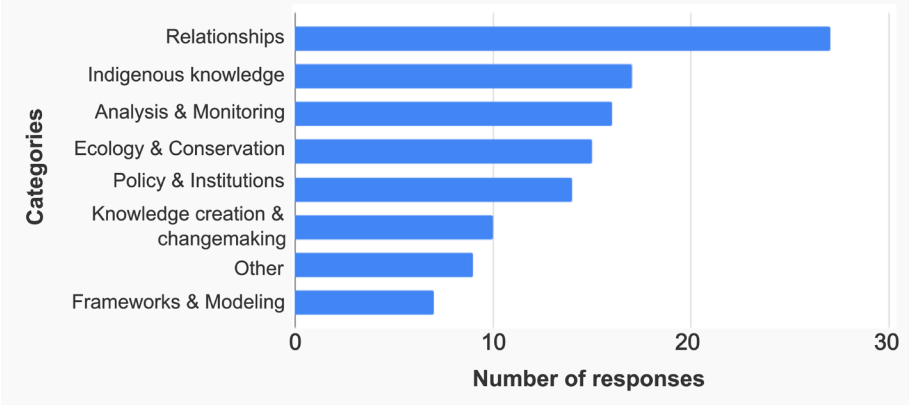

FIGURE 2 Responses to the question 'In order of priority, what are the objectives of this project?' were grouped into categories, resulting in the above list, ordered from the most frequent to least frequent responses.

'generat[ing] … knowledge that is more legitimate and beneficial for all actors' (Weaver, 2023, p. 1). Building relationships, balancing power, maintaining transparency and facilitating communication are essential for fostering trust. Several respondents expressed a desire for greater empowerment of rightsholders and stakeholders, stronger existing relationships with partners and enhanced transparency and communication. Power imbalances can lead to perceived or real inequality in decision-making authority, which erodes trust. When participants feel that their voices are less valued or that their contributions do not influence outcomes, their engagement and investment in the process decrease.

Engagement can be characterized as bottom-up ('initiated or led by citizen, public, or special interest groups with limited formal decision-making power') or top-down ('initiated and/or led by those with formal decision-making power who wish to empower interested parties with less power') (Reed et al., 2018, p. S8) (Table 1). We used these terms in our survey to assess whether respondents perceived research processes as top-down, bottom-up or a mix of both. Of the 38 respondents who did answer using one of the three main options, nine (24%) selected top-down, eight (21%) selected bottom-up, and over half ($n = 21$; 55.3%) selected a mix of the two. These results imply a balance of top-down and bottom-up approaches. This balance is encouraging, in the sense that top-down models can be seen as one of a range of approaches today (Pettinger et al., 2023). Communities and researchers themselves are often critical of so-called top-down research projects. Tucker and Taylor (2004) suggest that top-down models are 'extractive' and tend to discount stakeholder and rightsholder contributions. Many researchers speak about the benefits of bottom-up approaches, although establishing primarily bottom-up research more broadly would require significant institutional transformations (Jarvis et al., 2020), including changes to funding structures/sources; something individual researchers have limited influence over. The terminology of 'top-down' and 'bottom-up' did not resonate for many respondents. This may reflect an expectation that environmental research will be co-produced. However, taking a pragmatic view, we would emphasize that co-producing research requires a significantly greater time commitment and additional competencies on the part of the researcher, both of which are often unrewarded by academic institutions. Co-producing research also requires significant time and commitment from the community or partner who often lacks capacity or may be engaging on the 'side of their desk'.

Seeking balance can be a useful framing for approaching power sharing in knowledge co-production. This will also depend on who is initiating the process. Sometimes, in a collaborative research process, stakeholders and rightsholders take the lead and sometimes researchers play a more central role. For example, determining the research objective and research questions requires active engagement of partners; the imposition of a project idea by researchers can perpetuate historic power asymmetries. This conversation, however, need not necessarily be entirely driven by partners; researchers also need to meet their own requirements, and thus a combination of top-down (i.e. what is a relevant question from a research or policy perspective) and bottom-up (i.e. what is a relevant question for the stakeholders and rightsholders) is needed. Sometimes, research analysis is completely led by researchers with little input from partners, such as in statistical modelling or contaminant measurements. This situation is not necessarily extractive if the modelling or data collection is co-designed to address a stakeholder/rightsholder question or concern, with shared or synthesized results for further discussion and validation. Thus, researchers need to take a thoughtful, nuanced approach to how power is shared in engaged research that is context-specific rather than adopt a normative framework that specifies equal power sharing in all phases of research.

3.4 | Learning from reflection—Particularly on failures

In social-ecological knowledge production, learning is often facilitated through reflection on past experiences (Fazey et al., 2005). Failure without reflection is likely to beget more failure. Reflecting on the process can provide valuable insights for new research initiatives. One survey response suggested that researchers should

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foster ongoing learning by using systematic journaling and reflection on decision-making to learn and consider what decision points could have been altered or adapted. Here, we provide examples of reflections about project success from survey responses.

Twenty-five of 38 respondents (66%) reported that, in hindsight, they would have planned their projects differently to improve the engagement process. Fifteen respondents (39%) wished they had applied a more comprehensive and flexible recruitment/engagement process. Project design is one of the main variables predicting engagement success (Brooks et al., 2013; De Vente et al., 2016), and well-designed projects tend to engage partners from the outset (Reed et al., 2018). A well-designed project should be focused in its scope and include rigorous planning, work, and follow-up to ensure quality (e.g. Henri et al., 2020; Wilson et al., 2021).

Professional facilitation is recommended for participatory environment-related decision-making processes (De Vente et al., 2016; Reed et al., 2009, 2018) since it can positively affect engagement success. Two respondents wished they had directly hired someone to be fully responsible for engagement and outreach.

Short project timelines were criticized for hindering meaningful engagement, which requires time to build trust and understanding among participants. One respondent wrote: 'partnerships never end unless the relationship deteriorates, but projects are time-based'. This statement suggests a misalignment of objectives between what determines engagement success and what is demanded from funding agencies.

Lack of trust was identified as a major cause of engagement failure, with several respondents wishing there had been greater empowerment of rightsholders and stakeholders ($n = 7$, 19%), stronger relationships with partners ($n = 4$, 11%), and enhanced transparency and communication ($n = 3$, 8%). One respondent wrote that they wished for '…More proactive engagement management, such as identifying the optimal timing between emails or calls. Some participants lost interest in the project over time. Although this was inevitable in some cases, I would invest additional effort to ensure that everyone feels they are benefiting from the project'. These findings underscore the importance of finding a context-appropriate balance of leadership and communication in research to foster desired engagement outcomes.

Resource availability was a named concern, with 59% (22/37) respondents wishing for more support. Twenty-one per cent (8/38) of participants desired more in-person engagement, despite its high financial cost. Specific needs included more funding ($n = 15$; 40%), additional time ($n = 12$; 32%), increased staffing ($n = 4$; 11%) and better compensation for project participants ($n = 4$; 11%). This could be interpreted as a call for funding agencies to invest more in participatory research or to allow flexibility with timelines. Certainly, time limitations for completing participatory research and lack of funds (such as for participant travel or compensation) can hinder the ability to generate meaningful recommendations. However, money is not always the problem; feasible and realistic project scoping is required so that a project does not overpromise what it can deliver or overreach its means. When requesting funding, researchers should budget for visits to build relationships and learn, as well as for recurring visits and appropriate knowledge mobilization.

Respondents mentioned cases of stakeholders/rightsholders and academic parties working without compensation, which led to frustration, emphasizing the importance of valuing their time through adequate compensation, efficient project planning and expert facilitation (De Vente et al., 2016; Reed et al., 2009). It is common for community leaders to engage in research and maintain research partnerships in addition to their work responsibilities or outside of their employment entirely, often without compensation and/or without relief from their existing obligations. This can be contrasted to the situation of researchers, who are engaging with stakeholders and rightsholders as part of their education or employment, even if this aspect of their work often goes unrecognized or unrewarded by their institutions. Effective project planning--including careful selection of sample sizes, project management, compensation, and professional facilitation--can prevent participants from feeling that their time was not valued (Reed et al., 2018).

3.5 | Time and related considerations for successful research relationships

Building and maintaining a strong relationship between a local and/or Indigenous community and researcher critically requires a significant investment of time—and less talked about—the investment of emotions. Rushing any step in the research process, regardless of the reason, signals that the researcher may not equally value the stakeholders' or rightsholders' views and input, thereby reinforcing historical power imbalances in the engagement process (e.g. Ban et al., 2018; Weaver, 2023; Zanini et al., 2023). This can pose a distinct challenge for any researcher, and these pressures vary across research sector and career stages. Early career researchers in particular often face short academic timelines, making it difficult to meet quality engagement expectations. Balancing the time demands of relationship building with standard academic demands, such as publishing, can place unreasonable pressure on early career researchers (Castleden et al., 2012; Pannell et al., 2019). Funding timelines are particularly problematic for government researchers who often have deadlines related to fiscal-year funding. Academic researchers may have more flexibility in this context but may need to build adequate time for relationship building and contingencies into project timelines at the funding application stage. Conversely, Canadian federal, provincial and territorial government researchers often have the mandate and funding for long-term monitoring; therefore, acts of relationship building and working with the same partners and at the same sites over many years become part of their programmes. This focus on long-term relationships contrasts with many academics who are pressured to produce new, cutting-edge,

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innovative results and products to be leaders in their field and secure competitive funding. Thus, these opposing pressures need to be considered and managed with collaborators. Long-term, continuing relationships inevitably lead to greater mutual satisfaction and success with joint projects, so at the project development and initiation stage, careful, joint planning with the partners and communities should take place; administration, communication and long-term financing should be planned out, and ideally, this should include how and where to obtain funding that can endure changes in political directions and project personnel.

Survey respondents repeatedly noted that researchers need to give people time to absorb information, express their ideas and concerns and fully engage in the process (see also De Weger et al., 2018) if they hope to have successful engaged research. Successful relationship building usually takes on forms other than the direct planning and execution of research. Several respondents noted that getting involved with stakeholders and rightsholders in other ways (e.g. attending culture camps, giving public or school talks, going camping on the land, getting involved in local sports or events, creating art together (Neapetung et al., 2019; Strickert & Bradford, 2015), mentoring community personnel towards their career goals) can go a long way towards demonstrating a researcher's commitment to them (Ball & Janyst, 2008; Kirkness & Barnhardt, 1991). These acts can build trust and familiarity over time and are often viewed as equally or more meaningful than formal engagement processes (Castleden et al., 2012). They reflect a willingness to invest in long-lasting relationships beyond instrumental research goals, which is especially important in contexts where histories of extractive or externally driven research have generated mistrust (Latulippe & Klenk, 2020; Smith, 2012). Dedicating time to engage a community deeply and respectfully is a fundamental key to success and is often underestimated by researchers unfamiliar with relational approaches to knowledge production (Castleden et al., 2012).

Another important consideration in working with non-academic research partners is ethics. While a meaningful discussion about complex ethical issues regarding interactions with partners (e.g. what really constitutes informed consent?) was beyond the scope of this study, ethical guidelines for this type of work continue to evolve (e.g. Hayward, Sjoblom, et al., 2021; Mikesell et al., 2013; Nikolakis & Hotte, 2022; Wong et al., 2020) and this is a key area for future reflection and study. Specific ethics guidelines have been developed for conducting research with Indigenous groups and individuals, by Indigenous groups (e.g. OCAP®, in the Canadian context), governments and research organizations, and abiding by them is key to minimizing harm (Newing et al., 2024; Toombs et al., 2025). It is also important for researchers to consider that relational approaches are paired with emotional engagement. Researchers should be prepared to work through a range of emotions when working with communities that suffer from social and economic hardships and find opportunities through their research project to redirect resources for improving community capacity and opportunities. Mental health first aid training would also be appropriate for researchers who engage deeply with communities.

3.6 | What is successful stakeholder/rightsholder engaged research?

Successful applied research has been defined as 'well-designed and connected or relevant to an applied issue, resulting from the co-creation of research agendas and new knowledge' (Cooke et al., 2020, p. 360). Building on these perspectives, we distil a set of reflective prompts for early career academics as a practical synthesis of our findings (Table 2). Karcher et al. (2021, p. 214) further refined that definition to 'respectfully conducted, partner-relevant research that is accessible, understandable, shared, and used, enabled by good knowledge exchange products, processes, and social outcomes (e.g., creating networks, mutual understanding, social learning, and trust building), with the potential to contribute to changes in policy and demonstrable societal impact'. We summarized survey responses to the definition of success in stakeholder and rightsholder engagement into three themes: real-world changes, relationships, and logistics, as illustrated in Figure 3. Many respondents highlighted that successful engagement involves capacity-building activities to ensure that stakeholders and rightsholders can participate in the research processes (such as by participating in building databases or by applying data in participatory decision-making, operations or management). Respondents also mentioned that successful engagement provides mutual benefits that reflect shared interests and values, such as creating outputs that directly benefit stakeholders and rightsholders in addition to academic outputs. Success was also defined by its contribution to real-world change; for example, in management or involvement in decision-making due to the research partnerships. The empowerment of rightsholders was mentioned by several respondents, including by building a stronger path to self-determination, providing capacity to guide practices, or by making management systems more accessible and useful for rightsholders.

A consistent message from survey results and discussions among co-authors was that the *relationships* a researcher builds with stakeholders and rightsholders—responsive to contextual needs and according to the best available advice of mentors—are of utmost importance, and that relationships need to be established well before the project starts and must be fostered and maintained over time. The relationship must be grounded in open and honest communication; multiple respondents noted how 'authenticity' and 'genuine intention' can be sensed by a community and form a strong foundation for the legitimacy to foster two-way openness (Johnston & Lane, 2019) to support knowledge exchange. An important caveat is that participation in the research process can be a cause of significant personal stress and burden for partners, although this stress may be mitigated by providing resources and reforming processes (Young et al., 2020). Researchers may propose a project to a community that requires a clear, potentially rigid structure and timeline to achieve its goal. However, being transparent and knowledgeable in the description of the project while also listening and being responsive to stakeholders and rightsholders' needs (e.g. adjusting timelines and flexibility in research design; Mallory et al., 2022) may increase legitimacy and therefore potential project success.

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TABLE 2 Summary of insights: Reflective prompts for early career academics.

Summary of insights: reflective prompts for early career academics	
Clarifying motivations and scope	• Why do I want to engage in this work? Is it an ethical commitment, a research requirement, a funder mandate or a combination? • How will I balance my own academic/research objectives with the needs, values and priorities of partners? Do I have (or can I find) the time, resources and capacity to commit to engaging in this work meaningfully? • At what scale (local, regional, national) is the issue I am addressing most relevant—and how does that align (or conflict) with my partners' perspectives?
Understanding context and partners	• What is the historical, cultural, social, economic, and political context of the place and people I hope to work with? • Have I identified the right individuals or entities to approach first, and am I aware of the appropriate cultural and political protocols for contact? • What are the past experiences of these stakeholders/rightsholders with researchers, government or industry—and how might these shape their expectations or concerns?
Considering relationship building	• Who are the key informants or intermediaries that can introduce me to potential partners in a way that builds legitimacy and trust? • How will I make time to build authentic relationships before the project starts, and sustain them after it ends? • Am I prepared to engage with partners in informal, community-based ways (e.g. attending events, spending time on the land)—including becoming involved in community celebrations and challenges? • What boundaries will I set between my research and the relationships I build?
Designing for meaningful engagement	• What level of participation (consultation, collaboration, co-production, co-decision-making) is appropriate, and how will I discuss this openly with partners? • What resources—time, funding, staff—will be needed for sustained engagement, and are these realistically available? • How will I ensure that partners' time and contributions are valued and compensated appropriately?
Navigating power and ethics	• How might existing power dynamics influence the process and outcomes of our collaboration? • What steps can I take to share decision-making power in ways that are context-appropriate and feasible? • How will I ensure free, prior, and informed consent (especially with Indigenous rightsholders), and how will I address ongoing consent throughout the project?
Anticipating challenges and learning from others	• Have I sought mentorship or advice from experienced researchers who have worked in this context or with similar communities? • What could go wrong, and how will I adapt if things don't go according to plan? • How will I document and reflect on both successes and failures to improve future practice? • What training is available to prepare me to navigate these challenges? (e.g. OCAP®, Mental Health First Aid, facilitation training)
Defining success	• What would success look like for partners? For me? For the project as a whole? • How will we track and evaluate both tangible outcomes (e.g. policy change, data products) and relational outcomes (e.g. trust and capacity building)? • How will I ensure that benefits for partners extend beyond academic outputs?

3.7 | Limitations and future directions

There are a number of limitations of the research presented here. First, we acknowledge that our research team and examples are centred in Canada, in the Global North. However, given the prevalence in the Canadian research context of multi-scalar and multi-level governance systems, the central role of stakeholders and rightsholders as key voices in shaping environmental knowledge and governance, and collective interest in reconciliation with Indigenous governments and peoples, we believe that our work is germane to other social-ecological contexts around the world.

We acknowledge the absence of Indigenous voices within the empirical components of this study. While many of the insights synthesized here emerged through collaborations and relationships with Indigenous partners over the course of the authors' research trajectories, this paper does not present Indigenous perspectives directly. To address this limitation, we have intentionally situated our discussion within and alongside the extensive and growing body of Indigenous scholarship on community-based research, co-production and Indigenous research methodologies.

We also recognize that the peer-to-peer mentorship and exchange of experiential knowledge among non-Indigenous researchers described in this study represents only one pathway through which scholars may learn to undertake community-engaged research. Ethical guidance for research involving Indigenous Peoples emphasizes the importance of mentorship, training, and guided learning when researchers have limited experience in Indigenous contexts, while also underscoring the central role of Indigenous leadership, knowledge holders and community authority in shaping research practices and priorities. Accordingly, the insights presented here should not be interpreted as comprehensive guidance on Indigenous community-based research, but rather as a peer knowledge exchange among Western-trained researchers reflecting on their own learning processes.

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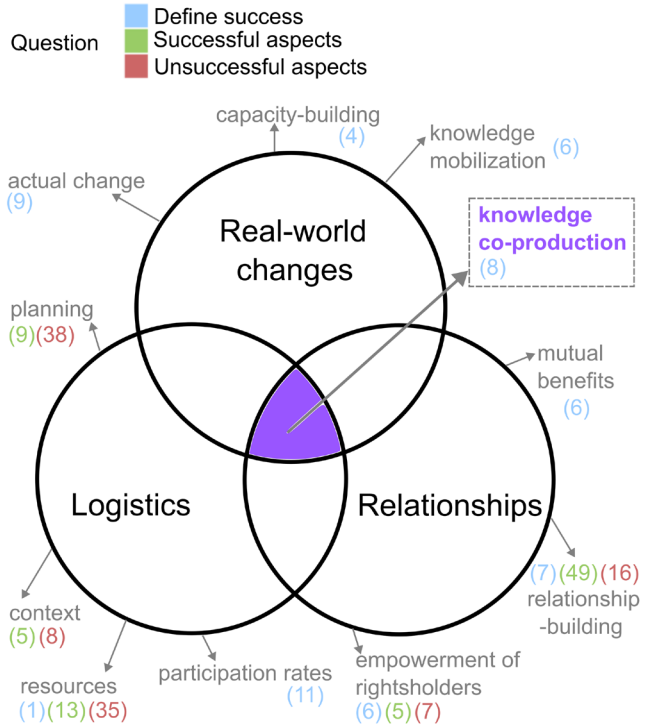

FIGURE 3 Qualitative coding was used to categorize written responses to the following survey questions: (1) How did you define 'success' for stakeholder/rightsholder engagement? (2) What contributed to successful aspects of stakeholder/rightsholder engagement? and (3) What could have been done differently to improve this stakeholder/rightsholder engagement process? Responses could be classified into one or more categories. This process resulted in the 12 codes listed above: Planning, context, resources, participation rates, empowerment of rightsholders, relationship building, mutual benefits, knowledge mobilization, capacity building, actual change and knowledge co-production. We then grouped these into three themes: Logistics, real-world changes, relationships and—in the centre—knowledge co-production. This figure illustrates the range of factors that contribute to success (or lack thereof) in engaged environmental research. The number of times each theme was mentioned in the responses is indicated in parentheses.

This study is therefore positioned as a synthesis of experiential insights among settler environmental researchers in Canada who engage with stakeholders, rightsholders, policy makers, practitioners, and communities. The intention is to provide reflective guidance for scholars at earlier stages of their careers while acknowledging that meaningful engagement with Indigenous communities ultimately requires dialogue, relationship building, and learning that extends beyond peer exchange and is grounded in Indigenous scholarship, leadership and partnership.

4 | CONCLUSION

The engaged researchers surveyed in this study have a wealth of experience to share, and these results provide an overview of key considerations for early career environmental researchers when engagement with actors in research collaborations. There are an increasing number of scholarly papers that describe stakeholder and rightsholder engagement processes in environmental research (e.g. Mallory et al., 2022), and researchers can from these approaches to apply to their situation. Here, we used survey data to highlight key lessons and general principles *derived from the lived experience of researchers*.

One of the interesting insights of the study emerged in the process of collectively writing this manuscript: lived experience is potentially more impactful when shared through vivid stories (Ganz, 2009; Pileggi & Morgan, 2017; Riedy, 2020). Co-authors shared stories about their own experiences, their relationships to communities, the challenges they encountered, the events that marked their collaboration as 'that was THE BEST collaboration!' or 'that's when it all went haywire!', the upheavals and the slow times, the messiness of situations, and how researchers responded in a certain moment and why. Narrative scholars have stated: 'A good story is often a good counsel, giving us good reasons to act in a certain way and guiding decision-making when we are faced with complex problems' (Thiele & Young, 2016 as cited in Klenk, 2018, p. 24). Phronetic researchers, as defined above, 'muddle through' (sensu Lindblom, 1959), doing the best they can in a messy reality that typically offers (at least a few) surprises. As researchers who work with stakeholders, rightsholders, and often with local communities know, there is value in learning from experienced researchers by simply talking with them, asking them to talk about their experiences, to see whether they are willing to share advice and approaches (especially regarding a specific topic or community). However, even the best preparation and experience may not preclude experiences of discomfort, personal challenge, and emotion that may be part of collaborative research endeavours, despite expertise, best practices and good intentions (Freeth & Caniglia, 2020; Winks, 2018).

Mentorship is a cornerstone of education and science (Ahern-Dodson et al., 2020; Pannell et al., 2019), and something most experienced scholars of engaged research are typically happy to share. Increasingly, there are training opportunities available to develop competencies as a mentor beyond sharing knowledge gained from their experience, whether through university-based programmes or academic associations (e.g. Association of Environmental Studies and Sciences; Diggs-Andrews et al., 2021). At the same time, there are increasingly opportunities for formal training in engaged research (Filyushkina et al., 2022), and options to recruit or hire a knowledge broker (e.g. a researcher with an existing connection to the community or an Indigenous elder) who may assist with such activities. Regardless of the means, researchers setting out to collaborate with stakeholders, rightsholders, and communities are well-advised to learn the norms, rules and social dynamics for a given context. Such preparation is crucial to successful engagement in this challenging and yet rewarding and increasingly important work in today's fast-changing social-ecological systems.

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AUTHOR CONTRIBUTIONS

Jennifer M. Holzer, Andrew N. Kadykalo, Elson Ian Nyl Ebreo Galang, Mark L. Mallory and Catherine M. Dieleman conceived the ideas and designed the methodology. Anna Pieper and Jennifer M. Holzer collected the data. Anna Pieper, Jennifer M. Holzer, Polina Mendes, Nicolas D. Brunet, Stephan Schott, Chad Walker, Andrew N. Kadykalo analysed the data. Jennifer M. Holzer, Nicole Klenk and Mark L. Mallory led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data supporting the results of this study are publicly available in the Borealis data repository at https://doi.org/10.5683/SP3/KC2KET. The dataset consists of de-identified survey responses collected as part of the online questionnaire on stakeholder and rights-holder engagement in Canadian environmental research.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information S1. Stakeholder and rightsholder engagement in Canadian environmental research.

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