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RESEARCH ARTICLE

Examining Human-Nature Relationships through the Lens of Reciprocity: Insights from Indigenous and Local Knowledge

Reciprocal contributions in marine Indigenous stewardship: The case of Haida abalone gathering

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Abstract

1. Throughout history, Indigenous people have stewarded seascapes, with people–nature reciprocity being a key component of many Indigenous management strategies, yet it is often overlooked in fisheries management.
2. This research focuses on northern abalone (*Haliotis kamtschatkana*) in Haida Gwaii, the home of the Haida Nation. The Haida have developed a range of values associated with abalone, including reciprocity. However, commercial fishing and colonial mismanagement have led to overexploitation, resulting in a prohibition on all gatherings since 1990. Despite this, the relationship between the Haida and abalone persists in the community's knowledge.
3. We used the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) framework and the concept of reciprocal contributions to help paint a complex relationship between Haida knowledge holders and abalone, identifying values, benefits, drivers and barriers.
4. We identified food uses and meanings that include emotional experiences. Additionally, we compiled an array of reciprocal contributions, such as enhancement actions, fishing guidelines and nature protection practices. These memories and guidelines have been passed down through generations. The principle of 'take only what you need to eat' is essential for managing abalone populations. Reciprocal actions have been crucial for both abalone and the Haida. Elders have transplanted abalone to other sites, and the Council of the Haida Nation continues monitoring and restoration work. Cultural and ecological education about abalone is preserved through family stories, school activities and ceremonies, reinforcing its status as a culturally important species.
5. The abalone fishing boom and Canadian mismanagement were identified as negative drivers that significantly impacted abalone populations. Most Haida elders recall their efforts in the 1970s to raise concerns with the federal fishing agency about the declining abalone population, but their warnings went unheeded. Currently, due to limited enforcement capacity, abalone poaching is the primary

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concern, while bureaucratic hurdles in decision-making processes impede effective assessment and management.
6. This work contributes to reviewing the past and rethinking management strategies in local contexts where values like reciprocity remain integral to Indigenous people. It also aims to generate dialogues and actions with international fisheries platforms, facilitating learning from other local experiences and recognizing common colonial barriers worldwide.

KEYWORDS
abalone collapse, fishing boom, Haida stewardship, Indigenous ecological knowledge, nature's contributions to people, reciprocity, values of nature

1 | INTRODUCTION

1.1 | Positionality statement

This work emerges from a partnership between the Haida Fisheries Program, the Council of Haida Nation and researchers at the University of Victoria (UVic) and Parks Canada. We are a team of Indigenous and non-Indigenous researchers and managers who worked together to address priorities identified by the Haida Fisheries Program. Jaime Ojeda is a Chilean postgraduate researcher who has been learning about reciprocity framed on Indigenous fisheries to understand its importance in the Pacific Rim. Gwiisihlgaa Daniel McNeill is a Haida Shellfish Biologist and currently holds the position of Stewardship Director. Jaasaljuus Yakgujanaas, a Haida marine biologist, leads Old Masset's Xaad Kil (Haida Language) Team. Niisii Guujaaw, also a Haida marine biologist, works as the Marine Planning Program Manager for the Council of Haida Nation. They are all committed to the long-term objectives of advancing Haida management and marine governance. Chris Rhodes is a postgraduate researcher who studies shifting baselines in fisheries. Natalie C. Ban is a Canadian researcher of European descent who dedicates much of her research efforts to priorities identified by Indigenous and other partners. This paper is one of the products of our research partnership, with others including a confidential report for the Council of Haida Nation, and a more ethnographically focused publication in progress. Together, the author team thanks and welcomes the reader to this space exploring reciprocity's value in Indigenous fishing management.

1.2 | Background and aims

Marine fisheries management has a long-standing history in Indigenous coastal peoples, often based on Indigenous knowledge, oral storytelling and guidelines that commonly embrace reciprocity (Berkes et al., 2000; Gould et al., 2019; Yua et al., 2022). Potawatomi scholar Robin Wall Kimmerer characterizes reciprocity as *a culture of gratitude, in where everyone knows that gifts will follow the circle of reciprocity and flow back to you again* (Kimmerer, 2013). Reciprocity is about both relationships between peoples and interactions between people and nature (see Comberti et al., 2015; Mauss, 1966; Trosper, 2009). This principle is an integral part of many Indigenous fisheries management strategies (e.g. Lee et al., 2019). Salmon management, for example, can focus on not taking more salmon than needed, and ensuring that the first salmon to arrive to migrate up streams are able to spawn (Mathews & Turner, 2017; Stephenson et al., 2014). Ancient clam garden management is another case of how Indigenous guidelines improved clam availability, benefiting people and other species (bears and raccoons, among many others; Deur et al., 2015; Groesbeck et al., 2014). Today, First Nations continue cultivating fishing and gathering practices based on reciprocity, including through potlatches and feasts which recognize mutual relationships between peoples (e.g. elders, family members and neighbours) and between people and other components of nature (Armstrong et al., 2024; Stephenson et al., 2014).

In contrast, colonial fishing history contains numerous examples of how fish populations were depleted in a few decades, causing marine species to be listed as endangered or threatened (e.g. on the northwest coast of North America, abalone; Gauvreau et al., 2017; Lee et al., 2019). In many fisheries, industrialization and neoliberal policies in North America have promoted an exacerbated market logic with outward-oriented export economy (Jenkins, 2015; Pinkerton, 2017). Individual private property rights for marine species (e.g. individual transferable quotas) have been the foundation of current management strategies (Pinkerton & Davis, 2015; Reid et al., 2022). However, many fisheries remain unsustainable, with historical harm to Indigenous food systems (e.g. Menzies, 2010). Although governmental fishing agencies, such as Fisheries and Ocean Canada (DFO), the Canadian federal agency responsible for fisheries management, have supported an ecosystem-based management approach that includes the voices of fishing actors (DFO, 2007), the effectiveness of repairing historical damages to Indigenous marine food systems remains low (Menzies, 2010). To remediate these damages, Indigenous fishing organizations are forging ahead with rebuilding traditional fisheries by pairing Indigenous and scientific knowledges and creating their own capacity for fisheries management (e.g. Jones et al., 2010;

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Thompson et al., 2020). Practices related to reciprocity are key to Indigenous efforts to rebuild fisheries (e.g. Jones et al., 2010; Lee et al., 2019; Reid et al., 2022).

Integrating reciprocity into all fisheries management—Indigenous, Western and hybrid—requires understanding people's diverse values regarding the ocean and marine life (e.g. Gould et al., 2019). Such research initiatives can inform community-based management plans, empower Indigenous agencies and facilitate dialogues and negotiations with federal resource management agencies (MPPI, 2015). Exploring these values in local contexts can also connect with global initiatives, allowing for learning from other local experiences and recognizing common colonial barriers worldwide. In this multilevel task, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) emphasizes embracing diverse valuations beyond ecological and economic dimensions in its recent 'Values Assessment' report (IPBES, 2022). Integrating dialogues and knowing experiences at different levels can promote a more inclusive and effective approach to fisheries management.

To further this understanding, two concepts can facilitate research on diverse valuations of nature: nature's contributions to people (NCP) and reciprocal contributions. NCP refers to all the positive contributions, losses or detriments that people obtain from nature, incorporating different worldviews of nature–human relationships (Díaz et al., 2018; Pascual et al., 2017). NCP has two lenses: context-specific and generalizing. The context-specific perspective is linked to Indigenous and local knowledge, recognizing people's responsibilities to nature and mutual benefits for human well-being and biodiversity (Díaz et al., 2018; Hill et al., 2021). The generalizing perspective serves an analytical purpose, with 18 categories defined according to the type of contribution from nature to people (Díaz et al., 2018). The concept of reciprocal contributions, which expands upon the brief mention of reciprocity in the NCP framework, analyses cross-cutting perspectives of reciprocity in social–ecological systems to address reciprocity as a value and as a lens to observe human relationships with nature (Ojeda et al., 2022). Reciprocal contributions encompass actions, interactions and experiences between people and nature that result in positive contributions across different scales and dimensions (Ojeda et al., 2022). This concept also acknowledges that reciprocity practices are intertwined with other aspects of human life and can manifest through narratives, memories and perceptions (Ojeda et al., 2022). These frameworks—NCP and reciprocal contributions—can help uncover the intricate ties between people and the ocean, identify barriers to effective fisheries management and illustrate how reciprocity operates in practice.

Abalone (*Haliotis* spp.) on North America's west coast represents one of the most significant examples of commercial overfishing, with negative consequences for Indigenous food systems and management based on reciprocal contributions. In the 70s and 80s, the abalone market boom, stimulated by the Asian seafood market, together with neoliberal policies and developments in diving technologies, were key factors in the collapse of many abalone species in British Columbia (Canada), California (USA) and Baja California (Mexico; see Hobday et al., 2000; Jackson et al., 2001; Lee et al., 2019). In Canada, abalone overfishing and its closure in 1990 harmed many Indigenous peoples. For example, Gitxaała scholar Charles Menzies remarks: *The closure of bilhaa* [northern abalone (*Haliotis kamtschatkana*)] *fishing has left a palpable sense a grief amongst Gitxaała people, especially community elders who have grown up with bilhaa as a key item of food and trade. Community members feel embittered that one more time a significant part of their normal lives has been closed to them by the Canadian government* (Menzies, 2010). Indigenous elders, such as Haida elder Diane Brown, play a crucial role in promoting the importance of rebuilding sustainable abalone harvesting practices within their communities and for future generations. She said: *my hopes and dreams for the future are that my grandchildren, my future grandchildren, and their grandchildren will be able to go out on the low tide, harvest clams, cockles, mussels, abalone, herring roe on kelp, and continue to live as we are, on the bounties of the ocean* (see HMTKSP et al., 2011).

This study explores Haida abalone relationships, identifying values, benefits, drivers and barriers relevant to fisheries management. Our methodological analysis aims to bridge local and global discussions about the values of nature, facilitating dialogue with other communities affected by overfishing due to colonial policies. Through a case study of northern abalone in Haida Gwaii, we highlight the significance of reciprocal contributions to fisheries management, where such relationships often go unnoticed by colonial fisheries agencies. The Haida Gwaii archipelago, the home of the Haida Nation, was one of the epicentres of commercial overexploitation in British Columbia, Canada. Haidas cultivated intricate relationships with abalone that remain after the fishery was closed in 1990 (Lee et al., 2019). We listened to Haida knowledge holders (e.g. elders) who have lived through the tragedy of the abalone fishing boom and subsequent decline and also spoke with younger Haidas. Finally, we discussed overfishing harms on reciprocal contributions to review the past and rethink future fisheries management strategies. This research contributes to filling the global gap of creating a better understanding of Indigenous fisheries management and sets the stage for re-establishing traditional gathering of abalone.

2 | METHODS

2.1 | Historical context

Northern abalone (*Haliotis kamtschatkana*; hereafter referred to as 'abalone') or Galgahl'yaan/GalGahlyan in the Haida language is culturally and nutritionally important for Haidas (names are from northern Massett and southern Skidegate dialects; see Figure 1). For millennia, Haidas used abalone as food, pieces of trade, jewellery and ceremonial regalia. Haida Gwaii was one of the epicentres of commercial abalone fishery. The total commercial landing of British Columbia Province (Canada) between 1976 and 1980 indicates that 34.6% were captured from the east side of Haida Gwaii (Fedorenko & Sprout, 1982). Haidas were witnesses to an onslaught

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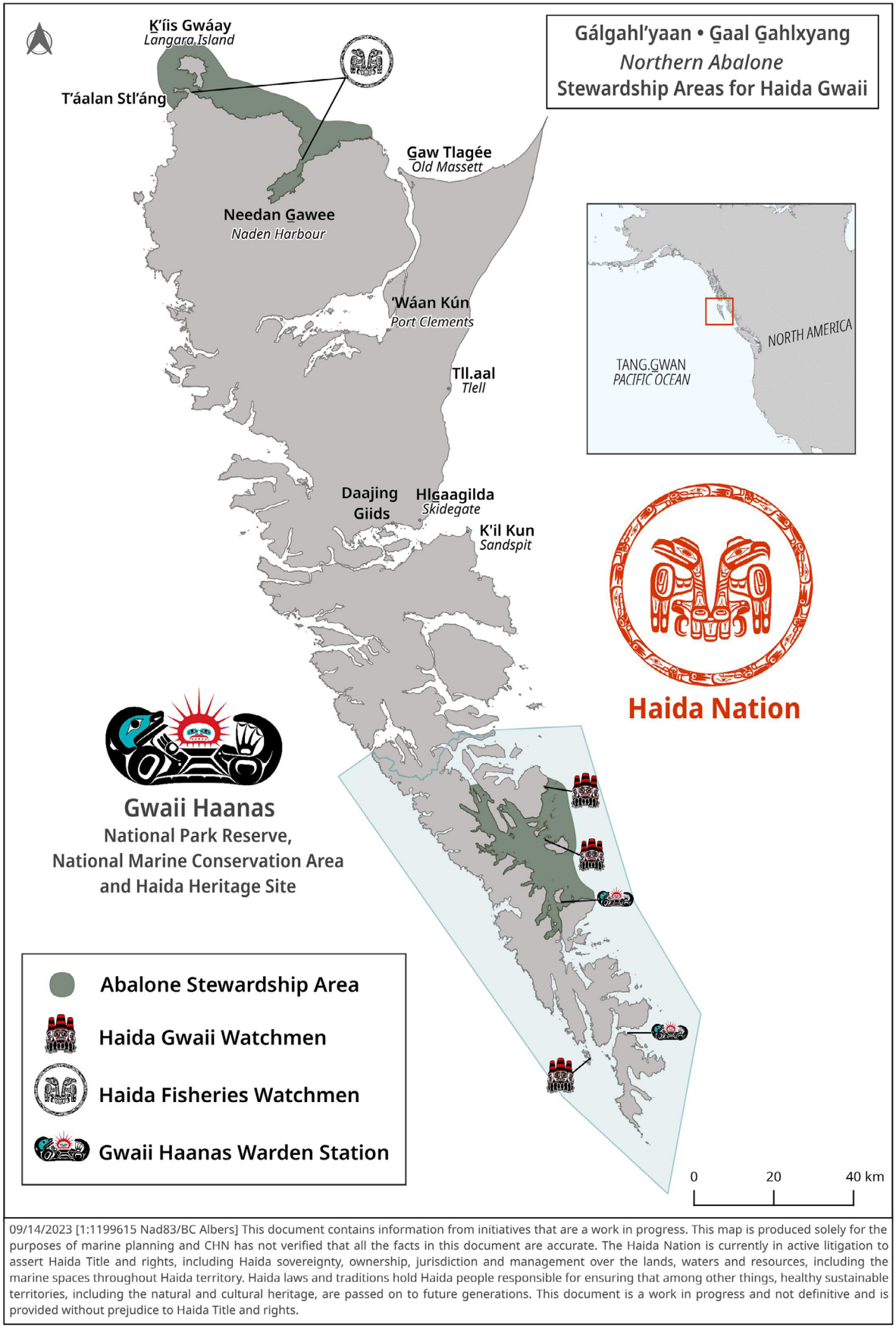

FIGURE 1 Haida Gwaii, Gwaii Haanas National Park Reserve and Haida Heritage Site. Northern abalone stewardship areas are highlighted in green. The map was designed by the mapping team of the Council of the Haida Nation.

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of commercial vessels, fishers and divers who travelled to participate in—and ultimately collapsed—the commercial fishery, impacting Haida food security, customary management and cultural traditions.

Although Haida Gwaii has been subjected to numerous cumulative effects (e.g. sea otter fur trade; Lee et al., 2018), we focus on the abalone fishing boom that started around 1975–1976 and, in 15 years, almost eradicated this species from British Columbia (BC). Before 1976, reported landings fluctuated at relatively low levels, ranging from 0.18 tons in 1959 to 67 tons in 1973 (Fedorenko & Sprout, 1982). Between 1976 and 1980, the Japanese abalone market increased enormously, and the BC commercial fishery captured 1474 tons, causing the reduction of legal-sized abundance (10 cm) by 60%–80% (Fedorenko & Sprout, 1982). In 1977, the regulations limited entry, and 29 individuals (fishing businessmen) were licensed to harvest abalone (Fedorenko & Sprout, 1982). In 1984, Fisheries and Oceans Canada (DFO), which is responsible for managing and enforcing fisheries and ocean resources (OAG, 2022), estimated that abalone stocks were depleted by more than 75% (Campbell, 2000). In 1990, DFO declared the closure of all abalone fishing—including for Indigenous (food, social and ceremonial) purposes (Lessard & Campbell, 2007). In 2000, abalone was designated as 'threatened' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2009). In 2009, abalone was legally listed and protected as 'endangered' under the Species at Risk Act (SARA; COSEWIC, 2009). This federal law aims to prevent animals, plants and other organisms in Canada from disappearing, by listing species to be protected (OAG, 2022). In some places on the west coast of BC, currently, monitoring and research studies suggest local recovery, such that abalone stocks in Indigenous territories have increased to levels that could withstand Indigenous gathering (Lee et al., 2018).

Through dialogues, contestations, protests and lawsuits, Haidas have led long-term efforts to develop conservation and stewardship strategies to limit industrial operations on land and sea that have affected their cultural and ecological system. For example, in 1981, the Haida Gwaii Watchmen Program was established to protect some cultural sites in southern Haida Gwaii. Four years later (1985), the Haida Nation protested and rejected logging activities and created the Gwaii Haanas Heritage Site (hereafter Gwaii Haanas). Negotiations between the Haida Nation and Canada resulted in the Gwaii Haanas Agreement (Collison, 2018). Today, Gwaii Haanas embraces land and sea protection in cooperative management among the Council of the Haida Nation, Parks Canada and DFO (Lee et al., 2021). We highlighted this Gwaii Haanas Agreement because 61% of total abalone landings from Haida Gwaii were captured in Gwaii Haanas (Sloan, 2004). In 2003, the Council of Haida Nation established a community action plan to recover abalone populations in partnership with other agencies (e.g. DFO, Parks Canada). This plan aims to restore the Haida Gwaii abalone population to a self-sustaining level that can support fishing for food. In 2015, the Haida Gwaii Marine Plan described the need to restore the abalone population and recover traditional gatherings for cultural and nutritional practices (MPPI, 2015). Finally, this study is another step to documenting experiences and memories of traditional management from Haida knowledge holders, exploring abalone benefits to people and people's contributions to abalone.

2.2 | Partnership

This work represents a partnership between the Haida Fisheries Program and the UVic researchers. The Haida Fisheries Program was established in the early 1990s as an operational department of the Secretariat of the Haida Nation (the administrative body of the Council of Haida Nation). The Haida Fisheries Program is responsible for managing, assessing and protecting marine species in and around Haida Gwaii. The Council of Haida Nation, through the Haida Fisheries Program, is interested in exploring the possibility of managing a traditional gathering of abalone on Haida Gwaii, which is currently prohibited by Canadian law. In 2018, we started a formal partnership to work on social–ecological perspectives to inform abalone fisheries management planning. One essential part of this collaboration was listening to knowledge holders' memories and giving voice to their insights about the future of the traditional gathering of abalone. We produced a detailed confidential report for the Haida Fisheries Program, and an in-depth ethnoecological account of our research is forthcoming (Rhodes et al. unpublished). The Haida Fisheries Program team and UVic researchers co-developed all aspects of this research. We received ethics clearance from UVic (ethics protocol number #18-1057) and a research permit from the Council of the Haida Nation. Our ethics approach included shaping this research to support Haida rights, ensuring full, prior and informed consent of all participants, and having materials aimed at publication reviewed by the Council of the Haida Nation to ensure no confidential information was inadvertently shared. In practice, we undertook a transdisciplinary investigation, collaborating in the conceptualization, execution and development of research outputs.

2.3 | Interviews and data analysis

We conducted 25 semi-structured interviews with Haida knowledge holders between 2019 and 2020. These one-on-one interviews included Haida elders, who gathered abalone before and during the abalone fishing boom (started around 1975–1976) until the moratorium (in 1990). We also spoke to Haida adults who grew up in the transition between the last period of the abalone fishery and the moratorium, or grew up when the prohibition was already established. These adults are linked to abalone through family activities, monitoring or educational initiatives. Women and men each have distinct relationships with ocean and marine species (Pfeiffer & Butz, 2005), and gender considerations are relevant in Haida culture, where women elders play a crucial role in passing knowledge through generations. Although we interviewed more men (18) than women (7), the women interviewed are involved in various areas of Haida culture, such as elder abalone gatherers, educational monitors, research professionals or Haida guardians. Each interview was

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conducted with a UVic researcher and a Haida marine biologist in Old Masset and Skidegate (see Figure 1). We asked about Haida-abalone relationships that related to abalone contributions to Haidas (e.g. food, social and ceremonial purposes) and reciprocal contributions, mainly in how Haidas have contributed to abalone sustainability (e.g. gathering guidelines, management and Haida values). We also asked about historical barriers and drivers that undermined Haida abalone gathering. Each interview contained 22 open-ended questions and took approximately 2 h (see interview questions in Appendix S1). Before starting each interview, we reviewed the project and presented the informed consent form. With permission, we recorded interviews and, in some cases, took pictures. Interviews were transcribed by a Haida Fisheries Program collaborator. We ensured the anonymity of participants by asking during the consent process if they agreed to have their quotes attributed to them in publications. Those who declined were referred to as 'knowledge holders' to maintain their privacy.

Guided by the historical experience of the Haida fisheries team, we emphasized the importance of capturing the diverse perspectives surrounding abalone as a culturally important species. This includes recognizing the benefits derived from this food species, the contributions made in stewardship over time and the colonial damages experienced in the Haida abalone relationship. Consequently, we decided to analyse interviews using the IPBES conceptual framework and the concept of reciprocal contributions (see Díaz et al., 2015; Ojeda et al., 2022). These frameworks offer multiple perspectives to illustrate the diverse relationships linked to abalone, including values, benefits, drivers and barriers (Díaz et al., 2015; Ojeda et al., 2022). This approach provided methodological flexibility to explore local abalone characterization while facilitating global discussions about the values of nature and enabling dialogues with other communities affected by overfishing due to colonial policies.

Using the IPBES conceptual framework, we choose two elements to organize the interviews (see Figure 2): NCP and anthropogenic drivers. NCP has two perspectives (context-specific and generalizing). The context-specific perspective acknowledges people's distinctive experiences and unique relationships with nature, recognizing their right to interpret and understand these connections in their own ways (Hill et al., 2021). Using this approach, we organized quotes of knowledge holders (references) linked to their abalone relationships with abalone framed on Haida values: Yahguudang (Respect), Giid tll'juus (balance), Gina 'waadluxan gud ad kwaagid

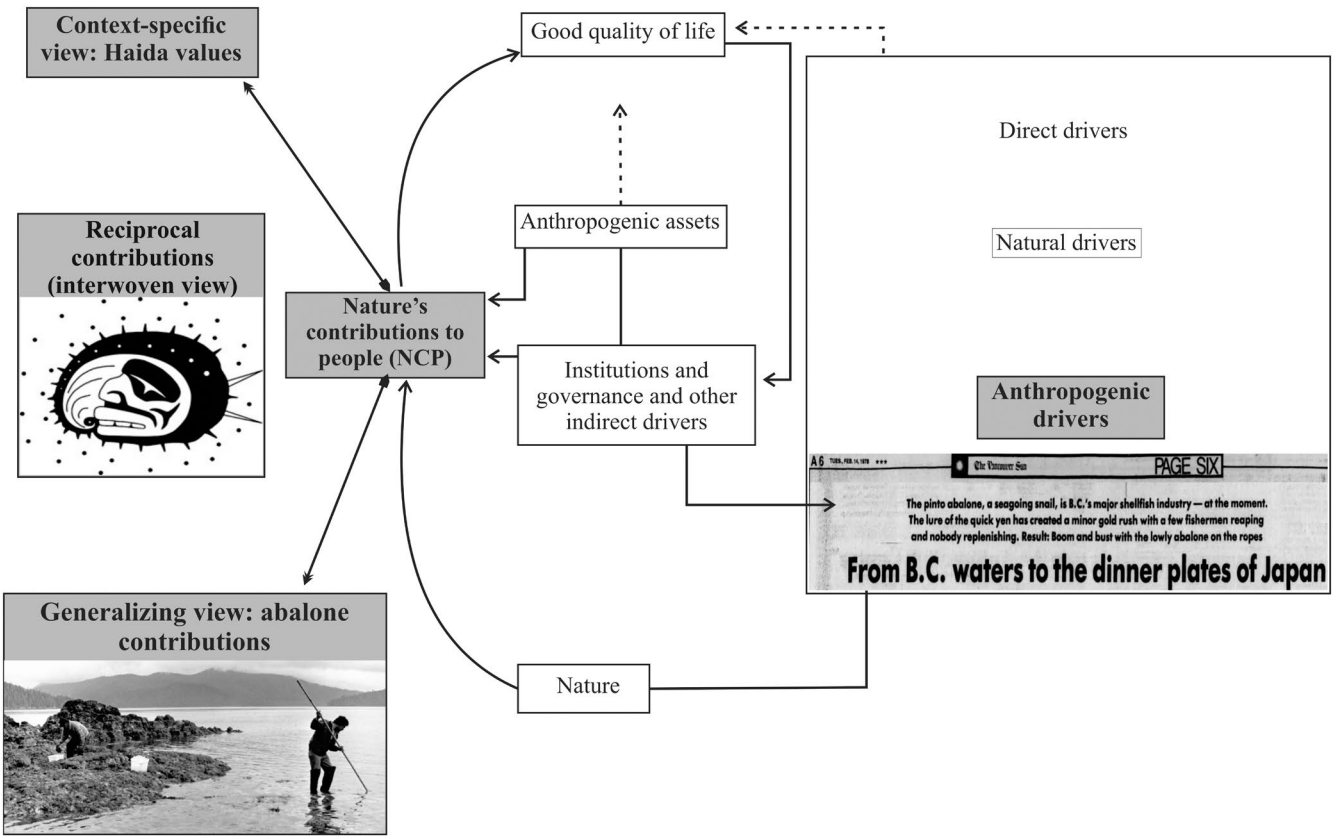

FIGURE 2 A simplified version of the IPBES framework used in the Haida abalone case study (see IPBES framework details in Díaz et al., 2015, 2018; Hill et al., 2021), and the linkage with the reciprocal contribution concept. In grey boxes, we highlighted elements that we focused on this study. The images illustrate the topics that we addressed. Anthropogenic drivers: The headline of The Vancouver Sun (newspaper) published in 1978 exemplifies that there was a public concern about the abalone boom in British Columbia. Abalone contributions: The image shows Haida abalone gathering using a spear (Taken by Ulli Steltzer, abalone harvest, with acknowledgments to Haida Gwaii Museum at Kay Llnagaay, Skidegate, BC, Canada). Reciprocal contributions: Haida abalone illustration developed for the action plan for abalone recovery (database of Council of Haida Nation).

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(Interconnectedness), Isda ad diigii isda (Reciprocity), 'Laa guu ga kanhllns (Responsibility), Gina k'aadang.nga gii uu tl' k' anguudang (Seeking Wise Counsel; Jones & Williams-Davidson, 2000; Jones et al., 2010). Haida values played an essential role in the Haida Gwaii Marine Plan, which presents guidelines, management strategies and educational activities based on a community-based approach (Jones et al., 2010). Certainly, in everyday life, people may not use terms like values, but many expressions describe actions linking people to nature. Thus, diverse values can be embodied in practices and memories. These inferences can present challenges that allow understanding but also can imperfectly capture original meanings, creating ambiguities (Gould et al., 2019).

The generalizing perspective allows us to understand various situations related to abalone, such as its significance as a cultural food. This perspective takes an analytical approach to identifying common attributes of abalone, facilitating dialogue across different levels and settings. We organized references to abalone contributions according to 18 NCP categories to highlight its uses from multiple dimensions (see Díaz et al., 2018). Some categories had many references, while others had none (mainly in regulating NCP categories). When there were no references, we excluded these categories from further analyses and visualizations. We used the 'anthropogenic drivers' category from the IPBES conceptual framework to characterize what harms or barriers were caused by commercial overexploitation, mismanagement or climate change impacts. This view helps to understand barriers and ongoing conflicts resulting from the abalone fishing boom and subsequent collapse. This analytical approach has limitations, as it does not capture all aspects of nature–people relationships, such as reciprocal contributions and cultural continuity (see Thompson et al., 2020). Acknowledging these limitations, we propose capturing these aspects through the reciprocal contribution perspective (complementing separate and more detailed descriptions of our research results, Rhodes et al. unpublished).

We used the reciprocal contribution concept to understand how Haidas enact and embody reciprocity, and how these actions and experiences are interwoven among multiple human dimensions and NCP categories. The reciprocal contribution concept offers a preliminary list of 21 reciprocal contributions across three human dimensions: symbolic–linguistic–cultural, biophysical and institutional–social–political (Ojeda et al., 2022). Using this preliminary list, we focused on these categories: biocultural continuity of reciprocity, feasts (ceremonies), enhancement, ethical values, guidelines, monitoring, nature protecting, oral stories and legal efforts (rights). Memories or descriptions of some reciprocal actions can address multiple categories, so we linked them through cross-cutting themes (see Appendix S1). When people share memories and experiences, multiple links often emerge, and we aim to cover the full range of ideas expressed (Brewer et al., 2017). We used NVivo 9 software (QSR International Pty Ltd) to organize interviews, helping visualize the data using tables, treemaps and word clouds showing the percentage of references (quotes) by category. To visualize reciprocal contributions, we built a chord diagram showing mutual relationships between Haidas and abalone. To do this, we used the 'circle' package created by Gu (2022) and ran it in R version 4.2.2.

3 | RESULTS

3.1 | Context-specific perspective: Haida values and abalone

Haida knowledge holders expressed narratives, memories and perceptions linked to Haida values that can nurture dialogues around fisheries management, food sovereignty and ethical actions. All knowledge holders described family memories and teaching experiences that are linked to *seeking wise counsel value (Gina k'aadang.nga gii uu tll k'anguudang)*. They spoke about learning from experienced community members, often relatives such as grandparents, uncles, aunts, mothers and fathers, who taught them about the gathering of abalone. In addition, the participation of elders has been crucial in schools, where elders join classes to tell stories and teach guidelines (Table 1, see the knowledge holder quote). Many participants expressed a concern that youths and kids have been unable to gather abalone, and hence are unable to learn about them and how to sustainably gather them in the same way. Elder Harold Williams Sr. said, *it's pretty hard[…]if they don't have the abalone to learn from—how we are going to teach them how to […] live off of abalone. I learned how when I was small. It sure helped*. In terms of a future step for Haida management, knowledge holders emphasized that if abalone gathering is to occur again, it should include elders and youths so knowledge can be shared in the field. In this context, Niisii Guujaaw described: *I think, even if all we can do for now is just open a fishery, but Haida Fisheries harvest or whatever having it […] still be a community. […] if it's something that […] kids can go eat it with the elders somewhere […] So, they learn about it and can talk about it*.

All Haida knowledge holders expressed the Haida value of *responsibility ('Laa guu ga kanhllns)* by emphasizing the importance of seafood sustainability: *we only take so much of what we need* (Captain Gold), *we're taught just take what you need* (Reg Davidson), *you just take enough what you need* (Nadine Wilson), *you only go out and take out what you need* (Richard Smith), *take only what you need to eat* (Rollie Williams) or *you just take as much as you need* (Stephen Collison). This guideline is connected to other Haida values, such as reciprocity and seeking wise counsel, in which youths and kids learn from elders, such as elder Harold Williams Sr. says: *That's the way I was taught—just get enough for a feed, and don't try get greedy and finish them. I always think the next time. That's the way I was taught*. In a practical way, the guideline *take only what you need to eat* is key for future management because it is still internalized by different Haida generations where elders taught it through stories of gathering, such as a knowledge holder described from a memory of her grandmother, *If it's a big patch—take one from every seven. And if it's a small patch. Leave it alone*.

Knowledge holders remarked on experiences, memories and actions linked to *reciprocity (Isda ad diigii isda)* with multiple

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TABLE 1 Illustrative quotes from Haida knowledge holders that were linked to Haida values. Here and in the other tables and figures, we used the symbol '[...]' when necessary to shorten sentences. If slangs or other expressions unrelated to abalone topics were present in the original quote, they were shortened to better illustrate the main point in the quote.

Haida values	Description	Illustrative quotes
Seeking Wise Counsel (Gina k'aadang.nga gii uu tll k'anguudang)	Our elders teach us about traditional ways and how to work in harmony. Like the forests, the roots of our people are intertwined. Together, we consider new ideas and information in keeping with our culture, values and law	I think it's [...] most valuable to have elderly people [...] teaching that [...] because [...] we respect elders. [...] if somebody like me or you [...] learned how to do it from an elder, and then we went to go teach it at a classroom or something—it might not have a [...] positive enough effect on them because they're hearing it from us. Where if they heard it from an elder, then [...] it seems more respectful (Knowledge holder)
Responsibility ('Laa guu ga kanhllns)	We accept the responsibility passed on by our ancestors to manage and care for our sea and land. We will ensure that our heritage is passed onto future generations	That's the way I was taught—just get enough for a feed, and don't try get greedy and finish them. I always thing the next time. That's the way I was taught (Harold Williams)
Reciprocity (Isda ad diigii isda)	Giving and receiving. Reciprocity is a respected practice in our culture, essential in our interactions with each other and the natural world. We continually give thanks to the natural world for the gifts that we receive	I picked up a lot of abalone, about 25 to 30 at Hot Spring in by canoe—and then I got some water, and I poured it into my canoe and let them walk around in there when I canoed home. And then when I got to a camp spot [...] like it took me a couple of days to get back up here [...] I'd find a place in the intertidal, where I put them. There were a couple of times I did that, and I told that to Dempsey one time, and he did the same thing, he told me (Captain Gold)
Interconnectedness (Gina 'waadluxan gud ad kwaagid)	Everything depends on everything else. The principle of interconnectedness is fundamental to integrated planning and management. This comprehensive approach considers the relationships between species and habitats, and accounts for short-term, long-term and cumulative effects of human activities on the environment. Interrelationships are accounted for across spatial and temporal scales and across agencies and jurisdictions	My dad always just told me ... we would always look for kelp beds because they eat the kelp ... so we were always looking for kelp beds ... When we were kids, we made a square box and put a glass in it, so you can look into the water without sticking your head (Reg Davidson)
Balance (Giid tll'juus)	The world is as sharp as the edge of a knife. Balance is needed in our interactions with the natural world. If we aren't careful in everything we do, we can easily reach a point of no return. Our practices and those of others must be sustainable	I think they [Haida ancestors] had ways of being able to manage it [abalone]. Sea otters is a prime example—they hunted them [...], but they never made them extinct or brought them below a sustainable level. But they were able to still keep that equilibrium—that balance [...] They always kept that balance—how they knew what that balance is, we can't speculate [...] Our ancestors knew what they were doing (Robert Russ)
Respect Yahguudang	Respect for each other and all living things is rooted in our culture. We take only what we need, we give thanks and we acknowledge those who behave accordingly	Everything was done with respect, I guess you can call it. And we never tried to over pick—there was always a rule that we only take so much of what we need. [...] Because it is like a form of wealth (Captain Gold)

connections that are described in the reciprocal contribution section. Here, we focused on enhancing actions to restore abalone population. In the past, elders took abalone to transplant them to other sites, even during the abalone fishing boom (see Table 1). Restoring abalone populations was formally continued by the Council of Haida Nation after the moratorium. For example, Robert Russ said, *we've been doing our research since '94[...] I guess prime example would be, the work that we did in this area [...] and even rebuilding the stocks. Rebuilding the stocks in that area [...] I think we put 1,200 abalone in those sites*. In the last 20 years, the Council of Haida Nation has also conducted efforts to care for juvenile abalone by building artificial condos. Vanessa Bellis described, *the condo site consists of four [...] decommissioned crab pots, and we put cinder blocks in them [...] or cement blocks that are cut into four. So, there's twenty-four pieces in each condo, and it's a safe haven for them, cause they become cryptic [...] So they want to hide in somewhere. And the smallest one, I believe, that they've found is two or three millimetres*. Abalone condos help to monitor the recruitment and contribute to assessing what places have healthy abundances. These actions require a lot of work in the field (diving), where the Haida Fisheries Program has been building its own capacity of monitoring with the participation of young Haida generations.

Linkages between abalone gathering and *interconnectedness value (Gina 'waadluxan gud ad kwaagid)* are relevant in the context of ecosystem-based fishery management because abalone gathering was connected to other food species. Many knowledge

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holders mentioned that abalone could be harvested at any time of the year, but big tides (zero tides) during daylight hours are more frequent during spring and summer. This is also the time of year when family groups navigated to the north or south of Haida Gwaii (see Table 1). Elders exemplified the importance of big tides using an old saying: *When the tide is out, table's served* (e.g. Captain Gold). Another factor is the roe-on-kelp (k'aaw) gathering in the spring season. Interviewees, who harvested before the moratorium, remembered participating in roe-on-kelp and abalone fishing (see Table 1). In wintertime, a few knowledge holders described that they could use a gas light to gather abalone at night, taking advantage of the nocturnal big tide. Yet, in this context, Elder Stephen Collison said, *In the winter, [...] you can get it [abalone] on a big tide. In those early days, they didn't have gas lights or flashlights or anything, so mostly in the summer months when the days are long. Daylight til eleven o'clock at night—then you could go out and catch abalone*. In general, knowledge holders indicated that if the tide was not low enough, Haidas used a spear. Judson Brown remarked that fishing with a spear (K'iitaaw, Haida Name) has specific guidelines, and people need to learn how to do it properly. He said, *I guess the one guideline is—when you use a spear [...] you have to learn how to do it properly. Like some people just stab it and then try to pull it up again. They don't know how to do it [...] so then you are stabbing it, killing it, and just leaving it—that's not good*.

Knowledge holders described ecological perspectives and *balance value (Giid tll'juus)* primarily when discussing the trophic interactions of sea otters and abalone appeared. Nadine Wilson remarked, *everyone loves to eat the abalone: the fish, the birds, us. Like the otters. They're in high demand*. Knowledge holders mentioned the importance of assessing sea otter predation in abalone recovery sites due to recent observations of sea otter re-establishment in Haida Gwaii. In this context, Linda Tollas said, *we don't have the sea otter here—which a sea otter would eat it [abalone]. But, they are slowly coming back [...] when I was still working here with Gwaii Haanas, there was some [...] around SGang Gwaay*. In this context, Guujaaw shared an historical ecological perception: *in the old days, sea otters were a factor, but they were also hunted. You know, so if they come in and they're not controlled in any way [...] They [sea otters] wouldn't come in so close to people, you know, so they would be kind of safer over there, like on the west side, where there's less people*. The value of balance is an important aspect of Haida cultural heritage, and key for sustainable gathering of abalone. Thus, learning this principle from ancestors and elders is essential in ensuring the sustainability of seafood resources (see Robert Russ quote; Table 1).

The *respect (Yahguudang)* for abalone sustainability has ethical and practical angles in the Haida culture. Elder Captain Gold described that Haidas cultivate respect for seafood because it is also a form of wealth in the community (see Table 1). This form of wealth is not about monetary profit. Haida elders mentioned that status is built over time, for example, helping others, respecting species and leading potlatches. Captain Gold said, *You know, one of the driving things about not overharvesting—is trying to maintain status. The Haida were very proud. And if you lose your status, you lose face, so to speak. And they didn't want to do that—so they always tried to protect their resources*. Another important link between respect value and traditional knowledge of fishing practices is the role of elders in teaching this cultural heritage. For example, Rollie Williams remarked: *Yeah, 'cause in the olden days, when we were taught—there was no one, two, three, four [...] like it was some or lots, when they spoke the language. There wasn't like, "Oh, I got twelve." Or some number for that. It was just, "Take some." [...] And then lots means over twenty .... Old Timothy Edgars...learnt the right way—like to respect it [abalone]. Respect what you have out there, and I'm still teaching that way*. Therefore, when Haida elders teach young generations about fishing, they emphasize the importance of respect to maintain the traditions and resources of the community for future generations.

3.2 | Generalizing perspective: Abalone contributions to Haidas

We classified abalone contributions to Haidas into 8 of 18 NCP categories of generalizing perceptive (Figure 3). The other 10 NCP categories (mainly regulating categories) were left out because no quotes were found for them. Forty-two per cent of the quotes were linked to the 'food and feed' category, which aligns with the proportion of

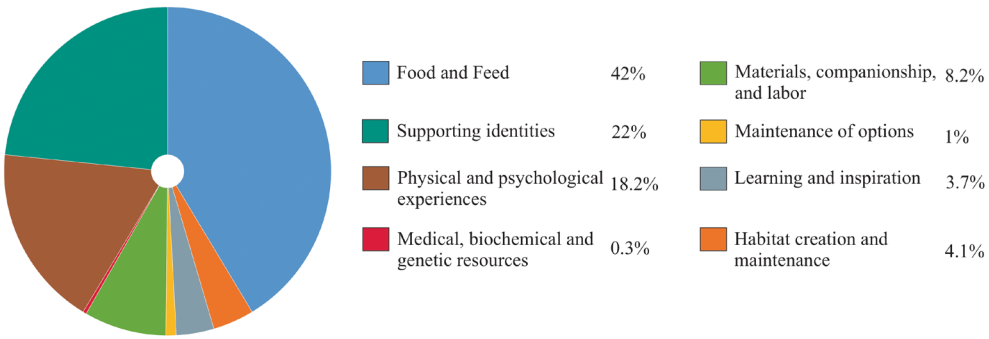

FIGURE 3 The pie chart shows the percentage of abalone quotes coded using NCP categories of the generalizing view from the IPBES framework.

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TABLE 2 Illustrative quotes from Haida knowledge holders that were linked to categories of NCP view. We did not include the food and feed category here because this is illustrated in Figure 4.

Generalizing NCP categories	Illustrative quotes
Supporting identities	I do is just tell them Haida stories [...] The northern abalone descended from the northwestern toad—so that was when the earth was covered by water. And then the other is [...] the mouse descended from the northern abalone as well ... Same with the mouse, the same thing—the way it moves, and it's nocturnal, and also because the abalone lets out [...] what is it that they emit when they are in danger. Slime, I guess [...] because the northwestern toad does as well—but theirs is poisonous to that keeps the predator away from them. So, there's the parallel (Linda Tollas)
Physical and psychological experiences	I was in Gwaii Haanas in the mid '80s [...] it might be 1985, when they were doing the protest thing of the logging [...] I was 13, I think, at the time. So, they went out and filled up these totes. I don't even remember how many totes there were, but they were all full of abalone [...] I remember sitting on the beach being a 13-year-old, angry, teenager. "Why am I cleaning these abalone to feed the loggers?" Like I didn't understand the concept, like, "We are protesting what they are doing, and we are going to have a feast for them?" Cause we invited all the loggers from the logging camp? You know, I didn't really understand it at the time. But that evening, it was explained to me [...] well explained to everybody why we invited the loggers to our cabin. To share food. Oh, just to show that, you know, it wasn't a personal attack on them (Judson Brown)
Habitat creation and maintenance	They like being around kelp. Yeah, you never see abalone around no kelp. Wherever there's a lot of kelp, you know you are going to see abalone [...] I noticed the kelp's not as much as it used to be years ago (Harold Williams)
Learning and inspiration	My dad has brought us gathering other shellfish, and sort of taught the values of how to gather something. Which I think is transferrable to abalone. He's always gathered like gumboot chitons and scallops and stuff—so I sort of knew, like, I think would have always known what to do (Niisii Guujaaw)
Maintenance of options	I think like education is like one of our biggest tools that we could have as well [...] like I guess my example. I remember so vividly that presentation [of abalone] and I was like 7 years old. All the way down [...] I'm like 24 now [...] I imagine if we have like a regular education program for like stewardship in the school systems [...] like we would be set for the future (knowledge holder)
Materials, companionship and labour	I used them for carving, but not the local [northern abalone]—it's too thin. You noticed how thin they are compared to California shells and they're a lot thicker, and then you can grind it. Cause if you try grind these, I mean, you end up with nothing. Cause there's a record of Haidas going all the way to California in canoes (Reg Davidson)
Medical, biochemical and genetic resources	I think, you know, Fisheries [DFO] should be held accountable for that—you know, that was a great food source for us, and you know ... now we suffer with things like diabetes and everything else, cause we got to eat crap rather than our natural food (John Bennett)

quotes we coded for the generalizing NCP. Furthermore, we identified abalone experiences linked to other categories, such as physical and psychological experiences, supporting identities and materials and labour (see Table 2).

The 'food and feed' category has three emerging themes: forms of eating, processing and the meaning of food (see Table 2). Knowledge holders used different methods for processing and storage: raw, fried, boiled, dried, smoked, frozen, jarred and canned (See Figure 4a,c). Elders said that, in the past, people canned abalone with tin, but later, they started using jars (see Figure 4c, box 6). Abalone represents food meanings framed on emotions. Nadine Wilson, for example, emphasized the importance of looking for and processing their own food. She expressed, *there's something so rewarding about harvesting your own food and processing it—you just have so much more respect for it. And that appreciation and [...] I think you enjoy it more*. With memories of eating abalone also emerges a meaning of nostalgia to bring it back. This nostalgia is nurtured by Haida elders and adults when they describe the taste, texture and sharing. Elders remembered their own elders with memories interwoven with sites, relatives and learnings (see quotes in boxes 4 and 5 in Figure 4b).

Physical and psychological experiences with abalone have supported traditional learning and social actions. In this context, Judson Brown described a personal experience of how abalone was an important food in 1985 when the whole Haida community protested against logging activities on Tllga Kun Gwaay.yaay (Lyell Island), resulting in the eventual protection and co-management of Gwaii Haanas. Judson's story reveals that abalone was part of crucial moments for the Haida community (see Table 2).

The many uses of abalone show the importance of abalone to Haida cultural identity as interwoven in stories, artwork, potlaches and trading (Table 2). Haidas traded abalone for oolichans (*Thaleichthys pacificus*) with mainland First Nations or for salmon with other fishing boats (Figure 5). Elders described abalone trading with Japanese people who worked on the east side of Haida Gwaii. Elder Harold Williams Sr. said, *there's another place close to Burnaby Narrows—Jedway, a Japanese saltery plant. We used to bring abalone there and trade with them [...] We didn't get paid –we traded rice and stuff. They had a lot of rice and everything*. Ancestrally, Haidas sailed in canoes from Haida Gwaii to California to trade California abalone and other items (Figure 5). California abalone shells are used as material in button blankets, poles (representing eyes) and bentwood boxes. Haidas carved with Californian shells for artwork, and northern abalone shells were used as fishing flashers, ashtrays or earrings. Sharing seafood, including abalone, in family groups or Haida communities

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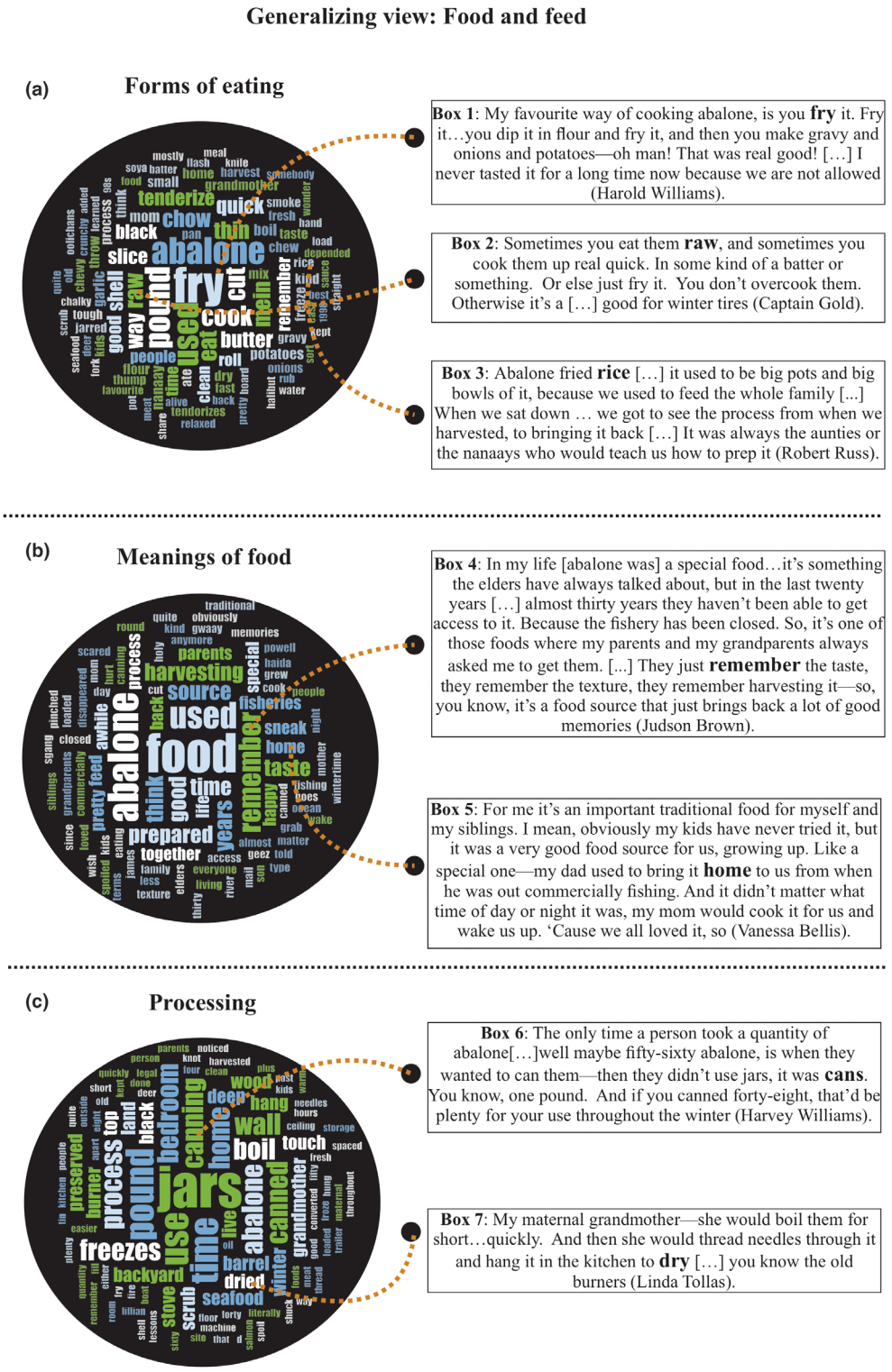

FIGURE 4 Word clouds depict the most frequent words in child codes (a: forms of eating, b: meanings of food and c: processing), which are part of the food and feed NCP category. We added illustrative quotes that show abalone memories linked to words.

has been essential during ceremonies such as funerals, traditional feasts and potlatches (Figure 5). Some knowledge holders mentioned that if abalone can be gathered again in limited quantities, offering them as food during ceremonies would be a priority in some cases, like Haida feasts, and Haida Fisheries staff should gather abalone (Figure 5).

3.3 | Reciprocal contributions

The concept of reciprocal contributions recognizes positive contributions from people to nature and facilitates analysis of ways in which people contribute to nature. In the case of the Haida abalone gathering, we found nine interconnected reciprocal contributions

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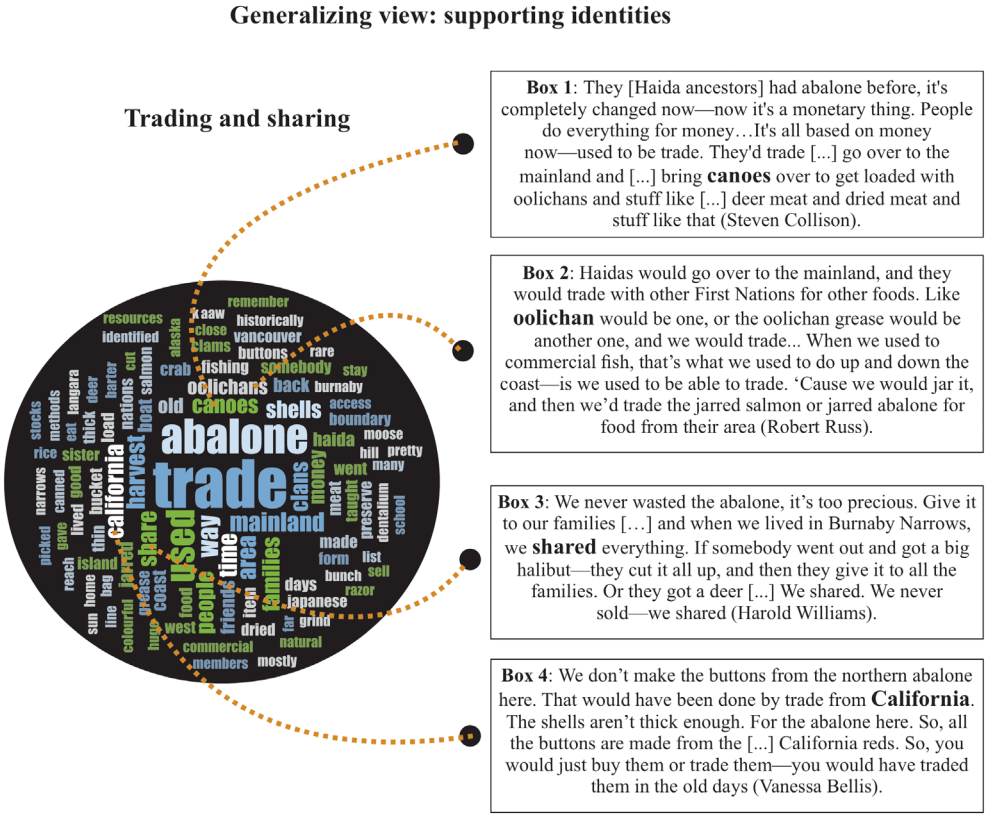

FIGURE 5 The word cloud shows the most frequent words in child code 'trading and sharing', which are part of the 'supporting identities' NCP category. We added illustrative quotes that show abalone memories and stories linked to words.

(Figure 6a,b). For example, knowledge holders described how Haidas have developed educational activities to steward or enhance abalone stocks involving elders and Haida fishery managers in schools (see Figure 6b). These educational activities promote the cultural continuity of abalone and have contributed to maintaining possibilities to generate community-based management after the closure in 1990.

Memories or narratives of some reciprocal actions can address multiple categories, so we linked them through cross-cutting themes (see Figure 6a). For instance, Judson Brown's statement intertwines 'ethical values' and 'food and feed': *I don't think [it's] abalone specific, but just in general—you know, you harvest it, you give thanks to the abalone for offering itself to you for food … always give thanks to that*, highlighting abalone's significance as a food source while stressing the importance of respect to this invertebrate. Themes of monitoring and nature protection based on reciprocity also emerged with cross-cutting connections (Figure 6a). Many references began with memories of the Watchmen and Guardian efforts. In 1981, Haidas established the Watchmen program, followed by the Guardian program. Both programs hold symbolic importance for the community and serve as international examples of Indigenous monitoring and nature protection. Watchmen and Guardians aim to foster respect and reciprocity for biodiversity and Haida heritage sites (Figure 7). Watchmen are a meaningful symbol in Haida totems, as explained by a knowledge holder: *[Watchmen] are brothers in olden times. The watchmen are three [...] it's not necessary one in the behind, because behind is Haida people*. She also stated, *I'm a steward of the land [...] I want to protect what is ours as Haida people. I want to protect that food*.

All the themes that appeared in interviews are integral to understanding the reciprocal relationships between Haida and abalone. The number of references in Figure 6a should not be taken as a numerical indicator of cultural significance for knowledge holders. For example, the themes of guidelines and monitoring emerged frequently because the interview process was framed on Indigenous management. Similarly, potlatches and feasts might be mentioned fewer times because we did not ask specific questions about them, but they are critical to the community's cultural, social and ecological well-being. The visualization of reciprocal contributions (Figure 6) illustrates themes that emerged through interviews, and it represents connections across themes. This intricate network demonstrates that abalone is more than just an economic resource; it is a culturally important species that brings together different dimensions of Haida community life. The representation of the network itself is a way to see how these different aspects of the species interconnect and how abalone contributes to the community in a holistic way.

3.4 | Anthropogenic drivers (barriers)

We identified eight drivers that affected Haida abalone relationships (see Figure 8). Today, poaching (illegal fishing code) is the primary

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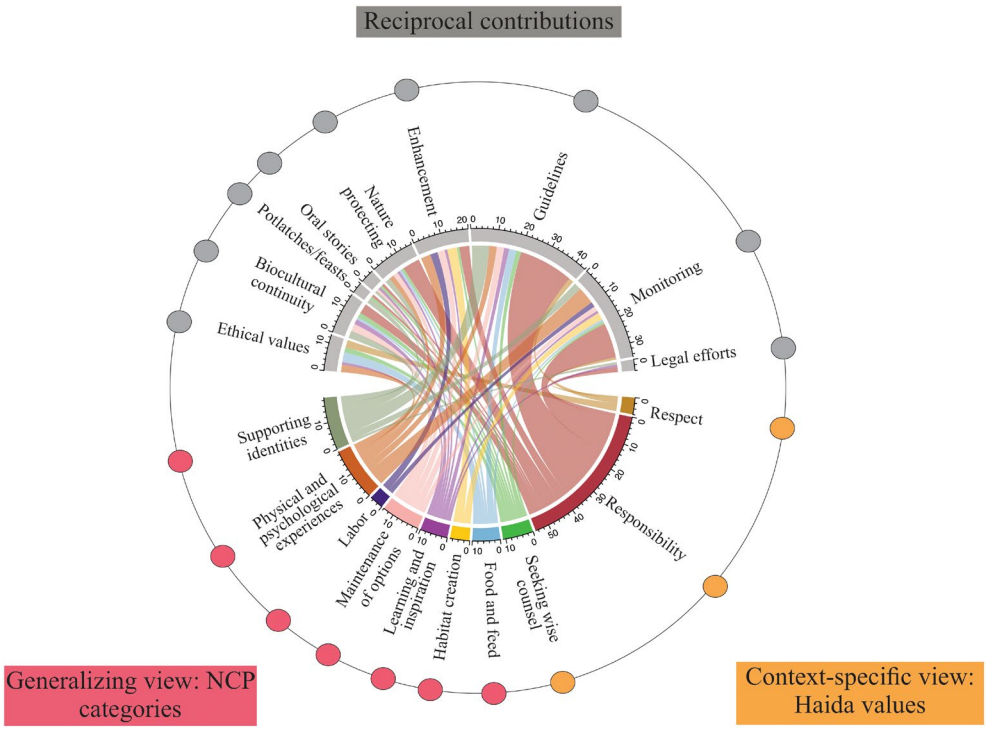

FIGURE 6 Chord diagram shows reciprocal contributions between Haidas and abalone and displays interconnections with nature's contributions to people (NCP) categories, including generalizing and context-specific views. The numeric scales represent the number of references (quotes) linked to each category.

FIGURE 7 Haida Fisheries Guardians uphold the Haida Nation's commitment to healthy marine ecosystems by gathering information about fishing. (a) Patrolling efforts on the ocean and (b) monitoring work on Haida food species.

concern due to the limited enforcement capacity of Fisheries and Oceans Canada (DFO) in Haida Gwaii. In ecological terms, sea otter interactions, climate change, sea urchin barrens and declines in kelp forests were drivers mentioned with negative effects for abalone recovery (see Figure 8). In social terms, the lack of boats, and hence inability to navigate to fishing places, is a recognized challenge for

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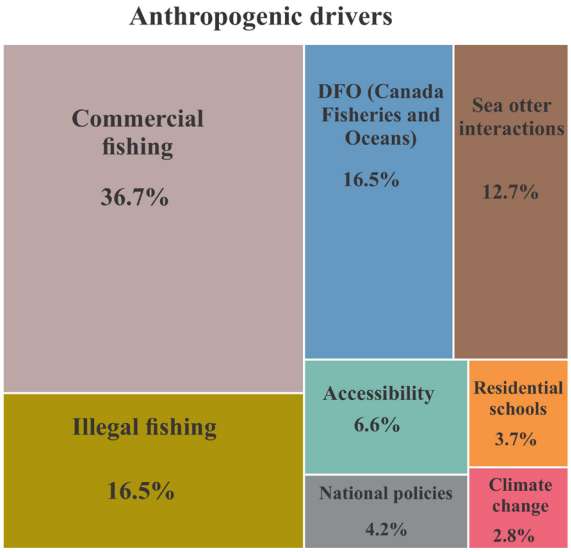

Illustrative quotes

Commercial fishing: I remember down in south end there [...] Hotsprings and further down […] there was abundance of them [abalone] I remember—before the commercial came. Like even out here, the same thing. Then, it just all of a sudden seemed like there was nothing! Just, "Boom!" commercial was—like they were taking everything (Rollie Williams).

Illegal fishing: I think the poaching has always come up, and it's always been the number one issue […] like there's different commercial fisheries that happen on Haida Gwaii, and nobody's really there monitoring them (Vanessa Bellis).

DFO: Everybody learned—in the way that you only take enough for yourself. Like that kept our resources in abundance for many years after when you find DFO turning it into a commercial license, then all our resources went down like that. So, we can't practice that anymore. Because there's closures and whatnot (Captain Gold).

Sea otter interactions: The sea otters are going to become a problem—they can clean a bay out…they're just like human beings, they can clean the bay out in a day. And they're showing up now. Christian found a dead one on the beach a couple of days ago. Out at the beach (Reg Davidson).

Accessibility: There's like resource aspect […] like not everyone has a boat, like they used to […] and not everyone has like the equipment […] like not everyone on-island has a scuba tank, or just like that kind of gear (Knowledge holder).

National policies: The majoring stumbling block that we've had in the last couple of years is DFO has been stonewalling us. Actually I can't say DFO specifically. It's been the SARA —the Species at Risk folk…they have been using something within the SARA act to basically […] it states something about how abalone is sensitive. You know […] they can't share that info (Daniel McNeill).

Climate change: Just global warming seems to have something to do with it [kelp forest reduction]. 'Cause even in places like Flagstaff—how you don't see a third of the kelp of what you used to. It's just nuts—there's no kelp anywhere! I remember Island Bay and them places—I used to just walk on the kelp. And now there's none there (Knowledge holder).

Residential schools: My father […] he went to Coqualeetza, he came home when he was fifteen, and you know, he was pretty smart, but what I think, personally—is that residential school […] brainwashing that they got there, where you were told your culture was stupid, your language was stupid […] and it was a dead language. And you know I asked my father to teach me Haida when I was a little boy, and he wouldn't—he just said, "Who you going to talk to?" You know, and then they tell you a couple words and that was about it. But, I think that's one of the reasons why he never talked so much to us about [...] the gathering of food and stuff (John Bennett).

FIGURE 8 The treemap displays percentage of abalone references (quotes) by child codes that emerged under the category anthropogenic drivers. We used illustrative quotes to exemplify child codes.

many Haidas. Elder Francis Ingram said: *there's not that many people who do that, hey? You'd probably have to get a big boat*.

Overall, the commercial fishery and DFO mismanagement were mentioned as negative drivers that affected abalone stocks. Most elders recall that the commercial fishing boom began in Haida Gwaii in 1975–1976, and that in the 1980s, people were concerned about population status. Robert Russ remarked, *The commercial harvest had, you know, drastic results to our population densities here on Haida Gwaii. Cause the last commercial ones were in the mid 1980s, and the volume that they took off of Haida Gwaii was amazing*

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[…] it was actually astounding. Between 1985 and 1986, Haidas requested recognition of their management authority over razor clams, abalone and roe on kelp due to overfishing on the island, but federal government was not recognizing aboriginal rights and authority. Gary Russ Sr. indicated, *We wanted to manage our own fishery, but the Department of Fisheries decided that they were doing such a great job, they didn't want our interference*. In the current context, knowledge holders have also expressed concerns about bureaucracy in the decision-making process for abalone management (as depicted in Figure 8). The assessment and review processes of threatened species depend on the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) under the federal policy Species at Risk Act (SARA). In the abalone case, the ecological data information is provided by DFO (OAG, 2022).

3.5 | Future considerations

If a well-managed Haida abalone fishery were to be permitted in the future, knowledge holders had several suggestions for overcoming social, ecological and political barriers caused by past mismanagement. Prohibiting commercial fishing is a very frequent message, such as a knowledge holder indicated: *I'd like to see a healthy, sustainable level where we can all enjoy the food and just keep people from poaching. Never open it for commercial again*. In addition, knowledge holders described that the Council of Haida Nation should continue working on a traditional abalone gathering plan led by Haida Fisheries, collaborating with other partners. Knowledge holders mentioned the importance of mixing old and new adaptive management strategies, such that they include Haida knowledge, traditional guidelines and science-based guidelines. For instance, a knowledge holder said: *I'm trying to mix the old with the new […] If you can figure out a system like that, that would be a good system to go to. But you got to take from the past in order to manage for the future*. We learned that there are three priorities for when abalone could be gathered again: elders passing away, feasts and potlatches. In this context, Ernie Gladstone said: *It could start small […] Maybe when an elder passes away, or at a potlatch or something—you only serve, you know, fifty abalone, and everybody gets a taste … if everybody buys into that, then you get the community supporting the conservation*. Finally, knowledge holders remarked on the need to improve funding sources and empowerment tools, particularly to prevent abalone poaching. Captain Gold, who helped establish the Watchman program, said: *We don't have that effective power as policing*.

4 | DISCUSSION

4.1 | Learning of Haida abalone stewardship

The values, memories and perceptions shared by Haida knowledge holders are closely linked to how the Haida have maintained a reciprocal relationship with abalone. One primary outcome is that abalone is more than just a commercial resource; it is a culturally important species connected to various aspects of Haida community life, including stories, food memories, food sovereignty, art and ceremonies. Our methodological approach helped paint a complex picture of the multiple ways of mobilizing contributions linked to abalone: elders' oral stories to family members, teaching activities in schools, potlaches and activities performed by the Council of Haida Nation. These contributions also extend to future perspectives on abalone management, particularly when Haida elders emphasized that potential fishing gatherings will require learning and hands-on experiences among children, youths and elders. These reciprocal contributions represent diverse forms of how Haidas contribute to abalone stewardship initiatives, which are recognized as high-level attributes between culturally important species and sociocultural groups (see Mattalia et al., 2024).

Through interviews, we listened to recurrent narratives and lived experiences that embody Haida values, such as *Isda ad diigii isda* (reciprocity) and *Gina 'waadluxan gud ad kwaagid* (interconnectedness). Haida elders, in particular, shared their respected practices for caring for abalone and other marine invertebrates, including the transplantation of abalone to enhance populations in areas impacted by commercial fishing. These narratives also often depicted a complex network of interactions among abalone, roe-on-kelp, herrings, salmon, seabirds, sea otters and kelps. This ecological and cultural network, framed in the Haida worldview, can help rethink conceptual discussions around culturally important species (Reyes-García et al., 2023) and cultural keystone species (Garibaldi & Turner, 2004) in fisheries management.

One critique of cultural keystone and culturally important species approaches is their overfocus on interactions between people and a single species, overlooking broader networks of interactions among multiple species and human groups (Mattalia et al., 2024). Both reciprocity and interconnectedness can aid in reconceptualizing cultural keystone and culturally important species through the lens of ecological and cultural interdependence between people and other components of nature. This interdependence is not just a theoretical concept, but a pressing reality that we must acknowledge. It also underscores the need for the development of practical tools for understanding how we 'evolve' in relation to each other amidst rapid social–ecological changes from the local to the global level (Ibarra Eliessetch et al., 2023). Haida values form the bedrock of Haida marine management (MPPI, 2015), where 'everything depends on everything else' (Jones et al., 2010). However, the recognition of cultural and ecological interdependence remains understated in colonial decision-making structures.

4.2 | Weaving different levels

While we recognize multiple approaches to researching nature–people relationships, our methodological analysis (using IPBES and reciprocal contribution frameworks) can help bridge local and global discussions about values and their linkages with fisheries management. Locally,

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traditional abalone gathering remains closed, but the continuity of food memories and gathering guidelines associated with abalone persists within the Haida community, constituting a part of their cultural identity. For example, Indigenous fishing guidelines, such as *take only what you need to eat*, are well established among the Haida (HMTKSP et al., 2011; Jones et al., 2010) and many coastal First Nations (e.g., Reid et al., 2022). Reciprocal contributions persist due to the Haida efforts to pass on knowledge despite various challenges. Many of these efforts shape monitoring programmes; for instance, 'abalone condos,' which are artificial structures designed to mimic natural abalone habitats, help monitor recruitment and assess locations with healthy abundances. These actions require extensive fieldwork, including diving, where the Haida Fisheries Program has been building its monitoring capacity with the involvement of young Haida generations. Capacity building is challenging for many Indigenous peoples (Blue Bird Jernigan et al., 2021). Highlighting this can help connect with other fishing settings and foster learning among Indigenous monitoring networks, which can lead these efforts in their territories, reducing the data control from external colonial agencies.

Although the 'anthropogenic drivers' category in the IPBES Conceptual Framework has not been extensively developed in the scientific literature, it refers to the impacts caused by diverse human institutions on biodiversity and human well-being (Díaz et al., 2015). Developing this category is important because NCP and people's contributions to nature occur within a network of conflicts and barriers. The inability to gather abalone since 1990 has significantly impacted hands-on fishing experiences. The exclusion of Indigenous voices from federal fisheries management and decision-making during the commercial abalone fishery prevented them from intervening (Menzies, 2010). Therefore, urgent challenges persist in fisheries management at the Canadian federal level (Thompson et al., 2020).

Our analyses underscore the immediate need for more effective actions to recognize the harms of overfishing on marine species and to advocate for Indigenous food accessibility. This recognition is not just about past mistakes of federal fishing agencies but is also crucial for rethinking and improving future fishing management strategies from a political perspective. The report on Protecting Aquatic Species at Risk conducted by the Office of the Auditor General of Canada indicates that DFO does not have enough staff to enforce compliance with the Species at Risk Act (OAG, 2022). To advance in effective power, Haida elders stressed that Haida programmes need more empowerment in policing and enforcement. This support requires political openings from government agencies to give more power to Indigenous fisheries management in future decision-making processes.

Across the Pacific Rim, many Indigenous peoples and place-based communities have suffered the loss of food access, triggering ecological and cultural changes with lasting consequences. From the 1970s to the 1990s, fishing booms led to the overexploitation of many abalone species (Berkes et al., 2006). Indeed, this fishing boom also impacted other marine snails, such as *Concholepas concholepas* (Muricidae) in Chile, which were sold internationally as Chilean abalone, experiencing similar overfishing trajectories (Castilla & Gelcich, 2008; Jenkins, 2015). In response, North American countries like Canada implemented neoliberal fisheries policies, which are market-based approaches that aim to allocate fishing rights to individuals to control access (e.g. Individual Transfer Quotas; Pinkerton & Davis, 2015). Thirty years later, we know that these policies did not solve abalone depletion or restore Indigenous food access.

Overfishing remains a global concern, and we are still grappling with the repercussions of the fishing booms from the 1970s to the 1990s. These events disrupted reciprocal contributions between people and marine species, which often go unnoticed and unresolved by high-level fishing decision makers. To face this, Haidas have made significant efforts to reinforce their marine food heritage through educational practices, ecological restoration and marine stewardship strategies (MPPI, 2015). Finally, we appeal to give voice, value and power to reciprocal relationships, articulating fishing management strategies through cultural, ecological and political efforts.

AUTHOR CONTRIBUTIONS

Jaime Ojeda, Gwiisihlgaa Daniel McNeill, Niisii Guujaaw, Jaasaljuus Yakgujanaas, Chris Rhodes and Natalie C. Ban worked in the conceptualization; Jaime Ojeda, Gwiisihlgaa Daniel McNeill, Niisii Guujaaw, Jaasaljuus Yakgujanaas, Chris Rhodes and Natalie C. Ban conducted interviews in Haida Gwaii. Jaime Ojeda led the writing of the manuscript and the methodological analysis. All authors provided critical feedback on the drafts and gave final approval for submission.

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CONFLICT OF INTEREST STATEMENT

Gwiisihlgaa Daniel McNeill, Jaasaljuus Yakgujanaas and Niisii Guujaaw are Haida marine biologists who work for the Council of the Haida Nation. They also are knowledge holders who have been working in education and stewardship projects related to abalone. In these cases, the interviews were conducted by Jaime Ojeda and Chris Rhodes and the data analysis was done by Jaime Ojeda.

DATA AVAILABILITY STATEMENT

The data supporting this study are included in the manuscript and Supporting Information. Interview transcripts and notes remain unpublished to safeguard participants' sensitive topics raised during interviews.

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SUPPORTING INFORMATION

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

Appendix S1. Semi-structured interview guide for Haida abalone gathering.

Appendix S2. Abalone' contributions to Haidas.

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