What is Canadian Ocean Literacy?: A Community Perspective Essay

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This essay is crafted out of the many responses to the question "What is Canadian Ocean Literacy?", which was asked of participants during dialogues, workshops, and conferences facilitated by the Canadian Network for Ocean Education (CaNOE) between 2013 and 2018. CaNOE is a (sea)grassroots, volunteer-run, non-profit society that works to advance ocean literacy in Canada by stimulating dialogue and communication about ocean literacy and by celebrating and showcasing current efforts in ocean literacy. CaNOE supports its cross-Canada membership of educators, community practitioners, and supporters through communication, national conferences, training opportunities, and learning resources. The response given here is only a starting place that may help shape what Canadian ocean literacy becomes in the third decade of the 21st century.

Context

National discussions on the definition of Canadian ocean literacy began at a workshop, which was hosted by Ocean Networks Canada in June 2013 at the Canadian Environmental Education and Communication Network (EECOM) Conference at the University of Victoria, British Columbia. Prior to those discussions, Canadian ocean literacy was generally indistinguishable from the Ocean Science Literacy Framework and its action statements, first published in the United States in 2005 (National Oceanic and Atmospheric Administration [NOAA], 2013) and adopted by several other countries, mostly in the European Union. The Framework's ocean science content now includes seven essential principles and 45 fundamental concepts, and its science knowledge content continues to be appropriate, recognized internationally, and kept current by ongoing efforts by the National Marine Educators Association (NMEA), among other groups. Despite offering a tidy answer to a tricky question – that is, ocean literacy is an "understanding of the ocean's influence on us and our influence on the ocean" (NOAA, 2013), the Framework misses pertinent points within the Canadian context. For example, in Canada, we must be able to succinctly and enthusiastically explain Canadian Ocean Literacy in French, English, and as many Indigenous languages as possible—a linguistic diversity that is absent from the Framework.

Building on the 2013 EECOM workshop, and driven by the question, "What is ocean literacy in Canada?", CaNOE (http://oceanliteracy.ca/) facilitated an

interactive workshop at the Northwest Aquatic and Marine Educators (NAME) Conference in July 2013. The question was asked again during a roundtable discussion at CaNOE's first national ocean literacy conference in June 2015 in Vancouver, British Columbia, "Canadianizing Ocean Literacy". The question was further explored by CaNOE's Education and Outreach Working Group in 2016 and then again during subsequent conferences on the Atlantic coast of Canada (CaNOE 2016 Halifax, Nova Scotia; EECOM 2017 Wolfville, Nova Scotia; CaNOE 2018 St. John's, Newfoundland).

Identified early in CaNOE's efforts in Canada was a desire for a unique and diverse Canadian knowledge approach to ocean literacy—one that is not only interdisciplinary and inclusive but that also inspires action. Three key themes emerging from the discussions in the abovementioned events demonstrated ways in which Canadian ocean literacy differentiated itself from ocean literacy in other countries. These themes and their sub-themes recurred through all iterations of CaNOE's co-developed community response to the title question. The three themes were as follows:

1. Respecting and recognizing diverse First Nations, Métis, and Inuit perspectives, laws, and ways of knowing without appropriation. Globally, this diversity of viewpoints appears to be missing in other ocean literacy understandings.
2. Highlighting the fundamental importance of ocean conservation and sustainability within Canadian Ocean Literacy efforts are elements that can be lost in a science-only approach; and
3. Including economic, emotional, spiritual, and aesthetic considerations, which may be crucial for instilling ocean literacy values in learners and igniting normative behavioural changes.

Each theme moves Canadian ocean literacy beyond ocean science content and towards a more holistic understanding of the ocean.

CaNOE's quest for a Canadian response to the title question culminated in its third national conference on ocean literacy in St. John's, Newfoundland in July 2018. The response outlined below includes results of an extended workshop on Canadian perspectives on ocean literacy at the above event. The purpose of the two-part workshop was to gather participants' views on identified gaps in ocean literacy in Canada. Part 1 was held as a single-track portion of the conference after the opening plenary, to maximize attendees' participation. Each participant's opinions were collected during the workshop through a mass interviewing process (i.e., Interview Matrix), followed by theme analyses and point form summaries done by volunteers during the conference. Part 2 took place at the end of the conference and consisted of a review and discussion of the analyses and summaries, enabling further input by participants in working groups. Findings were further refined by volunteers for the workshop report. Findings also contributed to the creation of a community perspectives'

statement (Stewart, 2019) and provided a general picture of Canadian Ocean Literacy. This statement, among other important points, identifies the need to enhance the response to the question "What is Canadian Ocean Literacy?" with diverse voices. This essay is, in part, a response to that recognition. It extends the 2019 statement by providing additional input and perspectives gathered up to this point. Since 2018, CaNOE has supported the Canadian Ocean Literacy Coalition's efforts (https://colcoalition.ca/) to be an active leader in examining ocean literacy in Canada through a more academic, regionally-driven, multi-sectoral, and multi-organizational approach in order to strengthen and advance ocean literacy in Canada.

Ocean What?

The *Oxford English Dictionary*'s first definition of literacy is the "ability to read and write"; however, the second definition—"a competence or knowledge in a specified area"—best fits the phrase "ocean literacy," albeit loosely. The ocean is very large, and there are many diverse areas of competency or knowledge. The term "ocean literacy" was truncated from "ocean science literacy" in the United States by the consensus-based movement of scientists and science educators who developed the Ocean Science Literacy Framework. They worked together to counter a lack of ocean topics in schools and a lack of ocean science literacy in society. Some countries, such as France, have developed their own approaches (Charette-driven) to combat the shortage of ocean topics being taught in schools; nonetheless, the term "ocean literacy" and the U.S. Framework are widely well received in Europe, despite difficulties in translating the word "literacy."

Challenges to, and possible solutions for, integrating ocean topics in schools were studied in eight European countries, (Belgium, Denmark, Greece, Sweden, Ireland, Portugal, Spain, UK) through the European Union's *Sea Change Project* (Fauville et al., 2018). The barriers found in these countries are also present in Canada, demonstrating that Canadians are not the exception but the norm in terms of ignoring ocean topics in curriculum, teacher training, and textbooks. These challenges were also reflected in the work done by Guest et al. (2015) in Nova Scotia.

As the Canadian Ocean Literacy movement attempts to bridge educational and community engagement gaps, the meaning of "ocean literacy" in Canada still needs to be addressed. While the phrase may continue to vex ocean literacy proponents and practitioners nationally and internationally, its use has become more widespread and is becoming a recognized part of ocean science literacy. Ocean Literacy is now embedded as an identified societal outcome (i.e., #7 *An Engaging and Inspiring Ocean*) in the Intergovernmental Oceanographic Commission (IOC) of UNESCO-led United Nations Decade of Ocean Science for Sustainable Development (2021-2030). While knowledge of ocean science is a

significant part of ocean literacy, Canadians distinguish themselves by bringing diverse ways of knowing into play that shape a distinctively Canadian ocean literacy viewpoint.

Diverse Perspectives

The diverse perspectives discussed below reflect some of the ways in which the ocean is significant to Canadians. They also point to a few of the many complexities involved in becoming a more ocean literate society.

From an *ecological perspective*, ocean ecosystems sustain life by providing oxygen, food, climate regulation, and support for all life on the planet. Although considered by ocean science educators to be the Framework's "low-hanging fruit," the majority of Canadians, who live busy, modern lives far from the sea, perceive these abstract concepts as having little relevance to them.

From an *economic perspective*, the ocean economy significantly contributes to Canada's GDP and provides employment in vessel design and construction, marine transportation, trade, high-speed digital communications, resource extraction, and more. The average Canadian, however, tends not to see these economic engines at work, and they often fail to understand how these offer career opportunities for youth.

From a *jurisdictional perspective*, most of our global ocean is outside national law, with the exception of the Exclusive Economic Zones, which run along shorelines of nations. While Canada has the longest shoreline in the world, a big responsibility in itself, it is also party to international agreements that pertain to shared parts of the global ocean. An example pertinent to Canadian ocean literacy is the Galway Statement on Atlantic Ocean Collaboration (2013), which explicitly includes advancing ocean literacy amongst citizens of nations, including Canada, who are signatories to the statement.

From an *educational perspective*, the commitment to ocean literacy is part of a Canadian jurisdictional conundrum, in that formal education is mostly a provincial and territorial jurisdiction while ocean literacy is a federal commitment. A possible solution to this problem would be to support and augment the role of the already active players in environmental education (from the tops of watersheds to the sea) while strengthening ocean science literacy at events such as National Science Literacy week, science fairs, and STEM-focused teacher professional development.

In the post-secondary learning environment, most oceanic knowledge is siloed to specialized areas of study or specific courses, such as oceanography, marine biology, and marine geology; thus, most post-secondary students in Canada do not learn about the ocean unless they are themselves motivated to do so. Canadian university ocean sciences programs do not generally use the term "ocean literacy," with the exception of Ocean Networks Canada at the University of Victoria, the Marine Institute at Memorial University, and the

Ocean Frontier Institute based at Dalhousie University. These organizations also explicitly engage in ocean science literacy promotion, reach out to learners who are not ocean science specialists, and engage the public (e.g., lifelong learners, youth, teachers, communities, artists).

From an *arts and culture perspective*, the ocean continues to be an important muse for creative people. This quote from the Transatlantic Ocean Literacy Workshop in Lisbon, Portugal in 2016, and the questions posed within, also apply to distinct Canadian arts and culture: "The ocean inspires. The ocean has always connected civilizations and made cultural exchanges possible. How can we highlight these dimensions in ocean literacy? And how can we use them to raise awareness of the importance of the ocean for society?" (AORA, 2016). Canadian artist Katherine Burns's paintings, as an example, epitomize the sea as muse. This can be seen as well in the art of master Haida artist Robert Davidson, in which the sea, family, and cultural connections are entwined and enshrined. These are just two examples among many of Canadian artists, musicians, songwriters, dancers, and poets who are inspired by the sea and whose creative work has the power to inspire others.

From a *coastal perspective*, the ocean is socially important in terms of sharing seafood with family and community, celebrating connections with the sea through festivals and events, and carrying on family traditions of cultural ceremonies and practices that connect individuals to the ocean. It is important to celebrate these cultural connections for their own intrinsic value and for their potential to instill in people a love and reverence for the sea, to improve stewardship practices promoting care, and to help people recognize the significance of relationships with the natural world through an understanding of our kinship with oceanic life forms.

From an *emotional perspective*, even people who are afraid of the sea can love and appreciate it. The sound of the sea can soothe us, and the sight of it can touch our hearts. This appreciation is often reflected in modern digital technologies. Furthermore, the sea can be an important spiritual mediator that can help people relax, reflect on their own purpose and spirituality, and feel gratitude. In highlighting these socio-cultural and socio-emotional links, we do not intend to reduce the significance of ocean science knowledge to ocean literacy, but we do aim to show how these links, rooted in deeply held values, may add powerful vectors for change in ocean literacy and eventually in ocean sustainability.

Respecting Different Ways of Knowing

Canadian science is becoming more and more open to recognizing and respecting traditional knowledge in ocean science. Although for many it is not happening quickly enough, the Eurocentric science perspective is nevertheless being broadened to incorporate other ways of knowing. An example of this expansion

can be seen in a recent crab co-management agreement, which stemmed from Coastal First Nations signing a Fisheries Reconciliation Agreement with the federal government. The agreement took four First Nations working together for 14 years to negotiate. As we continue to shape Canadian Ocean Literacy, it is clear that Indigenous leadership and multiple Indigenous perspectives are important. Canada's Truth and Reconciliation Commission's Calls to Action instruct Canadians to counter our tragic histories and genocidal residential school legacies. Heeding that instruction as we develop what ocean literacy means in Canada and what it will become is part of what will differentiate Canadian ocean literacy from that of other countries.

From 2013 to 2018, many educators and community practitioners across Canada contributed to the CaNOE dialogue about Canadian ocean literacy. The discussions showed that Canadians are in general agreement with Americans with regard to ocean literacy being about our reciprocal relationship with the ocean. However this relationship is more involved, complex, and holistic than previously acknowledged by the American ocean science literacy model. Indigenous ways of knowing may offer essential starting places and foundations for strengthening our understanding of and relationship with the ocean. Varied and distinct ancient wisdoms have parallels with the modern ocean sustainability movement. For instance, both ancient and modern wisdoms prioritize our relationship with the sea and our dedication to preserving it for future generations. Although very different, both ancient and modern wisdoms distinguish relationships of pure exploitation from mutually beneficial relationships that include reciprocity, obligation, and responsibility.

A vital difference between Canadian models of ocean literacy and those found in the United States, Europe, and other nations is that Traditional Indigenous Knowledge and Inuit Qaujimajatuqangit (IQ) are increasingly becoming more recognized and respected in Canada. These laws and ways of knowing about sustaining water, ocean, and land span very long time frames and bring responsible, stewarding worldviews to the national identity of ocean literacy.

Transforming Science and Education

Conventional academic hierarchies of science are also starting to level out, both in Canada and internationally. In my opinion, evidence of research and knowledge dissemination being decolonized appears in the form of an increasing number of open access journals, more crowd-sourced data, and improved citizen/community science. Both science and science education are evolving into a more process-oriented approach, wherein learners and citizens model *doing science* rather than just learning "the facts." These changes in science and science education may also accelerate more active participation in ocean literacy by youth and groups who are sometimes under-represented in science (e.g., women, Indigenous peoples, peoples of colour, etc). These trends are

important to defining Canadian ocean literacy and how we choose to navigate the concept moving forward.

Pedagogical approaches to science education in the 21st century include experiential, inquiry, project, and place-based learning as ways to promote critical thinking, creativity, and innovation for meaningful learning through doing. Canadians also see value in interdisciplinary learning (Woolf, 2017), and many educators who have already overcome the challenges of including ocean topics in curriculum use ocean examples as a means to integrating ocean learning within and across broader subjects and units of study. For example, teachers in many provinces are linking ocean acidification with atmospheric carbon dioxide and climate change in their Chemistry 11 classes, where required learning outcomes about bases and acids otherwise have nothing to do with ocean literacy. Another example is that educators are supporting students to use real ocean data from Ocean Networks Canada's Ocean 2.0 to meet mathematics learning objectives with regard to data visualization and graphing. Teachers are also successfully using visits to local waterways and nature to link ocean learning to students' everyday lives through field trip data collection, visual art, or even Haiku poetry writing sessions.

The ocean is especially important to coastal people, but it has an influence on all Canadians, the majority of whom live away from the coast and are only linked to the ocean through freshwater. What is more, all Canadians influence the ocean. Wherever we live, we are connected to each other and to life through water that all originates from the ocean and of course flows downhill, eventually returning to the sea. Canadian ocean literacy has an underlying goal of achieving a healthy, productive ocean that is recognized and revered as the planet's life support system. Fundamental to Canadian ocean literacy is our responsibility to care for the health of water, whether it be freshwater or salty. Making freshwater connections to the sea is one way to help all learners become more ocean literate. Perhaps water can be a common denominator to pull us together for ocean literacy.

It does seem strange that the ocean, a defining feature of our planet, has been overlooked in Canadian school systems and by Canadian society in this era of expanding human populations, increased ecological impacts, climate change, and declining ocean biodiversity. We know that the ocean is finite (we can measure its volume), and Chapter One of the United Nations' 2016 World Ocean Assessment clearly demonstrates how important the ocean is to us individually and collectively. It also clarifies that there are limits to what we can take without giving back. By understanding how the ocean functions, we have a better chance of learning how to be more responsible with respect to our impacts on the ocean. This understanding is an important aspect of Canadian Ocean Literacy. Ocean conservation science is also about managing people and their behaviours, and ocean literacy may well be an under-utilized tool in the ocean conservation toolbox. Modern education, which includes life-long,

not just grade school, learning could be key to turning the tide on both ocean conservation and ocean literacy.

Education along with science, traditional ways of knowing, laws, policies, and sustainability efforts can all help pull us "towards the ocean we need for the future we want" (IOC-UNESCO, 2017). Mutually beneficial collaborations between diverse people and regions can further inspire an ocean literate Canada. In this large country, with shorelines on three ocean basins, a vast freshwater network, and distinct regional and cultural perspectives, the definition of Canadian ocean literacy is both clear and fluid. We cannot do it alone, and the only hope we have of navigating toward a more ocean literate Canadian society is by respectfully working together.

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