Sparse Intimacies

An ethnography of (knowing) whales

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For Tim and Rowan,

Rob Finley,

and the whales

Table of Contents

List of Figures

Abstract

This thesis is about whales and the ways scientists and naturalists know them. Based on multi-sited fieldwork, including research and whale watching settings in Nova Scotia and South Africa; as well as interviews (remote and in-person) in Canada, the US, the UK and South Africa, it interrogates western knowledge practices about cetaceans. I pay particular attention to that which scientists and naturalists learn about whales that cannot be expressed in quantitative forms. I argue such knowledge is crucial to understanding whales, but is at risk of vanishing under contemporary marine science's turn toward remote technologies and machine learning. Seeking to elucidate what stands to be lost, I develop modes of expressing what lies within the aperture between what researchers know and what they disseminate. I argue that an ethnographic approach to cetacean research and its dissemination can offer new knowledge and new knowledge practices about cetaceans. I offer two ethnographies of specific Bay of Fundy cetaceans: the first, an orca and the Atlantic white-sided dolphins among whom he lives; the second, a humpback with a propellor-lacerated tail fluke.

In Chapter 1, I argue that despite the quantitative facade of formalized marine biological knowledge, cetologists already possess significant qualitative knowledge about whales, which informs and shapes their work. Yet, as Chapter 2 details, opportunities for gaining such knowledge are diminishing. Cetology was once characterized by "sparse data" in which scientists had only snippets of observational data. Now remote, automated technologies are increasingly used to collect huge volumes of data in human researchers' stead, and machines to process it. Chapter 2 discusses this, noting that spending time with cetaceans (or proximate with their habitats) and/or with raw data has until recently been an important component of cetologists' research process, despite associated inefficiencies. Collecting and processing sparse, raw data provided scientists with qualitative knowledge of whales and—combined with this data's inherent gappiness—with a thorough understanding of how much there is to whales that cannot be fully known. The shift from, to quote an interlocuter, "a sparse data scenario to a complete data scenario" changes, I argue, both the nature and the substantive content of scientific knowledge about whales, including how scientists advocate for them. As much as technological advances increase knowledge production's capacity, this shift is also a loss. The old, sparse, slow modes of being present with whales were one of the discipline's strengths, not a weakness requiring correction, and should not be left to slide unremarked into anachronism.

Each of Chapters 3 and 4 is a substantive cetacean ethnography. They are primarily literary-nonfiction in form, and argue for the potency of ethnographic research about cetaceans. Based on my own encounters with the specific whale protagonists; on in-depth interviews with longtime naturalists who know these individuals well; and on extensive reading of the marine biological archive, these ethnographies disseminate substantive knowledge (that has not been documented by science) about the specific whales in question; and work to set down, in narrative, something approximating the whales' lived experiences. The texts gesture to *who* and *how* these particular whales are, adhering to my human interlocuters' conviction that it is possible to know, by feeling and through sensory empathy, something of that which is intangible of whales. These final chapters propose new possibilities for multi-species anthropology, suggesting that qualitative researchers are well positioned to contribute new knowledge about cetaceans themselves. Such knowledge has conservation implications: for example, the orca who lives with dolphins may help us to understand cetaceans' capacities to adapt to change, and thus better conceive ways to help them when change cannot be avoided.

Résumé

Cette thèse porte sur les baleines et les manières dont les scientifiques et les naturalistes les connaissent. Basé sur un travail de terrain multi-site, y compris des contextes de recherche et d'observation des baleines en Nouvelle-Écosse et en Afrique du Sud ; et des entretiens (à distance et en personne) au Canada, aux États-Unis, au Royaume-Uni et en Afrique du Sud, il interroge les pratiques de connaissances sur les cétacés. J'accorde une attention particulière à ce dont les scientifiques et les naturalistes apprennent qui ne peut être exprimé quantitativement. Je suggère que ces connaissances sont cruciales pour comprendre les baleines, mais elles risquent de disparaître avec la tendance des sciences marines vers les technologies à distance et l'apprentissage automatique. Je développe des modes pour exprimer ce qui se trouve dans l'ouverture entre ce que savent les chercheurs et ce qu'ils disséminent. Je postule qu'une approche ethnographique à la recherche cétacéenne et sa dissémination peut offrir de nouvelles connaissances et de nouvelles pratiques de connaissance sur les cétacés. J'offre deux ethnographies de cétacés spécifiques de la baie de Fundy : 1. une orque et les dauphins à flancs blancs de l'Atlantique parmi lesquels il vit ; 2. une baleine à bosse avec une douve de queue lacérée par une hélice.

Le chapitre propose que, malgré la façade quantitative des connaissances biologiques marines, les cétologues possèdent déjà de significatives connaissances qualitatives sur les baleines, qui informent leur travail. Pourtant, chapitre 2 démontre que les possibilités d'acquérir de telles connaissances diminuent. La cétologie était autrefois caractérisée par des « données éparses », les scientifiques n'ayant que des fragments de donnés observationnelles. Aujourd'hui, les technologies à distance automatisées sont d'envergure pour collecter d'énormes volumes de données à la place des chercheurs humains, et des machines pour les traiter. Le chapitre 2 en discute, notant que passer du temps avec les cétacés (ou à proximité de leurs habitats) et/ou avec des données brutes était jusqu'à récemment une composante importante du processus de recherche, malgré les inefficacités associées. La collecte et le traitement d'éparses données brutes ont fourni aux scientifiques une connaissance qualitative des baleines et, combinée au caractère béant inhérent à ces données, une compréhension approfondie de tout ce qu'il y a des baleines que ne peut pas être entièrement connu. Le passage, dans les mots d'un interlocuteur, d'un « scénario de données éparses à un scénario de données complètes » change, selon moi, la nature et le contenu substantiel des connaissances scientifiques sur les baleines. Même si les progrès technologiques augmentent la capacité de production de connaissances, ce changement constitue aussi une perte. Les modes anciens, clairsemés et lents de présence auprès des baleines étaient une puissance, pas une faiblesse qui nécessite correction, et ne devraient pas passer inaperçus dans l'anachronisme.

Chacun des chapitres 3 et 4 est une ethnographie d'un cétacé. Leur forme est littéraire, et ils plaident en faveur de la puissance de la recherche ethnographique sur les cétacés. Basé sur mes rencontres avec les protagonistes cétacés ; sur des entretiens avec des naturalistes et des scientifiques ; et sur une lecture des archives biologiques marines, ces ethnographies diffusent des connaissances substantielles sur les baleines en question, et articulent leurs expériences vécues. Ces derniers chapitres proposent de nouvelles possibilités pour l'anthropologie, suggérant que les chercheurs qualitatifs sont bien placés pour apporter de nouvelles connaissances sur les autres espèces. De telles connaissances ont des implications en matières de conservation : par exemple, l'orque qui habite avec les dauphins peut nous aider à comprendre les capacités des cétacés à s'adapter au changement, et à mieux concevoir comment les aider.

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Introduction

Sparse intimacies and porous giants

> An ethnography carries beings of one world into another one.
>
> (Pandian & McLean 2017b: 1)

Bay of Fundy off Brier Island, Nova Scotia

Pfff-oooooo. A black head emerges from grey water. With it a plume of breath, and breath's sound: air pushed through the blowholes resonating not unlike air forced out through human lips, the way I might push out a jagged breath in search of relief from physical tension.

And breath's image: White droplets against the grey sky. The droplets are condensation: The heat from the whale's blow turns the water vapour in the air into liquid, a brief brilliant cloud. They prick my cheeks. On my glasses, they blot my vision. On my hand they are a soft lukewarm mist as I grip the white rail of the retrofitted crab boat. On my lips, the droplets are salty, and something else, something that corresponds, perhaps, to the smell that enters my nostrils: fish-filled but earthy, as if there is a garden in there. A burst of this odour then a swell, like a breaking wave in reverse.

In only one breath, this humpback whale could be exchanging fifteen hundred litres of air.[1] She will store most of what she inhales not in her lungs, but in her blood.[2]

Every time I am close enough to smell the dispelled portion of one of these exchanges, I suck in my own breath as hard as I can. Scents are physical entities. Tiny particles carry them through the air. I try to pull the particles deep into my airway. They contain molecules that were once inside her—and I want to bring her inside me.

Could I turn myself inside out, thus—if I inhaled hard enough? If my insides were more exposed, if I could make myself more raw, would I be more receptive; would I be a better vessel

[1] Cowan 1968
[2] Natural History Museum

for her? How can I render myself more penetrable by the vast, unfamiliar being of the whale, in these brief moments during which I am able to glimpse, smell, feel her presence?

Elsewhere in the Gulf of Maine, further offshore, another humpback wants to communicate with her calf, but a container ship—carrying oil, perhaps, or consumer goods or building supplies or perhaps returning some of the fish that Nova Scotia exports overseas for processing—is near. The whale voices her message, but her calf doesn't hear. She knows to raise her volume when there is noise from the wind; she has not yet learned how to make herself heard over the ships.[3] But the calf needs this message.

The mother bellows. He does not hear. She strains; she bellows again.

She could travel further down in the water column, away from the ships, but she knows she will not be able to effectively vocalize there. There is too much pressure; her body is not made for making sound down there.[4]

Finally she moves as fast as she can toward her calf, she shoves her body against his.[5]

The calf shifts out of the way just in time; the mother is struck in a glancing way by the very tip of a propellor blade, she feels a warm cloud at her pectoral fin as blood blooms into the water, but the ship has passed, she knows she will not die, her calf still cannot hear her and so she prods him to keep moving; she swims through the pain. The pain might be more bearable if she were less tired. Her larynx might be more powerful, if she were not always having to strain against the rumbling of engines, if she were not so often thrown into panic by their looming approach.[6]

Or—when she cannot tell if he hears her or not, when she, therefore, risks everything—she goes, and the ship strikes her—worse—and she cannot prod her calf, she cannot swim away; she drowns.

Or, she can tell that she would be able to make it but there is a trapline in the way. She calls and is not heard, she moves, she becomes entangled; her calf sees this, tries to reach her, is struck.

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[3] Girola et al. 2023
[4] Elemens et al. 2024
[5] Humpbacks, several scientists and naturalists told me, are more tactile than we tend to expect. Much of their communication depends on touch, assuming they can find one another.
[6] Findlay et al. 2023

Or, neither of them is in the way of the ship, but some hundreds of kilometres away an oil company is blasting the sea floor and she has been trying to teach her calf something and both of them are already frustrated and so she modifies her tone, she attempts to raise her volume but this is taxing and her body can manage only so much and she cannot transmit the complexity she would like to transmit to him.

Elsewhere, others—dozens, hundreds, thousands of others—face the same problem, and other versions of it. They are weary and there is little peace. The young must be taught how to survive and if they are not, at the same time, taught the cultural-creative specifics of what it is to be a humpback *here*, in *this* family line and *this* population—if they lose some of what gave meaning to their forebears' lives—that is the cost of survival, now.

The head returns to the surface of the water, its black skin a landscape: Small perfect hills dotting it, like drumlins. Tubercles, these hills. Hairs grow from them. Because of them, humpbacks can turn tighter, more quickly when they are swimming underwater.[7]

But this whale is at rest, and curious. A few metres away is a boat she has known her whole life, whose rumbling voice she trusts. On the boat are other mammals. Most of the voices she does not know, but one or two she does. It seems, even, that each year when she returns to the Bay of Fundy she seeks these voices, despite their smallness in relation to the roar of the engine below. She listens to them, these small voices.

At least, this is what I have been told by the humans who know her. And it is what I, in their presence and hers, have felt—a trust that comes from years of relation and care. A listening that is open-ended, that is safe, that is reciprocal. Messages—wordless, untranslatable—that transform, if you know how to hear them.

Some hundred and fifty kilometres east along the Fundy coast from the blowing whale, and a year and a half forward in time: Everything I own, including all my physical notes and drawings related to the Bay of Fundy humpbacks I encountered during my PhD fieldwork, is destroyed when my family's house burns to the ground. The bay, just visible on the horizon, is a distant backdrop to the conflagration, but no whales are there now. It is December; they have migrated south.

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[7] Fish et al. 2011

Crucial pieces of my own messages to my future self—the one who sits here, in a different house, and writes—are missing, now.

Months after the fire—still winter; still no whales—in a pile of rocks from the house's stone foundation, next to an old weeping willow, I find a sheaf of charred pages.

I sift through them. Bits of blackened paper stick to my fingertips.

I read:

> Is it not the ultimate betrayal to render stories as 'information' and not as stories?… The next step in this betrayal is the instant translation of the story into a fact, or what is called 'data'… The philosophical character of the knowing is changed. The reach and imagination in the story is lost. (Taussig 2011: 145)

Who is the whale diving below the bay to forage, hearing as the vessel I am on motors away? What is her *story*, and how can I, an anthropologist, parse it from the fragments of her that are accessible to me, which sometimes feel as fleeting as the charred pages whose edges disintegrate in the wind? This whale, like virtually every whale in the population to which she belongs, has been documented in the Gulf of Maine Humpback Whale Catalog. It contains information about the events humans know of her life: Her birth; which whale was her mother; whether and when she's had offspring; the sex of her offspring; any known injuries she has experienced; any physical abnormalities observable to the human eye. A story in Taussig's words, translated into data, bereft of the potency it carried in story form (2011: 145).

But *who* is she, before she becomes data? This thesis considers that question from an anthropological perspective, attending ethnographically to whales and the scientists and naturalists who know whales in, as I learned, many more ways than they tend to document.

In their way, scientists, too, have begun asking similar questions. In a pioneering 2001 article, leading cetologists Luke Rendell and Hal Whitehead documented a number of examples of "Culture in whales and dolphins," the article's title: humpbacks who share songs and innovative feeding techniques; orcas and sperm whales who have vocal dialects; dolphins collaborating with humans to fish (2001). Discussing culture and intelligence in whales, biologists often point to certain particularities of their brains, for example that they are larger and significantly more complex than ours, and have been so for longer; and that this brain evolution was driven by social behaviour and information processing (Fox et al 2017: 1702). Cetaceans

also have neural spindle cells, understood to be the locus of empathy and commonly referred to as "the cells that make us human" (Coghlan 2006).

All this is common knowledge within marine biology, but says little about who whales are, especially the particular whale blowing by the boat that day. Marine biologists Luke Rendell and Hal Whitehead note that whales' pelagic environment and the sensory orientation it demands, and the vast differences between whales' bodily capacities and human researchers', make finding "concrete evidence" about their social and communicative lives challenging; the cultures of humans and whales cannot be understood in the same ways (2001: 317; 311). Yet they lament the lack of ethnographic studies of whales (ibid.). In one of a series of scholarly response articles to Rendell and Whitehead's piece, anthropologist Tim Ingold was critical of the cetologists' conceptions of both culture and ethnography. He conceded, though, "a genuine ethnographic approach being applied to research on—or rather with—nonhumans" would be "exciting" (2001: 337).

This thesis probes that possibility, with animals for whom much is at stake. In the twentieth century, an estimated nearly three million whales were killed by industrial whaling—up to 90% of some populations, like blue whales (Rocha et al. 2014). Today, while there is little commercial whaling, virtually all whales in the ocean are under great, near-constant stress from pollution; habitat degradation; and anthropogenic noise masking their communication by up to 80% (Cholewiak et al. 2018), "effectively acoustically bleaching the world's oceans" (Clark 2016) for animals for whom sound is the primary sense. The extent of whales' cultural richness heightens the tragedy of the extent to which, in these conditions, they may be hampered in practicing their cultures, their sociality, their ideas, their creativity;[8] and which thus risks being lost both to current and future generations of whales and to any possibility of human documentation. While recognizing that whale cultures are living cultures, and adaptive to varying extents, part of the urgency of this thesis is to learn how to document whales more fully than conventional science currently does, and to make a beginning to the work of that documentation. That is because some species may soon be gone, like North Atlantic right whales—of whom only about 370 remain,

[8] See Gero 2016 on what it would mean to lose whale cultures and the accompanying traditional knowledge and "solution[s] to the problems of [their] environment"; McLean 2009 on expanding the concept of creativity to include nonhumans.

among whom almost none live to old age.[9] Their suffering haunts this thesis, as it haunts many of my human interlocutors.

1.1 Research questions

The main research question to which I set out to respond was: *Marine biologists know whales intimately. What can marine biologists' scientific ways of listening to whales, and qualitative experiences with them, tell an ethnographer about who whales are? What, in turn, might whales themselves tell us?*

I also wanted to explore these subsidiary questions: *How might scientific listening exceed formalized technologies like sound recordings? What other modes of imaginative listening, including anthropological, might make perceptible previously unarticulated or unheard registers of whales' experiences?*

Finally, I hoped to explore possibilities within ethnographic writing about nonhumans, asking: *How closely can ethnographic writing approach the lifeworlds, or umwelt (von Uexküll 2010), of nonhumans, and how closely might it draw its readers into those worlds?* I aimed to expand both what can be *learned* and what can be *conveyed* about the nonhuman companions with whom anthropologists interested in multispecies ethnography conduct our research.

I used the word *listening* in my research questions partially as synecdoche for sensory attention, but moreover because whales' primary sense, as I mentioned above and as marine biologists are quick to point out, is sound. In the ocean environment where they evolved, sound travels four times faster than in air, and light does not travel well at all (Peters 2015: 61). Whales communicate with one another across vast distances; in certain conditions, their songs can be

[9] Henceforth, where I state "right whale" I mean North Atlantic right whale; where I refer to their southern counterparts, I specify this. A 2004 study, which examined 30 of 54 total known right whale deaths from 1970-2004, found that shipping and rope entanglement caused 77% of the 18 adult and juvenile deaths (causes of death in the 12 calves examined were less clear; in the vast majority of non-clearly anthropogenic deaths among all the whales examined, the cause of death could not be determined) (Moore et al 2004). A more recent study of right whale deaths from 2003-2018 found that ship traffic and fishing together caused 88% of mortalities in which the cause of death could be determined (Sharp et al 2019). North Atlantic right whales forage along the Eastern Seaboard and in the Gulf of St. Lawrence, where there is significant shipping and fishing activity. But both ship collision and gear entanglement are largely preventable, if there were tightened regulations on ship speed and widespread adoption of ropeless trap technology (see Jones 2024). Right whale scientist Michael J. Moore writes of humans being unable to "let right whales die of old age" (2021: 157). Fisheries and Oceans Canada estimates the species' current population at 372 individuals (2024).

heard from thousands of kilometres away (see Ashcroft-Gaudreault 2023, Cormier n.d.). Toothed whales depend on echolocation to hunt, and speed-of-sound delays in communication condition all whales' experience of time and space, in ways that are difficult to conceptualize from a human sensory vantage point. Geographer Nigel Thrift proposes that for whales space "is not so much stretched as routinely practiced… Near and far just do not have the same connotations for them as for human beings" (2006: 142). It is impossible to know precisely *what* connotations concepts like nearness and distance have for whales, but I argue in this thesis that it is possible to get enough of a sense of whales' subjective lived experiences to know something about those experiences. For acquiring such knowledge, I learned, listening and sound—what I thought would be my main focal points for connecting with whales—are important, but almost equally so were other sensory modes of experiencing whales' worlds, and feeling whales' presence, especially (but not only) affect, eye contact, movement, and scent/breath, that is, smelling (and seeing and listening to and feeling and inhaling) whales' breath.

The four chapters of this thesis answer my questions in entangled ways. Chapters 1 and 2 deal primarily with marine biologists' quantitative knowledge practices, qualitative experiences with whales, and how the latter offer a great deal of knowledge about cetaceans that does not fit into the conventions of the former. Chapters 3 and 4 each offer "cetacean ethnographies," experimental answers to my questions about how to bring ethnographic writing closer to cetacean worlds.

1.2 Chapter summaries and review of the literature

There are many ways of knowing whales, of which I attend to only a specific few. Many Indigenous communities have deep relationships with whales (Sakakibara 2009, 2010; McNiven 2010; Coté 2010); and many human trainers and tourism workers come to know whales in captivity (Warkentin & Fawcett 2010; Servais 2016). Social science has frequently dealt with these topics, but has given less attention to whale research or researchers (see Burnett 2012 on cetology through the 20th century; Ritts & Shiga 2016 on "Military Cetology"), and almost no attention at all to how a social rather than conventionally "natural" science might study whales (with the exception of Ingold's 2001 critique). When whales are discussed in social sciences or humanities fields, they often appear as thought experiments or metaphors deployed to reframe

ideas about humans. For example, in a chapter considering the ocean as a medium, media scholar John Durham Peters makes the interesting point that whales have culture without infrastructure, then goes on to speculate about what it might be like to live with a long list of deficits: "memory but no history; poetry but no literature; counting but no… mathematics; music but no scores; … culture but no civilization" (2015: 82). Why would whales not have history? How is he able to call their communications poetry yet not literature? What is it to have "civilization," anyway?

Cultural scholars can do better than that by whales. Anthropologists are well equipped to think across difference, even species difference. There is our long history of engaging with cultures unfamiliar to our individual and institutional positioning; our self-reflexivity about our own commentaries, which have begun to cross the bounds of species; and perhaps most importantly, our diverse techniques for sensory attention beyond the constraints of language. Anthropologists have written extensively, in recent decades, about the importance of engaging with multispecies worlds, and demonstrated our disciplinary capacity to do so (see, for example, Haraway 2003, 2007; Hartigan Jr., 2020; Kohn 2013; Raffles 2010; Swanson 2017; Tsing 2012, 2015). In this thinking, the focus has largely been on the necessity of understanding something about nonhumans to better understand either human lives specifically or more-than-human relational entanglements more generally, not on particular nonhuman animals or species—with a few notable exceptions (Hartigan Jr., 2020; Swanson 2017; Lorimer 2006). Knowing nonhuman animals, and producing knowledge about them, is largely deemed the purview of quantitative science (Swanson 2017).

Yet, as I argue in **Chapter 1**, *"Subtle Methods": Qualitative learning at the sidelines of science*, in the case of cetaceans, much that natural scientists learn about whales is learned through qualitative means not dissimilar to the practice of ethnography. Such knowledge often cannot be quantified. In the field with whales, or in the office looking at or listening to raw data about whales, scientists learn a great deal through sensory-intuitive channels about what matters to and for the whales they are studying. This knowledge, I will demonstrate in Chapter 1, has significant effects on every stage of the work they go on to do—formulating research questions, doing research, processing data and writing up/publishing—and on how they conceptualize whales as *beings*, not just objects of study. Yet knowledge of this order is virtually undocumented. That is a disservice, I argue, both to whales and to our knowledge about them.

Anthropologists of science have noted how the language of scientific publications render these publications' subjects less lively than how scientists experience them. Latour called this "de-animating" (2014). Natasha Myers' ethnography *Rendering Life Molecular* (2015) is an excellent example of how STS not only provincializes western knowledge production, but also illuminates new knowledge about that which scientific knowledge producers take as their research objects. Her attunement to the research and teaching practices of protein crystallographers demonstrates the liveliness of protein molecules in ways the modellers' publications do not (and perhaps, within the conventional scientific publishing model, cannot). Stefan Helmreich, meanwhile, in *Alien Ocean*, learned during fieldwork with marine microbiologists that what anthropologists and microbiologists do is not that different; "oceanography and ethnography have much in common," partly in that each works to encapsulate in writing entities that are almost by nature too immense for words: the ocean; culture. These entities are fluid and malleable; they frequently transform (2009: 21-22). Yet science by and large continues to render its research objects in what Myers described as "static data forms." In protein crystallography, she writes, "two dimensional images depict molecules as rigid bodies… static images pose serious problems for those without the expertise to interpret the data" (2015, p. 4). Such is the case with cetacean research products, too. Quantitative forms render whales as far less rich and far less interesting than scientists know them to be.

Another challenge is that scientists' knowledge beyond what can be quantified is often not semantic, or exceeds what can be semantically articulated. In her ethnography of whaling in the Azores, Katja Neves-Graça noted how a former whaler described learning from whales' patterns of breathing about what the whales are doing or feeling (2005: 2). Meaning is transmitted in these interactions, she wrote; the whaler learns about differences and similarities between himself and the whale; and becomes aware of (citing Bateson) the "pattern which connects" each being with all others. This transforms whalers' understanding not just of the whales but of the ecosystem of which both whales and humans are a part. "The whaler glimpses the sublime and senses it with all his being" (2005: 3). While most of my interlocutors would not have used the word *sublime*, this whole-being sensory understanding, and the resultant transformation, is consistent with how they articulated their experiences. However, as Neves-Graça writes, echoing my interlocuters' struggle to find words, meaning is "immanent in the interaction and… therefore, not entirely reducible to descriptive prose" (2005: 3). Descriptive prose, I argue, still

has much to offer; in this thesis' latter two chapters, 3 and 4, I experiment with finding ways to render something of the embodied, qualitative knowledge of whales that is under analytic discussion in Chapter 1.

Chapter 2, *Sparse Data and the Spaces Between***,** considers some of the effects of marine biology's quantitative facade, in the context of the ever more dominant idea that all scientific knowledge is of a quantifiable nature, and therefore could as easily be collected, processed and analyzed by intelligent machines as by human researchers. A conversation early in my research with longtime marine biologist Richard Sears led me to realize that the blinders of isolationist scientific practices mean practitioners fail to even notice certain phenomena: if you are too focused on one specific element of a blue whale in the ocean, you might not notice something important about how the whale interacts *with* the ocean. And science, and the knowledge sphere in general, are, as Sears noted, getting more specialized (Casadevall & Fang 2014; see also Swanson 2017). Sears spoke of how one needs to understand whales in the context of their habitats and in their sociality. This was obvious in my own fieldwork with whales, and several of my interlocutors echoed it. However, as I discuss in Chapter 2, human researchers are less and less involved in field research about and with whales, and less and less involved in the direct processing of data. This is consistent with trends across the biological sciences (see Parris-Piper et al. 2023; Ríos-Saldaña et al. 2018; Hütt et al. 2023; Carmel et al. 2013; Tewksbury et al. 2014; Noss 1996).

I argue in Chapter 2 that something is lost in this shift from what cetologist Hal Whitehead described to me as "sparse data" to what is increasingly becoming, in his words, "a complete data scenario." Of course, as Whitehead then qualified, no dataset is ever truly complete. But the enormous datasets that remote technologies can collect (for example, underwater recordings with durations of months rather than minutes), so enormous that machine learning is required to process them, create a facade of completeness that I will argue has significant implications for how cetology formulates whales. The sparseness and "gappiness" of data that once characterized marine biological study, I will argue, made evident the excess of cetaceans, beyond what human knowledge practices can document of them and beyond what we can know of them—an excess that is obvious when one is in the field *with* whales. Whales become whole, I argue, in what is absent from our descriptions—scientific, anthropological, artistic and of other kinds. And while advances in technology and data processing capacity are generally framed as improvements to

marine biological research and therefore hailed as having the potential to improve whales' lives, a number of my scientist interlocutors said that actually more data is not what is needed to help whales. Rather, whales need regulatory reform based on what scientists already know, some of that knowledge precisely the kinds of qualitative insights discussed in Chapter 1.

One response to this loss is, I propose, to extend the purviews of science and ethnography toward one another, opening science to more qualitative methods and modes of representing; and admitting ethnographic methods into the realm of knowledge production about cetaceans. I argue throughout this thesis that ethnographers can observe and document knowledge about cetaceans that is new, and different in kind and in content, from what quantitative science allows or is able to hold. Chapters 3 and 4 demonstrate this argument. They also demonstrate how a literary-ethnographic style of writing is one form that can more fully articulate what we (knowledge producers, including scientists and ethnographers of cetaceans) know about "who whales are," while leaving open space for that which will likely remain unknown. Each of these chapters contains a brief "cetacean ethnography," of specific Bay of Fundy whales I encountered during my fieldwork.

The protagonist of **Chapter 3**, *Cetacean ethnography and the potency of strange intimacies*, is an orca I call "the lost orca," because he was separated from his mother at a young age and began to live, instead, with various pods within a population of Atlantic white-sided dolphins. When I encountered this orca in the field, he was with a nursery pod of dolphins which included several adults and thirty or more calves. Naturalists speculated that the orca, who had been living with the same population of dolphins for fifteen or more years, had been tasked with taking care of the young—the most vulnerable. All this is extraordinary for a number of reasons, first and foremost that scientific knowledge about orcas would point to the lost orca, male and transient, *eating* dolphins—certainly not peacefully hanging out with them. Some orcas, including entire resident populations on the west coast of North America, do not eat marine mammals; but this one, the lost orca of the Bay of Fundy, does: he has been observed multiple times eating porpoises, which are little other than small dolphins of a slightly different physical morphology. It makes no biological sense for the lost orca not to eat dolphins—except that they have cared for him since he was young, vulnerable, and alone; and that orcas generally live with their natal pods for their entire lives. Yet science has taken virtually no note of this orca, and has not remarked at all on his extraordinary lifestyle. Chapter 3 documents what I learned of him,

from seeing him and from speaking with naturalists who have seen him many times. I conclude Chapter 3 by suggesting that knowledge about cetacean singularity, and how specific individuals adapt to life-changing circumstances, has significance for conservation. Better understanding what whales desire and need, and the ways in which they are willing and able to change their own habits, may prepare us to better help them when change cannot be avoided.

Chapter 4, *Cetacean-human intimacies and what there is to lose*, takes up the story of an individual humpback whom I call "the half-fluke whale" (a propellor strike when she was young mangled one of her tail flukes), and the naturalist who has a special relationship with her. It also discusses more generally how the naturalist, Amy Tudor, comes to know whales—through field observation; through making herself emotionally vulnerable *to* the whales; through sensory-affective intuition; through secondary research; and even through dreams. Chapter 4 goes farther into speculation about whales' inner lives than any of the other chapters, attempting to evoke whales in the ways my interlocutors evoked them for me—as beings with, in marine biologist Lindy Weilgart's words, a wide "range of emotions," some of which can be felt by humans who are in their presence.

Two experiments are at work in Chapters 3 and 4, which I will discuss in turn: first, doing ethnographic research to learn about nonhuman animals; and second, narrating nonhuman animals' lives, including speculation on their subjective experiences of the world.

1.2.1 *Knowing whales*

There are a few anthropologists and other social scientists working to turn our disciplinary skills to learning about nonhumans. One is John Hartigan, Jr., whose ethnography *Shaving the Beasts: Wild Horses and Ritual in Spain* explicitly uses social theory, specifically Goffman, to better understand how horses experience being herded and shaved in small mountain communities in Galicia (2020). Hartigan Jr. uses intensive observation and draws on "thin description" and "flat ontology" (Hartigan, Jr., 2020: 9, citing Jackson [2013] and Latour [2007]) to open social analysis to the study of horses. Scientists, Hartigan Jr. notes, tend to espouse the idea that knowledge progresses "from initial qualitative formulations to more quantified ones"; however, much is lost in the process of quantification, including much of that which takes place in relations between animals, which ethnography is well suited to documenting (2020: 259).

Hartigan Jr. ultimately offers clear contributions to knowledge about Galician wild horses, and thus a significant intervention in the anthropocentric purview of most social science. In form, however, his writing falls somewhere between conventions of biology and classic ethnography. My own experimental approach to form and story goes farther, and is more of a kin with literary works I will discuss below.

Making an argument similar to Hartigan Jr.'s—that it is possible to do anthropological research *about* nonhuman animals, not merely about how they bear on human lives—Heather Swanson advocates for ethnographers to learn the methods of natural scientists. The multi-species curiosity that has blossomed in recent decades among anthropologists still has serious "methodological dilemmas" (Swanson 2017: 84), partly because many nonhuman animals are usually not accessible to those who wish to spend time with them. I did not venture as far as she did into learning the technical skills of marine biology (Swanson's example is examining salmon scales under a microscope), though I spent many hours listening to whale sounds and many days working alongside scientists in field and office settings, doing tasks that did not require extensive training or technical knowhow. I did, however, learn to read science's archive as a source for ethnographic data about cetacean interlocutors. This is a crucial building block for my cetacean ethnographies. Further, hearing from scientists and naturalists about how their bodily and intuitive responses also help them understand whales, I learned to attune to my own embodied responses to situations of "science"—for example, bringing seal body parts back to the sea after necropsy—in similar ways as the ones researchers described to me, alongside my own ethnographic attunement.

Critical theorists differ on the extent to which we *can* know what it is to be a nonhuman animal. Nagel's classic "What is it Like to be a Bat?" argues that human experiences are so different from those of bats that we cannot imagine them in any meaningful way beyond the merely schematic; "extrapolation from our own case is… incompletable" (1974: 439). I disagree, as do my interlocutors (on extrapolation across species of mammals, see my discussion in Chapter 4). Yet, something of Nagel's argument in this essay resonates with my work in this thesis, and that is his position that it is possible to "believe in the existence of facts… whose nature we cannot possibly conceive" (1974: 440). If to "conceive" is to "form or devise (a plan or idea) in the mind" (Oxford English Dictionary 2025), I am arguing that those humans who know whales intimately learn, through their embodied presence with whales, facts about the

whales that they cannot completely conceive. But, I argue, their sense of their own inability to "accommodate in [their scientific] language" (Nagel 1974: 440) these facts does not mean that they do not *know* them. Rather, these facts constitute knowledge about whales *beyond* what can be "conceived," or perhaps, in Stuart McLean's words, knowledge about whales that exists "before the branching and bifurcating of ways, before the relations that produce this world rather than that" (2017: 18) which western language, especially the language of science, is accustomed and equipped to describe.

I do not mean to suggest such "facts" are infallible or complete, nor precisely the kind of facts Nagel means. They are always imprecise, and as I argue in Chapter 2, that is part of their value, serving as a reminder that—to borrow Nagel's words again—whales have "experiences fully comparable in richness of detail to our own… And to deny the reality of what we can never describe or understand is the crudest form of cognitive dissonance" (1974: 440). Such denial is precisely, I argue in that chapter, what we risk in shifting to machines the task of direct engagement with whales and raw whale data. Far better to, as Kohn narrates of an Amazonian interlocutor, treat nonhuman others "as the intentional communicating selves they are," even if the resulting understanding is "never absolute" (2013: 81).

In Kohn's ethnographic work, the "good guesses" that his interlocutors make about the thinking of nonhuman others serve an important function for their (the humans') lives, for example helping predict significant events (2013: 85-86). My scientist and naturalist interlocutors' understandings of "what it is like to be a whale" are not directly significant to their daily lives in the way that they are for Kohn's Amazonian interlocutors. Yet most believed—some stating this belief more explicitly than others—that making guesses about whales' subjective experiences was worthwhile for their work, even if they never published those guesses. Michael J. Moore made a clear argument for stating knowledge of this order when he said that whales deserve to have their stories told. The extraordinary postscripts of his book, *We Are All Whalers* (2021), narrated from the first-person perspective of right whales Moore necropsied, were written, he told me, "from the heart"; the prose makes evident Moore's belief in the possibility of knowing, across difference, nonhuman others' subjective experiences of their lives and, in the case of his narratives, their pain. Moore is not suggesting that we can know everything about what it is like to be a whale, nor that all of that which we know about them can

be stated in language—but that whales deserve for us to try, and to try to share what we know, our own good guesses.

Hal Whitehead has noted how difficult it is for humans to imagine what it is like to be a whale. But, far from not trying to imagine it, he proposes artistic experimentation as a response to the gulf between humanness and whaleness. "Artists and writers aren't constrained by scientific processes," Whitehead noted in a *Guardian* interview. "You can speculate, imagine yourself in the world of the whale. And then open-minded scientists, by looking at what artists produce, may make hypotheses that will lead us onto paths that will begin to crack these great mysteries" (Hoare and Whitehead 2011).

1.2.2 *Writing whales*

The cetacean ethnographies here are experiments in ethnographic writing, contributing to the speculative effort that Whitehead proposes and using sensory, mimetic writing (see Taussig 2018) to "imagine… the world of the whale" (Hoare and Whitehead 2011).

Several literary authors have written works with nonhuman narrators. Novels include Barbara Gowdy's *The White Bone* (1997), which has elephant protagonists (and which Whitehead brought up unprompted in our interview as an example of a work of art he really liked); Sara Baume's *Spill Simmer Falter Wither* (2015), with its compelling, visceral narratives from the perspective of a rat terrier; and Patricia Korgemagi's *The Hunter and the Old Woman* (2021), in which one of two protagonists is a cougar. In literary nonfiction, there is Charles Foster's *Cry of the Wild* (2023), which comprises eight stories with different nonhuman protagonists. In science, there are the right whale narrators of Michael J. Moore's postscripts; and the dolphin protagonists of Richard C. Connor's *Dolphin Politics in Shark Bay* (2018). In social science, Tsing's *Mushroom at the End of the World* (2015) proposes protagonists such as pines and fungi; Raffles' *Insectopedia* (2010) turns to insects, although the narration there is more distant from animal subjectivity than my own; and Lorimer's "Herding memories of humans and animals" (2006) beautifully imagines how reindeer sense their geographies. These works differ in the level of explicit speculation they engage in around nonhuman subjectivity. Not all are written from a position of experiential closeness with their animal protagonists,

though all are evidently based on extensive research. Most do not explicitly work from their own intimate experiences with the nonhumans these works take as their subjects.

My cetacean ethnographies are inspired by and in conversation with these works, as well as expanding the possibilities of this genre. In this, I am inspired by the work of anthropologists who have theorized about and experimented with pushing the boundaries of ethnographic writing (e.g. Stewart 2007, 2017; Pandian & McLean 2017; McLean 2017). Ethnographers, such authors have shown, can "make a method out of ontologically curious writing," and in so doing "learn something about the creative energy of worlds" (Stewart 2017: 230), bolstered by the qualitative, experiential research that is ethnography's hallmark. I look, too, to sensory ethnography, which David Howes describes as "feeling along with others what they experience," and which is closely related to arts-based research situated *between* art and science. "These sense-based methods," Howes writes in his *Manifesto for Sensory Studies*, "disturb our conventional habits of perception, and lead to the discovery of other modes of being and knowing" (2022: 13). In Chapter 3 particularly, I use my own body "as an instrument of research" (Crang 2003: 499; see also Paterson 2009) to find points of entry into what it might be like to exist in a whale's body, with a whale's sensory plane.

In his essay on dolphins, Bateson expressed concern that it might be difficult for humans to empathize with cetaceans because our ways of apprehending the world are so different (1972, p. 374). But then he went on to empathize with them, speculating for example that their mode of communication with one another may be more direct than ours because, as they do not grasp, their representational mode is not "thing"-focused (1972: 374-5)—speculation, I would argue, of just the sort that Whitehead is calling for when he lauds the ideas of "open-minded artists." Though pointing to the difficulty of precisely understanding or delineating cetacean worlds, Bateson also wrote at length about how the earth's inhabitants are not so essentially different from one another. He saw minds as extensive with the worlds surrounding them; and of a "pattern which connects" us all, human and nonhuman, animal and otherwise (1979). He argued all beings are made of the same invisible matrix, perceptible in "cracks and irregularities" that emerge from "stories, percepts and dreams"; and that all minds think in terms of stories (1979: 13). *Stories, percepts, and dreams* therefore, are also points of access—if always partial access—to articulate the meanings and sensory planes of nonhumans.

Latour proposed in his 2014 "Agency at the time of the Anthropocene" that "story-telling is not just a property of human language"; that nonhuman agents, metaphorically, "tell" stories too, in the sense that their existence involves action and drama (2014: 14), not mere rote biology. Latour cited the novels of Richard Powers as one example of how to re-animate scientific knowledge through story, and wrote that doing so would mean our "statements will draw what [we] are bound to" (idem: 17). If we could do this, forces of nature would feed political discussions rather than stopping them (2014: 17). Such a shift could have significant consequences, for example in the lives of the North Atlantic right whales whose bodies so often wash up on shore wrapped in traplines, with the general public, as Michael J. Moore pointed out to me, largely unaware of their plight.

In Powers' *The Overstory*, the omniscient narrator observes there are "brains" underneath a forest floor, "ones our own brains aren't shaped to see. Root plasticity, solving problems and making decisions…" (2018: 453). If our human brains are not shaped to see them, Powers seems to propose, we are nonetheless capable of perceiving them when a storyteller presents them to us. Powers' success in "re-animating" the insights of science comes as much from theory (trees are alive and communicating) and method (deep listening, attention to scientific knowledge) as from the voice and style in the book that is eventually disseminated. Referring to the knowledge of a tree scientist: "*She's sure, on no evidence whatsoever, that trees are social creatures. It's obvious to her: motionless things that grow in mass mixed communities must have evolved ways to synchronize with one another*"; "*You and the tree in your backyard come from a common ancestor. A billion and a half years ago, the two of you parted ways*" (2018: 122; 268; italics added). The force of Powers' reformulation of dry scientific knowledge demonstrates how potent science studies scholars' analyses could be if we could, in our disseminations, dismantle what Tsing calls "the unfortunate wall we have built between concepts and stories" (Tsing 2015: 158-9) and take seriously how "style and voice… do the heavy lifting of analysis" (Taussig 2011: 148). Style and voice are important for the cetacean ethnographies of Chapters 3 and 4, especially in working to articulate the ways that whales might experience their environments through their senses. So, too, is what Taussig, in earlier thinking, described as the combining of "sensuousness with copy" in mimetic representations—a capacity that he argues (citing Adorno) immerses one sufficiently in "the concrete… to break definitively from the fetishes and myths of commodified practices of freedom" (2018: 195). If mimesis, magically, "[acts] as if it were

indeed the real" (ibid.) such writing as Powers' creates for the reader encounters with the real that change how they understand reality, and may encourage them to act differently within that reality, to, as Taussig suggests, "live in a different way" (ibid.).

The ethnographies of Chapters 3 and 4 are an exercise in what Jessica Marie Falcone, writing about ethnographic fiction, calls "genre bending," and while the effort is kin with hers and others' definition of ethnographic fiction—Falcone's being "(1) a narrative nurtured or inspired by lived experience (or 'being there'), and (2) it is unfettered from the bonds of the precisely observed" (2020: 213)—I do not think of them as fiction. That is because "fiction" about nonhuman animals tends to be categorized *as* "genre," shelved alongside science fiction or speculative fiction. Yet the speculation within them is not the speculation of possible futures that is implied by the aforementioned literary genres, but speculation into the subjective experiences of nonhuman animals who exist alongside us in the present. I think of the cetacean ethnographies here as a different way to narrate the empirical realities of cetaceans, that which science currently understands of those realities and that which my ethnographic research taught me about them. I do not mean that there is not the potential for me to have gotten things wrong, nor even that what I am writing here is explicitly *not* "ethnographic fiction"—but that pragmatically, stories about nonhuman animals, in the western reading public (academic and otherwise), are understood differently than stories about humans; and I think it is more fruitful, at this point in history, to categorize the *form* of my cetacean ethnographies as experimental or speculative, rather than to categorize their contents as fictional.

The writing in these ethnographies also bears commonalities with ethnographic poetry, perhaps even more than fiction. They aim to use the tools Nomi Stone attributes to poetry, which has, she writes, "its own embodied laboratory, to amplify sensation, to make a lived world"; and which can "[allow] for a more mimetic experience for the reader" (2020: 197) in how it helps with the anthropological effort to " render the condition of being in a body and being in time" (idem: 195). Stuart McLean, meanwhile, suggests "the language of poetry is inescapably evocative of the openness of human worlds to the other-than-human presences" (2020: 202). Both authors write of the texture, sound, and rhythm of language—"the rhythmic pulsions of words" (idem: 204)—as ways to evoke our interlocuters' experiences and, for McLean particularly, to evoke experiences that are more than individual or more than human. My cetacean ethnographies are attuned to such textures, to pacing and sensory clout, not venturing as

far into linguistic experimentation as poetry often does, but aiming nonetheless for their language to be similarly evocative of sensation.

1.2.3 *Cetacean singularity*

Much of the theory underpinning this thesis, like Bateson as cited above (1979), emphasizes interconnectedness, interdependence and relationality, challenging the notion that any of us, human or otherwise, really exist as isolated individuals (see Haraway's discussion of how each human is "vastly outnumbered by the tiny companions" that make up 90% of the cells in our bodies [2007: 3-4]). Grounded in such theoretical work, other scholars have critiqued the western literary tradition's emphasis on individual heroes (Ghosh 2016; see also Tsing 2015). In writing cetacean narratives, I kept this always in mind. However, when I began doing fieldwork I quickly learned that the most powerful stories scientists and naturalists had to share with me were about *individual* whales they had encountered, in some cases whom they came to know over the course of years. Because scientists' and naturalists' knowledge of this nature was a hugely significant way I learned about whales, I chose not to subvert individualism on as deep a level as I might, in a more explicitly literary-speculative project, attempt. I cannot know that whales experience themselves as individuals, or understand themselves to be individuated, in the way that humans do (which, of course, varies widely across cultural contexts), or in the way that I narrate their experiences. Yet, the ways in which my interlocutors—the vast majority of them cautious in the extreme about undue anthropomorphism—articulated whales suggest that on this very basic level of understanding oneself to be an individuated body with a singular perspective and singular history, parallels may be drawn between our experiences, as mammals, and that of cetaceans.

Discussing her break from the classic anthropological convention of making generalizations about cultures or societies, Lila Abu-Lughod wrote that a focus on individuals "helps to break down 'otherness,'" because it reflects how we think about the people we know in our lives and "actively facilitates identification and sympathy toward others" (2008: 29). That is almost precisely the argument I heard from Michael J. Moore. Almost all biological accounts of whales traffic in generalizations: they are about species, or at their most particular,

subpopulations of species.[10] Yet, "natural selection does not homogenize the individuals of a species" (Smail 2007: 124). My move to telling stories of individual whales is a break from the tendency toward generalization; and an intervention, in my argument that this merits academic study even though it may not lead to sweeping claims. To state the obvious, differing from most contemporary ethnographies, the cetacean protagonists of my last two chapters can never read my accounts of them. That is not to say that I do not write these ethnographies, on a fundamental level, *for* them—to help humans know them better, and thus, care about them more and more effectively. But the politics of representation are different than if I were writing about humans who were able to tell their stories, themselves, to other humans. Whales likely have something like what we call "stories," too—my work here is to try to hear them.

1.2.4 *Knowledge beyond science*

Of course, in many non-western and non-scientific traditions of knowledge about whales (for example, that which Neves-Graça [2005] relates about Azorean whalers) storytelling never went out of vogue; the animacy, uniqueness and capacity for wisdom of nonhuman animals were never questioned. Harry Brower, Sr., an Iñupiaq whaler and community leader, told oral historian Karen Brewster (2004) that when he was close to death in a hospital in Anchorage, Alaska, a baby whale came to him and took him north to Utqiagvik, over a thousand kilometres away. The whale showed him his sons hunting a mother whale, which they should not have been doing. Brower Sr. said he did not die in the hospital bed because he had to communicate to his sons that their practices were harmful. His story demonstrates both the power and the reality of listening to nonhumans for substantive meaning. It is a particularly poignant example among many accounts—scholarly and otherwise, from Indigenous knowledge-bearers as well as from anthropologists and other non-scientific thinkers—of more-than-scientific ways of knowing animals that have contributed to my own understanding of the being that any nonhuman animal *is*: at its most basic, an intelligent, communicative entity, reducible neither to its biology nor to

[10] Moore's 2021 book is an exception; other exceptions include some published "Notes" that describe the unusual behaviour of specific individuals, for example Conry et al.'s account of a humpback dolphin who repeatedly took on and cared for calves of other species, titled "Short Note: Alloparental care of a bottlenose and common dolphin calf by a female Indian Ocean humpback dolphin along the Garden Route, South Africa" (2022).

human description, deserving of our respect; a being with whom our own wellbeing is entwined.[11]

The deep and fulsome histories and relationships between Indigenous Peoples and whales around the world have been explored by other social scientists (see Sakakibara 2009, 2010; McNiven 2010) including by Indigenous thinkers (see Coté 2010). Here, while informed and inspired by these relationships, I am primarily interested in opening the western tradition to richer, more just, and more accurate ways of thinking about nonhuman animals, specifically cetaceans. My research demonstrates that even western scientists themselves do not share the reductive perspective of nonhuman animals that their knowledge products seem to illustrate; this thesis seeks to intervene against that reductivism, an intervention that is not needed for Indigenous knowledge about whales.

My narrativizations of whales' experiences are based in data from a combination of primary and secondary research, the latter primarily scientific publications. I feel comfortable plundering and extrapolating from scientific knowledge—collaging insights distant from one another in space, time, method or discipline; juxtaposing them with my own insights; reframing them. While there is vast traditional ecological knowledge about whales, it did not feel ethical to appropriate this knowledge for my experimental narratives. However, I want to be clear that in questions of conservation and regulatory policy, Indigenous knowledge of cetaceans should be a key factor in decision-making. In making the argument to expand the forms of knowledge that "count" as knowledge, perhaps my work in this thesis could also help expand the kinds of knowledge that are admitted to spaces of decision making, more generally.[12]

1.3 Fieldwork particulars

Though the nonhuman lives I set out to research were those of cetaceans, others also washed in: ailing Cape fur seals; diving seabirds; smaller others like "sea gooseberries," transparent comb

[11] Among these accounts are Borrows 2018; Cole 2016; Salmón 2000; Simpson 2017; Todd 2018; Feit 2004; Kohn 2013; Noble 2018; Scott 2013.

[12] Some progress has been made in opening formal knowledge to traditional ecological knowledge. For example, a recent ship noise exposure study used both western scientific methods and Inuit knowledge to identify whale habitat areas (Kochanowicza et al 2021). But, exemplified by this article, the opening is not to more *forms* of knowledge but in what knowledge sources are considered to produce acceptable input "data" for scientific claims. Here, Indigenous knowledge is rendered and deployed as simply another quantitative dataset.

jellyfish the size of highbush blueberries, which one naturalist scooped from the ocean and deposited into my hand, saying: Taste this. The smell of the seals; the residue of pelagic aliveness that I try to scrape from scientific papers; the texture of the jellyfish on my tongue—I could not bring myself to swallow; I was pregnant, I had never heard of eating such a thing; I spit it out; I regret that, now, writing these pages as a healthy two-year-old chortles in the next room. Surely the jellyfish was not sinister. By not eating it I may have spared it its life. But my body is less oceanic, now, than it might have been.

The raw oceanic materials for this thesis come from many places. Some are from forms of the "deep hanging out" (Geertz 1998) of classic ethnography, with marine biologists; with naturalists; with pelagic animals or, when animals did not materialize, as close as I could get to the spaces they inhabit. Some come from talking to people who know marine mammals intimately. Some of the raw materials were bloody, or pungent, or highly technical; some were spreadsheets and datasets. Many threads of the stories here were woven from amassed, then dissected, knowledge products of science.

I conducted participant observation in two field sites, including interviewing local naturalists in both; and interviewed (in-person where it was possible, but many remote) cetacean scientists in Canada, the United States, the United Kingdom and South Africa. The field sites were the Bay of Fundy off Brier and Long Islands, which jut into the Gulf of Maine on the western edge of Nova Scotia, Canada; and Sea Search Research and Conservation, a marine mammal research unit in Muizenberg, a surf-town suburb of Cape Town, South Africa.

1.3.1 *Nova Scotia fieldwork*

Since 2021 I have made several research visits to Brier Island and Long Island. The most sustained of these was five weeks from August-October. The owners of three (of 4-5) local whale watching tour companies generously allowed me to join them on their tours whenever space permitted, which, given I had a choice of three operators, was most days. One of these companies is explicitly a hybrid research/whale watching operation, and sends data on the Gulf of Maine humpback population—the primary whales who are watched, in that part of the world—to the Centre for Coastal Studies in Maine. But all the naturalists who "watch whales" on

these vessels are researchers almost by default; they cannot help learning about whales. Many remain in the same career for decades. Several have been working on the whale watching vessels since whale watching began in the area, in the early 1990s after a group of marine biologists arrived there in the late 80s looking for a population of humpbacks that had shifted its seasonal feeding grounds north. Those marine biologists realized—so local legend goes—that the best way to fund their work would be to take tourists out to look at whales while the scientists collected data (a model that is increasingly prominent globally).

My encounters with whales in Nova Scotia have been mostly with these Gulf of Maine humpbacks, and have mostly taken place in tourist environments, over the course of several dozen whale watching tours. My ethnographic attention on these tours was focused firstly on the whales, when they appeared (they almost always did); and secondly on the ways the naturalists learned about and interacted with the whales we encountered. I did not pay much attention to the ways the tourists encountered the whales; as noted earlier, many social science studies have already done this. During these journeys, I noted things such as: the whales' movements, and where their attention seemed to be; the texture and smell of their exhalations; the sounds of their breathing and their passage in and out of the water; the ways they interacted with one another; and the ways they seemed to respond, or not, to the vessels I was on and the naturalists I was with. By and large, I did not photograph or film the whales I encountered. Encounters with whales are almost always fleeting; I wanted to be as present with them as I could, when I had the opportunity to be with them. I made extensive notes and drawings after each tour (fortunately, my written fieldnotes were transcribed and backed up when my notebooks went up in flames; though I lost my drawings, I think the act of making them helped me gain a deeper understanding of the whales whose movements and physical form I was trying to emulate with my pencils. Two new drawings, made with reference to photos taken by a Bay of Fundy naturalist on two tours I attended, are included in this thesis—see Figures 2 and 3). I began to gain, as the naturalists had long ago, a sense for the local whales. I became able to hear the blows of whales that were too far away to see, or obscured by fog. I began to be able to predict how a whale doing a certain activity—for example, actively foraging for food, or resting—might move or behave. Though the mystery of humpbacks remains great, the whales themselves soon stopped feeling mysterious to me. They became simply beings who are different from me, who I encountered all the time. I

began to sense what seemed like joy or contentment from some of them, and from some of them, irritation at being disturbed, though this was rare.

When I was on one or other of these islands and weather prevented me from being on the water, I spent as much time as I could near it. I mention this because one of the arguments I make in this thesis is that spending time proximate to whales' habitats also offers some heightened understanding of whales. The affect of whales' presence is palpable from the rocky shores of these islands. Sometimes, I could see their bodies or their breath from shore; very often, if I stood still and listened, I would hear a whale surface and breathe. But even when no whale could be seen or heard, the ocean reminded me that it held them. The seabirds reminded me that they were sharing a food source with whales. The things washed up on shore brought me closer to whales, too: Sea foam, which contains plankton, a significant food source for whales; kelp, which humpbacks are known to roll around in when it aggregates at the water's surface; garbage of all forms—the plastics, big and small, that take up space in their stomachs; nylon ropes that wound them. Then there was the water itself, the 16 000 km^2 offshoot of the Atlantic Ocean that is the Bay of Fundy, deep blue so close to its mouth; the location of the highest tides in the world, into and out of which 160 billion tonnes of water flow every six hours. The power of these tides, the power of the presence of the bay itself, was a constant reminder of the expanse and extent of otherness within it. The bay kept me humble, and it kept me wanting to know more. When salt wind and water reddened my skin, when it whipped me and chilled me, I felt myself closer to their home, and I felt myself opening—to the ocean. To the whales. Inching closer to understanding what it might be like to live in there, as one of them.

I conducted in-depth, recorded interviews with four longtime naturalists who live on the islands and work on the whale watching vessels; during my time on the vessels and around the island's tiny villages (Brier Island and Long Island have a combined population of about 800 people), I had the opportunity to ask questions of and learn from many others, primarily naturalists but also the vessels' captains—who must understand the movements of whales so that they can mimic them, and not disturb the whales. I saw perhaps three dozen individual humpbacks, and one orca. I made eye contact with perhaps three of these animals. I inhaled, on the sea wind, air from many of their exhalations.

1.3.2 *South Africa fieldwork*

My fieldwork in South Africa was as a volunteer with Sea Search Research and Conservation in Muizenberg, a coastal town on the Indian Ocean edge of Cape Town. I was onsite for 1.5 months at the end of 2022 and then for 1.5 weeks in mid-2024, and have also done intermittent remote work with the organization. Sea Search is a marine mammal research unit that I approached because I was interested in the work they were doing on humpback whales; I soon learned their mandate is much broader than whale research. I spent my first few days, in November 2022, helping with humpback surveys up the west coast from Cape Town, offshore from an industrial town called Saldanha. After we returned to the Muizenberg office, several researchers continued working with the data I'd helped collect about humpbacks (mostly doing photo identification of the whales we'd seen). But the team's focus largely shifted to Cape fur seals. As a new volunteer, I was directed toward seals too, though I also helped with some day-to-day operations of the research unit, like equipment care and basic data entry. I joined Sea Search team members on several onshore and offshore marine mammal surveys; I also assisted with whale and seabird watching tours that Sea Search had been contracted to do for attendees of a film festival, where Sea Search team members demonstrated to the filmmakers (and, helpfully, to me) how they use their acoustic recording equipment.

The work I did related to seals requires some context. Cape furs, a generally thriving population of about two million, had a difficult couple of years in 2020 and 2021. In those seasons, thousands of seals died en masse (including, but not only, an estimated five thousand aborted pre-term fetuses) on beaches along the coasts of Namibia and South Africa. Sea Search, led by co-founder Tess Gridley, was essentially the first responder for these seal deaths, despite no dedicated funding and a general lack of both resources and skills related to a situation no one had experienced before, and no one had anticipated. Sea Search is composed of biologists, not veterinarians; they had permits to collect samples and carcasses, but no storage facilities for this scale of devastation, and few of the team members were trained in post-mortems, especially not of seals. Despite this, Tess was determined to figure out what was going wrong for the seals, and she led an extraordinary (still ongoing, as of early 2025) effort of surveying, collecting carcasses, and researching what the cause of death could possibly be. The hypothesis the team eventually arrived at—still the operational hypothesis, but still not proven—was that toxic algal blooms (red

tides) had caused a lot of the neurotoxin domoic acid to accumulate in significant concentrations in local shellfish. Seals, due to overfishing-related population depletion of fin fish, had undergone a dietary shift wherein shellfish had become their primary food; this was evident from the stomach contents revealed during postmortems. In the same couple of years, seals also began randomly attacking people, as well as one another, other animals like dogs, and inanimate objects like snorkelers' fins or stationary boats—behaviour that was unprecedented and totally out of the ordinary for them. During my first visit to Sea Search, most of the scientists suspected domoic acid toxicosis was causing this strange aggression too. There was precedent for this among sea lions in California (e.g. Goldstein et al. 2008).

I helped with several seal surveys, counting live seals and collecting carcasses for necropsy; I also helped with several necropsies, both in a lab and in the field. As a social scientist, I was further tasked with conducting about a dozen interviews with people who had been attacked by seals, to gather data on behalf of Sea Search that, it was hoped, could help both shed light on the human experience of seal aggression; and offer clues as to why the seals were behaving so strangely. In this process, I also had the opportunity to speak with many naturalists who work in the ocean tourism industry around the Western Cape (the province of South Africa in which Cape Town is located), and to learn something about how they, too, learn about the marine mammals they encounter all the time in their work.

A year and a half after I did this work, Tess invited me to return to South Africa to present about it at a scientific workshop on Cape fur seal aggression that the City of Cape Town, the Department of Forestry, Fisheries and the Environment (DFFE), and Sea Search were convening; and to spend a couple of weeks in the office helping sort data about seal-human aggression, of which there was, by now, a great deal, as there had by now been more than a hundred incidents (and likely many more that had not been documented) and more were being reported almost daily. A few weeks before the workshop was to take place, officials finally managed to kill an aggressive seal and collect its carcass.[13] When they tested its brain for rabies, the test came back positive. It was only the second time rabies had ever been documented in a marine mammal, the other being a single seal in Norway in the 1980s (Mørk et al 2004). The focus of the workshop

[13] Cape fur seals being slippery, aquatic and virtually visually identical, finding an aggressive one after the fact of its aggression had proven extremely difficult, not to mention the challenge associated with, if one did find it, retrieving an animal either tranquilized or killed while swimming among hundreds of others that look exactly like it.

rapidly shifted to rabies response; and the focus of the data-based work I did while in town suddenly felt newly urgent, as not everyone who'd been bitten in the past couple of years had even received a rabies shot. We needed to get through the data so that officials could contact anyone who might still require vaccination.

The focus of this thesis is whales—but seals intruded, and proved a compelling ground for my research interests. My time spent around seals and those who know them underlined the significance of qualitative learning from spending time with marine mammals and with raw data about them. The raw data I encountered of seals was their literally raw bodies, washed up dead then cut up either there on the beach or on steel laboratory tables. Seal postmortems were a window, for me, on what it is like to cut up a dead marine mammal in the hopes of learning something about its life. This work was different in scale and species from work with cetaceans, but not so different that I could not learn a great deal relevant to the lived experience of cutting up a whale. When I spoke with researchers who'd done extensive whale necropsy work, I could imagine something of what it was like for them to have their hands inside those giant bodies: my own hands had been inside dead marine mammals, too; my hands retained visceral memories of texture, smell, hue, heft. When Michael J. Moore told me that he could feel something like an *afterlife* of a whale whose story he was writing post-necropsy, I knew what he meant. While, because of constraints of length and scope, seals appear only on the periphery of this thesis' main arguments, they have informed and deepened those arguments in important ways.

1.3.3 *Interviews*

I conducted ten in-depth, recorded interviews with scientists who research whales, about half of them remote; and a total of five in-depth recorded interviews with naturalists (four, as aforementioned, in Nova Scotia, one in South Africa). I had many more informal conversations related to my research questions during my fieldwork. During my initial visit to South Africa, I worked with about a dozen researchers who are on the Sea Search team as well as encountered about a dozen more scientists and wildlife officials from other organizations. At the July 2024 conference, I had the opportunity to meet and speak with many more scientists and conservation officials, resulting in several in-depth conversations; and to witness scientists disseminating their work and discussing it amongst one another.

All these conversations, recorded and otherwise, were informal in nature. I had a sense of what I wanted to hear about, but allowed the interviewee to set the tone for the conversation. I began each interview by asking my interlocutor about powerful experiences they have had with whales; about knowledge they have about whales that they have not been or felt able to publish; or, in a few cases, about specific elements of their published research that I was curious about. I asked if they have ever felt "meaning" from whales whether or not they could say *what* the meaning was. I asked about what it is like to do the work they do and what it feels like to be with cetaceans in the wild. I asked about how the contemporary ocean and its ecosystems have changed since they began working in their field, and how the field itself may have changed. I asked each person about how they experience their knowledge of the ocean and the life within it on an emotional plane; how they deal with the realities of anthropogenic climate change and pollution. I allowed stories to flow and followed where my interlocutors' stories led. Often, among both scientists and naturalists, my interlocutors would ask if I had spoken to specific other community members; if I hadn't, they would tell me why I should or shouldn't, and would say things like "this person would disagree with this, but…"

Recorded interviews lasted between one and four hours. Informal conversations ranged from brief exchanges of a few minutes, sometimes over the roar of a small boat engine, to conversations over wine lasting long into the evening.

1.4 Conclusion

Whales make few distinct facial expressions. To human eyes, they can appear impenetrable as well as imperturbable. "They're quite rubbery looking," Sea Search's other co-founder, Simon Elwen, commented in our interview. But like us, whales are porous to what surrounds them. They inhale the same air. If there is a wildfire nearby, or a highway, or a factory, whales, too, breathe in whatever these entities breathe out. Ships, perhaps the most frequent product of industrial society that whales encounter, emit sulphur dioxide; nitrogen dioxide; and what is called "black carbon"—tiny black particles that combustion produces, which penetrate deep into mammalian lungs, and deposit toxins in mammalian blood and blubber.[14]

[14] See European Federation for Transport and Environment 2025; Climate & Clean Air Coalition 2019.

Some of these toxins, the whale breathes back out before they can reach blood. These, too, enter my nostrils when I suck in the air a whale's lungs have rejected.

Back on the boat, waiting for the whale to surface, I think: *Give them to me.*

Let me carry some of it.

As whales are porous to the waste of our industries, I argue in this thesis, they can be porous for us, researchers. We can learn about them through the ways in which we, too, are porous with—connected with—our surroundings, and the beings with which we share these surroundings—whales themselves, plus other entities we each experience. Comb jellyfish. Seals. Boat engines. The sea breeze.

The whale bursts from the water, her whole body shooting up, arcing to the side, huge sprays around her. The elegance of the curve, the white lines on her black body a mirror to her movements, water falling off her body in the shape of the curve, the whole event over before I register it is happening and then the huge crashing sound as she falls back to the surface—and she is gone. I am alone on the boat, surrounded by people. I am damp from the wave she made. It is October. I will not be on the water again this year. The sky is warm grey, and now, as late-day sun begins to smoulder through the clouds, the water is like slate. There is a brief patch of darker, smoother water where the whale submerged. Then that, too, is gone.

But I can still feel it—the whale's rise and then her crash, its resonance dying out of the soundscape while it repeats, *sssswoosh-crash* within me, somewhere behind my ribcage, moving from deep in my stomach to the front of my chest. My heartbeat catching it, rising in my ears louder than the waves, louder than the revving engine. *Ssswoosh-crash*. *Ssswoosh-crash*.

Then the engine reaches speed, the boat begins to move—and the breach's sonic residue, too, is gone. A friend places a hand on my hand, which is resting on the rail, not at rest. I can tell from her grip that my friend is short of breath, too.

The charred book draws me, landbound by winter, to read it. The frustration of missing words, paragraphs, pages; the blackened shards that agitate my nostrils each time I turn a page—these bring me closer to whales' lives, always conditioned by myriad forces that obscure. There is no pelagic life without pollution. Bodily toxicity, auditory masking, plastic floating on the waves.

In the fragments, Taussig describes a "sympathetic magic" related to corporeality. The magic happens when you make (specifically draw, but writing is also implicated throughout the

book) an image of something that you encounter in the anthropological field. The image provides its maker "bodily access" to the being the image represents. Making the image, Taussig argues, creates "a mimetic relation between you, especially that part of you called your body, with whatever it is that is being rendered into an image, and also with the resulting image itself" (2011: 23). That is what I am seeking when I write whales' images: I want to feel, as imperfect as such feeling necessarily is, some of what they feel; I want to be able to transmit some of what they feel to you—a reader.

Taussig says even "a fact like a kidney" is a story (Taussig 2011: 146). In what follows, an image I hold as I write is my own encounter with a Cape fur seal's kidney, which was like a dense, bright jelly in my hand.

I want to tell you what colour the kidney was, but "red" does not do, nor "pink," nor "crimson." The colour I can think of is *quinacridone,* a synthetic pigment that has always seemed to me to comprise many hues of red and many layers of light. I find this description of it: "Quinacridones combine the power of the staining pigments with the luminosity of the transparent pigments."[15] That describes it exactly: The stain the seal's kidney left on my psyche. And the luminous vibrance I feel when some small element of the being of the animal whose kidney it was becomes transparent to me—those moments of sympathetic magic (Taussig 2011: 23).

[15] Daniel Smith World's Finest Artists' Paints Blog Team 2025

Chapter 1

"Subtle Methods": Qualitative learning at the sidelines of science

You're diving deep, and once you get below the surface you're doing… the communication sounds.[16] You render these series of sounds, *codas*,[17] by moving air in particular ways through your right nasal passage, long and winding. You initiate a sound, and a small pair of internal lips clap shut just below your blowhole. The air travels back through the near two thousand liters of liquid contained along the top of your head, then forward again through a fatty cushion tucked below it, running just above your jaw. Then it vibrates out of your body. That is how each click is made: when you send a sound into the ocean, it first moves in a complex trajectory through organs on the inside of your head. You can modify it as it moves; it may even be that you are able to modify the shapes of these organs themselves, filled with liquids and fats that texture your sounds.[18]

Sometimes you make the codas with slight differences from other times you've rendered them, slight differences from how the other whales around you are rendering them. Sometimes you make a group of short codas, then add a click at the end; sometimes you draw one out longer, keeping to the same rhythm but letting the sounds slow or gradually speed up[19]—reflecting ocean currents perhaps, or reflecting your mood. You feel the vibrations from the communications of other whales, other members of your pod as well as far-off others. You are

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[16] Marine biologist Lindy Weilgart described sperm whale vocalization to me as "*doing* the codas, the communication sounds"—not *making* the sounds, or voicing them, etc., but *doing* them. This may have been merely a slippage in language on her part, and not intended to have deeper meaning. But it hints at something significant about whales and sound, which is that sound is very significant for them, their primary sense; perhaps the language of "doing sounds" suggests an intense and embodied nature of whales' experience of vocalizing, or that whales cannot be separated from their sounds.

[17] Sharma et al. define "coda" as "A short burst of clicks with varying inter-click intervals generally less than two seconds in duration"; these click sequences are "the basic units of sperm whale communication" (2024: 2).

[18] Information on sperm whale sound production compiled from Wagner 2011; Museum of New Zealand Te Papa Tongarewa 2007; Encyclopedia Brittanica 2024. The internal lips are "phonic clappers" often referred to as "monkey lips"; the liquid-containing organ is the spermaceti organ; and the fatty cushion is the "junk," what was once known as the melon.

[19] These variations in coda sounds are described in "Contextual and combinatorial structure in sperm whale vocalisations" (Sharma et al 2024), the former as "ornament" and the latter as "rubato" (2024: 2). "Rubato" is defined by the Oxford English Dictionary as "the temporary disregarding of strict tempo to allow an expressive quickening or slackening, usually without altering the overall pace" (2024).

attuned to the differences in these sounds, to what these differences indicate about both the whales and the world, its space and topographies. Sometimes you make sounds that overlap with your podmates,[20] but sometimes you wait, listen, feel.

Then you're on this terminal dive, you're raising your flukes and after a certain depth as you're going straight down you're starting to do the usual clicks. You are searching for prey now; for returning clicks that trace the forms of squid, octopi, schools of fish; and the precise ways each displaces and disturbs saltwater. *You hear your group members all around clicking, and you're keeping in touch with them*. You even know what is happening inside their bodies: you *could see a pregnancy pretty early on, could see if someone has a full stomach*, could perceive an internal injury or tumour. This awareness conditions your *social connections.*[21]

And your sonar is powerful. You must be purposeful about where you send it, because your clicks are strong enough to deafen any of your companions, should one come into contact with another whale's ear.[22]

If you hear a killer whale, you stop foraging and immediately move closer to your group; you form a tight circle at the water's surface, your heads together at the centre; if a juvenile is near, the juvenile is at the centre too. Feeling the smooth skin of the other adults against your own smooth skin, you begin slapping your tail, in concert with them, trying to deter your predators.[23] If the killer whales approach anyway, perhaps you and your companions defecate on them. Red will bloom into the water, not the blood the killer whales crave, but your feces, pigmented by squid.[24] If the killer whales managed to get one of your own away from the group, you would risk your own safety to bring your companion back.[25] When they disperse, you carry on: another terminal dive; another group of cephalopods—you sound your way toward them.

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[20] "Their vocal exchanges can last an hour, with different whales clicking and repeating after each other. 'It's not rude in sperm whale society to talk at the same time and overlap one another,' Gero says." (Sommer 2024 citing marine biologist Shane Gero)

[21] Cetologist Lindy Weilgart said in our interview: "That's a whole different sense almost than we have, yes we have hearing but not to that degree, right. So that changes I would think their social connections."

[22] Whitehead and Rendell cite this as an indication that sperm whales, who often find themselves in situations with 30 or more whales in an area of a couple of kilometres, must have "norms of use, shared agreements about the right thing to do," or "there would be many… deaf sperm whales" (2014: 295).

[23] Whitehead and Rendell 2014:16; Group for Research and Education on Marine Mammals 2024. These formations are referred to as "defensive groups" or as "rosettes"

[24] This behaviour, known as "defensive defacation" was most recently described by marine biologist Jennah Tucker in Barr 2024

[25] Pitman and Chivers 1999, cited in Whitehead 2003: xxii

Suddenly there is another burst of sonar, but this noise is not animal, this noise causes you both panic and pain, and you stop in your trajectory toward the squid; again you stop making the sounds that guide your hunting. You know how to deal with killer whales. This is different.[26] *Now you have this noise coming in, and you're struggling to hear one another, and you're struggling to stay in contact with your group*—but you keep trying to stay in contact, you try harder and harder. You and your group begin to vocalize more. You put all your energy into staying in contact, and you move horizontally away from the sounds, which are also moving.[27]

The sounds come in pulses, with brief patches of silence in between. When they cease, your group is discombobulated. You are tired, perhaps you are in pain, perhaps you are inhibited by lingering fear. You begin foraging again, but with less vigour.[28] And when the sounds start up again, not killer whales but that vaguer non-animal entity, several of these entities emitting these sounds simultaneously, their strange sonar so close in frequency to your own, the sounds so close to that group of hunting killer whales and yet so distant in affect from either—

When the sounds start up again, then again, then again, you will forage less, in general.[29] Perhaps it will be the pain, or the fear; perhaps, the strange sounds will have taken from you desire, energy, joy. Perhaps they will have dulled the sensation of hunger itself; or dulled your ability to sense food's presence.

Somewhere in you, does hope pulse, for a future without these sounds?

The italicized portions of the passage above are direct quotes from marine biologist and underwater noise expert Lindy Weilgart, whose research specialization over her four-decade career has largely been sperm whales. I interviewed Weilgart at her home in Herring Cove, Nova Scotia. I asked her if there are ways to imagine ourselves in a whale's body. She immediately began to describe her writing practice: "Oh, I love doing that, yeah. You know, you can—well, I start out sometimes when I write chapters for even scientific books, I imagine how… you're

[26] Curé et al compared sperm whale responses to killer whale predation sounds vs anthropogenic sonar, which are similar in sound and frequency. The responses were "very similar, including horizontal avoidance, interruption of foraging or resting activities and an increase in social sound production," except that with sonar, sperm whales did not form defensive groups, indicating that they did not believe the sonar sounds to *be* killer whale sounds (2016: 89).
[27] Information in this paragraph derived from Curé et al 2016; Miller et al 2022; and my interview with Lindy Weilgart. The anthropogenic noise to which sperm whales respond most adversely is low frequency active sonar (LFAS), which is used in military surveillance to detect submarines.
[28] Isojunno et al 2016, "Sperm whales reduce foraging effort during exposure to 1–2 kHz sonar and killer whale sounds"
[29] Miller et al 2012, 2022

diving deep, and once you get below the surface…" She went on to describe what I have further narrativized above.

"I think that's how we have to think to really imagine how they could be impacted," Weilgart told me. "We can't imagine all the impacts, we can't possibly imagine how all that we do could affect them." Yet, her answers implied at every turn: We can try. We must try. In a recent chapter on ocean noise impacts, she wrote, "If we flood the ocean with noise, it is as if we are shining a bright light into their eyes, blinding them" (2023: 153).

Weilgart is able to imagine herself in sperm whales' position because of the countless hours she has spent in their environment and in their presence, over decades of research work. She is not alone: During my research with cetologists and naturalists, I heard repeatedly about how, in the course of their work, they often find themselves in situations of significant qualitative learning about whales. What they learn, I will argue, is not only ethological, though it is, of course, that. It also results in what I think of as an extensive "unpublished qualitative archive" of knowledge, which contains not merely hints of knowledge that might be quantified later, but new knowledge of a kind that is not quantifiable. This knowledge arises in large part from what is perceived, including that which is sensed and intuited, from field encounters or from working with data; as well as putting that firsthand knowledge together with pre-existing scientific knowledge of the species under study. This "qualitative archive" exists in memory; in personal journals; in anecdotes shared with friends or, in my case, with those who ask; and sometimes in popular audience media pieces. For scientists, it conditions the knowledge products they ultimately disseminate, as well as the work (both research and advocacy) they go on to do, as illustrated by Weilgart's imaginative exercise described above. For scientists and naturalists both, it draws them into closer relation with, and better understanding of, the whales they encounter.

In this chapter, I focus on how cetologists and naturalists' qualitative experiences of whales teach them about what matters to and for whales.[30] Through their experiences in and

[30] I use the term "matter" as a verb, in its most basic sense, meaning "be of importance"; "have significance" (Oxford English Dictionary 2025). That which matters for whales is that which is important for them, and this category is as vast as it would be for humans, spanning intangible and tangible dimensions of whales' lives. While I do not specifically mean to invoke Barad's writing on how things come to matter and how "'mattering' itself acquires meaning and form in the realization of different agential possibilities" (2003: 817), "different agential possibilities" are very much at stake in my discussion throughout this thesis of how scientists come to know whales, and what they decide *matters* as knowledge. Scientists' qualitative knowledge of what matters to whales affects

around whales and their habitats and/or with raw recorded data from those animals and habitats, they come to appreciate, in both intellectual and intuitive ways, something about what whales care about, and what makes their lives subjectively good or bad, for them. What *matters* to and for whales encompasses both tangible and intangible factors in their lives: the former including things like migration pathways unobstructed by ship traffic, availability of food, ample echolocation space to find that food, and ample fat to reproduce[31]; the latter comprising elements such as acoustic space for unlimited communication at normal volumes, freedom from constant fear, and time and energy left over, after performing essential functions, for play.

Here, I attend to three subjective facets of experience that matter to whales, that came up repeatedly in my conversations with whale researchers: cetaceans' *desires*; their *suffering*; and the embodied, subjective experiences of movement, space and geography that I call their *proxemics* (Hall 1968). These are not the only facets of experience that emerged from my interviews and fieldwork—joy, play, offspring-rearing, and more anthropomorphic concepts like friendship are examples of other topics that scientists also mentioned they have learned about, qualitatively, from whales. I focus on desire, suffering and proxemics as the most ubiquitous among these elements, as well as the most impactful for research work and for whale wellbeing. By "desire," I mean what whales want. By "suffering," I mean both their physical, subjectively experienced pain; and their grief. "Proxemics" is a term I adopt from Edward T. Hall, who defined it as human "perception and use of space," the study of which was situated alongside what is "known to ethologists as territoriality" (1968: 83) and which involves the interaction of "many sensory inputs: visual, auditory, kinesthetics, olfactory, and thermal" (1968: 95). He transposed this concept onto humans from the work of zoologist Heini Hedigar, who studied personal distance in nonhuman animals; I rewild Hall's humanist elaboration, because it is the closest concept I could find to describe whales' subjective experiences of space and their presence within it, including how they experience time and distance. I also include, in the category of proxemics, *where* whales are, conditioned as their locations are by their perception

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these decisions, but is by no means the most important factor when it comes to shaping scientific knowledge products.

There is also a rare meaning of the verb "matter": "secrete or discharge pus" (Oxford English Dictionary 2025)—a meaning that bears poetic resonance with the viscerality of the specific sort of qualitative knowledge I am using the verb "matter" to help me name.

[31] For example, female North Atlantic right whales without enough fat stores do not become pregnant (Moore 2021: 95)

and use of space. While "proxemics" may appear to be the quantifiable outlier in my list of three, researchers repeatedly told me how little they know about where whales really go; what is *close* or *far* for a whale; and how difficult it is for humans to understand how cetaceans experience space, time and distance, entangled as these experiences are in sound and emplaced as they are in water. The differences between our spatial perception and theirs, and our sense of distance and theirs, are so great that whale proxemics seem more readily understood by human researchers not through mechanistic or technical modes, but through similar kinds of empathetic processes as we understand something like whale suffering.

In what follows I offer, for each of the three elements I identified above, several brief accounts that demonstrate how qualitative learning results in heightened knowledge and empathy on the part of the researcher. The chapter continues with a consideration of why, according to my interlocutors, the kinds of knowledge these accounts contain are mostly kept out of formal scientific publications. A broader discussion of scientists' qualitative learning—of what scientists *do* in the field to engender such learning—follows. The chapter concludes by considering why such knowledge matters, both for whales and for researchers.

First, though, in light of the experiences I narrate below, it is important to note that when cetologists (and most, but not all, naturalists) go into the field to find whales, they are seeking passive observation. My first contact with the marine biologist Hal Whitehead was by way of an email I had sent to a mutual acquaintance, which she forwarded to him. In it, I'd referred to "cetacean interlocutors." He was quick to respond that

> 'Interlocutor' seems wrong for how we study cetaceans. It suggests a dialog, but that is not our process or goal at all. We strive to study the whales as passively as possible. We do not want a dialog with them. We want to listen to and watch their interactions with each other, and avoid interacting with them ourselves, or affecting their behaviour. (personal communication, 2023)

Researcher-whale interactions, despite scientists' best intentions, sometimes cannot be helped. For example, Whitehead told me when we eventually spoke, in his experience sperm whales do not seem to notice when drones observe them. Dolphins, however, roll around and look up to watch the drones.

What I am calling "qualitative learning" does not depend on animals responding to human researchers' presence with them. Nor do any such responses involve direct transmission of meaning. Many of those with whom I spoke, scientists and naturalists alike, said they could *feel*

the presence of whale meanings—meanings meant to be communicated to other whales, only very rarely to humans who were present—for example by listening to their sounds. But they could not, and in some cases framed it as an active choice not to try to, articulate those meanings. (The exception to this is some naturalists' descriptions of fleeting experiences in which it seemed to them that whales were trying to communicate some kind of message *to* the naturalists; I will discuss this more explicitly in later chapters.) Still: when whales respond to our presence near them, or the presence of our technologies, those responses tell us something about them, knowledge which should not be discounted for its relational messiness. The naturalists I will cite here were less troubled by the notion of interacting with whales, as opposed to watching whales act, though they are well aware of what science expects of them in this regard, and are not always confident that their choices around interacting are the right ones.

I aim, through this chapter, to begin developing the more inclusive understanding of what kinds of observations count as "knowledge"; who gets to claim the right to produce it; and by what methods and in what forms it can be produced, for which this thesis ultimately advocates.

Desire

Denise Risch - *Marine mammal ecologist, Scottish Association for Marine Science / University of the Highlands and Islands, Scotland*

When she is listening to their sounds, she feels the ways in which their bodies are present to one another. Listening to "an animal in a canyon, whale sounds bounce from one end of the canyon to another. You perceive how the sounds of the whales interact with the environment, or if you're under ice there's a special way how that sounds." At times, especially early in her career, Risch has spent "hours and hours listening and hearing the whales come and go." In those hours, she has felt like she is there with them.

From a physics perspective, Risch tells me, a blue whale could hear another blue whale from hundreds of kilometres away (specifically, 1600, according to National Oceanic and Atmospheric Administration estimates [NOAA Fisheries 2024]). Their sounds are so low frequency they are below human hearing; we can only hear them on recordings at faster-than-life speed. Risch tells me about working on a study off the eastern United States about baleen

whales' communication range. The researchers calculated the change in ambient noise from the 1950s, before there was much shipping, to the noise levels of the contemporary ocean. Whales' vocalizations, the study found, have a much shorter range than they used to.

"These numbers we can come up with," Risch says. "But what we don't know is does it matter to them or does it not matter to them? Does a whale that is calling off Massachusetts, does he want to communicate with his friend in the middle of the Atlantic or not? I don't know."

Yet in listening to these sounds and working with them as data, she has experienced how, when sounds travel over long ranges, "it bounces up and down in the water column, and its image is changing, its frequency, so it's carrying spatial information in the sound." Perhaps a whale that hears a distant sound can tell "when it gets to him where his mate is, and where he's calling from… Our range of being in touch is so much smaller than theirs." It's very difficult to study such questions, she says, because "if you record a call off West Africa how do you then observe what's happening in the mid-Atlantic?"[32] However, Risch does have a sense of the answer to the question of whether whales *desire* to communicate over very long distances, rooted in her experiences of immersion in whales' sounds, the import of which is so difficult not only to study but to even conceptualize from a human sensory perspective.

> People will often say, 'but how do you know that it's important?' And I don't know that for sure. But knowing my own feeling is—so scientifically I guess I have to say I can't prove it. But as a human being, and with what I know about social structure and social behaviour of marine mammals, I wouldn't be surprised if it does matter to them… We probably don't quite understand how extensive their social networks actually are or how they work.
>
> And that's maybe—when we are trying to assess impacts at the moment we're really just taking off the first layer and ignoring quite a lot that we just can't see or don't have the tools or means to really assess. That's how I feel. Yes.

Risch's sentences include so many qualifiers; she takes such a winding path to arrive at that conclusion, "That's how I feel. Yes." She says science does not have the "tools or means to really assess it," and in quantitative measures that is true. But whales' experiences of sounds, their own and others, are precisely that: *experiences*, and perhaps they are best understood

[32] Researchers are beginning to try to answer these kinds of questions: A recent study used satellite tags and chaos theory to find patterns in the dives of bowhead whales. One that emerged was "synchronized bouts of diving" between two specific whales, over "as many as seven days on end whenever they were within 100 kilometers of each other… the maximum acoustic range for whales in that area." Coincidence is possible, but statistically unlikely (Thompson 2024; see Podolskiy et al 2024, "Synchronization of bowhead whales").

experientially. On that level, Risch not only holds the tools to assess whether long-distance communications matter to whales; she has already made the assessment. *That's how I feel. Yes.*

Andrew Reid - *Response Specialist, Marine Animal Response Society, Nova Scotia*

Having helped with countless attempts at whale disentanglements and "refloatings" (getting a stranded animal back into the water), both successful and unsuccessful, he tells me it's "hard to be objective," in those moments, about what whales do or do not know or feel. Some things are clear, though—once he found himself holding in his arms a young dolphin calf who had been separated from its group during the process of freeing the group from an entrapment. "Feeling its heart beat on its side and hearing it vocalize was something pretty difficult to see, but being able to get it back to its group was a pretty good experience." The dolphin's anguish at being separated from its group, its desire to be reunited with them, were evident to Reid, though he does not use overly emotional language to tell me about it.

Reid tells me he was trained to approach entanglements with "the mindset that… from the whale's perspective that initial entanglement was the human's first attempt to kill it. So when you're coming back it is probably thinking this is the second attempt." Yet stories abound, he says, about people feeling like a whale in distress is "acknowledging your efforts" to help it. He relates one example in which members of his team disentangled a humpback and "as soon as they made the last few cuts the other whale nearby started immediately breaching. So you can see that was a celebratory jump out of the water that its friend or partner whale was free of that gear."

Though he takes care to note that such instances could just be projection, that maybe this whale is just warning the team to "back off," Reid, when he speaks about whales' desires, is more blunt than anyone else I've interviewed. I ask him how we can understand whales' needs or wishes, when the differences between us and them are so vast.

He says, "Well, their ideal environment would be one without us."

Naturalist, Bay of Fundy

"Sockeye. I called to him that day, when he came over to the boat. He came over that day because he knew I was calling to him, and I never—nobody could ever convince me that that's not what he did. I kept calling and calling and calling him, and he came over—I was on one side of the boat and he came underneath the boat and he brought his head up on the other side and just sat there.

"And I just leaned over and I was like, petting him. For like two minutes. It wasn't like a thirty second little touch or something or five seconds or something. He kept his head there, so that I could just keep petting him on the head, and right on his scar, which I thought was really interesting cause he's got a big white scar on top of his head, and that was—it was harder than the rest of his skin, it was harder there, and it was kind of squishy but not really, kind of like a firm squish—Their regular skin, they're kind of squishy but there's definitely a firmness there, but then this scar part itself was harder again. But—I was trying to be super gentle when I was touching him just because I know that—his head's here, his whole body's underneath my boat right now. Part of my head was thinking, I can't startle him cause if he tries to bring his tail up we're flubbing. He could kill everybody on board, if he wanted to, right, he's got that power, I know he's got that power.

"So that was always what I had heard, why we don't touch the whales, because I've asked people before that dive with them, no you don't touch them because if you startle them or something this is what they can do, they can swing around and smack you with their tail. You don't know what they're going to do if you startle them, right. So I was scared, I was a little scared of him but I think he wanted me to all the same, so I just kept very very gently kind of rubbing my hand like this on top of his head. I was almost crying. I was almost crying, yeah. I cried afterward, after it was all done and over with…

"He had been doing this [interacting with the whale tours] for so many years. I had literally been watching that whale for over twenty years. I firmly believe that he knew not only who we were as a boat, he knew my voice—I think he was doing it on purpose. He *wanted* to come and check me out.

"I know when I touched him, I felt something—I felt connection, I felt energy, something, I felt something touching him that I'm sure he did too. Right? Like I mean, you know, even just

touching your dog you get that connection, you know what I mean? I really think that he wanted that too.

"And I never got to see him at all this year and I was really sad, and I only got to see him once last year."

She whispers as she tells me this story, like there is a sacredness to the experience, or like she doesn't want to disturb the memory.

Suffering

Lindy Weilgart - *Senior advisor, OceanCare; Research associate, Dalhousie University, Halifax, Nova Scotia*

She was a postdoctoral researcher at Cornell when she heard about a new project her supervisor was working on. The project was "ostensibly"[33] about climate change, and involved broadcasting low-frequency sounds underwater from Monterey Bay National Marine Sanctuary, California, to New Zealand. "They were trying to measure the speed of sound across the Pacific like this, because as the ocean warms, the speed of sound gets faster."

Weilgart knew Monterey Bay as one of the world's most significant habitats for multiple species of cetaceans; she knew that many of these species echolocate and communicate by emitting low frequency sounds, just like the proposed loudspeaker would. It was the early 90s and little was known about the effects of anthropogenic underwater noise on marine species (Anderssen 2023), but Weilgart felt immediately uneasy, even panicked, about how the sounds would affect the whales who lived in the area. She had just finished several field seasons observing sperm whales from a sailboat, and she knew how even the smallest auditory disturbance can spook them; she knew how careful she had to be to avoid the smallest splash whenever she slipped into the water with them.

> It was not my project at all, not at all… but this was happening in the same lab and I had to approach [my supervisor] and go, 'Isn't this going to affect the whales? '…

[33] Weilgart used "ostensible" because the project was funded by the US military and, she told me, she's always suspected there might have been military purposes to it, too. Weilgart has publicly spoken out in multiple formal and informal fora about the many and extensive conflicts of interest engendered by the extent to which marine research is funded by the US navy, a couple of times being an author (with Hal Whitehead and others) on publications that likened this situation to the tobacco industry funding lung cancer research (Canby 2007: 28).

> I couldn't let that go. I couldn't let it go… I would go… 'Oh my gosh, they're not going to be able to hear. How is this not, you know'—and I just would feel with [the whales], they can't manage that, how are they going to manage that? Maybe some of them will manage that but not all of them—
>
> And I was compelled. That's the only word, I was compelled. I put my whole research [career] in jeopardy.

Describing this to me, sitting on her back deck in the sun, Weilgart's voice becomes breathy; words come more quickly and her volume oscillates, like she is experiencing her panic—her empathetic anticipation of the *whales*' panic, of how they would suffer—all over again, even though this all happened thirty years ago.

Weilgart's supervisor did not change his plans when she shared her concerns, so she told him she was going to alert the media, and she did. She worked for a month to try to get press coverage, until finally the *Los Angeles Times* picked the story up, and public outrage ensued. Eventually the National Marine Fisheries Service revoked the researchers' initial permit. A revised version of the project relocated its speaker out of Monterey Bay, and only transmitted sound for two years, instead of, as per the original plan, into perpetuity (Weilgart 2023; Anderssen 2023).

She told me this story when I asked in what ways the sensory imagining she described to me, which I quoted from at the beginning of this chapter, changes her writing. She said it affects not only her writing, but has directed her whole trajectory as a scientist. Faced with assessing a given "impact," she tries to imagine, "from what I know about whales and what I've seen about them, how does that affect me"; she tries to imagine what she would feel like, if she were in the whale's position. "You have to try to get into another living being to imagine how you could be hurting them. That's what empathy is. And… empathy I think should enter into management."

As she described it, Weilgart was taken aback by the intensity of her empathetic response to the loudspeaker project. "That was how I got into the whole issue of noise, I did not plan, this was a complete distraction—I was trying to finish my postdoctoral research—" But the awareness she'd gained in the field, of whales' dependence on sound and their responses to sonic disturbance, had rendered her unable *not* to respond to what she knew would cause them suffering.

Michael J. Moore - *Senior Scientist Emeritus, Woods Hole Oceanographic Institute, Woods Hole, Massachusetts*

In *We Are All Whalers: The Plight of Whales and Our Responsibility* (2021), Moore wrote of a similar experience of compulsion in his work with right whales, though in his case the whales were dead, their suffering had already happened, and his empathetic awareness of it was projected into whale bodies' past, not, as with Weilgart, their future. "What is worse for a whale," he wrote, "an explosive harpoon or entanglement? One of the big surprises of my life is that the answer to this question is neither obvious nor clear-cut" (2021: 35). In the course of dozens of necropsies, Moore ultimately came to believe chronic entanglement, generally in fishing lines, was worse: Death by harpoon at least is usually quick.

Moore tells me in our interview about the first time he realized he had to "talk about the bits that are less hard science and more welfare oriented," because "life's too short." He'd been invited to do a talk at a big engineering conference, outside his field and with the clear expectation, he says, from the way the invitation email was phrased, "to be a little bit more subjective and a little more heartfelt." It was the mid 1990s and he'd been repeatedly faced with taking apart dead, emaciated whales with ropes wrapped around them, embedded in their bodies.

In his book, he described a number of whales he necropsied, one of them #2030.[34] She'd had multiple entanglements, a couple of which had been cut by a would-be rescue crew two weeks before her death. The same crew had tried everything they could think of to slow the whale so they could get close enough to cut her main entanglement, a rope stretching from flipper to flipper across her back, having cut a wound six or seven inches into her. They weighed her down with numerous anchors, but nothing worked; she kept struggling (Brown 2004). Moore described the entanglement

> as if the whale had been wearing a constricting, tissue-melting shawl of gill net and rope. There was evidence of shark bites at the wound edge… The bone of the inside face of the right shoulder blade had grown around the rope… The diagnosis was massive traumatic injury induced by entanglement in fishing gear with resultant starvation (2021: 120)

[34] #2030 is the whale's unique identifier in the North Atlantic Right Whale Catalog, maintained by the New England Aquarium's Anderson Cabot Center for Ocean Life on behalf of the North Atlantic Right Whale Consortium. Catalog entries include biographical information as well as information on death (where applicable), available photos, and information on injuries (see New England Aquarium 2019). It is the primary database for scientific knowledge about North Atlantic right whales.

Moore wrote: “She had been entangled for a minimum of six months. She became a ghastly icon that surfaced repeatedly in my mind… It was hard not to be incredibly sad” (2021: 121).

With the first talk he gave that focused explicitly on animal welfare, Moore tells me—its title “something like ‘Fatally entangled North Atlantic right whales die extremely slowly’”—he thought “that once that got reported on that would change everything and they would stop killing right whales. But that didn’t happen at all.”

Whale #2030 continued to surface in Moore’s mind in the years following her death in 1999. Her story is one of two “postscripts” at the end of his 2021 book, short narratives each written in the first person voice of a right whale Moore necropsied. In hers, #2030 describes how she was surprised by the pain her entanglement caused:

> *Most times when I ran my head into the bottom, or had a collision with another whale, the pain had gone away pretty quick, but this was different. It just kept on jabbing… Each day as I swam and tried to feed, the rope tightened around my flippers and dug deeper and deeper into my back. It was hard to expand my chest fully… My lungs started to burn as I began to feel heavy in my chest… I lost contact with the other whales that I usually spent time with. I was in a lonely tunnel with no light at the end*. (2021: 192, italics in original)

Moore wrote in his book, and has repeatedly told interviewers, that he does not believe it is too late for the North Atlantic right whale species. Many others I spoke with do believe it’s too late, including the naturalist Amy Tudor, who among them was the most blunt. She said: “Oh, the right whales are on their way out. It’s sad, it’s exceedingly sad, and nobody wants to, you know, be part of something like that but it was us, we did it. And we did it to a point of no return. And there’s nothing—no, the species will die.”

Moore, on the other hand, pushed back against an interviewer who asked him what it’s like to study a species that may go extinct in his lifetime—albeit part of that pushback was to say that he feels himself to have a remaining lifespan of about fifteen years, while many of the remaining right whales have about thirty. “What’s it like?” he said. “You must pace the right whale problem in your own head” (cited in Macapia 2024). Each of us, he seemed to suggest, must *feel* the problem, its timeline and its scale. His book, by detailing both how he has felt this problem and what that’s taught him about right whales’ suffering, attempts to enable more people to do that. And it impresses upon its reader the ethical imperative to stop perpetuating, through our consumer choices of seafood, extreme pain for right whales. After I read *We Are All Whalers*, I

was left with an understanding I'd never fully parsed before, of how it is one thing to fail to act in the face of potential extinction of a species; but that failure of action, ethically, becomes something much heavier when it means individual whales suffer for months on end. Moore's book, in recreating the qualitative conditions in which he learned about right whales' pain, made me feel it too.

Moore tells me it's easy to write those narratives when you have the information. I disagree with his assessment of "easy"; I will come back to this topic of narratives and narrativizing in my final two chapters. For now, I want to draw attention to Moore's movement from "hard science"—quantitative necropsy analysis and diagnostics—to #2030's story. He was able to understand, from #2030's death, her experience of pain in life; how it altered her quality of life. That understanding is, whether or not one agrees that creating a story from it could be "easy," common among people who routinely encounter dead whales. What is not common is its narration, not with such experiential depth and certainly not in the first person.

In a follow-up email to our interview, I ask Moore if he's ever tried writing from a close third person perspective. I attach a passage I have found helpful on anthropomorphism and its critiques, from Jane Bennett's *Vibrant Matter* (2009). Moore replies: "I've never really dissected how to write anthropomorphically. I just do it from my heart. Indeed I really am not very good at analyzing writing."

That is where, in its most fundamental form, the knowledge this chapter is about resides: in his, and other scientists', hearts.

Amy Tudor - *Naturalist, Mariner Cruises Whale and Seabird Tours, Brier Island, Nova Scotia*

"There was one night the whales were right out here and they weren't far offshore. And they were loud. They were making sounds that I have never heard a whale make. Sounds that were so—"

At the kitchen table in the house I am renting, the naturalist blows out a long, powerful breath. She does this to show me what the sounds were like, lacking words to amply describe them, though she is a person who rarely lacks words.

Amy is tall and captivating. Her voice fills a room; it even fills the whale watching boat, out on the open sea. Like the naturalist I cited earlier (who was not Amy), she seems connected

to the whales on a level I can hardly imagine. She is a researcher, too: She photographs every whale she encounters; she writes about the experiences; she documents change from year to year, that which she observes in individual whales and in the general Bay of Fundy population. The intensity of her presence is inspiring; I find it, at times, unsettling, in that it makes me feel like I am barely present to the world at all.

"My husband and I went out to the rocks and listened," she tells me, and as she speaks, I feel it—that night, the wee hours of September 7, 2018. I feel basalt cool and solid underfoot, the salt air brisk but still holding late summer heat. I hear the whales' rumbling calls, passing from seawater to night air.

She told her husband, "Jess there's something wrong, that is not a good sound… The sounds were deep, deep and loud, they weren't trumpets, they weren't the manual movements of the blowholes—they'll sometimes trumpet when they're going to charge in the breeding season or if they're about to go deep… But this wasn't a trumpet. This was guttural, it was low…. *A-heeeeeh*…" The sound seems to come from somewhere deeper than Amy's body; to come up through the floor, the cement basement damp from last week's storm, the earth underneath, stone, bedrock jutting until salt water.

"It was as if they were scared, it was a frequency that they made—it was a frequency, it was scary. It didn't elicit joy. It elicited fear, it elicited sadness, it elicited worry, it was… Helplessness, we couldn't see, we don't own a boat, who am I going to knock on a door at two o'clock in the morning and say can you take me out on your boat, because I hear whales?"

She is crying now, and the room is darkening, the sunset earlier and earlier over the bay. Below the sunset, the rhythm of waves against rocks; below the bay, basalt.

"In retrospect there's a few people who I could've done that."

Her voice a whisper now, and I think of the other naturalist's whisper, the opposite to this in mood but it's the same affect, something sacred being evoked. "We listened for twenty, twenty-five minutes, maybe half an hour— It just seemed like forever because it wasn't a happy sound. And I'm like what's going on out there.

"And the next morning we went out and Peajack was dead. Just floating on the surface.

"We didn't know that it was her. But we saw that there was a whale that was entangled, it was deceased and the tongue had started to bloat so there was this—the tongue was like a hot air balloon the way it expanded and the circular—you can look it up, it's online.

"And that's when I knew I'd heard a whale die."

She pauses, and I watch as her features steady themselves. Her sharp, shaking jawline. Darkness outside the picture window behind her; its long pane of glass reflecting Amy's shoulders, my own face.

"I don't know if it was her making the sounds," she says. "But it was more than one whale, and I… What other whales were around her? Did she die by herself? Did she have others around her mourning her? What were her final moments like before she—before she couldn't fight anymore—before—"

I stand and cross the room to retrieve the box of tissues.

Amy says she thinks she might be able to talk about this whale's death without crying, if she hadn't been there to hear it.

Proxemics

Mandy Crocker - *Naturalist, Freeport Whale & Seabird Tours, Freeport, Nova Scotia*

When you spend a lot of time watching humpbacks feed, you get to know how they move when they are feeding; you get a sense of what sort of movement indicates a deep dive (tail flukes straight up in the air, a pronounced curve of the caudal peduncle), and of what sort of movement indicates relaxation—sometimes, as naturalist Penny Graham pointed out to me, they just drift with the current, and you can tell this by the long pause between surface breaths, and the general quality of the movement. The captains of the vessels know that whales are usually okay with it if you track along them in a parallel way at the same speed the whales are going, or slightly slower. That is how to watch whales without disturbing them, the Bay of Fundy naturalists explained to me. So that is how the captains drive the vessels; and that is how, from decades of interacting with them, the whales expect the vessels to behave.

Mandy tells me the Bay of Fundy humpbacks are attuned to differences in the driving styles of different captains. The current captain of the vessel on which she works took over from his father who had been captain for twenty-five years. The son had fished his whole life, but as captain he didn't initially have the finesse his father had developed for interacting with whales.

> He'd come up on them too fast, come up onto them too close or just do little things that they didn't like and there was one time that a whale hit us. We were going along and we weren't matching [the whale's] speed and [we] got a little too close and the whale got mad and the whale took his tail and went *ka-whap*! against the bow of our boat and it hit it so hard I thought he holed us!… It really startled me because I'd never seen a whale do that, I'd never seen a whale get mad at me before. And it was mad. It was mad. There's nothing else to describe it, he was angry at us. We had scared him.
>
> But it made [the captain] learn. And I still tease him about it once in a while. But it's an art. It's an art to go out there and run the boat so that they like you… He's great now, he's awesome at his job now. He's just as good as the guys that have been doing it for thirty years.

That captain needed to learn what the longtime crew members knew about humpbacks' *proxemics* (Hall 1968), and what matters to the whales in that realm of their subjective experience, or the whales would not admit him into the relationship he needed to maintain with them to do his job.

"Most of everything I know," Mandy tells me, "comes from the same three books that I stole from the library when I was fourteen years old, and I still have those books on the boat, and they still have the library cards on the back of them." Yet, it is clear she knows so much more than what comes from books. She knows these whales' energy; she knows their specificity. "I love that every year I see the same ones. I love that they come back not just to Atlantic Canada, not just to the Gulf of Maine, not just to the Bay of Fundy but they come back *here*, to this one particular area, over and over and over again. I find that so fascinating that, yeah, yes, that they *remember* all of that, every time, that they are coming back to that."

Like the whales, Mandy remembers.

Denise Risch

"Listening to [whales' sounds] just gives you a different feel for what their space is.

"…You start hearing the whales coming in on your left ear and then they would travel through and all of a sudden they start coming out on your right ear so you get an idea of a space, and you get an idea of how the animals themselves move, and that can help you to understand how an animal calling five kilometres away can be heard by its group, and how they keep in

touch. That sort of recognition of space and orientation you only get I think if you are listening… also in terms of range, and hearing other sounds in the background."

Risch says her extensive listening work was what prompted her to specialize professionally in noise impacts. She was fascinated by whales' use and experience of sound, but she'd also become aware of how significant sound is for them. Resonating with Weilgart's comments, Risch's awareness of that significance made her want to understand it better scientifically. She did not say this explicitly, but her comments throughout my interview made it evident that she also hopes, like Weilgart and others with whom I spoke, to use that understanding both to mitigate sonic harm and prevent it from happening to whales in the first place.

Simon Elwen - *Co-founding director, Sea Search Research and Conservation, South Africa*

During our interview a few weeks after I'd begun volunteering with Sea Search, in the surf town of Muizenberg at Cape Town's southern edge, Simon comments that when I'd first arrived I had spoken about being interested in what scientists do not write down. Something struck him, Simon says, thinking about that: Years ago, early in his career, he'd gone offshore with some student friends who told him that when Vic, their supervisor, accompanied them to look for whales, they always found them; Vic made it look easy. "I feel like I've come full circle on that," Simon tells me. "Often when I'm out, we see more." He cites, as the reason for this, a combination of experience and broader understanding of "the ecosystem and what's driving the whale presence." He knows where prey species usually are; he knows to check the feeding grounds first.

> Whereas the students are like, 'let's go drive around til we find them.' Then, 'no we didn't find any,' and I'm like, 'you went the wrong way.'
>
> The same comes with the subtle things—you see the birds [where whales are], that's one of the first things you learn. Your eye gets in. Your eye and your brain just become so attuned to these things.

The knowledge that comes with that attunement is not always easy to describe, or even totally conscious: "Sometimes your brain will just clock, 'something's not right,' the whales are behaving [differently]." He describes a day when all the whales were blowing "really aggressively, like *rrrrr*, and later that day we saw false killer whales. So their presence had obviously thrown everything off."

Often, Simon says, those cues are not that obvious. He calls the art of recognizing them "subtle methods":

> You don't write them down and you don't really capture them, but they can make quite an important impact on your results [in sighting surveys]… You get to the end of a long field season and you have ten encounters instead of fifty encounters. The point of the scientific method is that this is ironed out but really—

Simon, not someone to mince words, breaks off with a laugh, meaning: Really, none of that is ironed out; really, though the scientific method is meant to be reproducible and objective, the success of many endeavours actually relies on individual scientists' qualitative knowledge, accumulated over time from lived experience with animals. When the field researcher's "brain clocks 'something's not right,'" it has already been informed by subtle, sensory cues from which it has not yet shaped a narrative about what is not right. In the present example, it is whales' proxemics that these cues allow Simon to track—their presence or absence in space as well as their subjective comfort in space based on who else is around and what else is happening. Sometimes the presence of birds reveals where whales are. Sometimes Simon's intellectual background knowledge directs him. Mostly it is a combination of factors, not all of which he can identify.

Discussion

In varying ways, all the scientists and naturalists I have cited here articulate their reasoning about what matters to and for whales as emerging from a combination of conventionally "scientific" forms of knowledge—their own formal or informal research work as well as knowledge gained from others' work—with the qualitative knowledge that they cannot help but accumulate along the way, from field experiences or from working with raw data. In the latter case, this is usually sound recordings, although that is not the only possible data from which qualitative knowledge might emerge. One other that several scientists mentioned was watching drone footage, though this is normally intended to produce quantifiable data, and it could have a distancing effect like the one Moore noticed when early in his career he moved from working on a small sailboat to observing from a bigger boat's royal yard, 95 feet up: it was "harder to get a 'feel' for the whales from the larger vessel" (2021: 31).

The most raw data of all, which my conversation with Moore made abundantly clear—listening to his descriptions, I could almost smell this data's rawness—is whales' carcasses. He did not call them data, though. He said that he sees the necropsy as the whale's *afterlife*, a term he said he hadn't used before but one that, when he inadvertently spoke it, resonated strongly for him. He told me his necropsy reports often tended to have more pre-mortem history than those written by others, who focused on the animal's death. "But to me the life was just as important because it was telling the story of how it came to die… I tried to get my head around that whole saga, including the cause of death and what we could learn about the life of the animal on the basis of what evidence we encountered during the necropsy." Repeatedly, Moore used the word *story*; he spoke of the significance of producing "an accurate as possible depiction of the reality" of the animal; he said "the animals deserved to have their stories told."

This, too, I will return to in later chapters. For now, I want to note that for Moore, telling a given whale's story, depicting what he could deduce of that dead whale's lived reality, did not really come to fruition until he wrote his book. He still feels the published version fell short of his ambitions for it. But among what it disseminates, particularly in the first-person "postscripts," are a great deal of visceral *qualitative* dimensions of the lives of some of the whales he necropsied, and what mattered to those whales—lives and cares that he learned about from the quality of their deaths. Depicting a dead whale's lived reality accurately required those visceral elements to be put on record; required him to go beyond the cold scientific language of necropsy reports or journal articles.

Moore is not the only scientist to have found what he described to me as *willingness*: "to speak out and go more visceral in the sciences" and "to speak out beyond the ones and zeroes of science." Other examples include several who published essays in general audience anthologies like *Between Species: Celebrating the Dolphin-Human Bond* (eds. Frohoff & Peterson 2003); and *The Presence of Whales: Contemporary Writings on the Whale* (ed. Stewart 1995). But these examples are few and far between. What Moore called the "fear of rebuke" is strong; I heard about it from several scientists as well as from naturalists who fear being "written off" by science. Yet that fear, as Moore experienced it, is not as straightforward as it may seem. At one point in our interview, I said it's a shame "the institution" isn't more supportive of this kind of work. Moore surprised me by saying that the problem isn't primarily institutions—it is scientists

themselves, paranoid about their careers and conforming to the expectations they believe their discipline holds of them:

> I think the constraints I felt as an employee were probably self-created, not institutionally created and whenever I pushed the envelope the envelope adapted and worked with me to make it happen. So I think probably it's the inner paranoia of the individual trying to conform to their own perceptions of what the barriers were, rather than the barriers being real in themselves. Does that make sense? … The risks are internal risks, self criticism, as much as any external risks of what the institutional review process might throw at you.

Hal Whitehead, too, corrected me when I alluded in our initial email exchange to that which "the scientific model prevents you from publishing":

> I have felt free and usually able to publish my wilder ideas (e.g. that culture is a vital part of what a whale is). The scientific model may keep some of these ideas from journal articles, but I put them in books and other fora (especially "The Cultural Lives of Whales and Dolphins" by Whitehead and Rendell; Chicago). However we try and make it clear to what extent these ideas are buttressed by data. (Personal communication, 2023)

The Cultural Lives of Whales and Dolphins (2014) is a groundbreaking work, arguing that cetaceans have not only culture—"a flow of information moving from animal to animal," social learning as opposed to genetic determinism (2014: 3), but likely also morality—"an idea of what is right and what is wrong, both for them and, sometimes, for us" (2014: 295). The latter proposition is supported by examples like whales of one species assisting distressed whales of another species; and like a dolphin who, when a human snorkeler behaved badly toward her calf, approached not that snorkeler but the leader of the group the snorkeler was in, and tail-slapped to express her displeasure (2014: 294), something like the whale hitting the boat Mandy Crocker was on when it didn't like the captain's driving. But Whitehead and Rendell's book does not much discuss modes of qualitative learning beyond observation, like how, as Mandy told me, she knows by feeling that the whales can "feel good energy" on the boat; how some of them seem to sense her own emotional state, though not all of them bother to. And though Moore spoke at length of how many constraints are self-created, he ran into very real barriers when he crossed the line Whitehead and Rendell do not cross, though Mandy Crocker does: attempting to get into whales' perspectives, to feel something of what they feel and then share that with others. Moore did something truly unusual in doing this in an academic publication, albeit also not a conventional journal article. But when it came to those first-person postscripts, he encountered a

huge amount of resistance at all levels of the editorial and publication process. His publishers "essentially humoured me by having these appendices at the back… The word 'presumptuous' came up a few times." And, he told me, the responses to subsequent whale-first-person essays he's attempted to publish in mainstream media outlets have been similarly negative.

Moore said some of the most support his book garnered was from retired scientists. He said he thinks this has to do with no longer having to "feed the institutional [fundraising] meter on a daily basis to keep [their] position… Having retired you can have a much more unrestrained perspective… you don't feel the constraints of political correctness." That is: Once these scientists, whom Moore described as "some of the straightest and some of the most academic people," felt freed of whatever constraints, self-imposed or otherwise, they'd experienced during their careers, they felt able to acknowledge that all along they had been experiencing the visceral, emotional intensity that Moore wrote about in his book. "There's a lot more humanity to scientists," Moore told me, "than the system allows them to express."

Clifford Geertz wrote: "If you want to understand what a science is, you should look in the first instance not at its theories or its findings, and certainly not at what its apologists say about it; you should look at what the practitioners of it do" (1973 :311). When Tim Ingold lambasted Rendell and Whitehead for calling their approach "ethnographic" in their early paper on whale culture,[35] he wrote:

> What R&W call ethnography is a million miles from what ethnographers, whether in anthropology or sociology, actually do. This is for the simple reason that the proper conduct of ethnography and its rationale rest on philosophical principles concerning the nature of knowledge and understanding that run directly counter to the positivist methodology and reductionist assumptions built into the research programme set out in this article. (2001: 337)

It is a fair critique, as is his subsequent comment about "R&W" failing to mention the history or theory of ethnography. However, when it comes to what cetologists *do*, in terms of what might be termed "ethnographic" research practices, I learned they do much more than what they state in scientific articles; and they learn much more than they say, formally, they have learned,

[35] Rendell and Whitehead 2001; their later book, apparently because of Ingold's critique, did not use this term (Whitehead & Rendell 2014: 42)

especially when it comes to what I've called qualitative learning, something usually perceived to be reserved for the social sciences and for humans.

In the quote above Geertz was, of course, writing about anthropology. He made a clear distinction between what anthropologists *do*—ethnography—and the "form of knowledge" that anthropological analysis amounts to. "Doing ethnography," he wrote, "is establishing rapport, selecting informants, transcribing texts, taking genealogies, mapping fields, keeping a diary, and so on" (1973: 311); it is the "localized, long-term, close-in, vernacular field research" he hailed in a later piece, "Deep Hanging Out" (1998). "Deep hanging out"[36] sounds a lot like what Hal Whitehead described to me as the kind of cetacean research that produces the "greatest insights about whales": These insights, he said, come from "people who are really good observers, have spent substantial parts of their lives out there with the animals and get to know them personally." The circumstances required to do that are rare, though, often not fitting into formalized academic structures like graduate school, "and that's a shame because those are the ones that really give us the insight." When I shared this comment of Whitehead's with Amy Tudor, she told me she wept, because she finally felt seen.

In the acknowledgements of *The Cultural Lives of Whales and Dolphins*, Whitehead and Rendell wrote:

> The foundation of this book is us sailing with whales, mainly sperm whales. While sometimes a little skittish, the sperms have been extremely tolerant of our sometimes bungling attempts to follow them in their milieu. Thanks to the whales.
>
> As we sailed with the whales, we fleetingly saw the huge creatures—"beings" or "hunks of blubber" depending on one's perspective—on the surface beside our boat, we listened to the sounds that they made far beneath, and we wondered: What is it to be a whale? We never expected to know with any depth at all but thought just a little window into their world would be wonderful. (2014: 303)

And yet, as I hope I have demonstrated here, many of my researcher interlocutors *do* know with some kind of depth what it is to be a whale,[37] at least in certain, partial ways. They do understand something about the dimensions of cetacean lives which Ingold says ethnographers come to understand about the humans we study—their "intentions and purposes… values and orientations… ways of perceiving, remembering and organizing their experience, and the

[36] Geertz borrowed this term, tongue in cheek, from James Clifford (who credited it to a discussion with Renato Rosaldo [Clifford 1996: 5]). Geertz's essay "Deep Hanging Out" was critical of Clifford's approach to ethnography.
[37] See my discussion of Nagel's argument in "What is it Like to be a Bat?" (1974) in the introduction.

contexts in which they act" (2001: 337). Cetologists learn these things in ways that, though their knowledge outputs are drastically different, are not entirely unlike the ethnography Geertz described, nor the postmodern style of ethnography that Geertz's "Deep Hanging Out" critiqued, emblematized by James Clifford. "Sojourning somewhere else…putting oneself in odd situations and trying to figure them out can be a good way to learn something new," Clifford wrote, albeit always something partial (1996: 13)—just as with my interlocutors' qualitative learning about whales. The partiality does not make that knowledge less interesting, nor less true; my next chapter makes the argument that in the case of cetaceans, partiality makes knowledge *more* rich, and deeper, than any façade of completeness.

When Whitehead and Rendell noted that behavioral ecology could not sufficiently explain the cetacean behaviour and sounds they observed (2014: 303), their response was to build an argument that culture is involved too. Whitehead told me he believes that the presence of culture in whales should be the "null hypothesis"—the thing that is true unless you prove it otherwise (as opposed to assuming cetacean culture is the thing that must be proved). Missing from subsequent scientific research into cetacean cultures is any kind of explicit qualitative research about the animals, directed toward learning about their cultures or anything else about them. Few would question the value of qualitative research—ethnographic or otherwise—about humans, but it is hardly discussed at all for nonhuman animals, even big-brained, highly social cetaceans. That is a disservice to knowledge, and to whales.

At base, Ingold's critique of Rendell and Whitehead was largely around how the scientists rendered and disseminated their claims; the interpretations they did and did not do; and the realms of cetacean experience to which they paid explicit attention. It was around the *form of knowledge* (Geertz 1973: 311) the article was. And indeed, while bolder and more comprehensive than the 2001 paper, and while it allowed Whitehead to disseminate his "wilder ideas," *The Cultural Lives of Whales and Dolphins* is a far cry from a contemporary ethnography. That is not what it is meant to be. What *would* an ethnography of cetaceans look, sound, feel like? I explore this in Chapters 3 and 4.

Conclusion

Some might argue that the reason scientists don't publish about the qualitative knowledge I have discussed in this chapter—about what they know about what matters to and for whales —is that such knowledge doesn't really matter that much: the ground on which it sits is too subjective, too uncertain; it is not "real science"; moreover, what whales need is not for us to float around in noisy vessels thinking about who they are, but for us to figure out ways they can safely access sufficient habitat and resources to keep *being* who they are. The latter belief was not held by any of the scientists I interviewed, though their "willingness to speak out beyond the ones and zeroes of science," in Moore's words, varied widely.

At the end of our interview, I asked Hal Whitehead, as I asked everyone, if there were questions I should have asked him that I hadn't. After a long pause, he said: "There's a perceived dichotomy that research is either applied or pure. And it kind of can be felt by some people that applied is good because you're actually trying to save the world and pure is bad cause you're just climbing your ivory tower." Both modes are valuable, Whitehead said. "But I think it is an issue for some scientists that they think, 'oh, I'm just diddling around trying to look at social relationships in something or other' and they try and relate it to 'oh we need to know about social relationships if we're to conserve them properly' which is sort of true but it's kind of a bit far fetched." There are more North Atlantic right whale scientists than North Atlantic right whales, "yet we don't really know what it's like to be a right whale"; as with elephant scientists, right whale scientists have "sort of given up trying to figure out what [a right whale] is and are spending their time trying to make sure there are [right whales] around."

We may not need, in absolute terms, to know about social relationships to conserve whales properly. And my argument throughout this thesis is that knowledge of "what," or the term I prefer, "who," a given whale *is*, has inherent value, whether or not it has explicit conservation value; that such knowledge has value even in cases where, in the words of Simon Elwen, we may be "documenting extinction." That said, the knowledge I have discussed here, derived from qualitative learning, has several clear implications for conservation. In briefly explaining them, I will focus on right whales, who are widely understood as the most endangered whale in the world.

First, as Moore argues in his book and elucidated in my interview with him, we cannot fully understand an animal's death until we understand what the animal's life was like—for right whales, life often involves a great deal of suffering, which Moore felt he could only fully articulate in qualitative narratives. Second, what Moore learned about right whales' suffering related to entanglement has huge, now quantitatively documented implications for their ability to procreate and continue the species: even minor entanglements severely diminish the likelihood that female right whales will ever get pregnant, or will do so again, as the case may be (Reed et al 2022, 2024a, 2024b). Moore knew, long before it was quantified, that the suffering entanglement caused mattered. Similar insights can likely be gained from qualitative attention to other species, like the suffering implied by the widespread instances of broken rostrums (beaks/noses) in South African humpback dolphins, which Simon Elwen and his research team have been documenting (see Frainer et al 2023), the precise cause of which remains unknown.

Third, as Denise Risch put it, "experience helps us to understand." Listening to whales sounds' interacting with the sounds in their environments, "if you then just put boat noise on top of that it's immediately clear what that means for a whale which would take me much longer to explain in words I think… But," she went on, "a lot of times it's not been the focus in science, a lot of times it's on the models and the numbers and so it's often forgotten that experience also helps us to understand." By "us," Risch means scientists, but also other stakeholders like regulators, and the public. Knowing something of the quality of whales' experiences and their proxemics helps researchers and others understand those experiences, and understand what whales need to thrive, or at bare minimum survive; to understand what matters to them and something of how and why it matters. Such knowledge makes scientific research better. Michael J. Moore expressed the hope, implicitly present in Risch's comments, that such knowledge may inspire public action on whales' behalf. Better elucidating what matters for whales could also contribute to better, more appropriate and more effective conservation action.

Sometimes feeling what whales feel is an experience of joy, aliveness, vitality; and some researchers seek that out—for example when, after finishing up required fieldwork, a group of scientists I was offshore with drove the RIB (rigid inflatable boat) we were in to a place where they knew dolphins would be. Each of us, in turn, lay on the bow in order to be near the group of dolphins that immediately materialized, "bow-riding" the wave the boat made. That gave us a qualitative understanding of both the dolphins' *desire*—in that case, fun—and their *proxemics*—

they were comfortable being physically close to the bow of the boat because it was moving at a particular speed, but would likely not have been if the boat was stationary, or moving too fast or too slow. Often, though, understanding what matters for whales means understanding their *suffering*, the other of the three elements I singled out for discussion in this chapter. And adequately understanding whales' suffering, my interviews showed, means suffering with them, opening oneself to their pain. That is not something cetologists specifically seek out, but for some, like Lindy Weilgart and Michael J. Moore, it can compel them to action.

When I asked Moore my question about if I'd missed any important topics during our interview, he, like Whitehead, left a long space of silence. Then he said: "Well, people have been trying to poke at the whole PTSD thing of people who are in the business of cutting up dead whales and animal welfare, telling stories and how all that works out… The emotional stress of dealing with these dead animals is something that is complicated." I am not sure if animals' suffering is more important, from a research perspective, than their joy. But from a conservation perspective, one which attempts to build the empathy that will result in action, it is hugely significant. The researchers I have cited here have spent long careers, most spanning decades, bearing with whales' suffering in order to learn about it and more broadly, about them—about the animals underneath the increasingly "stronger and more lethal" (Moore 2021: xviii) polypropylene fishing lines that so often kill them. Maybe one way of paying respect to all this grief, the grief of whales and that of researchers, is to open science to more "heartfelt" modes of dissemination, like the storytelling to which Moore has found himself drawn. Maybe there could be some catharsis in that, both in the externalizing of one's own suffering on the page, and in the hope that perhaps the story of one whale's suffering could eventually do another whale some good.

The third and fourth chapters of this thesis consider in more depth the potential of such storytelling. In the next chapter, I wrap up my discussion of contemporary cetology by noting how the discipline is mostly moving in the *opposite* direction of qualitative storytelling: toward big data, machine learning, and computer modelling. Many scholars have lauded the potential of such technologies for conservation and for knowledge. While I do not dispute that, I consider, in the light of this chapter, what might be lost in distancing researchers and research products from whales and raw data; and what was and is gained from the gaps and uncertainties that are

fundamental to knowledge about cetaceans. Much about whales, I will argue, is both contained and implied by those gaps; much stands to be lost, if we lose awareness of them.

I have focused in this chapter mostly on examples of qualitative knowledge about whales of a kind from which insights can be extrapolated with relative straightforwardness, for example hearing whale sounds then hearing ship sounds and combining that with one's knowledge of whale physiology. But of course, neither qualitative research, nor our understandings of what matters to and for our interlocutors, is ever that straightforward. Research findings are cumulative; they emerge as much from what we sense as from what our interlocutors state, or, in the case of whales, what of them we can quantify. Sometimes our findings lend themselves more to being experienced by the senses than known in any other way.

To illustrate the breadth of inputs from which such knowledge accretes, I will conclude by sharing the images with which Michael J. Moore illustrated his comment about PTSD. It is a history beginning with a dead whale on a beach, and ending with a whale skeleton in a museum.

> The first time I was really involved with a dead right whale I was left with the task of collecting the bones from the necropsy site, transporting them with a bucket loader and getting it into an eighteen wheeler so it could go off to the museum to get composted. It was just myself, it was after three days of necropsies, we didn't know what we were doing very well back then, and it was a rainy day and I was in boots and I'd empty the bucket into the trailer of the bones and then go back down with the bucket to the beach and we must've made twenty runs with the machine from where the whale was to where the parking lot was to the trailer.
>
> It was an incredibly oppressive thing because essentially I was moving the jigsaw pieces of the life of another whale, one less to the species, into a bucket that was going to a museum to be forgotten about. In fact it's on display now I think at U Mass Amherst… One of the pieces of the story that could be told would be to follow those bones… to then stick your head up inside the whale and look out and say well there's a student, there's a child, there's a parent…

Chapter 2

Sparse Data and the Spaces Between

> Perhaps the most important things we know cannot be proven.
>
> He did not believe that the mystery at the heart of things was amorphous or vague or a discrepancy, but a place in us for something absolutely precise. He did not believe in filling that space with religion or science, but in leaving it intact; like silence, or speechlessness, or duration.
>
> - Anne Michaels, *Held* (2023: 4)

> A more holistic, and beneficial, assessment would also include modeling of deaths not recorded. Variations in currents, carcass buoyancy, water depth, and water temperature can lead to a failure to discover whale deaths at sea. This is especially true for chronically entangled right whales, which are likely to sink, having burned up their buoyant oil reserves… As long as we are simply trying to reduce known mortality, while ignoring cryptic deaths and the sublethal trauma that constrains calf production, our efforts are doomed.
>
> - Michael J. Moore, *We Are All Whalers* (2021: 165)

Table Mountain National Marine Protected Area, South Africa

Twenty or so kilometres northeast of the Cape of Good Hope, the point where the Atlantic gives way to the Indian Ocean, marine biologist Tess Gridley says quietly to me, "*Listen.* I think I hear them."

We are at the bow of a sleek white boat in a body of water called False Bay. It is the morning after a gruelling two-day scientific workshop that we both attended in nearby Cape Town. Tess, alongside her spouse Simon Elwen, is co-founding director of Sea Search Research and Conservation, an NGO that is South Africa's only dedicated marine mammal research unit. She was a key organizer for this workshop, and she is exhausted. We'd been having breakfast at a cafe overlooking the water when she said: "Let's go offshore," and phoned Dave Hurwitz, this vessel's captain. To her eighteen month old son, Ronan (meaning "little seal"), whom everyone

calls Roo, Tess said: "Let's go see Uncle Dave." Dave is not really Roo's uncle, but Tess' longtime friend; in the past, she has worked as the naturalist on this, his boat.

Now Roo is sleeping on Tess. She asks me to go below and ask Dave to put the hydrophone down. Dave, unsurprised, laughs and says no. "There's a whale breaching up ahead. We're not going to miss a breach." For this boat, of course, is his livelihood; there are fifteen or so other people on board who have paid to *see* whales, not to cut the engine and float around waiting to hear them.

"Just listen, then," Tess tells me, "tune the rest of it out." Her affect has changed since she detected the sounds: something about her has stilled. Her attention is with the vocalizing animal, some unmeasured distance below the surface of the water, heard only by her and only because of the thousands of hours she has spent listening for them, and learning how to listen for them—past the noises, anthropogenic and otherwise, of both her surroundings and theirs; past whatever is going on in her mind.

I listen, and finally, I hear them too: long, groaning sounds that I recognize from recordings. The sounds are faint but even at such remove I experience them more as vibrations, more with my bones than my ears.

Here on the Indian Ocean coast, these whales sometimes linger for a few days or weeks, but mostly they are migrating, en route from their feeding grounds in the Southern Ocean to breeding grounds further north, where they will begin to sing in earnest. For me, it is an unlikely privilege to hear these strains of sound below us, however muffled; one of those rare moments when I have borne experiential witness to a hint of what marine scientists have repeatedly described to me—the sheer magnitude of what is going on down there, with whales and with others, the vast majority of all that is going on unperceived by any humans, even Tess.

Tess tells me that humans, researchers and tourist operators alike, tend to be more attentive to whales who appear to be doing something at the surface, like breaching, flipper-slapping or lobtailing—all behaviours we would witness later that morning, though only in glimpses (the dot of bright blood on the flipper that repeatedly slams the water: a surface scratch, or something more? The trigger of the slapping, or unrelated to it?). But, she tells me, she and her team have found that "boring" whales, who appear to be simply swimming and breathing, are the ones who are the most vocal. Below the surface, where we cannot see them, it is the least apparently active

whales who are most likely to be discovered singing. She's learned that if you only pay attention to the ones who catch your eye, you'll miss some of the most interesting results.

Recent trends in marine biology try to correct for that, in part by, for example, simply recording sound *all* the time, not just when a researcher sees a whale or deploys a hydrophone. This new style of research generates a *lot* of data, more than any human could listen to in its total duration, so many scientists have begun using various forms of machine learning to process that data, acoustic and other kinds. With the increasing power of these technologies, Tess' finely honed acoustic attention skills are less and less crucial; in the future, a bioacoustics specialist like her may not need to wonder about sounds she may not be hearing or noticing.

Scotland-based marine mammologist Denise Risch earned her PhD in 2013 on cetacean acoustic ecology. As I discussed in Chapter 1, she described to me how her own acoustic attention was honed through "hours and hours" spent listening to underwater recordings, during which she learned to recognize the dialects of different family groups of whales. "Hearing the whales come and go" made her feel like she was in their environment; those hours of listening were essential for how she understood whales, and how she developed as a scientist.

Now, though, her work is mostly "to look, not necessarily listen," when it comes to acoustic data. Computer software visualizes sounds into spectrograms, "pictures of the sound."

> It's actually easier for us to recognize patterns in that way. We look at time versus frequency and then the loudness as a colour scale. So a lot of times we just go through those re-callings that way and just mark out points where we detect [cetaceans] and we feed [those points] into AI services to teach them how to detect them…
>
> But I often find that I'm sitting there thinking 'oh I need to actually take a step back and listen to it again so I actually hear what the context is,' because if you're looking at it, if you're only staring at the screen which I would say 75% of my own work is, then you lose the three dimensional aspect that you have when you listen, especially a stereo recording so you just—you hear things differently or you perceive things differently, if you listen to it. I would say very often there's just not the time to really do that anymore unfortunately.

As Risch and other marine biologists I spoke with described it, the shift from listening to looking has been widespread and rapid—the "early career" of *listening* to data that Risch described was, after all, only about a decade ago.

For Risch, the increased capacity that comes with machine learning tech also comes with a cost. Listening had offered her an understanding of the whales' range of hearing—which, depending on the species of whale and frequency of sound, can be thousands of kilometres—their movement and their own sense of space. "You do see that on the spectrogram," she said, "but if you hear it it's just a different quality." Now, if she listens at all, Risch said, it is mostly to the points the software highlights, not to the raw files and therefore not to all the pelagic sounds in between those made by whales, sounds she'd once found both affecting and illuminating—the movements of currents; schools of fish; ship propellors.

"Are you closer to the whales' experiences if you are listening?" I asked.

"Yes, I think so."

"Does that matter for the kind of work that you do?"

She hesitated for a moment, then said, "Yes. I think that experience does matter. For all humans, not just scientists."

That experience matters for scientists was a main argument of the previous chapter. This chapter considers the implications of a shift many scientists described to me in cetology's research modes and technologies, in which the kinds of immersive experiences Risch described—which bring her closer to *whales'* experiences—have become less common. I begin by discussing the "gappiness" of cetology,[38] which I argue is not a weakness but rather a feature which makes the discipline more capacious, and more generous in its renderings of whales. Both that which is absent from existing knowledge, and that which appears to exist beyond the capacity of cetology's ways of knowing, contribute to scientists' perception of an excess, beyond scientific statement, to whales, or whale *being*. That excess, I found over the course of my research, is crucial to how scientists understand both the animals themselves and conservation of them. Rather than limiting what we imagine of whales, I argue, gaps in knowledge render our thinking more expansive; they bring us closer to perceiving whales' whole being, even though we are not able to precisely name or describe all or even most aspects of that being. Gaps leave room for all that we do not know; they also leave room for what we know to be overturned.[39]

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[38] Cetology is the branch of zoology that deals with cetaceans—whales, dolphins and porpoises. Not all the scientists I interviewed are "cetologists," and some of the claims I am making could be applied to other spheres in marine biology, marine mammalogy and bioacoustics. But my focus is cetaceans and so I delineate the specific field of science about which I am writing using the term "cetology." Where I quote scientists whose work is more broad, I focus (unless otherwise stated) on their work with whales.

[39] Jeremiah Scalia made this latter point in an early reading of this chapter.

Their ubiquity means scientists are less inclined to fix whales or reduce them.[40] Gaps hold open space for whales to be.

That is one of the arguments I am making in this chapter, based on what my scientist and naturalist interlocuters told me and on how I have experienced both cetaceans themselves and my own efforts to learn about them. Though I quote some of these interlocuters making similar claims about their research experiences, my argument that gaps in knowledge make research better is my own. As I will note later in this chapter, some of my interlocuters were very critical of the trends this chapter discusses (away from field research and towards modelling and machine learning); and some expressed their belief that acquiring more and more data should not be researchers' priority if the intent of their work is to help whales. None of the scientists I spoke with would say that more data makes research worse. But all agreed on a fundamental level that cetology will never be able to document, explain or "know" everything there is to know about whales. While individual scientists working with data-based styles of research are not likely to dispute this, I argue that the more technological, more distant style of research characteristic of the shift Risch described obscures the ineffable and the "excess" of whales that is obvious in closer, slower modes of research with and about them.

I go into more detail about this in the second section of this chapter, which outlines, with examples from scientific literature, scientists' concerns about the "technological turn"[41] in cetology. I also consider some of the consequences this change may have both for whales and for the claims scientists make about them. I argue that in attempting too much totalizing precision, accounts grounded in machine learning or modelling may have the effect of *reducing* whales, in science's formulations of them. Much has been made of the potential that AI and machine learning offer to the study and conservation of cetaceans.[42] I do not wish to dispute these

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[40] Quantitative science's modes of dissemination often render cetaceans in reductive ways. My focus here is not knowledge products but its producers, and how researchers perceive and formulate whales as relational beings.

[41] I borrow this term from Parris-Piper et al. (2023), which they use to describe trends in global conservation partnerships in which conservation increasingly is conducted through "smart technologies," involving both AI and various types of hardware (cameras, drones, etc.). They argue that these technologies and related practices result in significant harm to local and Indigenous communities and their livelihoods, and "neglect the main political economic drivers of biodiversity loss" (1). Though it is not my focus, this may well be the case with cetology, too, particularly the latter critique. The spirit of this article resonates with my argument here, pointing out that the narratives surrounding smart technologies and AI for conservation (and in my case, for research) largely frame them as tools to do good, interrogating neither the new technologies' potential for negative effects nor the losses that may be the result of older practices being swept to the wayside.

[42] See for example Khan et al. 2022, "Artificial intelligence for right whale photo identification: from data science competition to worldwide collaboration"; Bakker 2022, "Smart Oceans: Artificial intelligence and marine protected

potential benefits, nor to claim definitively that potential harms outweigh them. But the benefits are not my focus here. Rather, keeping faith with what I heard from the scientists and naturalists I spoke with as well as my own in-person experiences with whales, I point to what could be lost in this shift—usually articulated, by scientists and the media, as merely a shift in scientific practice. My research shows that in fact, these changing technologies and practices have implications not only for how data is acquired and processed, but for the very knowledge the data is used to produce. If the form and content of scientific publications mostly point to methods and data of kinds that can be replaced by machine learning software, the actual practice of cetology is much broader, with influences that are far from quantifiable (as I demonstrated in Chapter 1), and cannot be so easily swapped. There is danger, I suggest, in new research technologies that offer data so extensive and models so comprehensive that it becomes possible to conduct cetology without often encountering cetaceans themselves, and possible to lose sight of the extent—and the beauty and transformative wonder—of that which we do not know. I will offer two specific examples that demonstrate this danger, from scientific studies about which two of my key interlocuters expressed concern.

I conclude by discussing another recurrent theme among the scientists I spoke with: that collecting ever-increasing amounts of data may not be what is most needed to help whales. Several said that in the absence of data, policy could and should be based on harm reduction—and that shifting regulatory culture in this way could be a more important tack for science than attempting to acquire more and more data. Of course, this is not an "either/or" situation: the choice cetologists face is not data gathering *or* conservation and advocacy, and many regularly do a mix of both. But something is changing in how their work is done, and therefore in how whales are understood and felt.[43] Here I attempt both to mark that change; and to articulate the benefits of the old, sparse ways before they are subsumed entirely beneath the new ones, and

area governance"; Guirado et al. 2019, "Whale counting in satellite and aerial images with deep learning." More broadly: Thompson 2023, "How AI Can Help to Save Endangered Species."

[43] A number of scholars have critiqued the ethical implications of AI for animal lives and for research about animals (e.g. Hagendorff et al. 2022, "Speciesist bias in AI: how AI applications perpetuate discrimination and unfair outcomes against animals"; Coghlan & Parker 2023, "Harm to nonhuman animals from AI: a systematic account and framework"). Specific to cetaceans and to the AI-based research I will take as a case study in this chapter, see "Dr. Doolittle uses AI: Ethical challenges of trying to speak whale," by Mark Ryan and Leonie N. Bossert (2024). By and large such critiques focus only on the implications of AI technology itself, not considering the loss of that which the technology is replacing, obscuring or rendering obsolete. The latter is my focus here.

before whales become a different kind of data than, as Hal Whitehead pointed out in our interview, the data that "they always were."

Whitehead said this when I asked him if a change in scientific mindset is at stake, too, with datasets so huge only machines can deal with them. I asked if there is a risk the animals will become data and not animals. He said that to cetologists, whales have always been data. But to many of those I interviewed—including, of course, Whitehead himself—cetaceans are also much more than data. This is perhaps in part because until recently, if one wanted to research whales one had no choice but to encounter the animals *before* they became data—to encounter them as whales.

2.1 Gappy knowledge

Speaking about her work modelling the impacts of anthropogenic noise on whale hearing, Denise Risch said:

> We are really scratching the surface in many ways… For some species that we have in captivity, people have done hearing tests on especially bottlenose dolphins so we know what their hearing capacity is… We don't have that same information for the large whales but we can sometimes extrapolate a little bit. There's a huge knowledge gap there.
>
> But if you know which frequencies they're sensitive to then you can make estimations of, "okay if I have a noise and that frequency range that's so and so loud, we need to know a little bit about your environment and how the sounds spread,' which can be quite complex in the ocean but can be modelled… You can estimate [the] distance [sounds travel]; what we mostly look at is hearing threshold shifts…
>
> Those sorts of things we can assess for the smaller species, we have pretty good information on that. But for the larger species we kind of make it up as we go along almost. So we base it on, what it's based on is there are experts in hearing that look at the morphology of the ear and then come up with ideas about how they might perceive sounds. But we don't really know for sure.

Lindy Weilgart also works in the field of underwater noise impacts. Sweltering in the sun on her back deck, a glimmer of the North Atlantic barely visible beyond some scrubby evergreens, I mentioned early in our interview that my impression is that the oceans are generally getting

louder. “Do you think whales are changing?” I asked. “Behaviourally, but in less tangible ways too?” At this point on my recording, a motorcycle engine cuts into the background of birdsong.

Weilgart made an exhausted sigh.

> Who knows. I mean, I would guess that they feel more stress. But you know, it’s hard to piece it out, they’re dealing with so many things… And then there’s the whole interaction of those threats so it’s not even additive, it can be multiplicative or synergistic, it usually is in fact in nature, so all of that gets tricky.

I asked how she reckons with all the mystery involved in this work, with all that is unknowable. “Oh yeah,” she said,

> Some things you’ll never know. You just won’t know. And as a scientist it does drive me a bit nuts but… nature is complicated. Behaviour is incredibly complicated… Physiology is a bit more predictable, but behaviour is highly unpredictable in especially the more developed organisms.
>
> Then you have the ocean which is vast and changes from decade to decade for unknown reasons, even from day to day with currents and prey availability… The only thing that’s really obvious is say there was a mass die off and a bunch of fish float at the surface belly up.

Simon Elwen told me about a talk he attended by a physiologist, describing research in which heart rate monitors were attached to “some kind of antelope” (a frequent category of wildlife everywhere in South Africa). When the researchers were near,

> [The antelope] didn’t move away. But its heart’s like going through the fucking roof. It’s just standing there because its natural response is to hide.
>
> Everyone’s like ‘Oh go closer, it isn’t scared’—
>
> Its heart is just going *boom-boom-boom-boom-boom*—It’s just staring at you waiting until the point where it thinks you’re too close before it runs away—
>
> And the same kind of stuff comes into cetaceans but we don’t really understand how yet. Some point [will be] the breaking point and they’ll be like ‘this is too much’ and they’ll leave.
>
> But do they leave for an area that they know is better?
>
> Or do they just leave?

At the table just inside Simon and Tess’ wide-open garden doors, the question hangs in the early summer air. Across the courtyard the young hadada ibis, who has lived here throughout the month that I have, still moans, still has not flown away; its parents, it is clear by now, are gone.

I’d asked Simon about the more subtle impacts on marine mammals from issues like ship noise. As several scientists described to me, the regulatory standard for determining “impact” generally means finding out whether or not the animal in question will leave the area when a

disturbance begins. But, as Simon and others pointed out, disturbance is much more complex than that, often in ways science cannot parse, let alone fully articulate. For example, Lindy Weilgart noted that some animals may be too hungry already to consider leaving; that, given a change in a habitat they may have lived in for generations, they may not know where else to go. And, as in human communities affected by catastrophe, it is often the most vulnerable who stay.

Weilgart said:

> If you look even at birds, which are easier to study, and… a human comes or a predator or whatever, and you see the ones that fly away immediately, you think oh, they're more vulnerable, they're more timid, they're more stressed, because they're jittery and hyper and so they fly away. In fact sometimes it's the ones that stay that are more stressed. They can't afford to stop feeding. The risk benefit balance is different…
>
> It's the ones that stay that you have to protect more. They have fewer reserves. They can't afford any disturbance… Maybe they don't have another option. Maybe that's all they can do. Or, they're already deaf.

She also pointed out that any population of animals will have internal variation in noise sensitivity. All else being equal, those most sensitive to noise will leave first. So in an area with a lot of ship traffic, by the time humans get around to doing noise impact studies, often the most noise sensitive animals are already gone. "You don't know if you have the full breadth of the population represented… You're basing all of your reactions on this subpopulation of less sensitive individuals." With a laugh, Weilgart said, "It's like measuring noise amongst a bunch of seniors in a nursing home."

Measurement is not always what is needed—a point I will return to later. At his big round kitchen table, Simon said, "people say 'we should monitor climate change impacts,' but like, we *know* there's impacts… We *know* [the whales are] there. Even this ship impact stuff. You don't need to DTag them, you *know* it's an issue." Simon and other scientists know ship noise is an issue partially through both field- and modelling-based scientific research, their own and others'—but not only. Recall Weilgart's extreme discomfort with the notion of a loudspeaker in Monterey Bay, which I discussed in Chapter 1. As she described it to me, her discomfort was embodied and all consuming—a matter of feeling more than scientific fact; a matter of *more* than scientific fact. Three decades later, there is now ample scientific data demonstrating that anthropogenic noise, especially of specific frequencies, is harmful to whales. That is not to make the argument that knowledge *progresses* from qualitative to quantitative forms (see Hartigan Jr.

2020: 260); Weilgart's intuitive knowledge about the whales' discomfort was knowledge of a different order from, for example, the noise thresholds that more recent research has attempted to establish. But I want to note that despite the gaps in conventional knowledge, the lack of "proof" of harm at the time, Weilgart knew the sounds would be harmful to whales. I am not arguing that quantifying knowledge is bad—but that when quantification is understood to be the ultimate way to demonstrate animals' lived realities, we risk missing knowledge that is already there, or that exists in non-quantifiable forms; and that once a certain level of quantification is achieved, the extent to which all knowledge about cetaceans is fundamentally gappy is hidden under data that appears comprehensive. The latter is not a problem Weilgart was contending with in the early 1990s when she panicked about how the Monterey Bay whales would experience the loudspeaker—even though she faced, of course, challenges of a different order (ones she might well say were worse) given the lack of available knowledge. But the obvious gappiness of available knowledge, I suggest, may in part have been what allowed Weilgart to feel how the whales' would panic. The extent of what she could not know about whales was evident to her. Within and even perhaps *because* of the extent of these unknowns, she knew enough to know she needed to act.

When Simon and I sat down for our formal interview, Sea Search had just finished a field season of several weeks in Saldanha, a town 165 kilometres north of the Muizenberg headquarters. It was client work, "this ship impact stuff," a government contract to determine the extent of humpback presence, part of a larger effort to understand how shipping noise affects them. I spent a few days with the research team. DTags (digital acoustic recording tags), I learned, suction onto whales' backs, applied from a small RIB (rigid inflatable boat), with a long stick, ideally by someone with lots of experience and steady sea legs. The tags collect location data while they are attached. After a specified number of hours, the tag will drop off the whale and must be found by radio signal and retrieved in a similarly gravity-defying manoeuvre as it was applied, but without the stick. The team offshore is always assisted by a team up on a cliff somewhere with a good view of the water, tracking the beeping of the DTag with their own radios, and looking through binoculars for whales.

On my first day in Saldanha I spotted a humpback from the station up on the cliff, a bright, exposed location in a military compound where Sea Search had special permission to work. We

had been let in through a set of the big steel gates that are ubiquitous here; driven in the Sea Search "bakkie" (the Afrikaans-derived word everyone in South Africa uses for what I would call a pickup truck) up the hill on winding dirt roads; and were using as our observation base part of a crumbling concrete redoubt-like structure that I thought was abandoned, until we saw men with guns on the other side of it. The men were there for the entire seven hour day that we were, but never acknowledged us. The whales, of course, were there the whole time too, down in the bay, but it was exciting when we were able to actually spot them, and to radio the RIB team about it. My assigned partner, a young man named Julian who'd arrived for a few weeks with a biologist from Spain with whom he often did tagging work, had brought a plastic bag of tomato and cheese sandwiches and the equipment: two pairs of beat up Nikon binoculars, a radio to talk with those on the boat, a radio connected to the DTags, and an antenna that attached to the latter radio. To locate deployed DTags, you turn the radio onto the right channel and if the tag is out of water (as in, floating, having detached from the animal) and within range, you can hear it beeping; by moving the antenna you begin to pinpoint it (this was also how we located them the next day off the boat). If the tag is on the whale, it only beeps when the whale has surfaced to breathe. But that morning the task was to deploy tags, so Julian and I were on the cliff looking for whales. From that distance, one usually locates them by a blow or a breach—something far enough off the surface of the water that it registers to the eye as a disturbance.

Many whales, of course, go unseen. Those which we did see, we saw only fleetingly and only small portions of their bodies, with the exceptions of rare moments when a whale would breach, briefly flinging itself fully out of the water. Injuries or anomalies we would not likely see from that distance; even up close from the boat one might not see them, depending on the weather, the visibility, what the whales were doing. As an example of this, Weilgart pointed out that sperm whales are only at the surface for ten minutes out of every forty or fifty, and it's difficult to notice population effects of a given impact on animals that are so long-lived (sperm whales average a lifespan of about 70 years; humpbacks, 80-90; bowheads can live to over 200).[44] All this may seem obvious. Less obvious is how this partiality is reflected in the entire field of cetology, where research largely rests on glimpses of whales' bodies and behaviour; snippets of their sounds; small bits of their skin plucked during at-sea biopsies; or organs salvaged from beached carcasses before excavators drag them away. Cetology's knowledge base

[44] Lifespan data from, in order of appearance: National Wildlife Federation 2024; Oceana 2024; WWF 2024

is correspondingly incomplete, as oceanographer John Hildebrand told me. “People think we know way more than we do. They think that scientists can tell them where the animals go and their populations and what they eat. And even these basic things we don’t know.” Later he said:

> There are things that we just can’t even dream that are important to [whales], is what I would guess… It’s just such a different world. I can’t see very far beyond my little universe, actually. I realize the limitations of how much we can hope to understand, at least at this point. It’s kind of like eavesdropping on aliens.

On the Saldanha cliff, when the team offshore responded to our radio calls, their voices crackled and were partially obscured by the noise of the boat’s engine. Our voices must have crackled in return. Julian used simple, direct words; I followed his lead. His words were the same ones, I understood, that the team always used to communicate with one another across these distances, the communications always disrupted by the tenuous nature of the radio connection and by other, external factors like wind. It would be a waste of time and energy, and a source of needless confusion, to try to share more detail than was necessary, or to diversify the language we used to describe what we saw. Some jokes were shared, and these too, I understood, were the same jokes the team had been sharing on and offshore during the weeks that they had been here.

I thought of how whales’ communication space is almost always hindered by noise, though possibly less so here, where there is less industrial activity than on the Eastern Seaboard migration path of the humpbacks with whom I am most familiar. I’d mentioned to a few whale scientists and naturalists in South Africa that back home in the Gulf of Maine, as naturalists there told me, almost none of the humpbacks are without entanglement or ship strike scars. The South African scholars were shocked.

Onshore after the surveys, the group of us drank beer and made pizza at the picnic tables in the walled and guarded grounds of the Saldanha yacht club. It was a space that was quiet and protected, to which—unlike whales competing with ship sound—we knew we could retreat, and in which we could recuperate. There, our conversation filled in the spaces of the blunted communications we’d attempted between boat and land. In individual exchanges, some people slipped into Spanish or Afrikaans. My baby swung in one of South Africa’s ubiquitous slashed-tire swings, his small bare feet dangling over bright artificial grass.

Several longtime scientists I spoke with described how throughout most of their careers, they worked with what Hal Whitehead described to me as “sparse data.” Whitehead said that for most

of his career his work involved building models of a given population's social structure or movement or "that kind of thing" through a "photograph here, photograph there, and so on, and from that get a general picture of the animals… that's what I spent a lot of time doing." The data that could be collected only ever offered small windows onto cetaceans' lives, so scientists worked with what they had.

Simon said, referring to cetacean studies in general but specifically to the limited research resources in South Africa, "We don't have fifty hydrophones. What we do have is four hydrophones and we will really pull the data out of it… You don't have twenty surveys, you have two surveys, so you analyze the hell out of those two surveys." At first blush that might seem to be a detriment to the quality of research—and many of my cetologist interlocuters would probably say that it is. But Simon went on: "If you have twenty surveys, you're just kind of skimming the top layer, in all honesty."

Sparse data, then, is sometimes *deep* data. In any dataset something will always be missed, with varying significance. Larger datasets, as Simon suggested, may tend toward analysis that is wide rather than deep, like census data as opposed to in-depth ethnography. And "analyzing the hell out of those two surveys" means spending a lot of time up-close with the hydrophone recordings, which as Denise Risch emphasized, can be a powerful, even transformative experience in itself.

Marine biologist and activist Catherine Kinsman wrote of revelations she's experienced in field encounters with cetaceans, through witnessing a kind of excess she has trouble describing:

> In the presence of dolphins and whales, I have experienced moments of clarity that have revealed much more than the tremendous triumph of natural selection and the biological genius these creatures exemplify. And though I can offer no proof, it is during these precious moments when my consciousness has awakened… These are powerful moments, which can no more be captured than the surging, changeable oceans of which the whales are a part. (2004: 127)

If it fails to capture those "powerful moments," what this passage does capture is a sentiment I both felt and heard from many of my scientist interlocutors, who hesitated to state *too* much about whales: Lindy Weilgart's face opening with remembered awe when she recounted witnessing a sperm whale giving birth; the sense several scientists described of their impression that whales' vocalizations, in Denise Risch's words, "mean a lot more than we can imagine but in completely different ways."

My research suggests it is not primarily fear of getting it wrong, or of being discredited for excessive emotionality or anthropocentrism (though all these factors are at play), which stop many scientists and others from guessing at whales' meanings, or trying to "capture" what Kinsman calls "that part of [whales and dolphins] which is no more tangible than my own emotional and spiritual self," for which she works to "secure some haven" (2004: 127). Rather, what stops them is their awareness, gained from spending time with whales, of how *much* there is to what the whales are surely feeling and vocalizing; the excess beyond any attempt at statement. The meaning, though neither Tess nor I could decipher it, in those faint vestiges of sound below the boat, below the water, nearly below our human range of hearing. Whitehead told me there have been many moments during his career when it's been evident, based on behaviour, that something unusual is going on for a group of whales—but "it's a mystery" to scientists what's behind the behaviour. I'd asked him if he's ever felt meaning from a whale, like in the example he'd given, of knowing when one's dog wants dinner, and he'd said "No. I don't understand them at all. I believe that all that stuff is out there, but I don't [understand them]."

That excess, "all that stuff… out there," is less and less obvious in the practice of contemporary cetology, with the shift from, in Whitehead's words, "a sparse data scenario"—in which scientists were faced with excess and the unknown all the time—"to a complete data scenario."[45] "Sparse data," my interviews suggested, leaves space for that which we do not and will never be able to know about whales. "Complete data" hints at the tantalizing but misguided notion that the knowledge scientists produce from it may also be something like "complete." When I asked Whitehead if more data is better, he said "more is better but it brings up a whole range of questions of how to deal with it." The implications of having so much data, he went on, are something that behavioural biology is only beginning to grasp, so different is this scenario from the inference-based work that was once the norm. I am arguing in this chapter that one implication, little-discussed among natural scientists, is a shift in how scientists imagine the beings that whales are—a loss that has not yet been fully grasped.

During my interview with Michael J. Moore, I said: "I keep hearing about this shift from sparse data to having a *lot* of data and requiring machine learning to process it, and increasingly

[45] Though he acknowledged that no dataset will ever be absolutely complete, Whitehead offered examples like passive acoustic underwater recordings that can cover huge swathes of time; and drones that can follow animals for hours, and in the future, longer.

distant modes of data collection. I'm curious if you have thoughts on how that changes how scientists think, or how they experience their work?"

Moore, a recently retired Woods Hole cetologist who was introduced to whale research by Hal Whitehead in the late 1970s, gave a small hard laugh. "I think it's disastrous."

We were speaking on Zoom; his internet connection was tenuous; he has a dry sense of humour that I hadn't quite parsed.

I said: "You're not joking, right?"

"No. I'm not joking."

2.2 The animal deficit in cetology's "technological turn"[46]

Hal Whitehead described a back-and-forth to his process of coming up with research questions. He said he sometimes formulates hypotheses based on the patterns he sees in data, but he never begins seriously working with those hypotheses until he can "go out with the whales and test the ideas which I'm getting… My background is statistics—patterns and numbers and stuff are how I get my ideas. But even for me it's still really important to go out there and say, does that really make sense? Is that what may be happening?"

I mentioned that I'd read in his seminal 2001 article "Culture in whales and dolphins" that, at the time, there was little behavioural research about cetaceans in general,[47] and asked if this is still the case. Whitehead said, simply, "Cetacean research is pretty dominated by technology."

"And increasingly?" I asked.

"I'm not sure about that," he said, and went on to explain what he seemed to perceive more as a change in the form of technological mediation of research than in its prevalence.

> It can give us wonderful insights into whales. Using tags we can figure out what they're doing deep under the water, where we otherwise just have to make rough inferences. So there has been a big tendency and probably especially by male researchers to go for the newest technology and expect it to find us new insights.
>
> And it has but the problem is you don't see the animals, you don't… I've been on defence committees of master's students who never actually saw the animals they were studying. They were using entirely things from tags or underwater acoustic recorders or whatever and they can find out a lot—but not to see the animal? I don't know, that seems a shame.

[46] Parris-Piper et al. 2023
[47] Rendell and Whitehead 2001: 311

I said I'd heard a lot about the increase in machine learning from the scientists I'd spoken with. Whitehead said yes, that's true. "But with the orcas… at the moment they still pay John Ford to listen to the recordings and say that's that pod that's this pod that's that. And that will be replaced by AI probably pretty soon." Photo identification (of individual whales based on their markings or other unique physical attributes), he and others told me, is now being done by computers, which unlike in the case of the well-known killer whale scholar John Ford, are more accurate than the "innumerable students and co-op people and so on" who have done photo ID in Whitehead's lab. Sometimes, then, "these things can help. But still," he went on, "to have someone out there who's watching the animals" is, in his opinion, crucial for the integrity of research being conducted on those animals, which could ultimately be hugely consequential for the animals' lives. Fieldwork studies, however, are in general fewer and farther between than they used to be: a 2018 study found that from 1980 to 2014, among 60 000 "biodiversity and conservation"-categorized publications, fieldwork-based ones dropped by 20%, while modelling and data analysis-based studies increased by 600% and 800%, respectively. Fieldwork studies received fewer citations and were published in lower-ranked journals than what the authors call "synthetic" studies (Ríos-Saldaña et al. 2018: 2).

This shift has not been extensively discussed in academic literature (see Tewksbury et al. 2014, and Noss 1996), but there is significant concern in the scientific community. Ríos-Saldaña et al. point to a number of synthetic-based studies which call for better field data to input into models; if "synthetic analyses and big data approaches are instrumental to help set national and global priorities in biodiversity conservation… they can be severely handicapped by a lack of sound observational data" (2018: 2). They note that the decline in fieldwork studies they describe is not just a trend in conservation biology, but other fields too, such as ecology (idem, 4; see Carmel et al. 2013). The cetologists I spoke with during my own research saw this trend, too, and expressed a deep-seated, difficult to articulate unease about it, while acknowledging machine learning can help: "We're on this technology cusp of, like, we'll put the recorder out and record the dolphins, we'll send a drone and fly over—This is not why I became a biologist," Simon Elwen said.

> But [AI] also can do more boring jobs. Like, counting the dolphins is generally done by helicopter or something. It's boring. Like, 'Blow! 1.' Maybe the machines are going to take over the boring stuff, you can just scan the photos and look at the

good bits, you don't have to look at all that empty ocean.

I have spent little time on the "empty ocean" relative to that which Simon has. He has earned the right to be bored with it. The notion of "empty ocean," however, is—as I am sure Simon would agree—flawed. He means empty of visual evidence of dolphins. But in my field notes about my own sea time, there are frequent mentions of how being in—or more accurately, on the surface of—the whales' environment seemed to bring me closer to them—their experiences of their world, its tones and substances, its changing affect. It also had the important effect of reminding me that on both cultural and species levels, human experiences and understandings of time and space, specifically in the western tradition, differ radically from the timescales and space-scales on which other species operate and on which ecosystems and the planet operate. Tess pointed out, as we listened to the faint strains of humpback whale song somewhere in the Indian Ocean below us, that in her field, bioacoustics, computer engineers who create machine learning software are often unable to parse context or relate sounds to behaviour. And such things are not, Tess told me, easy to explain to a contractor who is not a biologist. You need, she said, the slow accumulation of fieldwork-based knowledge; you need background; you need to have, in one way or another, *been there*, whether it is on the boat with the baby or lost for hours in your headphones, like Denise Risch. To "interpret any kind of results realistically," scientists need "familiarity with Nature," wrote the then-editor of *Conservation Biology* nearly thirty years ago in his editorial "The Naturalists Are Dying Off" (Noss 1996: 2). He did not mean familiarity" as extensive knowledge about facts, but as muddy feet and mosquito bites and getting lost in the woods. Field-based familiarity with whales, I am arguing, while it adds to scientists' knowledge about them, also makes palpable the extent of that which we *cannot* know about them—something that is less evident when scientists spend less time in the field. It is easier to perceive the presence of the ineffable in a fleeting glimpse of a giant aquatic mammal, in the overwhelming smell of its breath, than in a dataset.

The problem cetologists flagged during my interviews is not only how scientists do interpretations. Sometimes it is the results themselves. Moore said: "The reality is, because of the power of these models they can run them and do them and say 'yeah, we made the following assumptions,' and there it is, done. But what they don't say is that the assumptions are impossibly vague and as such, they're worthless." He referred me to a paper, "Uncertain

bioenergetics of North Atlantic right whales" by Hütt et al. (2023), on which he is the last of four authors. Jasmin Hütt was an undergraduate when she submitted it.

> Her paper evolved as it bounced through endless rejections because the modellers didn't like it for obvious reasons… The paper says basically that all of these population consequences of multiple stressor models—which is the current iteration of what the right whale modelling scion has been producing, and I've been party to in part to try to throw some sanity into them—they're all BS because they don't know enough about the basic science of right whale bioenergetics to say anything about it at all. And they, you know, the people doing this modelling are very well funded and they're very respected in the community and it is the way forward... But it's based on a bed of sand and you can't build a building on sand…
>
> In the absence of better quality and focus of the numbers, the models are inevitably flawed. I'm not saying—I don't think the design of the models is wrong. It's just that the garbage going in is garbage out.

In the paper, the authors tried to model the impacts of two stressors on the reproductive success of female North Atlantic right whales: chronic entanglement and climate disruption-related lowered availability of their food (tiny free-floating organisms, mainly copepods, a miniature crustacean). They also wanted to know how these impacts interacted, and to compare them for a contemporary North Atlantic right whale; a North Atlantic right whale from two decades ago when the species was doing better; a southern right whale; and eventually, a stunted right whale. As the abstract details, the models failed:

> Parameter uncertainty… was so great that differences between the 3 generic right whale females were indistinguishable. Therefore, we included a stunted whale in the model. It was also indistinguishable from our first 3 model whales. Further, it made robust predictions of [North Atlantic right whale] energy budgets, let alone the impact of specific stressors of varying intensity, impossible. (Hütt et al. 2023: 167).

The paper presents a table of possible approaches to resolving these uncertainties.[48] These do not shy away from recent technologies, but use them in ways that augment species-specific field research techniques rather than "the other option published to date, such as that taken by

[48] These include increased sampling in right whale feeding paths, to estimate plankton density; and analysis of drone-based infra-red video, to estimate "capture efficiency" of feeding right whales—whether and to what extent their foraging style creates an active hydrodynamic pull of plankton—and how entanglement affects that (Hütt et al. 2023: 178).

Gavrilchuk et al. (2021),… to assume that captive dolphins and seals are the appropriate model for inputting BMR"[49] into right whale models (2023: 177).

Of this, Moore said:

> We don't know anything about the field metabolic rate… for right whales or bowhead whales [right whales' closest cetacean relative] or whatever. And yet, that ignorance is papered over by transporting information obtained from seals, for instance, which is completely worthless, but that's the assumption they make and then they go ahead and run the models. Rather than funding a technological solution to measure the field metabolic rate of a right whale they just go ahead and run the models anyway.

As Hütt et al. write, the models in question, those used by Gavrilchuk et al. (2021) "demonstrate conclusively that female NARWs [North Atlantic right whales] foraging in the Gulf of St Lawrence (GoSL) since 2014 do not have sufficient prey densities available to them to successfully calve. However, 2 recently published papers, based on field data, demonstrate the opposite" (Hütt et al. 2023: 173-4). Right whales defy the model's predictions, having babies anyway. This could, Hütt et al. suggest, have something to do with something yet unknown about the whales' foraging hydrodynamics. The authors are more concerned with another relevant unknown—right whale basal metabolic rate, the amount of calories a right whale needs to survive. Gavrilchuk et al. assume it is something like that of seals or captive dolphins; Hütt et al. (including Moore) consider this assumption "unrealistic" (2023: 177).

I looked in Gavrilchuk et al. to see where it notes the information taken from seals. The word "seal" only appears once in it, in the bibliography—an article about elephant seals (2021: 132). "Dolphin" appears three times, also in the bibliography. The seal article cited (Aoki et al. 2011) is noted in-text under "Materials and Methods," where the authors state their assumption about drag ratio being "comparable to previous bioenergetic studies on marine mammals" (2021: 121). Besides seals, the other two "previous bioenergetic studies" cited are both focused on odontocetes—toothed whales (including dolphins), which right whales are not (Gavrilchuk et al. 2021: 121).

Here is the effect Moore was talking about when he spoke of the "power of these models"—"there it is, done"; when he spoke of "the ignorance [being] papered over." Will the

[49] BMR stands for "basal metabolic rate," or the number of calories an animal needs just to survive, not including energy expenditures; field metabolic rate, to which Moore refers, by contrast, accounts for the energy costs of doing activities required for survival, like foraging for food. Neither is well understood for north Atlantic right whales or close relations, like bowhead whales.

average person reading this study—likely to be, if not another scientist, someone with some amount of regulatory power or involved in conservation or industry lobbying—notice the "papering over" of science's lack of precise knowledge about right whale BMR; the sleight of hand involved in the at-best oblique disclosure of where the model's input data came from? Three of the study's five authors are scientists with Fisheries and Oceans Canada (DFO)—that is, the main regulating body in Canada for industrial activities related to right whale habitats. How might it affect policy if DFO assumes that the right whales who follow their food to the ship-riddled Gulf of St Lawrence do not even find enough food there to reproduce? And what of the right whales who *do* reproduce—do they risk being written off as irrelevant outliers, grasping at futile straws to pull their species back from the precipice that is their extinction?

"That was succinct," I commented to Moore when he paused for a breath.

"Well, you've kind of hit a nerve," he replied. There's a lot of funding out there for modelling, he told me, and as someone affiliated with a "hard science soft money" institution, he feels guilty if he doesn't bring in enough grant money to cover his salary and research costs. "I have a hard time really engaging with [modelling based work] because I don't see it as a valuable use of my time. But money's money," he concluded, the last words in a tone that indicated he wished he were not being sincere. Of course, the critiques Moore was offering in our conversation were pointed, referring directly to the body of work Hütt's paper challenges, and broadly to the modelling studies that he has himself encountered. There are many kinds of models; not all of them will be as fraught. But the consequences of models getting things wrong are serious.[50] And for right whales, it is their very *differences* from dolphins or seals—their slow, steady foraging habits; their bulk; their vision that does not notice ropes; the precise ways they tend to spin when entangled; their food specialization—which make them so vulnerable to the industrial practices that kill them, while agile, sharp-sighted dolphins and seals, largely, thrive.

[50] Mostly, although I spoke with a number of scientists about the challenges of creating, "teaching" and using machine learning software, as well as about the benefits and potential pitfalls of its repercussions for the practice of cetology, the possibility of AI getting things actually *wrong* did not come up in my conversations. A broader examination of inaccurate modelling/AI work is not in the scope of this thesis. But it is important to note that the stakes for animal lives likely far surpass those I have identified here. For example, Ryan & Bossert (2024) provide a comprehensive discussion of what they identify as six main ethical issues around attempting to use AI to "translate" or communicate with whales, specifically: "anthropomorphism, privacy rights, cultural and emotional harm to whales, technological solutionism, ineffectiveness for whale conservation, and gender bias" (1). A more specific example, also related to whale "translation" by AI, was noted by philosopher Kristin Andrews (cited in Andersen 2024): We could, believing we have "translated" whales, try to communicate with them and actually express something that disrupts or harms them, such as by giving them incorrect information about their prey.

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Another anxiety I heard and witnessed a number of times, reflected in Whitehead's words above, was that it is possible to get so caught up in technology or in policy that one forgets it is *animals* one is dealing with. This anxiety came up a number of times in the workshop on seal health I attended in Cape Town, when a conversation about something like issuing euthanasia permits would go on at length and Tess or another researcher would raise their hand and say something along the lines of, "Let's not forget animal welfare"; "let's not forget what this means for the animals." That example (for which I hope Moore will forgive my slippage between species reference points) is not explicitly linked to technology or to whales, but it shows how, in Hal Whitehead's words, "we [scientists] sometimes get sidetracked thinking about the technicalities, rather than the animals" even though "we have been able to find out things we couldn't have without these nice devices" (interview with Hoare, 2011). Risch's words echoed this: though analyzing acoustic data visually is standard practice now, and vastly increases processing capacity, she said it creates a disconnect between researchers and the animals they study. "Often we just look at the ocean and we see this construction program and that impact and that seismic boom but because your head is full of that you might miss the animals in between." She yearns, she said, for time in her work to "go back and just think about the ocean," but she rarely is able to find it.

Even if time were not such a precious resource, the "animals in between" are difficult to articulate, especially in the language of science; and if getting to know whales "personally" by way of spending lots of time with them has always been, as Whitehead said, the path to gaining the greatest insights about whales, there are decreasing opportunities in marine biology's research methods to do so. In our interview, after he talked about the importance of going out to the field to verify that his hypotheses make sense, Whitehead briefly brought up a recently begun, much-lauded "whale translation" project that had been making a lot of headlines, involving marine biologists working with "these incredibly sophisticated AI people at the moment at Harvard and MIT and whatever." He said:

> When I last talked to them none of them had actually seen the whales, only Shane.[51] Now it's great they're working with him because he has the insight. But you know these people are working away with their wonderful brains on their wonderful computers with these great systems, and finding things out but does it sort of make sense, given what we know? That's what we need to…

Then he trailed off.

The project Whitehead was referring to is called Project CETI (Cetacean Translation Initiative).[52] Since 2020, a group of biologists and computer scientists have been making headlines about their intention to use machine learning to "translate whale-speak"—a phrase from CETI's homepage. The page describes the endeavour as "a listening project that uses advanced machine learning and robotics to understand what sperm whales are saying," by way of data gathered through "aerial drones, small high-tech suction-cup attached computers, hundreds of synced underwater microphones, [and] swimming robots" (2024).

A number of concerns about the "translation" of whale meaning arose from my interviews with scientists. One was that whales' communications involve much that goes beyond vocalizing sounds, in ways that we know and almost certainly in ways that we do not know. Denise Risch, for example, told me about being surprised when she saw drone images demonstrating how tactile large whales are with one another. "They touch each other a lot. I think we underestimate the things that they do that we just haven't been able to observe in the past and which might also be very important of how they keep contact with one another." Whitehead also described, during our interview, his recent surprise—though he has been conducting field research on sperm whales for decades—when he saw drone footage of how many sperm whales are continually touching a newborn. CETI is using drones, but as Weilgart pointed out, sperm whales are only at the surface for a fraction of the time. Much that takes place underwater will inevitably be missed even by the most sophisticated drones; any "translations" CETI produces will hinge on a version of whale communication which necessarily reduces some of its complexity.

Denise Risch said, in our interview:

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[51] Shane Gero, Whitehead's former PhD student and colleague. Whitehead clearly holds great respect and admiration for Gero and his work with Dominica sperm whales; Gero's work was one of the examples Whitehead offered when he talked about the ways science gains the "greatest insights" about whales.

[52] Whitehead did not explicitly name Project CETI, but he described it in ways that made it easily identifiable. and named scientists who are involved. I do not believe this was an intentional omission on Whitehead's part.

> We're often of course asked the question: What did they say? What does it mean? And of course as I said we don't really know. But what I know, and that's going back to when I started and was listening a lot more than I am doing today, I think there's so much that is completely undiscovered of… what does it all mean, we don't really know…
>
> We always try to discover language in animal communication, expecting the same sort of structure as we use in language, and I sometimes think that might not be the way we should look at it. We take animal vocalization sequences and segment them and try to look for any sort of pattern that may be resembling how we communicate. But I think we should be more open to the possibility that their way of communicating is completely different from the way we do it.

I asked Whitehead what he thought about speculatively attributing voice or other "human" qualities to nonhumans—if that bothered him. He said it doesn't bother him when artists do it. "If it's a science thing then it will worry me, if someone proposes we need to do this research so we can learn what the whales are saying—that worries me a bit."

"Direct translation?" I clarified.

> Yeah, yeah, that does [worry me], because it does suggest something about the animals which I don't think makes a lot of sense, and it can guide research—I mean I might be wrong. I'm not terribly, I don't write a great deal about this but I do kind of feel it's a non productive way to think about it. It's also a very anthropocentric perspective that we have to translate it into our language. Rather than seeing how they use sounds for themselves and what it means to them, and then working from that perspective rather than trying to put it in something which we can—

There he cut this thought off, and said that since humans are the only species for which we know much about culture, scientists can get useful hypotheses about animal cultures from disciplines like anthropology. In those cases, however, "it's not that we expect them to be like us or we have to translate their world to be like us, it's: 'we do this, maybe they do that too'—it doesn't mean they have to be doing that. Occasionally it'll work the other way: 'they do that, do we do that?'"

Whitehead told me about a couple of specific ways in which his assumptions about sperm whale societies were changed by his recent reading of David Graeber's last work, *The Dawn of Everything* (Graeber and Wengrow 2021). One salient example was that Whitehead had assumed that, in sperm whales, different vocal patterns could be used to distinguish different clans. He realized from reading Wengrow and Graeber that in human ethnolinguistic groups, "which as far as I can see are the closest parallel to the clans we find in sperm whales… ethno and linguistic don't always match":

> You get neighbouring societies that have the same language but very different ways of life, or have a similar way of life but very different languages. Our perspective on sperm whale clans is not linguistic but vocal. We have it mostly through listening to their sounds. And especially in the Galapagos, we have been able to relate that to actual behavioural differences, so the 'ethno' bit, and it matches nicely. These guys who sound like this do this, and those guys who sound like that do that. But maybe that's… we've kind of assumed, I have kind of assumed that that was the same everywhere… But—it's much easier, it's easy enough to record the sounds; it's much harder to go out and collect the behavioural information which would show that [clans with different vocal dialects] do things differently. And so we—I'd assumed that elsewhere they match too. But maybe they don't.[53]

Whitehead also pointed out that scientists often assume mammals will have "some kind of dominance hierarchy. But in fact there's very little evidence of that in the ocean and that sort of makes sense if you think about what domination is, it's getting exclusive use of resources and that's really hard in the ocean because it's 3D and it's fluid and so on and it's really hard to defend anything." He is a good researcher in part, I think, because he second guesses himself. He seeks his own biases and reconsiders, from as many angles as possible, ideas he deems too affected by them; he seeks confounding elements he might not have considered. He bears with the gaps, seeks them out, even seems to delight in them—the vastness of what *could* be going on, what remains to be discovered—and that is a fundamental part of his knowledge creation practice. It was evident even his discursive style: During the hour or so in which we spoke, he frequently reconsidered statements he made, saying things like "well actually," and "in some cases." Recall that he always goes to the field to confirm that his hypotheses make sense: Whales themselves, though of course he cannot "speak" to them in the terms of scientific publications, are the primary authority on his research projects. I have quoted Whitehead extensively here in part because he articulates complexities in his work in ways that are difficult to paraphrase. But his winding sentences, his use of qualifiers, his overturning of his own statements—all these also point to something significant about his vocation, the study of cetaceans: that whales continue to defy science's explanations. Scientists still have more questions about them than answers, and even someone with as long a career as Hal Whitehead, who got his PhD in 1981—forty years

[53] Whitehead has since published about these ideas in *Royal Society Open Science*, directly referencing *The Dawn of Everything* (2024: 1).

before I interviewed him—is still regularly surprised by whales, and regularly refines his frameworks for understanding them.

It is no surprise, then, that Whitehead expressed concern about the notion that human machines can "translate [whale sounds] into our language"; that he felt that is not a "productive way to think about it." It is not only that there is so much about whales that we have not yet observed or the import of which we have not grasped; it is not only that so much of whale communication is *not* vocal, and therefore not of a form that can be captured by recordings—though those things matter. It is also—and here I am paraphrasing another anxiety that emerged from my conversations with many scientists—that any effort to "translate" whales is necessarily a reduction of that of them which differs from us, and both differs from and exceeds our current understandings of them. The scientists with whom I spoke—all of whom have intimate, extensive, field-based knowledge of whales—were not prepared to circumscribe whales in that way. As I discussed in the previous section, part of what emerges out of that field-based knowledge is the clear sense of how much there is to these animals that we cannot state.

The late Roger Payne, the scientist who made whale sounds famous in his 1970 recording *Songs of the Humpback Whale* and who in his final couple of years was CETI's "principal advisor," felt that, too. Shortly before his death he said that hearing whale sounds constitutes "a direct emotional exchange. It's like what happens if you look at a picture and it just moves you totally. There it is, and it hits you really hard" (Moran 2022).

The question of what whale sounds mean has pervaded whale research since the middle of the twentieth century, when it became widely known to western science that whales make sounds. Trying to learn about whale communication, the infamous neurologist and biologist John Lilly administered LSD to dolphins (one of many dubious research practices, the notoriety of which more than one of my interlocuters told me continues to inhibit anyone's ability to get funded for research on dolphin communication). The dolphins became 70% more vocal under the influence of acid, Lilly said, and their fear of humans diminished (1967). One usually reticent dolphin approached and made extensive eye contact with Lilly, which he took to indicate a desire to communicate with him. Lilly determined that in dolphins' communications, vocal and otherwise, meaning "resides completely in… non-verbal exchange. We are out of what you might call the rational exchange of complex ideas because we haven't developed communication in that particular way as yet" (1967: 49). *"Out of"; "yet"*: Lilly, I would argue, did not intend to

suggest the absence of "rational exchange" was a deficit of dolphin communication, but rather that dolphin communication goes *beyond* the rational, into spheres of communication humans have not "yet" explored.

During the same time period, Gregory Bateson, who "had an opportunity to meet Dr. Lilly's dolphins" (1972: 364), also theorized about their communication. He proposed that dolphins' communication is likely largely about their relationships and (since they do not grasp) not a "'thing' language" in the way that human languages are; that dolphins' communication forms might be more like music (1972: 375)—an assertion that, like Lilly's sense of being out of the sphere of *verbal, "rational"* meaning, tracks with Payne's and some of my interlocuters' sense that dolphins were communicating some meaning to them that was *direct*, less mediated than human languages and, even though whales vocalize a lot, not reducible to the vocal.

Bateson wrote:

> I personally do not believe that the dolphins have anything that a human linguist would call a 'language.' I do not think that any animal without hands would be stupid enough to arrive at so outlandish a mode of communication. To use a syntax and category system appropriate for the discussion of things that can be handled, while really discussing the patterns and contingencies of relationship, is fantastic. (1972: 371-2)

He went on to propose a few ways we might begin to learn more about dolphin communication, including working to understand dolphins' patterns of relationships, their kinesics and their "metaphor system" to better understand the contexts of their vocalizations; and not "expect[ing] the techniques for cracking human linguistic codes to be immediately applicable to the vocalization of dolphins" (1972: 372). That expectation, of course, is precisely what Whitehead expressed worry about with relation to current whale "translation" efforts (perhaps more aptly described as attempts at "decoding"). In superimposing the structures of human language onto whale sounds, researchers may indeed find something they can render as what they call "translation." But the result may well be what Benjamin called a "distinguishing mark of bad translation, which can be defined as an inexact transmission of an inessential content." For Benjamin—albeit writing about translating human poetry—the essential content of a work to be translated lies in "the incomprehensible, the secret, the 'poetic'"; "that which the translator can render only insofar as he—also writes poetry" (1997: 152). That is, some ineffable essence of a poem must be felt and reproduced in order to make translating it worthwhile, and faithful to the

original expression. This is not an exact parallel to what scientists are trying to do with regard to translating whales' vocalizations, which are likely mostly more mundane than poetry. But I would suggest that this poetic essence of which Benjamin writes is kin with what Payne felt in that "direct emotional exchange" that he described as his experience of listening to whales' sounds, that experience of something that "moves you totally" (Moran 2022). And it is precisely what will be lost in translations made by machines.

"The more we have in common with their world, the more that it'll work," Project CETI's founder David Gruber told a podcaster, describing the unsupervised machine translation that is the technological basis of the project's efforts (interview with Rand 2024)—confirming, I would hazard, Whitehead's worries about the anthropocentrism underlying the project's very premise.

As I write, in early 2025, Project CETI is in the final few months of its four years of funding from the TED Audacious Project. It made headlines in spring 2024 with the publication of "Contextual and combinatorial structure in sperm whale vocalisations" (Sharma et al. 2024). The *Associated Press* reported that scientists on Project CETI "now think there are sets of clicks they believe make up a 'phonetic alphabet' that the whales can use to build the very rough equivalent of what people think of as words and phrases"; they quote the project's founder and president, David Gruber, stating that the group is "now starting to find the first building blocks of whale language" (Cheng 2024). The publication itself does not use the word "alphabet," one that seems to me both premature and unnecessarily circumscriptive. It documents various modifications of the twenty-one types of vocal codas (sonically distinct series of clicks made by sperm whales) that had previously been identified in their study population, Dominica sperm whales. The authors argue that based on these modifications and how they are used, sperm whales' vocal system is in "in principle, capable of representing a large space of possible meanings, using similar mechanisms to those employed by human sound production and representational systems" (Sharma et al. 2024: 2). This "complex combinatorial communication system," they say, opens the possibility that sperm whale communication could involve "duality of patterning," a property of human language in which meaningless sounds are combined in essentially unlimited ways into meaningful words and concepts; and which has thus far not been documented in nonhumans. Duality of patterning, the authors write, "generate[s] a very large space of meanings" (idem, 7).

Consider that phrase, "large space of meanings," and its repetition. With each use of the phrase, the authors propose a corresponding previously undocumented human equivalence for sperm whales. That whales experience a large space of meanings is less the point of this study than that perhaps whales can *articulate* many meanings amongst one another. Yet the space available for us to perceive the extent or depth of whales' meanings, that which is essential about them (Benjamin 1997), is diminished by the project's very mechanisms, and by its underlying assumption that whale vocalizations isolated from relational context are even an order of communication that *can* be "translated" by "unsupervised machine[s]."[54] When Whitehead said he would worry about such an effort if it was a "science thing" but not if it was an "art thing," I do not think he meant to essentialize the difference between science and art; he lauded the capacity of artistic speculation to spur his scientific thinking. Rather, he spoke out of an awareness that science is perceived as fact and art as a product of the imagination. The claims of science, then, have comparatively greater clout than speculations made in art, both on the level of policy and in affecting the ways scientists and others understand the realities under discussion (indeed, my own speculative writing about whales in this thesis is grounded for this very reason in the assertions of scientists, not artists' speculations, much as the latter also inspire me). Science must be cautious with the claims it makes, as also evidenced by the extent of Michael J. Moore's discomfort with the notion of using seal data to explain whales.

The input dataset for "Contextual and combinatorial structure in sperm whale vocalisations" comprised 8719 recorded codas of whales in the study area (that is, all available recordings), including a subset (3948 codas) of exclusively DTag recordings, which also include data on time of day and the identity of the whale who was recorded. "In both cases," the paper's "Methods" section concludes, "rare, long codas were excluded from analysis (greater than 10 clicks, less than 5% of all codas recorded)" (Sharma et al. 2024: 7). In an applied statistical way, this makes sense; the scientists needed to find a simple set of sound-based variations to work from. Yet something of this exclusion points to the broader concerns the scientists I spoke with articulated about how machine learning interprets whales, not just their communications but many aspects of their lives. The ineffability that cannot go unnoticed by a human researcher disappears into data's murk, even in cases when it is not intentionally excluded. Machines do not experience "direct emotional exchange." In the ostensible service of working to demonstrate

[54] Gruber cited in Rand 2024

complexity in whales' communications, complexity had to be removed from the datasets. Perhaps, if what they call "translation" really becomes a possibility, the CETI researchers will exhume those "rare, long codas." But it seems equally likely they will remain in obscurity, and with them a host of unknowns about whales that, when we apprehend their presence, gesture toward a "space for [whale] meanings" that approaches that space's real vastness.

Each line entry of the file "DominicaCodas.csv"—each whale vocalization rendered as data—reads something like this: "32,25/03/2008,7,0.337,0.042,0.057,0.056,0.058,0.056, 0.068,0,0,0,7i,EC1,A,1,0" (Sharma 2024, line 33; see Figure 1 below). Perhaps whales have "always been" data, as Whitehead said. But they here appear as a very different form of data than what Simon Elwen described to me as ticking off a box on a clipboard, saying, "Blow! 1," as your boat bumps over the waves beneath you, as perhaps the odour of the blow arrives in your nostrils with about the same temporal delay as is required to put pencil to page.

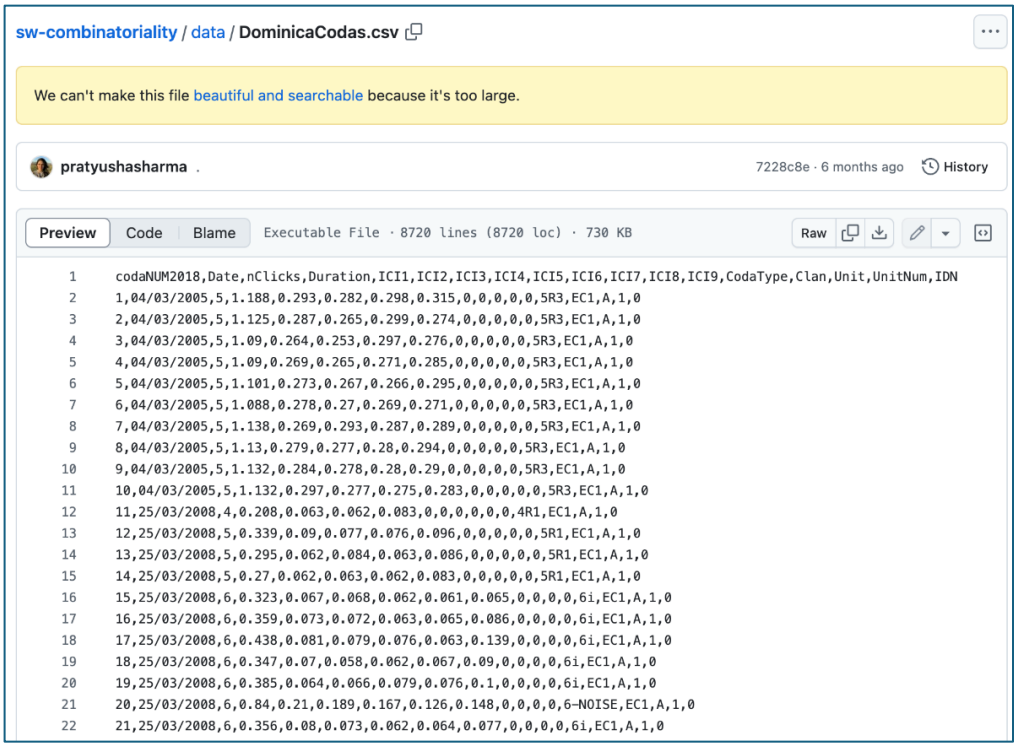

***Figure 1**: Screenshot from "sw-combinatoriality "dataset (Sharma 2024). Each line of data is a recorded whale coda.*

And there is always the problematic of the listener, human or machine "supervised" or not. Sharma et al. continually refer back to human systems of meaning, and how we vocalize our meanings. Here is another human metaphor, which I take from Franz Boas' 1889 problematization of a purported phenomenon that was being called "sound-blindness": "The vibration of the air corresponding to the sound sets into motion the membrane of the tympanum

of the hearer, who then perceives the sound. But how does he apperceive it? Only by means of similar sounds he has heard before" (48). What of sounds or forms of expression for which the hearer has no reference point? They risk vanishing under the pull of familiarity.

I chose Project CETI as one of this chapter's case studies because it exemplifies the machine learning-based technologies around which a number of scientists I interviewed expressed discomfort; because Hal Whitehead explicitly brought it up; and because the project has dominated North American news and human interest media about whales for the past few years. Many other AI technologies exist for whale research of all stripes, and many more are under development; such technologies are standard now in the field.

But when I returned to South Africa in July 2024 for some more work with Sea Search, most of the scientists to whom I mentioned the "whale translation" project had not heard very much about it, if anything at all. They scrunched their foreheads into expressions of perplexity when I said "translation." When I explained, they did not think much would come of it. I didn't have the time, in the workshop or after-workshop pub settings I was in, to ask detailed philosophical questions about their opinions of such an effort; I know that machine learning is being explored by Sea Search scientists, as it is by scientists everywhere. It was edifying and heartening for me to be reminded, again, of how vast the field of cetacean studies is: of the very many people who are involved, their many perspectives, all the widely varied questions they are asking and diverse tools they are using to answer them—tools I hope remain as diverse as the animals they are deployed to understand.

I'd spent many hours, in the months before I visited, thinking, reading, and writing about North Atlantic right whales and in turn about extinction, chronic suffering, animal grief and human grief for animals. It was heartening, too, to visit another continent and be reminded that southern right whales are doing comparatively well. They rebounded well post-whaling and there are at least several thousand of them, though they face a number of climate change related challenges.[55] A few hours before my flight home, I rode with Tess, Simon and their family as they drove south along the coast from Muizenberg. At the top of the first mountain, overlooking

[55] For example, southern right whales now must travel farther to find food, as the diminishment of sea ice in their normal foraging grounds has reduced the availability of krill, the whales' main prey species (see Evans' interview with marine biologist Els Vermeulen, 2023).

Kalk Bay, Tess asked Simon to drive down to the pier. She and I got out and walked through the horizontal rain to a stretch of water where Tess thought she'd seen something. Sure enough: A slightly frilled, angular fin rose maybe a hundred meters from us, maybe closer. Eventually it dipped below the surface and another poked up. The animal was upside down, Tess told me; she could tell from the position of the fin—and it was, as she'd suspected, a southern right whale, the only right whale I have ever laid eyes on. The whale remained there for a long time. Sometimes it would roll and take a breath; sometimes an eye seemed to hover above the surface, aimed in our direction or in the general direction of the pier; but mostly the whale floated on its back, most of its rough, callosity-crevassed body remaining just below the surface.

2.3 Policy beyond data

Lindy Weilgart told me there are "two types of research":

> You can say what exactly is the mechanism, what's happening here, how exactly is this happening, or you can just go, "How can we make this less risky?"
>
> Two different approaches, and I argue do them both, but policy really should be based more on making it less risky. As long as you're convinced there is a risk there [with anthropogenic noise], which I think we are, then just harm reduction. Just make it safer. Is there harm to making the oceans quieter? I don't think so, so let's just do that. Why is this so hard? I beat my head against the wall at some of these technical groups I'm on.

"Scientists are very data driven," Simon Elwen said. "They're very like, I don't want to go into this meeting without facts to present." We were talking about Sea Search's work with endangered South African humpback dolphins. He said sometimes it seems like they are "monitoring the animals to extinction." He described a conversation among a group of scientists tasked with trying to figure out how to count the remaining members of the species. During the conversation, Simon recounted, he kept thinking:

> We know [the population is] fucking small and any counts we get have such big error bars that it's going to take us ten years to show a trend. By which point they will be extinct, so what will be the point? … There isn't really like a nice single solvable problem. But… we don't need to go and do another map or another survey… What we need to do is stop the ships or put some pavements for pedestrians or whatever.

Even as machine learning continues to make data gathering less labour-intensive, more affordable, and more totalizing, a consistent theme among the researchers I interviewed is that data is not always what is needed for whale conservation; that lack of data is often not the problem. Though there may not be *much* data about potential impacts and their specific implications for whales' lives, often there is enough knowledge to demonstrate serious risk—enough that industry should listen, or that policymakers and regulators should insist industry listen. But, as Weilgart emphasized, knowledge that is not "proven" by the conventional standards of science generally is not allowed to stand in industry's way. One concrete example of the repercussions of this mindset is Canada's recently released draft Ocean Noise Strategy (Government of Canada 2024), in which nine of the twenty total recommendations relate to one or another form of data gathering. Of this, environmental lawyer Dyna Tuytel expressed concern the government is "using the ongoing pursuit of perfect information as an excuse not to act" (cited in Bulowski 2024). Compounding this refusal to act in the absence of or beyond concrete data, what is considered an "impact" on a given species is narrowly defined, often failing to take into account effects that are chronic, intangible, or simply not obvious to human measurement technologies.

Some scientists have suggested we must understand impacts for whales by extrapolating from what we know about other mammals. A 2007 review paper, Weilgart among its nineteen authors, took this stance, arguing that given noise is a stressor to marine mammals, we must assume they experience poor health outcomes because of this stress, as it is known that other mammals, like humans, do (Wright et al. 2007). Another paper suggested, in a similar vein, that given what is known of the effects of stress on various other mammals' health, chronic stress could "partly explain why some species have not recovered after protective measures… have been put into place" (Wright et al. 2011, 5). Such extrapolations differ from those in the paper Moore criticized, in that the authors of these studies make both the fact of their extrapolating and the reasoning behind it clear; and are not attempting to make precise predictions. These types of extrapolations are crucial if we are to preserve livable space in the ocean for whales, or—what is actually needed—to make more of the ocean livable for them again. But in the annals of marine mammal science they are few and far between; and the kind of complex, long-term research studies *on* whales that would concretely prove or disprove such effects are, as early in this chapter I quoted Weilgart discussing, extraordinarily difficult to conduct. It is in this light that

several of my scientist interlocutors (notably Elwen, Weilgart, Risch, and Moore) suggested that conservation action and/or a precautionary approach are sometimes more important than increased data-seeking. In various formulations, all said we must acknowledge the impossibility of complete data, and move forward based on what is evident between the metaphorical lines of data-supported "proof."

Weilgart said, discussing her frustration with a technical group discussion, "I'm like, ok, there's 150 species that are affected by noise. Do you think that's enough for us to take remedial action or do you want yet more proof?"[56] Risch said that management action should be "precautionary, so even if you don't know the impact you do something about" disturbances human industry imposes on ocean habitats. "But not everyone sees it that way," she said, adding that among both scientists and regulators, some would call that over-regulating. Risch disagrees. She finished this thought by saying: "We won't know everything, ever. I think we need to let go of this idea that we would be able to."

Her voice went softer, as she said these last words; more space lingered between words and sentences. It was like Risch was, perhaps unconsciously, leaving room in her narration for what she was not able to state or apprehend.

2.4 Conclusion

Hal Whitehead said maybe AI-based technologies could make certain hypotheses more testable. He said has always wondered, for example, whether pilot whales, who appear disruptive to larger whales, are just "short term pain" for those larger whales, "or is it bloody hell, if I didn't have those pilot whales I would have had four more babies? Or whatever." Perhaps AI analysis of enormous amounts of drone footage could shed light on questions like that. "But in that case the initial hypothesis is coming from people just out there watching whales." Whitehead made that

[56] Since our conversation, Weilgart (2023) published a chapter titled "Ocean Noise Pollution" in *The Ocean and Us*, an edited volume intended to "enhance ocean literacy by making specialist concepts accessible to non-experts" and empower citizens to improve ocean health (Obaidullah 2023). Weilgart's chapter makes many of the points I have highlighted from my interview with her, including that "we cannot hold all the characteristics of the ocean constant and only add the noise, which is what we would need to do to separate out the effects on marine life from noise alone" (155). The concluding lines of the chapter's penultimate paragraph point to technologies for quieting seismic airguns used to look for offshore oil, then go on to state: "Of course, an even better solution environmentally would be to leave oil and gas in the ground. Several quieting technologies are available for pile driving that have been shown to be effective. Nevertheless, noise requires a precautionary approach due to the large potential area of impact and the difficulty in detecting population and ecosystem impacts" (158).

distinction, between those who have significant field experience with whales and those who do not, several times throughout our interview. It resonates with other scientists' comments about how meaningful it is, for their work, to spend time with whales; how their perspectives are enriched by working with raw footage and/or recordings from whales and their environs, even though such work is time-consuming and may be less than efficient.

Rebecca Giggs wrote that "the limits of human imagination were never more concrete than in the seconds that pass, eye to eye with another sentient organism" (Giggs 2020: 25). The shift scientists described to me in how marine biology is done—namely, that machines are increasingly gathering data in human researchers' stead; and sorting and visualizing data on scientists' behalf—reduces their proximity to whales and to our conceptual-imaginative limits. The huge datasets that machines can process create, both in volume and in form, the appearance of comprehensiveness, exhaustiveness, and therefore of a "completeness" that obscures the extent to which knowledge of cetaceans is, regardless the extent of the data, both partial and sensorially limited. There are always "spaces between" data points—gaps where our measuring, recording and translating tools cannot reach. I have argued in this chapter that when these spaces are sufficiently evident to researchers, they serve as crucial reminders of the vastness of what we do not know. In turn, they also make evident the need for what Weilgart called "harm reduction," which she and other scientists I spoke with argued should sometimes be undertaken in the absence of specific data about harms, and should displace data acquisition as a priority.

Current trends in cetology obscure the learning that arises from gaps in knowledge. Also obscured, or even foreclosed before they have the opportunity to take place, are the non-quantitative modes of learning and knowing that almost all of the scientists I spoke with said are important for how they conduct their research, as I detailed in Chapter 1. Intuition, imagination, extrapolation, ethnography—all these add to what quantitative science can discover, to offer a more expansive and more robust version of who whales are, and what is at stake for them, in specific circumstances and writ large. Whales are always more than "data" is able to render of them; until very recently, the forms of data available to scientists made that impossible to ignore.

Chapter 3

Cetacean ethnography and the potency of strange intimacies

> Beauty and grace are performed whether or not we will or sense them. The least we can do is try to be there…
>
> We must somehow take a wider view, look at the whole landscape, really see it, and describe what's going on here. Then we can at least wail the right question into the swaddling band of darkness or, if it comes to that, choir the proper praise.
>
> - Annie Dillard, *Pilgrim at Tinker Creek* (1974: 8)

When Simon Elwen spoke in our interview about "counting animals into extinction," he told me that he was an author on a paper that tries to work against that pattern. Its title speaks volumes: "Science Alone Won't Do It! South Africa's Endangered Humpback Dolphins *Sousa plumbea* Face Complex Conservation Challenges" (Plön et al, 2021). Humpback dolphins are South Africa's most threatened marine mammal; Simon, as I mentioned in Chapter 2, was clear that even if they were straightforward to count—which they are not—counting them is not the most important problem and, the paper's authors argue, will take too long to save the species. If "science alone won't do it," then—what more is needed?

Simon and the other authors propose creating, in conversation with various stakeholders, a more action-oriented conservation management plan (idem: 2); the article's main conclusion is that cetaceans should be understood not as "sentinels" whose status warns of coming oceanic changes, but as "indicators" of the ocean's current health. This, the authors argue, will lead to a more holistic understanding of cetacean health on individual and population levels (idem: 8). I would further add that understanding holistic health for whales includes understanding their social and emotional wellbeing. These dimensions of cetacean life, I believe, are most effectively articulated not through conventional quantitative science but through narrative, like Michael J. Moore's (2021) right whale postscripts that I discussed in Chapter 1—stories written from the first-person perspective of chronically entangled right whales Moore necropsied, which detail their lived experience before dying from their injuries. For Moore, in a context where "science alone won't do it," the shift that is needed is one of consumer demand rooted in public empathy for whales: if people knew the stories of suffering right whales, Moore reasons, they might be incited to insist on change in the fishing and shipping practices which cause that suffering.

"What I was trying to do writing that book was to get [those whales' stories] into the kitchens of every consumer in the world."

Science's razor-focus on the quantifiable, on counting populations and determining the precise cause and extent of harm or of species decline—a precision that, as the case of humpback dolphins warns, sometimes cannot be achieved (Plön et al. 2021)—also has another effect that several scientists mentioned to me. That is that, in marine biologist Denise Risch's words, "you look at [the whales] from the point of view of how they are impacted rather than looking at them going about their normal lives." As another marine biologist, Hal Whitehead, told me, as I noted in Chapter 2, we don't know much about what it is like to be a right whale. Moore's right whale narratives in the postscripts of *We Are All Whalers* are one step toward a fuller understanding of that:

> *The ships were very noisy and confusing, because we could hear them for hours and hours as they got closer… We also had to watch out for long curtains of net, stretched along the bottom… When I was a calf, I used to try and play wth the ropes… It was really hard to miss the ropes when I was so intent on finding the best food patch and sticking with it*. (2021: 187, italics in original).[57]

These narratives are grounded in Moore's experiences, during necropsies, of what he described to me as the *afterlife* of the whale. A whale's afterlife held, and transmitted to him, the affect of the whale's suffering. He could do justice to that suffering only through stories, specifically stories that traversed the whale's life and death—a conclusion he came to after "running the reel through how to best interpret the available evidence… The animals deserved to have their stories told." So too, Moore believes, do the humans who "had unwittingly almost always been involved in the demise of an animal" deserve an "accurate as possible depiction" of that dead whale's reality, in case Moore's observations someday impacted those humans' lives and livelihoods, for example by tightening fishing regulations or—as right whale advocates hope—mandating

[57] These narratives are also largely focused on demonstrating the "impact" on right whales of anthropogenic disturbances, for good reason—no cetacean life exists completely outside of such disturbances, with North Atlantic right whales lives being on the extreme end of "impacted" or "disturbed." Yet Moore's narratives, perhaps *because* they are narrative, nonetheless offer a sensory glimpse of North Atlantic right whale life, delivering with it, I would argue, also the capacity to imagine what right whale life might be like with lessened anthropogenic trauma. For example, the same section of Moore's book also contains information about what the whale narrator learned from her mother; about building up blubber by eating lots of food in the feeding grounds, and how pregnancy is dependent on fat; about calves waiting for their mothers at the surface while the mothers dive deeper than the calf can handle, etc. (Moore 2021: 186-7)

ropeless gear. Making an accurate description involved "telling the story about how [the whale] came to die."

Even though all the stories Moore has so far published involve brutal deaths, either of the whales themselves (2021) or their close relatives (e.g. Moore 2022), the insights about whale lives that these stories contain (nursing, feeding, diving habits, etc.) are relevant far beyond describing those whales' suffering. So are Moore's insights about story itself, which is effective not only for describing suffering leading to death but also for describing whales' dailiness and other aspects of life. This chapter and the one which follows work through storytelling to disseminate *ethnographic* research about cetaceans, and to make the argument that both the method and form deployed herein merit a place in the annals of knowledge about cetaceans. Ethnographic research, as I suggested in Chapter 1, differs from the scientific and veterinary work that grounds Moore's postscripts primarily in the training and intentions of the researcher; and in the form that its knowledge products take. Moore's postscripts, vignettes written from the perspective of an individual and meant to exemplify the suffering of many, are closer in form to ethnographic texts than to most scientific publications. The field practice of ethnography and the insights gained from that practice differ in other ways, too, from those of cetology; I am interested here in the similarities, and in what I think of as a qualitative gap in knowledge about cetaceans. Scientists learn a great deal qualitatively about whales, but their insights on this level are rarely discussed or disseminated.[58]

The two chapters which compose the final half of this thesis consider how to address that "qualitative gap." In them, I offer partial responses to two questions I alluded to above: "What beyond 'science' is needed?"; and, "How can we better elucidate cetaceans' normal lives; what is it like to *be* one of them?" Denise Risch said during my interview with her that she thinks the implications of disturbances can most accurately be understood by experiencing whales' sonic environments through recordings. Here, I work to recreate something of whales' experiential worlds through image and story. But I hold in abeyance the urge—crucial as it is—to focus on *disturbance*, attempting instead to show how ethnographic storytelling can contribute to a holistic understanding of particular whales.

[58] Scientists' qualitative learning about whales was the topic of Chapter 1.

My methods in this endeavour are mixed and omnivorous.[59] The gaps between my lived reality and that of cetaceans are enormous. I spent as much time as I could on the water, with whales and where whales might be. I spoke with people who research whales formally, and with naturalists who do so informally, who are often the people who spend the most time with them. I read extensively about whales, largely—because of this project's scope—in scientific archives, but also outside of them. I listened to whales' calls. I reflected on my own embodied experiences as a mammal, and on how they could help me to understand the mammalian traits that I share with cetaceans. I read the works of others who have written stories with nonhuman animal protagonists, whale and otherwise—for example, Barbara Gowdy's *The White Bone* (1998), Charles Foster's *Cry of the Wild* (2023) and even, more distantly, *Moby-Dick* (Melville, 1851).[60]

This chapter disseminates, in ethnographic form, what I learned about a specific group of toothed whales (consisting of one orca and a population of Atlantic white-sided dolphins) when I set out to conduct ethnographic research about cetaceans on the Bay of Fundy. The ethnography's form is inspired by literary modes, including the work I cited above; and by the work of ethnographers who have pushed the boundaries of narrative in the service of ethnographic truth and, in Moore's words, "depicting accurate realities" of our interlocutors.[61] It is also an invention of my own: A series of written images—cetacean-ethnographic, conventionally ethnographic, and auto-ethnographic; none fictional, but some involving some careful speculation—which I have juxtaposed to form the most accurate depiction I can of the reality of a particular whale and the circumstances that surround him. That whale's story is the one from my fieldwork which best exemplifies the kinds of knowledge ethnography can contribute to the archive of what is known about cetaceans.

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[59] In this, I follow Tsing's argument that in telling the stories of nonhuman protagonists, "it makes sense… to use all the learning practices I can think of, including our combined forms of mindfulness, myths and tales, livelihood practices, archives, scientific reports, and experiments" to create "stories built through layered and disparate practices of knowing and being," even if those ways of knowing and being clash with one another (2015: 159). As I noted in the introduction, there is one significant source of knowledge about whales which I draw from only sparingly, and that is Indigenous knowledge of whales, which I did not feel it appropriate to decontextualize and reframe in the way that I have done with the archive of marine biology and with the stories of my (as far as I know, all non-Indigenous) interlocuters—people from whom I had consent to reproduce their words, and with several of whom I developed personal relationships.

[60] See also Moore 2021; Hartigan Jr. 2020; Korgemagi 2021; Tsing 2015; Haraway 2007

[61] See, for example, Raffles (2010); Stewart (2007); Haraway (2003); the contributors to *Crumpled Paper Boat: Experiments in Ethnographic Writing* (eds. Pandian & McLean, 2017)

The orca protagonist whose story I lay out below, who lives among dolphins, has been remarked upon by humans for about two decades, and has been mentioned a handful of times in the media. Dubbed "Old Thom," he is a household name in some communities around the Bay of Fundy and Gulf of Maine. Recently, the CEO of a Quebec marine consulting firm said the lone Bay of Fundy orca would be a good starting point for "establishing a program on orcas in the northwest Atlantic," on whom little data exists (Lyne Morissette quoted in Deer 2023). But neither the orca *himself*, nor his extraordinary relationship with dolphins, have otherwise been paid any attention by science. He is too singular; neither he nor his weird interspecies community can be generalized; not much about the orca-dolphin sociality that goes on here lends to quantification. I hope to show that this orca's singularity, and that of the multi species relationships in which he is embedded, is in fact one of the reasons the attention of knowledge producers is deserved.

Cetacean Trauma, Interspecies Calf-care, and a Playful Predator on the Bay of Fundy

A Cetacean Ethnography

I. The Lost Orca of the Bay of Fundy

When the lost orca is born, he is larger and longer already than an average adult dolphin. His mother lifts him above the surface to breathe. Soon, he will lift himself there. He is not, yet, lost.

His mother's milk is warm, and rich with fat for him,[62] a contrast to the chill slip of saltwater along his skin.

He begins to make his first sounds. They are shrill and nothing like the carefully formulated pulses of adult orcas' voices. They are loud, ugly, gorgeous.[63] They command his

[62] Breast milk is generally around the temperature of the body that produces it, though it rapidly drops a few degrees when excreted. Orca body temperature is not precisely known but is around the same as humans; Russell et al., in 153 samples from 13 whales, found rectal and blowhole temperatures with respective mean temperatures of ~36°C and ~34°C (2024: 07), much warmer than the average Bay of Fundy water temperature of less than 10°C or (given the lost orca could have been born outside the Bay) the even colder rest of the North Atlantic.

While orca milk composition has been less researched than that of some baleen whales, cetacean milk is generally low in carbohydrates and high in fat compared to cow's milk or human breast milk (while human milk averages between 3-5% fat, cetacean milk can range from 10-60, with orcas estimated around 40-60% [Weiss 2024]) (See Denuncio et al. 2024, Oftedal 1997)

[63] For explanation of orca vocal development see Weiss et al. 2006.

mother's attention. They may command the attention of others in the ocean too, but it doesn't matter: His kind are apex predators. His mother will fight off anyone, even a great white shark.[64]

She cannot fight container ships, or storms; if she finds herself in water too shallow, caught in an outgoing tide, she cannot un-beach herself.

She will teach him how to avoid ships, and safely hunt near the shore, and to watch, when he is doing this, for a tide that might suck his ocean away. He lives now, as I do, alongside the highest tides in the world.

His mother can teach him nothing about the contaminants that have built up in her blubber, or in his—the contaminants that have moved from her milk into him, and from her blood into his, from the moment her womb began to build his body. Does she know something of these pollutants?[65]

She could be forty years old: Does she remember a time when fish tasted different? Is the water more metallic now—does she sense this as it washes through her mouth—how heavy it is with human industry's offcasts?[66] And what about the taste of the dolphins some orcas also hunt, the flesh of prey also laden with the same toxins that colonize orcas' blubber? Does she know the taste of dolphins; does she hunt them? Had she begun to teach him this, when her life with him ended?; when he became lost, did he know, already, the particular shapes he must make with his lips to click sound waves into being? Did he know how to point the sound waves; could he use them to map his surroundings the way his mother could?[67]

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[64] See for example Towner et al. 2022, "Fear at the top: killer whale predation drives white shark absence at South Africa's largest aggregation site."

[65] On bioaccumulated POPs (persistent organic pollutants) in orcas, see (specific to the Atlantic context) Remili et al. 2024; Desforges et al. 2024; Lee et al. 2022 (specifically with regards to maternal transfer in utero, which was found for some contaminants to be over 95%). On bioaccumulated contaminants in other marine mammals and fish, see Kim et al. 2021; Durante et al. 2024. For a detailed explanation of biomagnification (the process by which the concentration of pollutants in animal bodies increases at higher trophic levels, i.e. higher up the food chain), see Drouillard 2008.

[66] Humans have noted a different taste to some fish; in farmed species that difference has been attributed to the compound geosmin, created by algae that form under specific conditions related to fish farming environments, as well as to other volatile organic compounds, of which one study (Podduturo et al. 2023) found 104 in farmed tilapia. It seems reasonable to extrapolate that prey animals could also taste different to whales, especially larger prey like dolphins, who are likely to have higher concentrations of pollutants in their bodies due to their larger size and longer lifespan (see note above re: biomagnification).

[67] For an explanation of echolocation in whales see Demers 2023.

It is likely the lost orca was very young when he became lost; it is likely his world was still malleable, not weighed down by stone-set relationships of predator and prey. He must have been old enough to survive without his mother's milk.[68]

See the two of them moving through the steel-grey Atlantic—a tonal, green-hued world for them, lit up not so much by the way light makes colour but the way sound makes space. See them touching, current of feeling passing through skin, then—a blot. A separation, gut-wrenching. For her, fatal. Ship-strike. Beach-slip. Storm.

INTERLUDE (AUTO-ETHNOGRAPHIC)

23 March 2024. As I am writing the story of the lost orca on Canada's east coast, another orca and her calf become entrapped on its western one, in an inlet in the territory of the Ehattesaht First Nation on Vancouver Island. They enter the inlet at high tide, probably following a seal, and low tide imprisons them there. The mother is beached, and dies.[69]

There is a video of the calf, coupled with a hydrophone recording.[70] *The calf calls out as it swims in circles around the small body of water. The call is squeaky, perceptibly young.* Aaa-aa-ah*, a tripartite sound, rising slightly in pitch toward the end.*

I watch the video over and over. Outside my window, the early spring sky over the Bay of Fundy is smoky grey, shot through with darker lines.

I don't notice that my dog is in the room with me until I hear her breathing—pushing breath out, a low tremolo of it. Her drawn-out exhalations, I realize, are responses, sounding in time with the cries of the orca calf playing from my laptop's speakers. The orca cries, and sound emanates from the dog's throat, even though she appears to be sleeping. I let the recording loop. I can see how the dog's sounds travel through her body. She lies on her side, sounding, and her ribcage quakes, and her flank, and the upper muscles of her back leg. Her eyes are closed but her eyelids flutter when the calf cries; she cringes, in her almost-sleep, then she responds.

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[68] Some dolphins have been documented nursing calves of other toothed cetacean species (see Conry et al. 2022); there is no evidence of this in the case I am discussing here. While it is not impossible, it seems unlikely because even as a newborn he would have already been as large as or larger than any adult Atlantic white-sided dolphin.
[69] See Cecco 2024
[70] Bay Cetology 2024b

The recording loops. The calf cries. The dog's exhalations become vocalizations—she adds a low moan then a low howl then a longer howl. Her eyes begin to flicker open in time with her mouth. After three or four minutes she emits a long, real howl, then raises herself off her side and lifts her head, as if waking. She shakes like she's trying to dry her fur. She looks at me.

Perhaps the mother of the lost Bay of Fundy orca was seeking food when she died. Twenty years ago the seals were not as plentiful in these waters as they are now.[71] Perhaps she was startled by a ship, or a military blast. Perhaps she simply veered off course. Were there others in their pod, or were they alone? Transient orcas like them sometimes hunt alone, but as far as anyone knows they do not live alone.[72]

The North Atlantic, during the time of the lost orca's great-grandparents and grandparents and parents, was emptied by whaling and by the wrath of human fishers of nearly all its orcas.[73] Slowly, the species is rebounding. But few orcas ever enter the Bay of Fundy. To anyone's knowledge, the lost orca is the only one who lives there.

Even if the lost orca calf had seen others of his kind, if they were from a different pod he probably would not have known how to communicate with them.[74]

See the Bay of Fundy at mud-watered high tide; see, in there amidst the silt the water always roils to life, *him*: the young lost orca, swimming alone, circling perhaps, hungry. See his smooth black flank, the white patch just behind his eye; see how it catches light as he flits back and forth, his mother no longer there to guide him. The grey patch below his dorsal fin blurring as he

[71] Grey seal populations have been increasing since 2009 when the European Union banned imports of seal except when harvested by Indigenous communities. See Hammill et al. 2017; Withers 2023; McDonald 2023.
[72] Orcas in the Northwest Atlantic are not well studied. On the Pacific coast of North America, scientists distinguish between "resident" and "transient" populations. There are three resident populations (distinct cultures with distinct habits who do not intermingle or appear to understand one another's calls), and a number of small transient pods, lifelong and family-based (see Pynn 2017). There are no known resident orca populations in the northwest Atlantic, and transient pod composition can be assumed to be more or less the same, with the caveat that there are far fewer orcas and they have received much less scientific attention. Generally, transient orcas eat other marine mammals (seals, dolphins, porpoises, etc.) while residents eat fish, but again, little research exists on transients in the Atlantic. That which is available suggests diverse diets which include marine mammals but sometimes also fish (see Remili et al 2023).
[73] See NOAA Fisheries 2024 "Killer Whale"; Jourdain et al. 2019
[74] Orcas can learn to communicate with other pods (see Abramson et al. 2018), but generally do not (see Tyack 2019).

moves. The notch that cuts into his dorsal fin a third of the way up—But perhaps he does not have this yet. Perhaps it is from a later injury.

See him seeing a pod of dolphins, perhaps in the midst of hunting—see them flitting toward a pulsing cloud in the distance; follow them, with him, until they are close enough for the cloud to resolve into fish. Herring, hot-hued and iridescent, thousands of bright dashes against the sandstone bank. See the dolphins seeing him—sense the jolt of unease that shudders through them: Is he hunting *us*? Hear—no, feel—the reciprocal clicks that caress then describe the contours, inside and out, of the meeting strangers' bodies. The pod. The giant calf, who would have been the size of an adult dolphin before he exited his mother's womb. Their clicks reveal his empty stomach, his youth.[75] Maybe they never even consider him as a predator.

He approaches; all eat their fill.[76] Sated, they study him more closely. Their pods are fluid. Animals come and go; mostly the pod are not genetically related to one another.[77] The lost orca comes from a pod that is, by contrast, stable and matrilineal. He would have stayed with his pod his whole life.[78] Yet, the dolphins recognize he is not so different from them. Or, the differences don't matter.

See him among them—their smooth sides half grey, half white; his white eye patch, his white stomach glinting, the rest of him bold black except for that blur of grey.

At first their sounds are foreign. But he listens, swims, mimics; learns.[79]

I encountered him once, the lost orca—the first sight of him a six-foot dorsal fin rising out of the water, identifying him with that notch that cuts into its silhouette, perhaps from a long-ago propellor strike. He is fully grown now, fifteen or twenty years old.

He slides along the surface, his huge black fin surrounded by the smaller fins of dolphins, and the even smaller fins of dolphin calves. For the first time, as far as humans know, he is travelling with the Atlantic white-sided dolphins' nursery pod, which is exactly what it sounds

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[75] It is not known at precisely what age this orca was separated from his mother but as longtime Bay of Fundy naturalists told me, he was still a calf when he was first seen travelling with dolphins (around 2006).
[76] Transient orcas were conventionally understood to only eat marine mammals (this is the case on the West Coast) but recent research has shown that in the Atlantic their diets are much more varied and may also include fish (Remili et al 2023).
[77] Atlantic white-sided dolphins have fluid pod composition in which individuals come and go—unlike some odontocetes (including orcas) their pods are not primarily kin-structured (see Pugliares-Bonner et al. 2021).
[78] See NOAA Fisheries 2020, "Killer Whale."
[79] On orca learning other species' sounds via imitation, see Abramson et al. 2018.

like: a group consisting of females with their calves, who stay with them for between three and six years. It is the most vulnerable grouping of dolphins. Pregnant females return to their natal nursery pods to give birth and raise their calves. Adult males are almost never seen in these groups.[80] The lost orca is singular in more ways than one.

In the water the flickers of dolphin movement are faster than the waves. Elegant curved bodies, newly attuned to a big solid object and a rush of motion beside them, the thrum of a propellor they likely recognize; the vessel I am on has been traveling with cetaceans in this place for decades.[81]

They are moving in a particular direction but this does not mean they don't flash to the side, dart this way and that, relish the wake of the boat from all directions, relish the presence of the other small sleek bodies and the larger one, whose movements are slower but no less graceful.

The lost orca does not flip or flail. His bulk is a mountain beside the others, inches away from them, but they do not collide. Their choreography is precise, and perfect; perhaps a result of long companionship or perhaps simply the physical attunement at which toothed whales excel. They know the boundaries that divide skin and fat from the saltwater between bodies are different from those within bodies: between blubber and bone, bone and muscle, muscle and the particular chambers of the heart.

The babies' bodies are the length of his jaw. Next to him they fling those bodies fully out of the water. The orca's dorsal fin rises again from the blue. It rises and rises, it is briefly infinite until the dark mass below it resolves itself into a body, a head. This is the first orca I have seen and his white patch seems to erase the spot where his eye should be. Then I see it, a small twinkle—he is looking at us.

He submerges. He returns for another breath. The dolphins begin to dive. The orca disappears again, becoming to my eye a blotch of black and greened-white below the water. Then all that remains is a smooth imprint on the surface.

I am standing behind the wheelhouse and after the water has been still a few minutes the captain turns to me and says, "He'll be up soon. You always know, when they all start to come up

[80] This was explained to me by local naturalists; for general information on how scientists define dolphin nursery pods, see Stockin et al. 2021.
[81] Bay of Fundy naturalists assert that whales recognize the sounds of particular boats; Michael J. Moore also spoke about this phenomenon in my interview with him.

like this." He gestures, and indeed: a wave of dolphins have begun to rise, texturing the stillness, more of them than before, maybe thirty of them. And indeed: from within their midst appears, again, the great, notched dorsal fin.

INTERLUDE (AMY TUDOR, NATURALIST)

She tells me that when she sees a whale's tail she feels herself heat up. She feels it almost at a cellular level. She approaches them and feels appreciative, because she knows the whale knows she is here, that it accepts her presence and the presence of the vessel she is on.

She experiences what she witnesses of them through narratives in her head. It isn't analytical, like "whale dove, tail arced, indicating mid-level dive." It is, "Oh I just saw some fish, I'm going down!" It is the whale's story, she senses it more than hears it, but there are words involved; it's complicated, tough to explain to someone who doesn't live inside her head, but she gives it her best shot. "I understand this is me being biased, it's me, it's me thinking, but in my head I'm not directing it. I'm not the director of the thought pattern."

The stories come to her through her unconscious imagination, she tells me, like what some might call a sixth sense. She hears conversations they may be having. When the whales are near enough that she can smell them, the hairs on the back of her neck and along her arms tingle. She gets goosebumps.

When she tells me this, she makes sniffing sounds and moves her nose through the air, demonstrating for me. "Oh, there's a whale." She tells me how her senses become alerted. When a whale breaches, she jumps, too. She's let go of trying not to show emotion. These creatures evoke a wonder in her that she needs to express.

"They're sexy… Giant male whales breaching from the water, it's as phallic as it comes." When she looks at the social media analytics for the whale watch tour, she sees that the main demographic is women age 35-65. "They are the likers, the clickers, the sharers, the commenters, and you know I have, with my background in [psychology] I'm very okay with talking about human sexuality… Whales excite me physically and emotionally and sometimes even erotically… to watch something that big and powerful riiiiise… One of the things my husband brought home for me from the whale in Sandy Cove was the penis."

She no longer tries to stop herself from crying when she is feeling big emotions around the whales, even when she is with the random members of the public who've paid to come out and see wildlife while she explains it to them. The whales humble her. She has to accept being a very small organism. A small organism who is powerless against the big emotions that these particular big organisms evoke.

Her voice rises and falls, speeds and slows, as she describes the whales rising and descending, their movement, their presence and how she, herself, feels that presence and its affect.

She tells me she has tried to write about looking into their eyes, but the words always fall short.[82]

The calves won't leave him alone. I keep thinking he's going to push them out of the way. One flipper slap and they'd scatter. But no one is jostled or perturbed, though their movement remains frenetic.

Amy, who is the naturalist on board today, tells me the dolphins are more excited than usual—excited to have their orca companion present. They jump in the waves, they ride his wake, dozens of them dipping in and out of the water with the performative joy that, when they find no cause to feel otherwise, is characteristic of dolphins all over the world.[83]

Another longtime naturalist later tells me that whenever she's seen the lost orca, the dolphins seem bolder, more gregarious, jumping and spinning with abandon. Of course: When he is with them, they need not fear predation, and so are free to be as expressive as they like.

Since he was first seen by humans nearly twenty years ago, the lost orca has returned to the Bay of Fundy every summer. It seems he is always in the company of dolphins. He is seen alone, the naturalists told me, only in winter, when the dolphins are elsewhere.

He is about eight metres long, and could weigh as much as six thousand kilograms. Adult Atlantic white-sided dolphins are about 2.5 metres long, and two hundred kilograms. The new

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[82] The third person narrative in this scene is a very close rewriting of Amy Tudor's words in our interview. I chose to shift from first person to third person for clarity and concision, but I did not paraphrase, summarize or add any technical or descriptive terminology Amy did not herself use.

[83] This is common knowledge among the naturalists and scientists I spoke and worked with, and has been evident every time I have myself observed dolphins in the wild; for an example, see Würsig's discussion of bow-riding (2009).

calves, of course, are much smaller, about one metre long.[84] The naturalists I spoke with, in the days after the lost orca appeared with the nursery pod, guessed that he was there to protect this important, vulnerable group of dolphins. The dolphins trusted him with this task even though sometimes he eats porpoises, which are little other than small dolphins; even though transient orcas like him normally hunt and eat dolphins as a regular part of their diet.[85] He does not, and it seems they trust that he *will* not.

In the months following this encounter, I search and search online, in scholarly and lay sources. But I can find no other instance of an orca allying itself so thoroughly with a group of other cetaceans, let alone cetaceans who should be prey animals, let alone doing so year after year.

INTERLUDE (AUTO-ETHNOGRAPHIC)

4 April 2024. It has been more than a week since the mother orca in the Little Espinosa Inlet died. The calf has resisted all attempts to encourage her to leave the inlet. There are only two thirty minute periods each day when the tide is high enough that she could safely do so. Officials announce that as soon as it can be arranged, she will be airlifted out of the lagoon, and returned to the open ocean where, they hope, she can reunite with her pod.

She circles and circles. She, too, would have stayed with her mother her whole life.

They are going to move her, they say, by way of a sling attached to a rope attached to a helicopter.[86]

I was lifted through the air into a military helicopter, once. I'd had an anaphylactic reaction to a series of wasp strings on a remote hiking trail, and there was nowhere for the helicopter to land. Several men in thick uniforms laid me on a board and carried me along the rough forest path to an open cobble beach. They placed me into a metal basket, like a shopping cart. The helicopter roared as it idled overhead. I could hear nothing but its roar. I sat with my knees tucked into my chest. My blood pressure was very low. My body's connection with the basket seemed tenuous. I was not strapped in. I was not sure gravity could hold me there; I knew

[84] On orca body size, etc., see NOAA Fisheries 2024 "Killer Whale"
On Atlantic white-sided dolphin body size, etc., see NOAA Fisheries 2024 "Atlantic White-Sided Dolphin"
[85] See notes 14 and 18.
[86] See Canadian Press 2024

I could not hold myself there. When I lifted my head, my field of vision became a grey cloud, and then, without images, the roar was everything, and I could not locate myself. The voice of the helicopter filled me.

The basket kept swinging. A man with a winch was pulling it upward. On the ground, another man was stabilizing the rope. I was keenly aware that one of them might let go, and that if this happened, there was nothing I would be able to do to save myself from falling.

But I knew the men were there to help me; I knew they were trained in doing so, and that many other people had been saved in this way.

Kʷiisaḥiʔis—the name the Ehattesaht First Nation gave the orca calf, meaning "Brave Little Hunter"—will not have that frame of reference, or my familiarity with the open air. She may be able to tell that her would-be rescuers mean her good; some people say whales are aware of this.

But whales have also been known to die when humans try to transport them.[87] *Other marine mammals appear to die from fear fairly regularly, in such situations. It isn't much discussed, but when I was working with seal conservationists in South Africa the general consensus was that when a seal was "rescued" and put into a vehicle to transport it to a rehab facility, the animal would nearly as often as not be dead on arrival. It's often important to relocate a seal in distress for the sake of public perception—and of course the rescuers do hope to, and sometimes successfully do, help the seals they transport—but the outlook isn't generally good for the seal.*

When the basket that carried me had risen what seemed like a great distance—perhaps two-thirds of the journey from beach to helicopter—the motion stopped. The basket dropped a couple of inches then hung, suspended. It swayed. I was certain, during that period of time, that the men were going to let go. They could not lift me any higher. I was going to drop.

My encounter with the lost orca was Amy Tudor's first time seeing him, too, though she's been on the Bay of Fundy nearly every day of the whales' feeding season for years. She'd told me about the intense, "dirty" crying she's done on the bow of the boat, standing there waiting until her emotion subsides enough to return to the deck and face the public. The time I saw Amy cry, in my kitchen during our interview, her tears were quiet, not like how she described her whale-

[87] See, for example, Rodriguez 2024

tears. But the intensity of feeling was there; the skin of her face seemed to change in hue, it seemed to glow. When the lost orca appeared and Amy briefly vanished, I knew she was up there on the bow, experiencing the overwhelm of his presence before she would have to bring herself back to human level.

See her there on the bow, looking into the eye of a whale, weeping. See her love for the whale seeping out of her body as salt; the salt merging with the salts of the ocean, like she's overflowing, outward-flowing.

See her returning to the deck, telling us about the lost orca, her skin—a map of the time she's spent in the salt wind, her features not so much weathered as burnished by it—still aglow with his presence.

Interlude (Kʷiisaḥiʔis)

One day, she finally eats their offering: eighteen kilograms of fresh seal meat.

Three days later, when the tide waters have come in under a waning moon, she swims over the sandbar, back into the open water.

As the local scientific research group, Bay Cetology, described it, she became excited before she left the pool where she lost her mother. She breached, slapped her tail, tested the current. "She appeared to know where she needed to go but just seemed to want more water to make the move."[88]

Before she left, she made a gesture acknowledging the humans who'd been present almost constantly over the five weeks of her orphanhood, trying to help her.[89]

Over the following few months, humans try their best to keep surveilling her, but mostly her movements go unrecorded by us.

It is not known who her companions are now, or if she has any.

[88] Bay Cetology 2024a

[89] Bay Cetology, the group that spearheaded the orca's care and rescue attempts, wrote: "Then, this afternoon while approaching the last intersection before open waters we watched amazed as she went out of her way to seemingly say goodbye to her guides Rob John and Judea Smith before taking off like a rocket on her own" (2024a).

For some years now, the lost orca has been of the age that he could seek a mate. Each year, the naturalists tell me, they think it might be their last time seeing him. They know there is no mate for him here.

But each year he returns.

In winter, the dolphins go further offshore and somewhat south. The lost orca does not follow them. He seems to remain around the Gulf of Maine, sometimes venturing as far as Cape Cod. Off Brier Island, people working on winter lobster boats have seen him. Maybe this reflects the lost orca's genetic tendency to *stay*—a home pod, a home place. Maybe, lacking a family who share that tendency, he transposed this instinct onto territory.

Sometimes the lobster fishers toss him some of their bait fish: a gift, or an offering—or perhaps, their response to the pull I always feel when I am close to a whale, the deep longing to connect with the animal. Perhaps that particular form of longing can transcend species. Perhaps the lost orca and the dolphins felt such a longing toward one another, too.

II. What I Learned From Learning About the Lost Orca

II.1 *Naming cetaceans*

It has been a long time since the Bay of Fundy lost orca was lost. He has a home territory; he has a pod, even if the members of it change sometimes. I have chosen to refer to him in this way because "Old Thom," the name humans gave him, feels to me uncomfortably like mockery.[90] He is not old. And the other orca "named" Old Tom, the original one, was for decades, until his death in 1930, the leader of the pod of orcas off southeast Australia who herded baleen whales into a bay where human whalers could kill them. That Old Tom sometimes even towed the

[90] I explain below why Old Thom seems inappropriate as a name for this orca. Some Bay of Fundy naturalists I spoke with say that the other Old Tom was not an inspiration for the lost orca's "name," and rather it was that one local marine biologist felt the lost orca behaved like an "old tomcat," as he kept coming back to the same place. It does not seem plausible to me that the Old Thom/Old Tom names could be entirely coincidental, given "Old Tom"'s infamy.

In my critique of the whale-naming habits of western knowledge cultures, I do not include Indigneous practices such as the name the Ehattesaht First Nation gave to the orphaned orca calf whose story I cited earlier in this chapter. That name emerged from a long history of relations with whales and knowledge about them, and interestingly, the name's meaning was descriptive of the orca calf's specificity—"*Brave Little Hunter*" (though this may not have been the only factor that contributed to its selection)—whereas in many of the cases I critique in this section, the name's relationship to the actual whale is superficial at best.

whaling vessels, taking a rope in his teeth; on other occasions he would "jump on the rope fastened to a harpooned whale, hanging onto it with his teeth to be towed around like a sea anchor by the injured beast" (Killer Whale Museum Inc, 2024). That orca, too, forged relationships of cooperation across the boundaries of species, the benefits of which he and his pod reaped when the human whalers would leave parts of a gutted baleen whale carcass on a buoy so the orcas could eat the tongue and lips (Reeves & Holmes, 2023). But that mode of interspecies relating was completely opposite to the one lived by the lost orca of the Bay of Fundy. The Australian "Old Tom" was characteristic of orcas' reputation, like cats, as wily animals who kill well and even for sport—*killer* whales. Sometimes they live up to that reputation. The Bay of Fundy's lost orca does not; living with vulnerable prey animals and *not* killing them, everything about him undercuts that pattern.

It is possible, too, that the lost orca has something like a "name" for himself. It is not known whether orcas have what scientists call "signature whistles"—"a learned, individually specific tonal whistle that conveys identity information" to other members of the same species (Cones et al. 2022: 338), but Atlantic white-sided dolphins likely do (Cones et al. 2022). Is there a whistle, sounded amongst the lost orca and his dolphin companions, that means *him*? The dolphins could use this to call to him when they want him. Like dolphins, he might sometimes call out this signature whistle himself. Perhaps looking for a companion. Perhaps seeing if anyone is there. Or perhaps just enjoying the resonance of it—the sonic marker of his unique being, sounding, to the edges of his universe, something entirely other than "Old Thom." If the lost orca does not have a unique identifying sound as such, that does not mean he is not known as an individual—in fact, if that were the case, the lack of a sonic identifier could suggest something significant about orcas, something that bears noticing.

Most of the naturalists I met in the place where the lost orca lives use the "names" humans have given whales, often chosen for their habits or for physical characteristics like the shapes of the unique markings on their tails—Badge, Cloud, Sockeye, Peajack. But not all of the naturalists: Penny Graham, the eldest and most experienced among them, who owns the vessel on which Amy works, chooses not to engage with the whales' assigned names. She is more interested, she says, in the whales' being. For her, the "names" get in the way.

It is true that names point to singularity, in opposition to the flattening effect of species. Still: I wonder what, or rather whom, we miss when we call the lost orca Old Thom, or the

humpback with the undercut jaw Sockeye; I wonder what forms of relationships might become evident if we were more attentive to the in-betweenness of whales and whale species, and to how they might perceive one another; if we could see them neither as rotely performing members of species, nor as the westernized individuals into which the cute names seem to render them, but as something else, something between those extremes as well as something other entirely. Sockeye is a dominant male, the naturalists told me, well travelled, sexually prolific, gregarious. All that seems true. But he also bears a name that calls to mind a motorcycle gang member or football player. Probably he is also compassionate, sometimes vulnerable, sometimes scared.

Amy told me how disappointed that whale seemed when he came close to the boat and she told him she could not touch him; she told me of her tears in that moment and how the whale seemed, with his gaze, to perceive and to acknowledge them. In Chapter 1, I quoted another naturalist who felt this same desire from the whale they both call Sockeye, and who *did* touch him. What is it in human touch that this whale craves?

II.2 *Cetacean possibilities*

Almost everyone I spoke with around the Bay of Fundy said the lost orca "thinks he's a dolphin," implying that what the orca "thinks" about himself is incorrect; that his human observers, in fact, know with more accuracy, more "truth" than he does about the qualitative dimensions of his identity and relationships. This claim that the lost orca's identity is somehow incorrect seems unfair to both him and the dolphins. Perhaps they do not have a concept of *species*; perhaps the distinctions they make have different kinds of nuance. Atlantic white-sided dolphins need, of course, to be able to recognize orcas as top predators—though there aren't many in the Bay of Fundy, there are almost certainly some in the dolphins' wintering grounds. And they know insiders from outsiders as regards their pods. The lost orca demonstrates that species may not be as significant an exclusionary factor to pod composition as we tend to assume. He and the dolphins know one another, after all, primarily through echolocation: not by appearance and size but by sound, shape and density—information that for the most part humans, unassisted by technology, can only long for.

Bateson wrote that a unit of information is "a difference which makes a difference" (1972). If we are to understand the differences which make a difference to a whale, we must hold in

abeyance those, like species, which have such ingrained meaning for our own world of information—not only our particular bodily capacities, but our thought patterns, too. Perhaps it matters less whether the lost orca thinks he's a dolphin than that he perceives, in himself and the dolphins, what western humans too often miss about our relationships with one another and with nonhuman others: what Bateson called "the pattern which connects" all earth's beings, which he defines as "*primarily*… a dance of interacting parts and only secondarily pegged down by various sorts of physical limits and by those limits which organisms characteristically impose"; it also manifests in Bateson's proposition that "all mind or minds, whether ours or those of redwood forests and sea anemones," think "in terms of stories" (1979: 13)—not just pertaining to social behaviour but also "internal stories" like embryology and evolution. Humans have a hard time perceiving that, Bateson writes. We glimpse the "stuff" we are made of—the pattern which connects, that which we *share* with other beings (*creatura,* the living [idem: 7])—mostly through "dreams and percepts and stories," cracks in our usual modes of perceiving reality.

The lost orca and the dolphins with whom he lives do not appear to have this difficulty. Orcas and Atlantic white-sided dolphins are toothed whales who echolocate. All are considered oceanic dolphins, *Delphinidae*; orcas are the family's largest member. They are distinguished mainly by the visually significant characteristics of size and colour (and of course, sheer physical power, and the fact that one sometimes eats the other); and by their habits of pod composition—orca pods stable and matrilineal, Atlantic white-sided dolphins pods fluid and shifting. The "internal stories" of their physiology and physical capacities are very similar. Captive orcas and dolphins have shown themselves capable of learning to communicate with one another (see Abramson et al. 2018, Tyack 2019). I want to suggest what matters to the lost orca is what *connects* him with the dolphins. He is not confined to the pattern, the life-way, that human science has come to expect from transient orcas like him. In this, he is an exception to "normal" orca behaviour—but science's understanding of what is normal for a whale is conditioned by how western thought distinguishes species and understands more basic relations (and lack thereof) between individual bodies, which thinking like Bateson's (and a great many other theorists as well as most of the planet's Indigenous populations) calls into question. Maybe the shared "stuff" orcas and dolphins are made of is usually evident to them; maybe that is their given, and they are able to hold the complexity involved in, for example, eating an animal whom you understand not to be so different from you.

For a long time, orcas have been an example of a species whose subpopulations' cultures sometimes mean more to them than their survival, with much scientific attention paid specifically to the three pods on the west coast of North America. Of one of these pods, known as the southern residents, there are only seventy-odd members left. They eat only Chinook salmon, even though orcas can and do thrive on more varied diets or ones that consist mainly of marine mammals like seals, which are much more plentiful than the dwindling salmon. Until very recently most scientists believed that, though pollution, warming waters, and engine noise were also harming the southern resident pod, the lack of these salmon was the main reason they were failing to thrive (see for example Robbins 2018). But a 2024 study showed the southern residents' feeding grounds contained twice as many salmon as the area where the northern resident pod hunts—and the latter population is doing comparatively well, even growing (Saygili & Trites).

Salmon availability, then, is not the issue: it is more subtle than that. Co-author Andrew Trites told the *Canadian Press* that for these orcas, perhaps the ship traffic in the Salish Sea means they can't communicate with each other about hunting; he likened their experience to being constantly in a busy supermarket with one's family, surrounded by food but unable to discuss what to eat—and therefore, failing to eat—because of the noise (Shen 2024). That suggests the problem for the southern residents may not be ecological limits but *social* ones; not that the southern residents are picky eaters, though they are that, but that, in specific ways that are significant for them, they are social eaters. If the ocean were less noisy, would they have the social space to experiment and find ways of eating different food?

Trites said some people might find the study's results "difficult to accept." But "if we really want to save southern resident killer whales, we need to think bigger and not assume we've solved the problem because if we're wrong, we're dooming them to extinction" (quoted in Shen 2024). The lost orca is a powerful example of this type of nuance: Given the right circumstances and the right support, he appears to be, against all odds and all assumptions, surviving—perhaps even thriving. In other circumstances, he might have died as a calf; might have spent his life alone; might kill and eat dolphins like other transient orcas do. In his circumstances, he is alive; isn't alone; doesn't eat dolphins. I do not know whether the lost orca desires a different kind of life; whether he would, in fact, *like* to find a mate his own size. But there seemed to be joy in that motley group of cetaceans, the day I saw him, a huge predator

surrounded by leaping babies. It seems that he must, year after year, on some level, be choosing this life. It seems that he could, in this life he has ended up with, be having fun.

II.3 *Cetacean fun*

INTERLUDE (AUTO-ETHNOGRAPHIC) | NOVA SCOTIA

When I was a child, I had a grown-up cousin who lived down the street. He was a huge man, weighing several hundred pounds, about the same as an adult Atlantic white-sided dolphin. To a child, he was a giant. On hot summer days I, along with some other child-cousins, would go to the backyard pool at my giant-cousin's house. My giant-cousin would stand (or perhaps, crouch?) in the middle of the pool, put his arms out—he must have been crouching, the water could not have been more than four feet deep—and spin as fast as he could in the centre of the pool, creating a whirlpool effect with waves we children, breathless, would ride.

Did he also hold our hands, sometimes—did our small bodies help, too, to make the whirlpool? I think I have a memory of that, but my more vivid memory is the rush of being in the wave, suspended—carried by it. It was such a small pool. The days were sticky and windless. The motion of the water and the way the water carried me made me feel dizzy and high; it made the long hot day feel exalted. I hung onto the side of the pool to catch my breath. Everything was blurry, in the pool without my glasses. The thrill lingered. The heat in the air that had felt so stifling now felt like a rare gift. When I got out, I watched the heat-shimmers until I thought I could see individual molecules of it, shining.

Fun could be one reason the dolphins hang around the lost orca. At least since the time of the ancient Greeks, dolphins—almost all oceanic dolphins in the world—have sought out bow-waves to ride (Pynn 2018; Würsig 2018: 136). (Orcas—big dolphins—do it too [Pynn 2018]). In my experience, they just appear: One moment no dolphins, the next moment, as if magnetized to the wave, a dozen. In opposition to theories of dolphins using bow-waves to assist in migration, the scientists I was with when I witnessed this believed the purpose of bow-riding was fun, or play; so does marine biologist Bernd Würsig, who wrote the entry on bow-riding in the *Encyclopedia of Marine Mammals*. When dolphins are bow-riding, they make their most social sounds. They do not tend to bow-ride when they are hungry or under threat from hunting; but

they seek out opportunities from kilometres away "during and after social/sexual activities that take place immediately after bouts of feeding" (Würsig 2018: 136). They ride not only the waves made by human vessels, but also oceanic waves and the waves created by the movements of larger whales.

> Dolphins even "entice" whales to surge ahead by rapidly crossing back and forth in front of a whale's eyes and snout. The whale surges forward in response (and apparent annoyance), often blowing forcefully during the surge. An abrupt bow wave is formed, and the previously heckling dolphins line up in the wave, apparently enjoying its momentary pressure effect. This activity can go on with one whale for 30min or more, until the whale tires and surges less or not at all. (Würsig 2018: 16)

My cousin would have protected us if he had been called to do so. He is dead now, and I did not know him well, but I remember him being fiercely loyal. We didn't need his protection, though, and he put his hugeness towards offering us joy. It makes sense, the naturalists' hypothesis that the lost orca protects the dolphins who took him in; he is the single most powerful animal in perhaps the whole Gulf of Maine; he cannot help that effect. But I wonder if that is how they see one another. Perhaps his primary notion of them is as his family, who also keep him safe. Perhaps that is their primary notion of him, too.

The lost orca probably knows that dolphins enjoy riding waves. I didn't know what bow-riding was when I encountered him and his dolphin companions, but looking back it seems that was likely what they were doing—the dolphins leaping over and over from the water in the same curve as the waves created by his movements.

When they are travelling through the Bay of Fundy on a warm summer day and everyone's hunger is sated and the sun glimmers through the water and warms their skin—does the lost orca, unprovoked, surge forward and curve his body to one side or another—because he knows the waves he makes will bring them joy? Because he *wants* them to play, he wants them to feel that joy. Because, perhaps, their joy brings him joy, too.[91]

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[91] Play and its social/evolutionary roles have been extensively studied in nonhuman animals, including cetaceans and especially dolphins. Less so "joy" (though much has been written about the joy dolphins bring *to* humans). While there are ample studies demonstrating that cetaceans have brains well-equipped to feel such things as joy (see King 2019; Kachar et al 2018; on other nonhumans see Bekoff 2000), less discussed is how we can be confident something like "joy" is what they are experiencing. Nelson et al. review approaches to studying joy in nonhuman animals in a 2023 *Biological Reviews* article. They define joy as involving three characteristics: an intense, positive affective state; being somehow event-driven, such as a response to doing a particular activity (such is the case with the whales I am writing about here); and being short term, though it can lead to longer lasting feelings of pleasure or happiness (2023: 1550). They argue that "behavioural correlates of joy are measurable"; one way they propose we

Figure 2*: Drawing of the lost orca and his dolphin companions, by the author (September 21, 2021 sailing with Mariner Cruises. Reference photo: Tudor 2021a, used with permission).*

can measure joy in nonhumans is when there is an increase in play behaviour (idem 1549; 1550). My use of the term roughly coincides with this, but is based primarily on the affect I perceived from these specific dolphins.

Conclusion

INTERLUDE (AMY TUDOR, NATURALIST)

"In this world we're as receptive—We can hear and see as much as we want to allow ourselves to, right? Are you open to it? Do you believe in ghosts or, is it that when you believe in something you're biased because you're looking for it, or—I don't believe it's that way, I believe it's because you're open to it—

"I hear their conversations in my head when I see these whales and I'm like oh, this is what he's thinking—I don't tell this to guests, this isn't something I'm outwardly sharing, it's something that just kind of happens in the back of my head and if it comes from my own imagination, well, great, it's bringing me happiness —and if it is some type of subliminal connection—

"I can't prove the thing either way. I'm not making it up. It's not like I'm there to prove a type of idea. It's kind of a watch and then, aaah, the thought comes into there, and it's not like I'm hearing whale voices or like each whale's got its own voice or an overlay or anything, it's just a kind of sense—"

She tells me she wonders so much what they wonder about us. She wonders: What do they think of us?

She says she thinks they've got the whale watching vessels trained. The whales can predict how the vessels will behave when they encounter them: The captains track parallel to a whale's swimming path for fifteen or twenty minutes and then the boat moves on. She believes she has seen humpbacks use the boat as a barricade for food. She knows, she says, the science of how boats affect the water, and the science of how the moving water affects the whales' food. She believes the whales know these things, too,[92] *and that they have figured out how to guide the boats so it makes it easier to round up food. They make the boats move in circles, or use a boat as a wall beyond which the food cannot easily move.*

She won't be able to prove any of this, she knows. She doesn't have the technology or, as she's mentioned to me several times during our interview and outside of it, scientific credentials. She doesn't seem to mind, at least not too much.

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[92] Here is another example of a naturalist's knowledge of what I referred to in Chapter 1 as whales' *proxemics* (Hall 1968); and another example of *new* knowledge that ethnographic methods can document about cetaceans.

No one wants to guess wrong, she tells me. No one wants to take the risk of hypothesizing based on a gut feeling combined with un- or informally-documented observation. "You guess one thing wrong and suddenly you're discredited because your hypothesis was wrong, which I never liked about science anyway."

What is the place for wrong guesses about nonhumans, especially those we know as intimately as Amy knows whales? For example, *He thinks he's a dolphin* (an assertion I do not recall Amy specifically making with such directness, though several of the Bay of Fundy naturalists I spoke with did). What if this guess that so many people make about this orca is wrong?

Sometimes what we learn about whales cannot be abstracted into general claims, because of how we learn it and because of the nature of the knowledge. But knowledge is not less significant if it cannot be rendered as hypothesis; hypotheses are not funamentally less valid if they are made by those lacking formal training. Wrong guesses are the foundation of experimentation. What is needed is to be clear about the source material.[93] The wrong guess that I discussed in the previous chapter, in the paper Michael J. Moore decried,[94] was in form quantitative and conclusive, closing possibilities instead of opening them. Amy's guesses are the opposite, allowing infinite space for whales to surprise her, to be different from what she expects. *We're as receptive as we want to allow ourselves to be.* In the next chapter, I delve deeper into some of Amy's "guesses" about the whales of the Bay of Fundy, specifically a particular humpback.

Researchers are faced with a choice: To keep our knowledge, our singular observations, our guesses, to ourselves; or to describe that of the "beauty and grace" (Dillard 1974: 8) that we *can* sense, and hope that something comes to life in the description. The guiding hope of this

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[93] Quantitative studies are not immune to being wrong, or missing things. Lindy Weilgart said, in our interview:

> I unabashedly say, I view the evidence on effects differently than the evidence of no effect. Because the evidence of no effect just means, *could* just mean, you just couldn't find it. Doesn't mean it wasn't there. It's the whole thing about looking for your keys under a streetlight. That's where you can see the keys, but there's all kinds of other places where it's just not possible to see stuff. So in all of the studies I read on the impacts of noise, I always ask for a power analysis or a sensitivity analysis. How likely, if the effect would have been there, how likely would you have found it? If your sample size or your statistical power is too low, oh well, big surprise, you looked at two cases, of course you didn't find it. So every study should be accompanied by the probability that you could have found an effect had there been one there.

[94] The authors of that paper used captive dolphin and seal data to make models that incorrectly predicted a lack of right whale reproductive possibilities (see Gavrilchuk et al. 2021 and the discussion of it in Hütt et al. 2024). Michael J. Moore described this approach as "garbage in… garbage out."

chapter is that sometimes, "describ[ing] what's going on here" (ibid.) results in something more than description. John Berger writes of how, when he is drawing, a work "becomes an image—that is to say it stops being a heap of signs and becomes a presence" with which he, its artist, can interact (2011: 8). That is what Michael J. Moore hopes of the right whales whose first-person stories he puts down on the page, stories which flow not from abstract knowledge of writing craft but from, he told me, his heart. He hopes that the whales, even though dead, will become present to those who read their stories, present enough that their suffering affects how his readers act—that, to borrow Taussig's formulation, once readers' mimetic faculty is activated, "once [they] 'get it'," "the world looks different and feels different"; "a bodily connection" may be activated too (2018: ix). Such a mimetic connection might allow for an "unwinding" of the human domination of nature (2018: x) that causes right whales such suffering.

Berger describes how a sketch, after much erasing and correcting, comes to resemble the specific dancer he is drawing, not just any dancer. She becomes "more insistently there" (2011: 14). Cetaceans deserve that particularity too, on the level of the individual and on the levels of myriad possible groupings (species, subspecies, pod, singular orca-dolphin assemblage, culture). That kind of description, that kind of rendering-particular, is the foundation of ethnography. In it, hypothesis is not the driving force, nor are grand or generalizable conclusions. *This* orca, not a "program on orcas."[95] The power is in the describing—rendering being-there, with the giant predator among tiny dolphins; with the dead whale on the beach, the scientist's hands inside it, taking samples; the scientist cutting the whale into pieces to load it into a trailer; the microbial communities in its guts adjusting to the rhythms of a dead animal instead of a live one, of land instead of sea. Whale barnacles outliving their host as they gasp for water, then, eventually, shriveling.[96]

Interlude (Auto-Ethnographic) | South Africa

Four of us travel to the place Simon told me "seals go to die."[97] I didn't understand what he meant until now, faced with dozens of seal bodies scattered across a sedimentary headland, white

[95] The words of researcher Lyne Morrisette, cited in Deer 2023
[96] See Grunbaum 2021
[97] Simon Elwen, one of the co-founders of Sea Search Research and Conservation, the organization with which I volunteered in South Africa, hypothesizes this location is something like a "B colony," as he described it, a less than

with a thick layer of bird excrement crusted in rivulet form down the rocks. The rocks are pink, brown, grey; the seals' bodies grey, too, and black and in the places where their fur is brown, gilded almost gold in the sun. The dead seals rest in the same postures as the living. To find out which are which, one must approach a group and see who moves. The soundscape is wind, seabirds, a smattering of seal barks, and now our voices, and when a group of seals is not inclined to move, our clapping hands.

In one such group, a live seal is draped, as fur seals drape, across a dead one. The live seal hesitates, it hedges, several times it turns back as we shoo it away. I am not able, yet, to bring myself to make noise. When finally the resistant seal slides into the water, I am sure, though there is no way to be sure, that it's the same animal that then pokes it head out of the waves to watch as we lift the corpse it was lying on, and carry it across the headland to the place where we have been lining bodies, in order of level of decomposition, for necropsy. This one is near the top of our priority list. Fresh.

I feel very present here. For the first little while I have no job to do and I begin to feel panicky. Once I am handed a clipboard and a pen, I feel better. Some of the carcasses release gas with "farting" noises when we move them; some of them fall apart, so we can't move them.

A newborn is stuck inside a thin crack between rocks. We find it by the sound of its bleating. Aa-aa-aah, like a lamb. No mother is apparent. We cannot help it.

When the scientists are done with a carcass, I bring it back to the ocean. It is basically a sack at this point, it doesn't feel like a seal at all. Scooping organs back into the body to carry it—they have begun to dry in the hot late November sun, tacky under my gloved hand—the splash as I throw it into the water, bloom of red blood that dissipates in the tannic tide pools. The seal-and-guano smell of the headland, it fills you and you forget until a new smell interrupts it. The ferrous, sulphuric cloud that rises from the carcasses. Blood and decomposition. The smell that will accompany us in the car on the drive back to Muizenberg, me wondering if the kid who tries to sell me a purse in the strip mall parking lot notices it. What he might possibly think it is.

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ideal habitat where weaker animals sometimes end up. The affect of death is strong there, and while there were a lot of dead seals (and, my more experienced companions told me, in the past there have often been more), to me that did not seem like the only reason for this affect, though neither I nor others I spoke with, including Simon (who was not there on this trip, but has spent lots of time there), could precisely identify what was causing the feeling.

For the seals, as for Michael J. Moore, relationships did not end with an animal's death. For Moore, his sense of obligation only grew. He told me that with each whale he necropsied, he promised the dead whale he would tell its story. The stories he wrote that he shared with me, published and unpublished, told not only of individual suffering but of collective grief. North Atlantic right whales and seals surely perceive death in different ways: Cape fur seals have a huge and (until recently[98]) thriving population, give birth to many young and have a very high natural morality rate. Right whales invest a lot in their young, by contrast, and have a much smaller family tree. But the experiences Moore described, of *feeling* the stories of animals when his hands were buried in their bodies, resonated with how I experienced scientific work with dead fur seals. And my seal encounters, which took place after I met and interviewed Amy Tudor, also resonated with how she described feeling whales' stories. There was for me, in these encounters, a kind of visceral witnessing, where it's clear there is a story present but the contents of it are known in ways that are neither precise nor semantic. I could sense the power of the connection between the dead seal and the live one who did not want to leave it. In the contours of a carcass on a lab table, I could sense the forms in which the seal once moved.

One necropsy I helped with was of a seal with a thin green nylon line wrapped around its neck. The line was loose part of the way around the seal's neck but it cut a couple of centimetres into the blubber on about half the neck's circumference. The entanglement was not particularly recent; some of the cut skin had healed over, but some of it was raw and pink. We didn't have the kind of detailed, individual life-history information Moore had about the whales he necropsied. Still, like Moore, I could feel the pain the seal must have felt when it was alive; the affect of this pain seemed to pass from the animal—the carcass—to me. It was almost kinetic, like I could feel something of what it had been like for the seal to move through the water with that rope around its neck, flinging its head back and forth trying to dislodge it, failing and failing again.

In the lab, I felt again that sense of total presence with the animal, but not in the way I felt it with the live animals in the colony. The lab created in me a kind of displaced presence, as I both concentrated on the physical task at hand and simultaneously imagined (viscerally, not

[98] In spring 2024 testing revealed a rabies outbreak in Cape fur seals. The extent of the outbreak is not yet known, nor is the effect it will have on the species. It is possible that rabies will be of less significance for seal population health than has been seen in land mammal populations—for example, some scientists have hypothesized that rabies may not spread as quickly in salt water as it does terrestrially. In July 2024 I attended the first formal inter-stakeholder workshop on Cape fur seal health, and there was no discussion of species-level endangerment.

consciously) what it must have been like to be in the dead seal's living body, hours or days or weeks earlier. I was not thinking about those things at the time, of course. But when the necropsy was done I understood why the researcher I'd caught a ride to the lab with had told me how exhausted, how emotionally drained she is at the end of necropsy days. After she delivered me back to my garden cottage quarters in Muizenberg, I sat on the beach with my baby, and couldn't muster the will to walk half a kilometre to buy a coffee.

"The least we can do is try to be there," Dillard wrote, then we can try to describe being there, and only then can we know what questions to ask, what praise to offer (1974: 8).

Moore told me he's considered the possibility that maybe the next step for him is to write a novel, and then he wouldn't have to deal with the editorial resistance he encountered with the first-person whale narratives he wanted to include in his first book. Yet those narratives are not fiction in the conventional understanding of "fiction." They are disseminations of empirical knowledge, and rest on the foundations not only of Moore's own scientific work and firsthand experience, but also his vast knowledge of the scientific archive about North Atlantic right whales. And, importantly, they are grounded in his own lived experiences with whales dead and alive. Knowledge gleaned in that way deserves a place, I argue, not only in nonfiction but in science itself. I do not wish to diminish the value of fiction, or elevate science over art. But the truth-telling of literary fiction tends to be framed, among popular-audience thinkers, as its capacity to articulate human interiority with greater depth than conventional nonfictional writing; and in the argument that whether, or precisely when and to whom, something *happened* is less relevant to truth than how a character of comparable demographic might experience such a thing happening.[99] A style of writing that is guided by fictional techniques will go a long way toward articulating cetacean's lived experiences and their richness as beings—toward saying something

[99] The words of two novelists exemplify this perspective: Leslye Penelope asserts in a *LitHub* essay: "The appearance of truth with the perceived distance of fiction allows a writer to delve into the heart of subjects in ways that journalism isn't as well suited for. And within those depths, relatable emotional truths can be found" (2022); see also Jeanette de Beauvoir's "Is Fiction a Lie?" (2024). For academic discussions, see Lewis 1978, Valdes 1992. Some anthropologists who have theorized about fiction think much more expansively about what fiction *is* and what it can do (and for that matter, in some cases, what truth, nonfiction or the concept of reality itself are) (e.g. Latour 2014; McLean 2017; van Voorst 2024; McLean & Pandian/Paper Boat Collective in the prologue and introduction to the 2017 volume *Crumpled Paper Boat,* and the other contributors to that volume, e.g. Hecht 2017, Stewart 2017). Such thinking is an important theoretical ground for my creative writing in this thesis. In this passage, however, I am thinking pragmatically about connotations of the terms *fiction* and *nonfiction* for the broader-than-academic audience someone like Moore desires his writing to reach.

about who they are—as well as imagining something of the affect, flux, and in-betweenness of entities, including how cetaceans experience these latter. Yet, it is impossible to write cetaceans' experiences of interiority with the same sort of depth as it is possible to write about human experiences of interiority; with cetaceans we must rely more on forms of knowledge (observation, intuition, physiology) which rely less on the shared experiential ground of being in a human body with a human brain. It is for this reason that I hesitate to label what Moore wishes to write, or what I am writing here, fiction. The events Moore disseminated in his postscripts took place in reality; real whales experienced them. To label them "fiction" would be to label them—in the eyes of the general reader—potentially false, and therefore open them to being dismissed. In the next chapter, my own nonfiction—in the form of literary ethnography—verges farther toward the specific form of speculation in Moore's book, in that it works to imagine and narrate not only the events of a whale's life, but something of how the events make the whale feel.

I offered, in this chapter, a brief ethnography of a particular group of toothed whales who do some unusual things. In a time when survival is increasingly complex for species of all stripes, in all kinds of habitats, it may be that interspecies cooperation like that between the lost orca and the dolphins will become more and more essential. When such stories are dismissed as too singular or too anecdotal, or simply paid no attention, scientific knowledge is impoverished by their absence. And in diminishing our knowledge of the adaptations animals come up with, themselves, we may diminish our ability to recognize the forms of help we may be able to offer them when human use of the earth, as it almost always does, shapes and constrains the habitats *they* can use, the possibilities for what they can do and who they can be. Knowledge about the "higher" order elements of whale being; about, in Whitehead's words, "what it is like to be a right whale"; what a right whale, or any whale, *is*—beyond questions of life or death and into questions about social, curious, creative, joyful, mournful, fraught life—is not a bonus or an add-on. It is part of "the basics" about whales, which, as many scientists pointed out to me, are in many ways still open questions.

What this ethnography documents about the Bay of Fundy's lost orca, then, is a substantive addition to what is known about orcas, as well as to what is known about orca, and dolphin, *possibilities*. Consider the differences, for example, between the lost orca's trauma response and that described to me of North Atlantic right whales. My research suggests that the latter, faced

with a raft of colliding traumas—changing habitats, the relocation of food into more dangerous areas, repeated bereavement, diminished ability to reproduce, chronic suffering from long-term rope entanglement[100]—have contracted into their own species: Most of them no longer approach humans or their vessels with openness, curiosity or any desire to interact, though Nova Scotia naturalists told me they used to, and Cape Town naturalists told me their morphologically identical southern cousins do.[101] Orcas in the northeast Atlantic do not experience the same kinds of brutalities in the contemporary ocean that right whales do. But until about half a century ago—easily within a single orca's plausible lifetime—they were killed with abandon by fishers who believed them to threaten their catch.[102] And they are still legally hunted off Greenland, which is only about 3000km from the Bay of Fundy, less than a third of the distance tagged transient orcas have been documented to travel.[103] The lost orca found himself alone, at a very young age, in what can only have been terrifying circumstances. Instead of contracting into self and species, he was able to expand.

Scientists and governments are beginning to recognize the necessity of distinguishing between specific orca ecotypes or, some call them, cultures; for example, in Canada the three west coast orca pods have different conservation statuses reflecting each individual population's health, something that is quite uncommon within a single species. On the other hand, a recent study published in *Royal Society Open Science* argues that transient and resident ecotypes should be recognized as taxonomically distinct species, beyond "culture" or "ecotype" (Morin et al 2024). They argue the implications of such a move would be positive for orca conservation, allowing for more precise assessments of conservation status internationally (2024: 11). Their argument demonstrates that "species" remains the most significant category for distinguishing between groups of cetaceans.

In the search for claims that are generalizable across species or populations, the singularity of animals is too often lost in science. As I have argued throughout this chapter, through the case study of the Bay of Fundy lost orca, singularity matters not only in itself, but also because it opens us to possibilities around what animals may be capable of. If attended to, it can incite more

[100] See Moore 2021
[101] There is, of course, nuance to this: Michael J. Moore told me some right whales still show some curiosity about the vessel he uses for drone-based research work, but they avoid any from which he has done more invasive work like administering injections or collecting biopsy samples.
[102] NOAA Fisheries 2024, "Killer Whale"
[103] NOAA Fisheries 2020

expansive thinking about them. I argue both for an expansion both in our openness to the range of what *could* be going on, as well as in our literal modes of observation and knowledge dissemination.

Here I began to craft one form capacious enough to hold this kind of expansion. It is a textured nonfiction grounded in science as well as lived, ethnographic observation with marine mammals alive and dead, encountered up close and from afar. My writing style is different from Moore's, and my knowledge base of whales is a drop in the ocean compared to his—which, in fairness to the whales, is also a drop in the ocean the whales know so much more intimately than any human does. We must be careful when we write these stories. But, also out of fairness to the whales, we must write them.

Ethnography has a great deal to add to science's current repertoire of research methods for understanding whales. In the cetacean ethnography this chapter offered, I focused on ways *in* to whale being, including ways of relating to whales through my own embodied experiences. In the next chapter, I develop this method further, seeking to move not only toward whale being, but away from my own human being; thinking through how other people make that move; and further fleshing out the "entity," in the naturalist Amy Tudor's words, whom that chapter's cetacean protagonist is.

The cetacean protagonists of my two cetacean ethnographies are likely aware of one another's existence. They share the same limited habitat during the same season of each year, and are around the same age. Humpbacks and orcas are not generally known to be friends, as orcas sometimes hunt humpback calves. I wonder how close these whales have passed by one another in the slender Bay of Fundy, just about 100km wide at its mouth, its widest point. I wonder if they ever think of one another, and if so, *what* they think: what are the differences that matter, to them?

Chapter 4

Cetacean-human intimacies, vulnerability and what there is to lose

The scientist is on a sailboat in the Indian Ocean off Sri Lanka. She is with a team, doing field observation of sperm whales. One morning, a female whale starts to make flexing, U-shaped movements, and the team is thinking *what's that, we've never seen that before,* when the whale turns onto her side. Blood rushes into the water, and in the midst of it, a little black thing. The team realize it all at once, in a rush like the billowing blood: The whale has given birth.

The researchers decide someone will slip into the water to observe. It is her turn—the scientist who describes this event to me, decades in the future. The scientist is very careful when she enters the water. She knows how even a small splash can alarm them. She gets a little closer, but not very close. She knows it would be wrong to approach the baby, not ten minutes old.

But the baby whale comes right up to her. Directly. The scientist does nothing to approach the calf, but it makes a beeline.

The mother whale hangs back, allows it.

Every instinct in the scientist is to reach out and touch the newborn. She does not. She thinks: *This is such a privilege. I cannot in any way scare this baby.*

She reflects, in our interview, about the mother: *Which other wild animal would allow that*? The team of researchers had been with that group of sperm whales for a while at that point; the mother knew their boat. *She allowed it… It was such a privilege.*

In the Indian Ocean, the newborn sperm whale's eye is bright blue. The scientist, treading water, is awed by the amount of expression in that bright blue eye. She almost cannot believe the range of emotions. The baby, perhaps fifteen minutes old now, is inquisitive. There is a little fear. And there is, in that baby's eye, a sentiment that matches her own: Awe. The world, newly met. Sparkling.

Lindy Weilgart shared this experience with me when, near the beginning of our conversation, I asked her the question that, after some back and forth, finally made my research intentions clear for her: "Do you know them in ways that aren't quantifiable?"

My first chapter argued that such non-quantifiable knowledge is intimately linked with the practice of studying whales and with knowledge products about them—or at least that this was the case until recently. In Chapter 2, I showed how the discipline of cetology is moving in the opposite direction of such knowledge. In Chapter 3 I presented a first iteration of what I call a *cetacean ethnography.* This chapter is another such ethnography, and builds on the argument in the previous chapter, namely that ethnographic research can contribute new substantive knowledge about cetaceans; and that literary writing is both a productive and appropriate way to disseminate that knowledge. I think of the mode of writing here as *ethnographic creative nonfiction*. It is a form capacious enough to evoke the animal without reducing it; to formulate whales in ways that are truer to who and how they are than can the forms of conventional quantitative science, which must leave undocumented insights such as those that arise from experiences like Weilgart's encounter with a newborn sperm whale. This chapter verges farther than I have so far into speculation about its cetacean subject's "range of emotions," and the other intangible dimensions of an individual cetacean's experience. As with Chapter 3, I learned what I disseminate here from ethnographic research with both whales and humans who know them; and from the empirical archives of cetology, where knowledge about whales' physiologies helped me imagine their lived experience.

My narrative interpretations of cetaceans' experiences, as grounded as they are in empirical knowledge, will inevitably be imperfect—as are, to different extents, all ethnographic accounts. I offer them in the spirit that it is better, and more accurate to cetaceans' lived realities, to risk getting something a little bit wrong, than to leave out the emotional, intangible dimensions of cetacean experience—among them those which I discussed at length in Chapter 1—and thus risk perpetuating the notion, ingrained for so long in western thought, that animals are little more than zoological machines.[104] I do not attempt, here, to create an overarching theory of whale

[104] I am guided here by Jane Bennett's argument that emphasizing or even over-emphasizing "the agent contributions of nonhuman forces" can "counter the narcissistic reflex of human language and thought. We need to cultivate a bit of anthropomorphism—the idea that human agency has some echoes in nonhuman nature—to counter the narcissism of humans in charge of the world" (2010: xvi). Bennett further argues that this "bit of anthropomorphism," despite the associated risks ("superstition, the divinization of nature, romanticism") is worthwhile because it counters anthropocentrism, embedding humans in the environment rather than assuming we are above or outside ecosystems on which we understand nonhuman animals to depend. "Too often," she writes, "the philosophical rejection of anthropomorphism is bound up with a hubristic demand that only humans and God can bear any traces of creative agency." Exploring the possibility of creative agency in nonhumans (for Bennett, this includes objects; I focus on marine mammals) makes visible aspects of nonhuman lives that would otherwise remain in obscurity (2010: 120).

consciousness or a comparison of their intelligence and range of emotions with our own. Rather, I allow the unstated "theory of whale consciousness" that my human interlocutors' espoused—remarkably coherent from one researcher to another, though the extent to which individuals I spoke with would attribute emotions or specific types of intelligence to whales varied widely—to be my guide. I assume the whales in my writing have the capacities that my interlocutors, people who know whales intimately and have done for a long time, believe whales to have, based on their qualitative experiences with these animals; I assume the whales are the kinds of beings my interlocuters' stories evoked for me.[105] I have chosen not to specifically define that "kind of being," or to attempt articulating these capacities analytically, in the belief these things will be better demonstrated if they are allowed to emerge through the creative text.

Before the cetacean ethnography, a brief ethnographic vignette about cetology. It takes place at Cape Town's Labia Theatre, an ornate midcentury haven tucked into the city's Gardens neighbourhood. A PhD researcher is giving a talk about humpback whale song, to an audience comprised largely of female filmmakers. Throughout the talk, the researcher refers to the songs as music, as art. During the question-and-answer session, an audience member sitting near me comments on the generally accepted theory, which most scientists present basically as fact, that female humpbacks do not sing. "That's a familiar narrative," the audience member remarks, "that only males do a thing." She asks what research backs this up.

The researcher responds: "You have to understand that animals don't do what's not biologically necessary." She talks about how animals need to conserve energy so they can spend it on survival, how their lives revolve around this need. Without a biological "need" to sing (the underlying assumption being, though I can't recall if the researcher explicitly said this, that male humpbacks sing for mating purposes), females will not spend calories on it.

[105] I should note that most of my interlocutors pointed out significant species differences in these capacities—for example, Weilgart suggested it would make sense that toothed whales, who must hunt for food, have evolved higher intelligence than baleen whales who feed by lunging and gulping or by simply swimming along with their mouths open. More than one of my interlocutors suggested North Atlantic right whales are on the lower end of cetacean intelligence and that could be partly why they have not learned to evade ships or traplines. In this chapter, I am more interested in whales' general capacity for things like emotions, memory, a sense of self and of individual history, etc.; than in defining specific intelligence-derived skills, like hunting. Here, where I mention such skills, for example "bubble net" feeding among humpbacks, these are not speculations on my part but behaviours formally documented by science.

Does the researcher mean, I wonder, that music and art are biological necessities? Or does she mean the whales only sing for biological purposes, not artistic ones—and if so, do the songs still constitute art; does art not exist, by its very definition, in excess of rote biology? Maybe she is contradicting herself: if so, has she slipped up, misspoken, or is it something deeper than that—some philosophical struggle that scientific thought has not resolved? She is not the first cetologist I have witnessed seemingly torn between the mechanistic model in which scientists are trained, and that which they observe of whales that far exceeds the mechanistic.

Tess Gridley is sitting beside me, her own presentation on bioacoustics complete. I watch her for a reaction, but she remains placid.

I have asked a few scientists about whether we might, someday, discover female humpbacks do sing. Most said it's unlikely, but none that it's truly impossible. The ocean is vast. As I noted in Chapter 2, scientists are acutely aware of how much there is of cetacean lives that we neither hear nor see—both that, with the physical faculties we have evolved for such different conditions, we *can* neither hear nor see; and that which we are prevented from seeing by the biases we have inherited from our cultural and scholarly traditions, the human exceptionalism that "blinds us" to other ways of being (Tsing 2012: 141).

Consider how scientists learn about whale song: Humans observe whales or record sound or video in the whales' breeding grounds, where humpbacks often number in the thousands. Sometimes researchers are fortunate enough to be able to link individual whales to their songs, as in the scuba diver-shot films of Herman et al.'s 2013 study which demonstrated that males of all ages sing, not just—as scientists had previously taken for granted—the sexually mature adults. In that study the researchers argued that this all-ages chorus creates a "lekking aggregation"—a phenomenon seen in many bird species as well other animals, in which multiple males co-produce courtship displays to attract females and maintain territorial bounds. This, the argument goes, through its "heightened signal level," serves better than a lone singing voice would to attract females (2013: 1653). The study is based on 87 individual whales, found opportunistically by driving a small outboard boat around the Hawaii breeding grounds where "dense concentrations of humpback whales" were expected to be. "When a singing whale was located, a swimmer was deployed wearing face mask, snorkel, and fins and carrying a digital video camera" (2013: 1655). The authors do not explicitly state whether underwater listening technology was used to locate singing whales, but it seems likely that human hearing was

enough—as humpback researcher Jim Darling told me, when you're on the water during breeding season, the singing can be loud enough to make the boat vibrate, even to make your body cavity and your fingers vibrate. Echoing many other researchers, Darling told me the reason for humpback singing is not clear cut: it happens during mating season, so mating is likely a factor at play, but generally what Darling has observed is that singing provokes male-male interaction or even cooperation (see Darling et al. 2006). "I don't even know if we've ever seen a female showing any interest," he told me. Yet there is also the possibility, remote though it is, that females have simply never been *documented* singing—or (while this possibility is even more remote) that they are simply not as loud.[106]

As the presentation at the Labia wraps up and attendees begin to chat amongst themselves, I surreptitiously type "biological necessity" into my phone's search engine, wondering if it is a scientific term with which I am unfamiliar. To my surprise, the first result is a famous 1940 essay by the anthropologist Margaret Mead, titled "Warfare is only an invention - not a biological necessity." In it, she argues that war is not an inevitability but an invention. She credits her recognition of this fact to her experiences as an anthropologist, learning from and about other societies where warfare, as western society understands it, had not been invented. She suggests at the end of the essay that "a form of behaviour becomes out of date only when something else takes its place, and, in order to invent forms of behaviour which will make war obsolete, it is a first requirement to believe that an invention is possible" (1940: 405).

The scientific convention that led the presenter to make that comment about the "biologically necessary" is like this, too. It is deeply ingrained in western thinking, and will not change unless someone invents something new—like, for example, Michael J. Moore's narrative experimentation, done explicitly against the conventions of his discipline and out of a deep

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[106] I asked Denise Risch if it was possible that female humpbacks were singing at a frequency that science doesn't have the tools to hear, and she said it was unlikely, that acoustic recording technologies are very good. However, that does not preclude the possibility that female humpbacks have been recorded singing, but without anyone being aware they were female.

In *How to Speak Whale,* Tom Mustill notes that for a century and a half it was assumed female birds did not sing; and that assumptions about whale song have historically been closely linked to what was known about birdsong. But "now that (mainly female) scientists have finally started to investigate female birdsong properly, they have discovered that female birds do sing in the northern hemisphere—just more quietly and less often. It was easy to miss, especially if you weren't looking for them" (2022: 150). Mustill speculates on whether assumptions about sex and whale song may also someday be overturned. "I thought about how the loudest whale sounds tended to be made by the males but the most cooperative, long-lasting sociable groups of cetaceans tended to be female. Were we missing the more interesting conversations by starting with the shouting?" (2022: 151).

conviction that the whales deserve that. I want to suggest that what is needed is less an invention than an opening, with indeterminate ends (Tsing 2010), of knowledge about cetaceans to a wider array of methods and practitioners: not only ethnographers, but also Indigenous knowledge bearers, artists, divers, dreamers, and many other kinds of knowers—knowers who may be neither human nor whale; or knowers whose knowledge practices and products defy form, or transgress the neatly differentiated disciplinary bounds to which most of us are accustomed.

Weaving through the theatre's red-upholstered seats, the audience member who'd asked the question about female humpback song approaches to ask Tess her opinion. Tess says it isn't absolutely certain that female humpbacks don't sing. She recounts an instance in which, as a grad student, she thought she had recorded a cetacean behaviour that her professors dismissed as impossible. A few years later, someone else recorded the same behaviour and published the discovery. Tess had been right, but as a young female grad student she did not have the space or voice to challenge disciplinary wisdom, "scientific fact."

Animals are so often more than we think they are. What if we began from that perspective, instead of assuming they are what we (in the west, in science, in humanism) too often think they are—that is, *less* than us?

Any story I write will fall short of the real whale behind it. The task is not to make a story that articulates the whole whale, just as our human stories never articulate any whole human. The task is to evoke the whale, by leaving sufficient space for the animal to emerge from between the lines of text. My aim is that some spark of who the whale is may be felt in the juxtaposition of that which is stated and that which remains unsaid. Like the dorsal fin of a humpback emerging from the murk of the bay and as quickly, disappearing into fog. Or like the fog itself, perhaps—as it mingles with the whale's blown-out breath, and then, with mine.

The specific invention, or *intervention*, that I offer here is a literary-speculative story about events in a whale's life, and her relationship with the naturalist Amy Tudor, who recounted to me the events that form the basis of the story. The cetacean narrative voice, while unusual, is not itself entirely new; it follows in the footsteps of works I have cited as inspirations in previous chapters, like Gowdy's *The White Bone* (1998) and Foster's *Cry of the Wild* (2023). It is distinct

from such literature because of its ethnographic foundations.[107] It is an invention that I believe has something to offer to the practice of ethnography, the study of whales, and, in the spirit of Michael J. Moore's hopes, to whales themselves.

In Chapter 1, I quoted Hal Whitehead saying that the greatest insights about whales come not from people whose lives mesh well with the structures of conventional scientific work, but from those rare folks who spend months and years with whales, in whatever ways they can, and "get to know them personally." Amy Tudor is one of those people. When I transcribed my interview with Whitehead, I was so struck by that quote that I sent it to her in a Facebook message. She responded a few hours later: "I am slightly weeping because I feel like I have 'been seen.' Someone has put into words how I feel."

In our interview, Amy began to put into words something of how certain individual whales feel, the ones she knows. She did so not by statement, but by storytelling. She told me what took place in specific encounters, and what she felt from those experiences. As in Berger's narration of drawing (2011), in which the drawing's subject becomes a *presence*, the whales emerged from the story-images she made of them, for me.

The Half-fluke Whale and the Naturalist

A SPECULATIVE CETACEAN ETHNOGRAPHY

I. THE WHALE'S STORY

The season of gestation (17 August 2020)

The old male's weeping, injured tail makes her own mangled right fluke ache, something in the way that it does when the swell hums with the approach of a storm. Pangs, experienced anew or

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[107] A number of ethnographers have written extensively about nonhuman living entities (animals, plants, fungi) but generally have not gone so far as to have nonhuman narrators (see Haraway 2003, 2007; Hartigan Jr. 2020; Tsing 2011, 2015). Notably, Tsing (2015) writes of the need for nonhuman protagonists, and offers several substantive examples of such thinking and writing, including protagonists who are pines, fungi, etc.

By "narrative voice," I do not mean exclusively a first-person storytelling voice, but the character in a given story whom the reader assumes is relating the story—in the speculative ethnography I include in this chapter, that character is a whale, and the story is told with a close third-person narrative voice, meaning that while I, the author, do not attempt to be fully *inside* the whale's mind, my third-person rendering includes information (memories, subjective bodily experiences, etc.) that can only exist in the main character's mind. I did not attempt to be this close to the mind of the cetacean protagonist in Chapter 3.

remembered, singing along the nerve endings through her trunk, seeming to linger and amplify around the place where her stomach has begun to enlarge. It has been forty seasons—though she surely does not count them in this way—since she lost half her right tail tail fluke when, three years old, she collided with the propellor of a ship. But still the muscles of her peduncle—the densest, heaviest part of her body, just above her tail—sometimes send far too much energy to that missing fluke.[108] The energy travels along the several elongated flaps that remain. Pain stabs the place where the rest of her tail should be, then the muscles' misplaced force is dispelled into the surrounding ocean, where instead of influencing matter, as the force is meant to do, it simply peters to nothing, nothing but her memory of pain and more distant than that, her memory of being whole—and in between, the memory she does not call on. Searing slicing bleeding—escape, but barely—she remembers little of how she managed this.[109]

She accepts the old male's company despite the trauma in her that his injury calls up. He cannot help his injury; it seems to comfort him to see her, not only living but making new life despite how he knows her future must have seemed to her, her tail splintered and bleeding in the saltwater those many seasons ago. A few seasons have passed since his injury, too; the worst of it has healed.[110]

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[108] Numerous studies argue that mammals other than humans experience phantom pain (see Menchetti et. al 2017). No such research has been conducted about whales. Throughout this section of this chapter, which I am calling a "speculative ethnography," I permit informed extrapolation of whales' experiences in cases where we share enough with them physiologically to reasonably assume their experiences are similar to ours (i.e. lactation, hunger, play, pain, the breathing of air, stress in response to sensory environmental disturbance or habitat depletion, etc.). I am guided in this approach by the two papers I cited in Chapter 2 which argue that it is reasonable and even necessary (due to the infeasibility of many research modes with regard to the experiences of enormous, long lived free swimming wild animals) to extrapolate from what we know about other mammals in order to gain some understanding of how whales are harmed by chronic stress, chronic noise etc. (see Wright et al. 2007, Wright et al. 2011). This, as I noted in Chapter 2, differs from Michael J. Moore's critique of predictive modelling studies done with inaccurate input data, because as Wright et al. write, "stress… responses [in mammals] are highly conserved among all species in which they have been examined to date" (2007: 275); whereas, as Moore pointed out to me with regards to his specific critique, there was no good reason to assume the basal metabolic rate of a baleen whale—an extremely precise measure that is highly dependent on specific physiology and environmental energy demands—is comparable to that of a seal. Making the extrapolation that since loud, invasive noises are stressful to humans, they probably are also stressful to whales; or that since humans and other mammals experience phantom pain, whales likely do too, is a different order of assumption, one that many scientists, including Wright et al. (2007; the "et al." including Lindy Weilgart), believe is essential for regulatory decisions related to animal wellbeing.

[109] It is common knowledge among Bay of Fundy naturalists that this particular whale ("Bayou" in the humpback whale catalog) was struck by a propellor (an experience that is sometimes fatal) when she was three years old, and this is how half of her right tail fluke was severed into several fingerlike strips, clear visual representations of a propellor's blades. Bayou is now in her teens, a young adult.

[110] Amy Tudor described the injuries of the old male ("Cloud") and the course of their healing, which she had documented, to me. She did not know, when she witnessed Cloud hanging around Bayou, why he was doing so; at the time she suspected he was courting her, but after she learned that Bayou had been pregnant she guessed his behaviour might have been protective of Bayou during a time of increased physical vulnerability. I am adding my

The whales do not have to worry much about predators here, but other harms lurk—traplines and herring seiners, the latter posing not only a physical risk through the huge nets they throw but a risk to the food supply, as they scoop up schools of fish the whales might otherwise eat.[111] The half-fluke whale needs more than ever a reliable food supply: her body even now is mining itself for the nutritional needs of the calf growing inside it.[112] She knows that by the time the calf is outside her body, she will no longer be in a place of food, and will have to feed him by depleting her own fat stores while the two of them make their long migration back here. She has witnessed this, in other mothers, her whole life: The slowed journey, the mother whale thinning.[113] Already she is tired, more tired than usual, but she also radiates with it—the young, perfect life she carries everywhere she goes. The small body that will emerge from her some months from now, in a different place. The small mind that will emerge from her with no reason not to believe that, as in the womb, its environment will always be kind to it, will always provide, will not harm. She will have to teach it otherwise. She will have to teach it what, and how, to fear.

A softness of plankton in the water ahead; she opens her mouth, their ingress is slow, not a glut but a dappling. The barnacles on her chin activate; she does not feel their many reaching limbs as they, too, lap at the dappling, but she feels a shift in the way they hold her, the grip simultaneously more and less tenuous, and something new this time, a slight letting-go—perhaps they are readying themselves to leave her. She makes a gentle bucking motion with her chin.

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own speculation about the older whale being drawn to Bayou because of how she thrives despite her tail injury, and about Bayou's response to his closeness. Amy described both whale's affect that day, specifically the female's, as happy, even excited.

[111] Amy Tudor described to me how the operators of commercial herring seiners watch, as a way to find their target populations, the publicly available marine GPS data of local whale watching boats. The boats spend time where the whales are, and the whales spend time where the herring are. Knowing this pattern is controversial, Amy said, they have shifted their operations largely to nighttime, when there are few observers (the commercial seiners, she told me, were the source of the flashing lights I regularly saw when I looked toward the bay from my living room window at night, which I had not been able to identify).

[112] This an extrapolation from how human pregnancy works (see footnote 6 above).

[113] Humpbacks in the North Atlantic spend the summer in cold, food-rich northern waters, where they build up blubber stores to support them during the breeding season, spent in warmer Caribbean waters where there is little food. These blubber stores carry them through their migration of thousands of kilometres back north in the spring, for new mothers including the energy demands of lactation (see Kennedy et al. 2014, NOAA Fisheries 2024). Numerous Bay of Fundy naturalists told me the mother-calf pairs are usually the last to arrive, slowed down by caring for a newborn and increased hours spent resting (see Bejder et al. 2019).

Their tiny movements produce tiny irritations; sometimes a slight answering gesture on her part quells them.[114] The calf in her belly quivers, too.

Yes: She will have to show the calf, safe inside her now, what and whom can be trusted. The old male who has been travelling with her is one such being; the clinging barnacles are others. Another is the being whose voice has attracted her, today—the female human on the boat, taller than many of the others, her voice just loud enough that it makes the half-fluke whale's ear-fats tingle.[115] She heard the voice from some distance away, and angled her swim to cross paths with it. The old male followed, he stayed off to the side, he's tired today too. It takes more energy for him to move now, with the injured fluke. His balance is not as elegant. He struggles to swim *toward* something. She can feel the added effort in the drag of the water around him, the slight added heave as he breathes.

The feelings are familiar to her, both because of her own old injury—how it exhausted her—and because of more recent feelings whose origin she cannot quite pinpoint. So often now she is just moving, rather than moving *toward*. She is moving through. She is drained of directionality. She moves, eats, breathes; otherwise, without any conscious action on her part, her body swells with the calf. Was there not, once, more?[116]

The boat goes quiet, and the two whales approach it. The half-fluke whale feels the energy of the strong-voice female human, the voice she knows, and she moves toward that, and when she is close enough that she can make out the individual sounds the strong-voice female is emitting, she slows, circles the boat once or twice; locates the strong-voice female and stops

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[114] Barnacles live about 1-3 years (Grunbaum 2021); for information on whale barnacle behaviour and life cycle see Grunbaum 2021, Nogata & Matsumura 2005, National Marine Sanctuary Foundation 2020 "Whales and Barnacles."

[115] On baleen whale hearing see Quaglia 2023; Lippsett 2012

[116] Here I am, of course, speculating on this whale's psychology. As I stated earlier, I am following my interlocuters' lead in the kind of beings this chapter presumes whales are. Based on that, it is reasonable to assume that whales notice a changing ocean and are affected by it. In the case of this specific whale, the speculation is my own, not that of any of my interlocuters (though my interlocuters did make speculations of a similar order about various whales). My motivation in doing this is, first, because I want to portray a balanced understanding of whale lives—whereas mostly my interlocuters told me stories of witnessing whale joy or whale suffering, most cetacean lives are, of course, lived between these two extremes. Second, I want to portray the "slow violence" (Nixon 2013) to which all whale lives are, differentially, subject—anthropogenic noise, toxins and ship traffic high among them, as well as climate changed related changes in ocean ecosystems (see note 16 below)—but to which little narrative attention has been paid in literary or scholarly writing. Scientific journals and popular audience media outlets often publish about these cumulative effects on whales of human industries and their waste, but these accounts largely leave out any consideration of what these effects feel like for whales in their daily lives.

Cetaceans have been documented grieving (see Bearzi et al. 2018; Reggente et al. 2016) and (largely in captivity) showing signs of depression (see for example Marino et al. 2020).

moving. She lets the water hold her as the water in her uterus holds the calf growing there. She rolls onto her back, her stomach above the surface of the bay, the late-day sun caressing it.

Her vision is tonal. She perceives the smoky brightness on the horizon. But her primary awareness at sunset is of a changing atmosphere and with it, activity changes in the other beings who live here. Her daily life and movements, in this place of food, are dictated by the tides and by the presence or not of the beings which she eats. Fatigue and satiation govern her rest, not light or its lack.[117] But she is aware of diurnality; she relishes the cooling summer air on her body, the remnants of the day's heat—the air just warm enough, now, to slacken the tension in her swelling belly but not so much that she overheats in it, as she would when the sun burns overhead. She lingers there on her back for a few minutes, sensing as below her, the light-loving others begin to retreat, and the dark-loving others to emerge. It is always a comfort to her when this shift takes place as she anticipates it will, as it always has. More and more, there are changes,[118] and the predictability of these crepuscular ecosystem shifts seems more important.

She shifts her aural attention above her now—the strong-voice female, the vibration of her sounds activating the tiny hairs on the half-fluke whale's face. When they are born, she will bring her calf to the strong-voice female, to let them feel the reassurance the voice gives her: that not all boats are there to destroy their kind and kin.

For, though all the boats come with varying kinds of loud voices—voices that throb into the deepest parts of her, that by times disorient and dismay her—some of the boats come in peace, and in peace there is some hope of a future in which things are quieter; in which vessels do not strike whales, do not kill them, do not tear up their extremities. Just like, as her grandmother taught her, at one time the whales conceived of a future where humans on boats did not throw long sharp objects at them, did not spear their hearts, lungs, heads. Whale blood, in the places where she and her kin live, no longer spouts into the air under the impact of those strange, blunt objects propelled by human hands—objects that, for her, are difficult to imagine, so accustomed is she to the small, dark things the human hands she encounters are normally

[117] While whale sleep cycles are not fully understood, partly because they are very difficult to research, they are generally understood to forage and rest opportunistically, not dictated by circadian rhythms. Therefore, they are not considered specifically diurnal or nocturnal (see Marandet 2024; Lyamin et al. 2008).

[118] Climate change related ecosystem changes in the Bay of Fundy include warming water (and resulting geographic shifts in baleen whales' prey species, which have been most devastating for North Atlantic right whales but must also affect humpbacks) (see Record et al. 2019); changing ocean currents (Cave 2022); and the arrival of new species which once mainly inhabited waters further south (Cave 2022). On risks to "the long-term health of the Bay of Fundy," see Cornejo and Galang 2024.

grasping, their highest capacity for harm in the sometimes shocking strength with which they reflect light from the sun.

Hands seemed supernatural to the half-fluke whale's grandparents: such small appendages which could wield such brutal force; the mystery of *grasping*, an action she has of course observed herself but which her fins—though they slap the water, though they can displace certain free-floating objects—cannot do. Hands matter little to her, except insofar as it seems that sometimes the strong-voice female uses hers to express something. She rarely feels she knows *what* the voice and the hands' concurrent gestures are trying to express. But sometimes something ripples through her, like a spark of shared awareness between her and the human. When this happens she understands the awareness to have its origins in both the strong-voice female's voice *and* her hands, and to have crossed the air between them to reach her own body.

No—the half-fluke whale does not know *what* the strong-voice female wishes to transmit to her, but, perhaps, nor does she desire to. Her kind communicate as much in the smooth, big gestures their bodies make; in touch; and in the tonal variations of their sounds as they do by the kind of specific formulations of sound that the strong-voice female emits with such conviction. The whale can feel the affect behind the sounds; she can feel care there, can feel love, can feel encouragement; and these feelings allow the half-fluke whale to imagine a future for her calf that does not make her contract with fear; an ocean that tastes less of metal, that is less riddled with nets, where young whales swim unencumbered by scars.

There materializes a sonic trace[119] of this future—the expansive quiet; the distant, easy sounds of her relatives voices', confident they will be heard. It buoys her. Is it, as she desires it to be, a truly possible future—or is it rather the echo of a distant past that sounds, hopeless, helpless,[120] in her bones?

She rolls to the side and then to her back again. She gazes at the humans on board the vessel. She has ears only for the strong-voice female, but she scans the others, feeling their energy, confirming that little in the others compares. The half-fluke whale waves her pectoral fins. She feels how they displace air, thinks again of *grasping.* What would it be like—to *take*

[119] With "sonic trace," I am imagining the cetacean equivalent of a "vision"—e.g. "a vision of this future buoys her"; but whales' primary sense is hearing, so I am imagining that a whale would have this experience through sound images, not visual ones.

[120] I am speculating that whales, as highly intelligent, long-lived beings, have a sense of anachronism, of having experiences that are no longer appropriate to the conditions in which they live.

something, to move it out of the place where it has chosen to be; or has been deposited? She has witnessed birds doing this. She knows of displacement, how hard she sometimes works, with her kin, to stir up the water and create brief undersea barricades that trap their food.[121] It is, she feels, nothing like what the humans do with their hands.

Because of her lopsided tail, she cannot breach as well as she used to; she rarely does, anymore.[122] She was old enough when she had her injury that she remembers the feeling of jumping out of the water, how the air would, briefly, hold her—the gut-thrill as the water reabsorbed her, the frenzy of it—she would jump again, again—

She used to feel sadness, when she remembered such easy breaching. Pregnant, she no longer wishes to expel her body from the water. It is enough to feel the air on her belly, to think of her calf, one day, jumping. She twists. The calf moves in response—it seems she can feel how its form has elongated in a matter of days—and the half-fluke whale twists again. That fresh, unsuspecting life. It is a thrill and the deepest terror she has known.

The half-fluke whale raises her pectoral fins and does a couple of backward strokes, this time massaging her own cramped muscles. She turns back to the strong-voice female. She focuses on the strong-voice female's sounds, and lets them drown out the frothing, worrying, unformulated un-sounds that pulse inside her whenever she thinks about the fresh, unsuspecting life, when she is accosted by the knowledge—she *knows*, she knows—that, in a future that creeps ever nearer, she will have to release it from her body, into an ocean that, she *knows*, will probably not be much changed.

Interlude (Amy Tudor, Naturalist)

She speaks and her words bring me onto the Bay, a late summer evening a little over a year ago, pink in the sky and on the water; on the distant shore, the purples and rust tones of the shortening days tint the headlands.

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[121] This is called "bubble net feeding," in which a group of humpbacks blow bubbles at schools of fish from below, creating "bubble nets" that aggregate the fish near the surface for long enough that the humpbacks can swim in and eat them (National Marine Sanctuary Foundation 2020, "Bubble Net Feeding").

[122] Amy Tudor told me she has never seen Bayou breach or heard of her doing so, and feels that her mangled tail would be an impediment. I was told by another naturalist that there is an account online of Bayou breaching, but I have not been able to locate this account.

I try to absorb the moment, which in the pages above I imagined from the perspective of the whale.

"She came up, I was on the bow, and I was like 'yeah, oh you're beautiful,' and I tell them they're gorgeous and I tell them how I feel. And she stopped, rolled on her side and brought out that eye and just looked at me and looked at me, and paused too. She wasn't just passing—I was on the bow and I could see from the upper deck that Bayou was moving and that she was looking at people but when she came up and circled the boat, I was on the port side, she kind of just stopped, stayed in place and just—listened to me.

"I don't know, maybe she was like 'She gets it, this one understands.' Maybe she was trying to get acknowledgement and no one else was truly getting her, but I was getting her, I was getting that there was something that she was trying to communicate."

Amy had told me that the whale, who humans call Bayou, was pregnant during this encounter, but Amy didn't know that at the time. When Amy says maybe the whale thought "this one understands," I respond, "They identify pregnant humans in the water, right? Maybe she expected you would identify this in her."

"Yup, yup, maybe… I wrote about it a couple times, I don't share these types of thoughts too often as the voice of Mariner,[123] because it becomes subject to [the standards of] 'Esteemed Whale Watching,' there comes that burden [of science]… So few people will talk about this human side because there is this fantasy to it and you can't be fanatical if you're a scientist… I tend not to go into my personal interpretation using the voice of Mariner, but I did in that case. Because I was just that emotional about it.

"I couldn't not… Bayou's energy was so powerful that day that other people felt it and it drove me to the point of almost emotional, not madness in a fanatical way but just—

"Connecting," she finishes.

Amy tells me she's spoken with a couple of people online who have also known Bayou over the course of years, and those people had also felt a different affect from the whale that season. "But no one wants to say 'I think she's pregnant,' nobody wants to take those risks because what if you're wrong?… And then I think it was July the tenth [the following year], I was scrolling through my groups, and then I saw it, Bayou's tail and a baby's tail—" She pauses in her recounting, and neither of us breathe.

[123] Mariner Cruises Whale and Seabird Tours is the tour company Amy works for.

Then, recreating for me her moment of realization, she says: "Whoa! Whoa boy! *It was instantaneous, there was no thought processing, it just was,* that exactly is what she was telling me*, I didn't think about it, didn't dwell on it—that is it. Tears. That was it. Scroll the newsfeed to dirty crying, that's what it was. I'm like oh my god, to see her when do we see her, I knew she'd bring that baby back,* she will bring that baby she will bring it here—*"*

The season of lactation (Summer, 2021)

The half-fluke whale and her calf—her calf external to her body now but still feeling more like a part of her than not—have returned to the place of food. She badly needs it, the food, both to continue feeding the calf and to show them how to forage on their own.[124] Yet food seems scarcer this season.[125] It is not so much that she is hungry, but rather she is fearful. The food are in strange places, behaving strangely and becoming, in strange ways, depleted. It has become increasingly hard to ignore that, as she suspected earlier in the season, boats with bright lights seem to follow immediately in the whales' aftermath.[126] The boats go to the schooling fish the whales have found to feed on. A day or two later, both boat and food are gone. It clouds her rest, this worry that nourishment is uncertain. Her survival, and that of her calf, depend on a great deal of eating. In the long, hot season that is to come, they will be in the breeding place, where there will be no food.

They are resting, now, their sides touching, the calf's smooth unscarred skin making her more aware of her own aging body. The roughness and barnacles, the raw areas which she has rubbed too hard against the underwater cliffs in an effort to dispel itching. There is so much less sensation in her weathered skin than there once was. When her tail was slashed she was forced to dull certain centres of feeling.[127] Otherwise the pain would have overcome her. She had to do this, but there was a cost. And other costs of living abound. Her voice has grown rough with age and strain, striving to be heard over the near-constant background noise.

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[124] The sex of this calf does not appear to be known yet. I am choosing to use a gender neutral pronoun rather than guessing, not because I think an inaccurate guess would be a particular problem, but because it also serves to suggest that the sex of offspring may not matter as much to whales as it does to many humans.
[125] Several of the naturalists I spoke with that September had observed that throughout the summer krill, herring, etc., had been less plentiful than normal.
[126] See note 9.
[127] This possibility is speculative.

Now her calf rubs against her with intention, placing their mouth on her body where they know a nipple will emerge.[128] It is a quick arousal, a hidden node of skin emerging to protrude from her belly; a rush of charged energy as pressure releases and milk shoots out. When she has seen this happen between other mothers and calves, she has seen how the thick milk parts the water instead of disintegrating into it, like a streak of tangible sunlight.[129]

Her calf opens their mouth for her milk. It takes only a few seconds to satiate them, for now. Soon she will need to return to foraging. She has grown thin; the bounty here has not yet made up for the long journey she and her calf undertook together, slower than she has ever made that journey before.

She remembers mother's milk, sweet and rich, like nothing she has tasted since. She remembers how it would course through her, warming her in the time before she had enough fat to keep herself warm. She calls often on that memory, in these first weeks of each spring, when she has returned to the cold waters but not yet rebuilt her protection against them.

She has not met or sensed her mother in years. Once in a while she catches a brief trace—a sound, a feeling—but by the time she identifies it, it has dissipated. Perhaps, she thinks, with time the senses dull; perhaps one's modes of expression dull too, sit lighter in the ocean, so that one is less noticed by others, and can fade.

Perhaps her mother is simply gone.[130]

Her nipple retracts and with it the brief pleasure, the brief respite that came with her own memory of her mother's milk. The meal imbues her calf with a sudden burst of energy; they arc their tail flukes and flip their body, just for the joy of it.

Again her own fluke, in the place where it is no longer, aches.

Some weeks later, weeks that pass in much the same way, she is again with the group of mothers and calves when a different memory of ease surges to her ear: The sound of the strong-voice female, her bottomless joy.

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[128] For a description of this behaviour see Videson et al. 2017

[129] On humpback whale lactation, see Kingdon 2019; Tackaberry et al. 2020; Videson et al. 2017; Zoidis et al. 2017. See also footnote 5 in Ch. 3.

[130] Naturalists I spoke with on the Bay of Fundy had not seen Trident, Bayou's mother, in several years; the most recent documentation of her I can find online dates from 2010 (Whales With Names, 2024).

Interlude (Amy Tudor, Naturalist)

There was a provincial election due the year the half-fluke whale first brought her calf, external to her body, to the Bay of Fundy. Amy—cobbling together extra work to make up for the minimal seasonal income that for her is the cost of spending time with whales—had agreed before the election was called to work as the local returning officer. Nobody predicted that work would take place, as in the end it did, during the summer months. For the first time in years, Amy was not on the sea for the better part of July and August.

She tells me how deeply, how physically she craved contact with Bayou and her calf; how, every day, she looked at the sea and longed for the whale.

The day after the election office closed, August 24, Amy went offshore.

"There was a group of six and we didn't know who was there, three mothers and three calves, and"—again, her whisper, like she does not want to interrupt whatever fragile, intangible thread connects her with the half-fluke whale—

"I knew you were there, I said Bayou, Baaaayou—

"And I saw a whale arc its back and I saw her tail. And—

"… I knew she was there, I was going to see her… I'm like oh my god, baby, Bayou, calling to her. Now, whatever she was doing was a functional behaviour, there was something going on—it was a mother's group and I don't know what they were doing but it's unusual, it is unusual to see that type of group… Whatever they were doing they didn't have time for or weren't in the mood for an interaction. And I said, okay no problem, I got to see her, I was still beyond thrilled, because like I said I put out all my karma magic hippie dippie hoodoo that this is what I wanted.

"And I understand completely coincidence, I know what it is, I know coincidence is not correlation, I understand all that but it makes my heart feel good. It's, you know, if allowing yourself and indulging yourself with a little bit of fantasy gets you through in this world—why not? Why not allow myself to believe?"

But the experience Amy is describing is not fantasy. It is a real interaction; it took place in reality. She gained from it intangible, invaluable qualitative knowledge about the being of humpback whales in general, and the being of one individual whale in particular.

The season of weaning (August 2021)

The half-fluke whale will go to see her. She will not linger, but perhaps her calf will.

She orients herself, a task that took her some time to relearn when her fluke was cut, so deeply did this disrupt both the balance of her body and her ability to establish balance. She learned how to compensate, how to accomplish directional movement without expending too much extra energy. That is especially important now, with energy scarce and so much in demand as her body is responsible for nourishing two.

She makes sure her calf is beside her, and she heads for the voice.

When she finds it, she will be able to dive deep. There are, she knows, krill below. She can feel them, humming. Her calf does not have the attention span to accompany her. They will enjoy the strong-voice female and the movements of the boat. When she has eaten her fill, she will be ready to feed them again.

Then she will again release milk, and once the calf has eaten, and once they have calmed, she will direct their attention to the boat's propellor. She will make sure they notice the sound of the displaced water as it churns around the propeller and, secondarily but crucial, this sound as it is interrupted—so briefly, barely perceptibly—by the steel cage that surrounds the evil thing. She has learned that when the cage is there, the evil thing cannot reach, cannot grasp. (There it is again—that mystery—*grasping*.)

Her calf must be taught to recognize the creatures that propellors are, because not all of them are contained in this way. Some can reach and grasp, some can pull you toward them without even touching you—they are worse than sharks, worse than orcas. A bitten-off tail is the least of the harms in such creatures' power.[131]

How to communicate this to them, without also instilling in them that gnawing fear that alternately nibbles at her and—more and more—punctures her?

[131] This paragraph hyperbolizes what propellors do, in order to imagine how monstrous they must seem to whales, especially those who have been harmed by them. I speculate whales' conception of them as *creatures* rather than *things* to suggest that whales' understanding of aliveness and agency could be different to ours.

—the fear itself a crippling psychic wound that makes her heavier and heavier, slower as she moves through the water, slower to eat and then—sometimes—making her choke instead of swallowing—[132]

—the strange foul taste that seems to come from the food itself but she knows—

—she believes she knows—

—because it *must* be her own fear making it taste that way—

A few minutes without him, that is what she needs.[133]

They arrive at the boat. She does not glance at the strong-voice female, lest she fall into it—the voice, its sounds slipping into her ears, settling there— The fats in her ears vibrate, anticipating that feeling, but she does not stay long enough to relish it. *Go*, she communicates to her calf, *play.* And the half-fluke whale, mother now, dives. Down and down. Her body cools as she descends; some calm returns, as plankton spread around her.

Sometimes she brings them with her, down. She must slow when the calf feeds from her, though for their part they wave their fins more while suckling, projecting pleasure into the water their wriggles displace.[134] Their pleasure makes little bubbled whirlpools; someday she will teach them to aggregate food using bubbles.[135] Elsewhere on their journey she has been able to hover with the calf near the seafloor, where there is relative quiet, and relative calm, compared with surface waters. But it takes more from her, to feed them down there: the time and energy spent traveling from the surface and back to it; the pressure; in the pressure at depth she cannot really vocalize.[136]

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[132] I am extrapolating that whales' anxiety responses could be similar to humans, and hinting again at the subtle, accretive effects of polluted waters and polluted bodies, both whales' own bodies and those of their prey (see notes 8 & 9 in Ch. 3).

[133] I am here following the lead of all the Bay of Fundy naturalists I spoke with about this (~6-8 people out of about 15 across all the local whale watching tours, many of whom have been observing whales for decades) in understanding the behaviour I narrate here to be linked with the notion the boat provides "calf care"—of which I documented an interspecies instance (albeit between two species of toothed whale) in Chapter 3. See further discussion of this in the next section of this chapter.

[134] Tackaberry et al. 2020, Bejder et al. 2019

[135] See National Marine Sanctuary Foundation 2020, "Bubble Net Feeding"

[136] Elemens et al. demonstrated that baleen whales' "laryngeal structures set insurmountable physiological limits to the frequency range and depth of their vocalizations" (2024: 123).

In this northern place of food she rarely goes near enough to the seafloor to perceive it. The waters here are deep and murky. She feeds her calf in peace when she can, and when she cannot, she seeks a space where the drone of ships is low.[137]

Now, light rises into the distance as she dives, drops, and now, here it is—the salt rush of herring flesh, the cloud of them black and bigger than her body, differentiated only by the moving flashes of last light on individual bodies flitting through the water. The school disperses when she plunges, mouth open, into it.

She can hear him still, his rumblings of enjoyment as he plays in the water near the strong-voice female. There are few orcas in the place of food. There are other threats. The strong-voice female will keep those threats away; the half-fluke whale knows this as surely as she knows that other humpbacks would protect her calf from orcas, if the occasion arose to do so.[138]

She takes a final gulp. The fish writhe when they enter her mouth. They quickly go still. She does not feel the moment when life leaves them. They pass through her baleen, and feed her body, while that which is too large pours back into the seawater.[38]

A strange weight has lifted from her, since she began feeding her calf. She feels lighter and, somehow, both more *whale* and more whole, even though she is divided, in a way she has never been, between two selves, her own and that of her calf.[139]

She does not ruminate overlong about this. Perhaps she attributes her feelings—of wholeness, of whaleness—to the fulfilment of having procreated; perhaps there is relief in the knowledge that if she dies it will not mean the end of her. She accepts the lightening and is grateful. Her fluke pangs, perhaps, slightly less than it did before, or perhaps it is that the pain affects her less.

Her stomach full, she makes her way placidly to the surface. Her calf is rolling there by the boat, as she knew they would be. The strong-voice female is speaking to them from the boat's surface, as the half-fluke whale knew she would be. She looks at the strong-voice female in

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[137] This is in part an extrapolation from the human experience of lactation and suckling, in which distractions prevent successful feeding; and in part based on a 2019 study which demonstrated lactating mother humpbacks need significantly more rest than non-lactating whales, and therefore must seek areas where there are fewer disruptions (Bejder et al. 2019).

[138] When they hear the hunting calls of orcas, humpbacks are known to seek out the calling orcas and, in groups, scare them away to defend the targeted prey animal, even when (as is the case most of the time) the prey animal is not a humpback or even a whale. There are a number of hypotheses about *why* they do this, the leading one being that the behaviour saves enough humpback calves to be worthwhile (Langlois 2023).

[139] This "weight" is primarily a psychological speculation on my part, but is also intended to allude to the fact that toxins that have accreted in the whale's blubber are being transferred to her calf through milk (see note 39 below).

acknowledgement. In acknowledgement, she breathes—once, twice—toward the human on the boat.[140]

Then she vocalizes, a small sound that draws her calf to her.[141] She relishes the soft bump as they touch, the calf's joy radiating along her body; the smooth passage of water as they swim away.

The half-fluke whale's mode of thinking is likely less drawn-out, less explanatory than it seems when rendered in the text of human language.

She knows so much that I can neither state nor imagine. Something she cannot know is that the toxic burden that has lifted from her, as she transforms her blubber and expels it as milk, has not lifted at all but has simply transferred into her calf, as with lactation in all mammals. If the calf is male, he will never have the opportunity to clean his body in this way. He will become heavier and heavier with the burden whose lessening—whose very existence—his mother can neither describe nor interpret. [142]

At one point in history whale fat fuelled human industry. Now it contains industry's wreckage. They carry around our waste, though, having no material things nor hands to hold them with, there is no reason to presume that whales even have a concept for *waste.*

INTERLUDE (AMY TUDOR, NATURALIST)

Though the half-fluke whale did not have the time or energy for an intense interaction with Amy that day, her calf did. As Amy describes it, the mother whale brought her calf to the side of the boat—the calf between the boat and its mother, Amy is careful to note, indicating the new mother's trust of the boat—

[140] Unlike humans, whales are voluntary breathers—they must choose to take every breath. See Cabana 2016, and Amy Tudor's comments below.
[141] See Videson et al. 2017 on humpback mothers and calves "whispering" (France-Presse 2017) to one another to avoid being detected by predators.
[142] On toxin transfer during lactation in cetaceans, see Remili 2023, Andvik et al. 2021 on killer whales; on "maternal offloading" of persistent organic pollutants in female humpback whales from the Gulf of Maine, see Baugh et al. 2022.

"And I was like 'I can hear your flippers' and I'm telling the baby 'oh you're so beautiful you're the first whale I've ever known that I've seen in your mommy's belly and your mommy's just so beautiful,' and Bayou's just like hochhhh*, spraying.*

"To me when they choose to spray—they're conscious breathers, right. They have to initiate their breaths, they don't have necessarily a set amount of breath patterns. They breathe when they need to and how deep they do is based on the function they're going to do next. And it seemed like she was breathing in relation to the conversation and acknowledging it.

"Again, I understand I'm speaking from a bias, but it felt like she was acknowledging that I was acknowledging how wonderful this thing is, how wonderful this baby is—"

She breaks off, sniffling, lightly laughing at herself. She speaks again of Bayou's visit to the boat last summer, how she seemed to be showing off her stomach, how proud she seemed.

Describing her own experience of feeling, though not in words, the whale's gestural meaning on that day, Amy tells me—speaking slowly, deliberating her word choices—that she sometimes experiences "a subconscious fantasy narrative based on observational knowledge that plays in the back of my head when I observe whales in an intimate setting."

Again there is that word, fantasy. I want to experiment with removing it: Amy experiences "a subconscious… narrative based on observational knowledge that plays in the back of my head when I observe whales in an intimate setting."[143]

She may refer to it as a fantasy, qualifying in the way she knows she is expected to. But in this instance too, it is not. It is real knowledge based on real field observation and intimate, long-term companionship with other living animals. It deserves to be taken seriously. We owe it to the whales, to take it seriously.

[143] Amy's description calls to mind Harry Brower Sr.'s experience of being transported to another place by a baby whale, while dreaming, which Karen Brewster and Brower Sr. document in their 2004 oral history of Brower Sr.'s life, and which I related in the introduction.

Figure 3*: Drawing of the half-fluke whale and her calf, by the author (September 22, 2021 sailing with Mariner Cruises. Reference photo: Tudor 2021b, used with permission)*.

II. Discussion

When I encountered the half-fluke whale and her calf, about a month had passed since Amy had first seen the calf. Again, the mother whale did not stay long with the boat I was on; she again took several long dives while the calf remained near the vessel. Whale calves drink a lot of milk—hundreds of litres a day[144]—so the mother has to forage extra hard, both to replenish the blubber that is being depleted by lactation, and to accumulate the usual fat stores necessary to survive a winter without eating.

The calf, a few months old at that point, seemed fascinated by the boat. It rubbed against the boat's sides; it rolled and spy hopped, waved its flipper above the water, lingered so close to the boat that people worried we'd hit it. It spent most of the time on the port side, near the bow. That was where Amy stood, speaking to the calf, encouraging it. When she called to it, to all appearances, it went to her. During the forty five minutes or so that we spent near the calf, the mother whale was gone for minutes at a time. She came up to breathe a couple of times; she stayed well within communication range of her calf.[145] But she never appeared to physically protect it; she never placed her body between it and the boat, or, as far as we could tell, discouraged the calf from being near us.[146]

It was not my first time witnessing such behaviour in a mother-calf pair. As several Bay of Fundy naturalists told me, it is common, in that particular human/whale ecosystem, for mother whales to go on long (ten minutes or so), and therefore deep, dives when they are near the vessels with which they are so familiar. To the naturalists, this appears to be a kind of childcare mechanism—the boat is a trusted form of entertainment for the calf while the mother takes a welcome break to search for food without having to mind her offspring. That is also how it appeared to me. And in my interview with cetologist Jim Darling, who has worked largely on the West Coast, he described a similar phenomenon he's witnessed in Hawaiian waters, where female humpbacks "use boats to shelter themselves from harassing males… the females spend hours basically under a boat. I guess they find it useful when avoiding unwanted attention."

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[144] 350 L/day (Kingdon 2019)
[145] About 2 km (Indeck et al. 2022)
[146] Other whales also "introduce" their calves to humans; there is, for example, Lindy Weilgart's experience which I related at the beginning of this chapter. Grey whales are also known, in their breeding grounds, to lead their calves to close proximity with human vessels (Siebert 2009).

Mine is a generous reading of the whale watching "calf-care" situation in the Bay of Fundy. A less generous reading would be like the one Charles Foster suggests when he narrates orcas encountering a whale watching boat; as he imagines it, the orcas feel like they are being pounded by "a thousand sledgehammers," but knowing that the boat will chase them if they try to move off, they stick around "rolling and blowing," in order to satisfy the camera-bearing tourists and get rid of the annoyance as quickly as possible (2023: 46). In such a reading, applied to the circumstances I am narrating here, a mother whale encountering a tour vessel on the Bay of Fundy knows the boat will continue to pester her and her calf until a performance is offered, so she delegates the unwanted task of entertaining the boat to her calf, and spends her own energy where it is really needed: on finding food.[147]

Yet these vessels, as all the naturalists I spoke with emphasized, do not badger the whales. When they encounter one who is focused on feeding, they may trail after it at some distance for a few minutes, tracking parallel to the whale's path so as not to get in its way. They never force a close approach and do not stay for long—the general standard is about twenty minutes,[148] although as in my experience with Bayou's calf, sometimes they remain for shorter or longer durations based on how the whales are responding and if there is other boat traffic. We cannot know for certain the cost this may have for the whales. Though the whales generally neither leave nor speed up, that—as I have been arguing throughout this thesis—is not sufficient information to be certain no harm is being done.

Still: the behaviour of the Bay of Fundy humpback population in general—the way many whales seem to seek out the vessels, the way the mothers leave their calves when the boats are near—suggests a generally reciprocal, or at least generally not harmful, relationship. So does the affect that one feels from the whales—the affect the naturalists described to me, and the affect I felt myself. Proponents of whale watching usually argue that the activity has the potential to engender care in those humans who encounter whales, therefore increasing the likelihood of people making ecologically sound choices, advocating for ecologically sound public policy, and

[147] Another way of explaining these perspectives would be what Eve Sedgwick termed "reparative" and "paranoid" readings (1997). While I am optimistic that reparative reltionships with whales are possible, "paranoid" seems hyperbolic here, because the notion that whales are bothered by vessels is quite reasonable and in many cases true.
[148] Humpbacks' life expectancies are similar to ours so it seems reasonable to assume that they experience twenty minutes as roughly an equivalent to how humans would experience a twenty minute chunk of time, although this is obviously subjective.

so on.[149] It is undeniable that whale watching under certain conditions and in certain modes is harmful.[150] But my fieldwork on the Bay of Fundy revealed a deeper, more complex relationship between whales and boats, whales and humans, one with more give and take—if sometimes the vessels annoy whales, sometimes they also provide calf-care; if sometimes the human voices are an annoyance, perhaps sometimes some of them, like Amy's, could be a balm, as I speculated above.

Amy said the whales produce many different "tones and frequencies." She went on, "I'm sure that joy, the sound of joy the sound of excitement, and its mechanism in the frequency of *us*, is probably familiar to them. I truly believe, will go on record and state that they understand the frequency of joy." She has noticed that whales seem more curious about the vessel she works on when there are lots of children onboard. It makes sense, she says—"I know I love baby whales. Why wouldn't whales be interested in baby people?… They understand the difference, in the voices and in the energy."[151]

Children's energy is more free than that of adults, Amy suggested. "They're not scared to be happy, they're not scared to call the whale beautiful, where some adults… we're self conscious of showing true emotion to a creature that can't give it back." Amy felt that way when

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[149] See, for example, Harms et al. 2013; Hoberg et al. 2020.

[150] *The Guardian* reported in 2014—while acknowledging there could be a reporting bias in the data they used to come to this conclusion—that whale watching boats are the most likely type of vessels to strike whales, though not to cause the worst of vessel strike injuries (Farrell & Evershed, 2014). Michael J. Moore noted significant harm caused by the whale watching and recreational fishing industries around the Stellwagen Bank off New England, where there is often what he described as a "monstrous circus": "You'll have a group of whales with three large whale watch boats each with 200 people on board all vying for position with other fleets of recreational boats that are whale watching and fishing with monofilament line, such that the Centre for Coastal Studies now spends the summer with a boat out there just cruising looking for whales with entanglements of monofilament line from this industry—because they're all following the same whales… It's not necessarily a direct conflict but the conflict is driven by indirect interests in the same base of the food chain."

Jim Darling, speaking more generally, said humpbacks "are watched from dawn to dusk all over the world/ In that case it seems like there's an ability, I don't know what their limits are but there's certainly some ability to habituate to these sounds so it doesn't have, one presumes at least that it's not having a huge impact on them. They keep feeding, they don't go anywhere, they keep behaving as they did before a boat shows up."

[151] As I mentioned in Chapter 1, other naturalists, most notably Mandy Crocker, echoed this assertion that the whales can feel the energy of the humans on board the whale watching vessels on which they work. This could be different in contexts where whale watching boats are larger and therefore the people on board are farther from the whales and, perhaps, by sheer numbers, more overwhelming. Of the four larger (not inflatable) vessels that run tours in the Digby Neck and Islands area, three of which I regularly sailed on, the two largest are 50-foot Cape Islander style boats, built for crab or lobster fishing then retrofitted to hold passengers. Each has capacity for 40-50 passengers at a time and has a small upper deck from which, weather permitting, 8-12 of these passengers are permitted to observe. Compare this with another boat the same humpback population might encounter further south, off Maine: Bar Harbour Whale Watch Co.'s AtlantiCat is 130 feet long, with four 1800 horsepower engines, three levels, and able to accommodate 350 guests (Bar Harbor Whale Watch Co.).

her relationship with whales began, she told me, but she soon realized she needed to be emotionally open and vulnerable with them if she wanted to have interactions with them.

In the face of this realization, Amy made the decision:

> I'm giving all my love to this whale that I can. Alright whale, all the love that I can give you're getting it. I don't care if I get anything back. I want you to know that your presence is enough.
>
> You just being who you are as an entity is good enough for me.

That was when the whales became overall more interactive with her, she told me—belying the perception she'd described of whales being unable to "give [true emotion] back." She described several instances when she called to a whale and the whale responded. For example, she described an experience in which a whale appeared to have decided to pass the boat by without paying it any attention, and she called out to the whale: "I would have loved to look you in the eye, I would have loved to have seen your eye… And that whale turned around, did a U-turn, came back, and I could see it coming back to me. It brought its eye out of the water, went under the boat and kept swimming off."

"He could have seen a school of herring on the other side of the boat," she said. "I could give you thirty other reasons why the whale did a U-turn or why the whale rose. But in my heart it's because I asked him… The other parts of the story could tell a different one but those are my truths."

Science is often too quick to retreat into the "biologically necessary"—to assume the school of herring. Amy's and Mandy's relationships with the Bay of Fundy humpbacks point to the possibility that whales' truths could be many-layered, multiple. Perhaps the whale that came when Amy called saw a school of herring, but simultaneously was drawn to her voice. Perhaps humpbacks sing for biology *and* for pleasure, depending on circumstances, depending on the day. There is much more to whales than biological necessity; likely other kinds of necessities feed into biological health. That is part of the reason that, as biologist Shane Gero argues, we must preserve not only whale species and populations, but also specific whale cultures (2016).

Amy's experiences demonstrate that those Bay of Fundy humpbacks who seek out interactions with humans and boats ask, of those humans who know them intimately, our vulnerability. Of us all, they ask—literally, as with the whale watching vessels,[152] and in a wider

[152] In Chapter 1 I detailed an example of a whale retaliating against a boat, the captain of which had not yet learned how to drive it in a way that did not disturb whale foraging.

sense, as in what they need to continue surviving as a population—that we meet them where they are, at the speed at which they are traveling, not the speed at which we wish to travel.

The vulnerability the whales ask of those of us who watch and conduct research on and with them pales in comparison to the level of vulnerability whales have no choice but to live with, in habitats riddled with container ships and fishing lines. But it is, perhaps, something we can give them. We can render ourselves vulnerable in response to their pleas. It makes, as Amy's experiences demonstrate, for better research.

It would also make for better policy. Simon Elwen, tongue in cheek, proposed retraining fishermen as astronauts, to save North Atlantic right whales. "There's two very clear problems" with right whales, he said. "But nah, let's give them another fishing license." His sarcasm evaporated when he continued: "No. Stop the fishing. People are like, '*ooooh, hum hum, there's people involved*', so it's different." Dropline fisheries remain open because of how economically vulnerable the human communities who depend on fishing would be, if the fisheries were shut; because the fisheries are supposedly already too economically vulnerable—and, Maine lobster fishermen are, they said of themselves, too busy—to adopt (existing and viable) ropeless trap technology (Sommer 2023). But shutting fisheries, or changing them, like with the aforementioned traps, could save the species. What if we were more open to rendering ourselves vulnerable, on a broader level, for the sake of nonhuman others? Echoing the words Simon said to me, Michael J. Moore recently told a reporter, "We know exactly what we have to do… The science is all there" (quoted in Jones 2024).

For years Amy sacrificed financial stability in order to work on a whale watching vessel so that she could spend time near whales. She spoke of this as if it were a selfish endeavour. But it was clear in the way she spoke of them, on the vessel and at my kitchen table, that almost everything she does is for them.

Conclusion: Multispecies love[153]

Near the end of the essay I found on my phone at the Labia Theatre, once Margaret Mead had robustly demonstrated war is "just an invention," she asked: "But once we have said this, have we said anything at all?" She wanted to know if it *mattered* that war was only an invention—

[153] See Tsing 2010

now that it had been invented, could it ever be turned away from? She determined that to relinquish the invention that is war, two conditions would need to be met: people would have to recognize the defects of war, and a new invention must be made to replace it. "There is further needed a belief that social invention is possible and the invention of new methods which will render warfare as out of date as the tractor is making the plough" (1940: 405).

I am not suggesting machine learning, or big datasets—the objects of my critique in Chapter 2—should be "rendered out of date" or abandoned as tools, nor that "biological necessity" should not be among what science considers about nonhuman animals. But a belief in the possibility of new, and *more*, ways of learning about nonhumans will go a long way in formulating nonhumans as something that approximates who they are—much more than mechanistic interpretations can. Here I have presented one such new way of learning about whales: by listening to those who know them intimately, and weaving from that a story in which the whale, not the human, is a protagonist:[154] in which the human is a minor character in the whale's life, as most humans should be for whales—a role our industries have brutally bloated, against the wellbeing of whales.

Have I "said anything at all," then, in the story I offered about the half-fluke whale; her calf; and the human woman I know as Amy Tudor, whom the whale may know, perhaps equally well, by some name I will never be able to guess? (Does the half-fluke whale know that when the humans say *Bayou*, they mean her?) Tsing wrote in 2010 that in a space that intersects the natural and cultural sciences "a new model is afoot," defined by its embrace of multi-species love. Its practitioners, among whom she counts herself, aim not primarily to critique science but to immerse themselves in the worlds of the nonhuman others they are trying to study, using the tools and insights of the humanities and social sciences alongside those of the natural sciences. She wrote that the objective of those working in this space is to "open the public imagination to make new ways of relating to nature possible" (2010: 201). In her 2015 book she argued that such work also "enlarge[s] what is possible" (156) and allows a way of thinking past modernity's fixation on linear progress. Here, I argue that working in this interstitial space to create

[154] Tsing points out that "subsistence hunters recognize other living beings as 'persons,' that is, protagonists of stories. Indeed," she asks, "how could it be otherwise? Yet expectations of progress block this insight: talking animals are for children and primitives." (2015: 155). She argues that "to enlarge what is possible," anthropologists must attempt to articulate landscapes as protagonists (idem: 156). Elsewhere in the book, she makes protagonists of such entities as money, pines, and fungal spores.

something like what Tsing referred to as "an open-ended assemblage" that gestures "to the so-much-more out there"[155] can do something else, too: It can discover, develop and articulate new knowledge *about* nonhuman others, in this case whales, knowledge not primarily for the purpose of changing human mindsets (although I hope it can do that too), but for its own sake.

Such knowledge archives something of what oceanographer John Hildebrand called "the basic things" that we still don't know about lives lived in the ocean, which he reminded me is a rapidly changing space. Hildebrand has collected several petabytes of data, he told me, largely underwater sound recordings. "Datasets like that, it's kind of like documenting what the ocean was like at this place in time… It's a good way to just kind of get a sense of what's there." He went on to describe how surprised he's been about the ongoing impacts of the Deepwater Horizon oil spill. "I thought it would just be a few years of impact but it's still an ongoing impact, we've seen declines in a lot of the animals there." Cetacean ethnographies, I hope I have shown, give some sense of *who's* there, what they are like and what their lives are like, now.

I told Simon Elwen that, in my desire to learn and to tell the stories of, for example, North Atlantic right whales, sometimes I feel like I'm doing work uncomfortably akin to salvage anthropology. After I explained the term to him, there was a moment of silence between us, filled with the sounds of his family's ducks in the courtyard. I was thinking about how unfair it seems to try to extract knowledge from animals that barely have the energy to exist. I had hoped Simon, his dry sense of humour usually at the ready, would reassure me, but all he said was, "Well, that's depressing."

Of right whales, Amy Tudor said "We decimated, decimated, decimated that population." She let out a long sigh. As I noted in Chapter 1, she does not believe there is hope for the species. Publicly acknowledging this makes her an outlier among the scientists and naturalists I spoke with, and among most of those whose views I have read in academic publications and in the media. Amy told me how her heart both sang with joy and raced with panic when she was the first to observe a new right whale calf. She has never been seen by a right whale, she told me, unlike her relationship with Bayou and many of the humpbacks. She loves right whales anyway,

[155] "The so-much-more [that is] out there" (Tsing 2015: viii) to whales was a consistent theme among cetologists and naturalists I spoke with over the course of my research, as I discussed in Chapters 1 and, more fully, 2. That excess was also evident during my own field encounters with whales.

despite that she hasn't felt an intense two-way connection with any of them, despite the fact she believes the species will die out, despite how her love for them causes her to reckon directly with that knowledge and the grief it entails. If more people felt that kind of love—and here I am paraphrasing, at a particular slant, Michael J. Moore's basic argument—perhaps the species would *not* die out. Perhaps, as Moore argues, heightened empathetic, *narrative* knowledge of right whale suffering could finally trigger public action to stop that suffering.[156] If, however, he is wrong, I want to argue that qualitatively archiving whales' lives, as he has done, as the research methods for which I am advocating would do, is nonetheless meaningful. It is some small respect paid to them, and to a future where perhaps, a vanished species will be slightly less forgotten by us; where we may be better companions to other species.

Moore wrote, in the introduction to his book in which right whales are first-person narrators, that the book is about "what it would mean to lose this and other species" (xiii). In this chapter and in the previous one, I have offered some knowledge that may help in understanding *what there is to lose*—linked to, but not the same as, "what it would mean to lose"—of specific whales in the Bay of Fundy, and of specific whale-human intimacies that have proliferated in the small-scale whale watching and research community there. While the notion of "baseline data" for these whales is in some ways misguided—is the baseline pre-commercial whaling, pre-commercial shipping, pre-European colonization, or some other indistinct historical moment?—documenting what they are like *now* is meaningful, because their world continues to change; with increasingly warming waters that will result in less and less predictable food and weather patterns, it may do so more rapidly than we imagine. Amy Tudor told me how much she worries about what it would mean for her if the humpbacks moved a few kilometres further east into the Bay of Fundy. That distance is nothing to a whale, she pointed out, but for her it is everything. The vessels on which she works would not be able to travel that far to visit the whales. Perhaps the absence of whale watching boats would be a welcome change for some of the animals who live in the Bay. I have argued in this chapter that for at least one of the humpbacks there, something would be lost, if this particular naturalist could no longer go out to sea to be with her.

Amy's relationship with the half-fluke whale opens another possibility, one that is likely already closed for North Atlantic right whales, but not for all species: If we love wild animals in

[156] Moore made this point in our interview and has alluded to it in other fora (see for example Macapia 2024).

the right ways, in some instances—though it is never acceptable to *expect* this of them, for we rarely deserve it—they might love us back.

Amy told me that once in a while she has what she calls "whale dreams." Whales are not always present in these dreams, but in them a particular, palpable intensity of emotion, related to whales, overtakes her. She described it as a feeling of following whales—not chasing or watching them, but being *led* by them. "Every time I've had this dream, and I mean every time, I've had amazing encounters. When I tell the crew I had a whale dream last night they don't laugh at me anymore… When I have this particular sense, this dream, we have intimate encounters with whales."

I found myself shivering, as I listened to Amy's voice speaking these words on my recording of our interview. I remember shivering in the moment, too, because it seemed to me that something had been activated in the room. Something—something of the whales Amy, through her stories, had conjured?—had come to life. It was like a presence was at the table beyond just the two of us. Perhaps the energy of Amy's whale dreams.

They are, she said, not premonitions, but *events*. They catapult her into a state where she shares some kind of energy *with* whales. They precipitate not just seeing a whale, but "being *seen* by a whale."

I thought of her earlier question: What do whales see, hear, sense, when they see us?

I asked if Amy thought the dreams were trying to teach her something. "I can't," she said, "I've really tried to say—What do you want? What is it you're trying to tell me?… Somehow the messages get through to me," she said. But she cannot put them into words.

Perhaps the whales are trying to tell her a particular way to be.

Perhaps their "messages" are warnings.

Perhaps they are pleas.

Like most of us who were brought up in the western tradition of knowledge, Amy has been conditioned—as she describes herself—to discount such experiences, to relegate them to the realm of fantasy that, in her words, "gets you through in this world." I argue in this chapter and throughout this thesis that we must take these forms of knowledge and knowledge gathering seriously as essential modes of learning about cetaceans. The corollary to that argument, as I

have shown in this chapter and elsewhere, is that a great deal of that kind of knowledge *already exists*, held by scientists, naturalists, and laypeople alike, who have had close interactions and long-lasting relationships with whales. Gaining such knowledge, in such situations, almost cannot be helped. It is more difficult to do the work of discounting it. Its insights are not always generalizable and not always even articulable, but they tell us something about whales we cannot otherwise grasp, whose ends we cannot know in advance but which might allow us—even transform us—to be better to them; better, for them.

In this chapter, I have tried to evoke one particular whale as something approaching the being that she is. Here and in the cetacean ethnography of the previous chapter, I have held in abeyance what the whales may or may not be trying to "tell" Amy or anyone else. I hope that in doing this, I have contributed to the archive of substantive knowledge about Gulf of Maine whales, specifically those who visit the Bay of Fundy, specifically the one humans call Bayou and the one humans call Old Thom. I further hope the rendering I have offered of those particular whales may render their and other cetaceans' capacities as well as their needs more audible, and more evident, to us; and incite empathy that could in turn incite public action to insist on change so whales' needs can be met.

Throughout these efforts, I have adhered to Tsing's intersectional method of "multi-species love" (2010). More fundamentally, I have based my approach on the one Amy described the backbone of her work as a naturalist:

> All the love that I can give you're getting it.
> I don't care if I get anything back.
> I want you to know that your presence is enough.
> You just being who you are as an entity is good enough for me.

If, in imagining the my cetacean ethnographic subjects as I have—as full, rich entities, with thoughts and hopes and sorrows—I have gone too far in attributing "human" characteristics, or gotten some details wrong, I have done so in part out of my desire to evoke the whales as my human interlocutors, who know whales far better than I ever will, evoked whales for me; and as I, myself, experienced whales.

In part—here, too, following my interlocutors' lead—I have done so out of love.

Conclusion

Bearing with and bearing witness to whales

The above is the online table of contents for marine biologist Michael J. Moore's article, "Policy enabling North Atlantic right whale reproductive health could save the species" (2023a). When I saw it on the lefthand side of my browser window, I thought it looked like a found poem, and wondered what beyond these choice words needed to be said about the state of contemporary North Atlantic right whale research.

Moore, trained in veterinary science, has spent decades seeking "solutions" to save right whales. Early in his career, in the late 1970s, he witnessed whale drownings in cod nets off Bay de Verde, along Newfoundland's Avalon Peninsula (Schweitzer 2014). Right whale entanglement, in ropes whose chemical structure producers kept strengthening, was, as he

described to a journalist, a different order of suffering. He described a whale with polypropylene rope that in places had cut her body "open… as though by cheese wire." He said there were instances when he wanted to look away—"it was almost too much to see" (cited in Schweitzer 2014).

He did not look away; he has spent his life refusing to look away. When I interviewed him, even though we were speaking remotely over a spotty video connection, I could feel the toll this choice has enacted on him. He was tired, he sounded sometimes disheartened. He told me didn't know what the next step was, what more he could do. He repeated several times how fruitless all his efforts sometimes felt. He gave no indication, however, of giving up.

This thesis is about bearing with the excess of whales, even beyond what we think we can bear, as Moore has always done and continues to do—whether that is an excess of suffering; or one of various other excesses to whales, beyond quantification, words, or human apprehension itself. While Moore's ethical impetus toward the whales he studies has been to *not* look away, I have tried to approach these excesses by looking differently. I am inspired by a different theorization of what it is to "look away," and how doing so can sometimes allow us to see *more* of those about whom we wish to say something; how it makes space for that of our interlocuters which is irreducible to "any system," including anthropological language (Stevenson 2020: 9). Stevenson is writing here about research with people; and while she renders looking away as a researcher's choice, cetaceans, by contrast, regularly vanish. They are normally not visible from our terrestrial vantage points. But Stevenson's insights about looking away help me to think about "saying something" about whales, because I share her hope: that spaces of *not* looking, or in the case of whales not seeing, may be spaces for something "*just*, or something *alive,* to temporarily break through" (idem: 9). When the whale has left, or died, or its GPS tag has fallen off; when the surface of the water is still; when the hydrophones are silent, or filled with the white-noise roar of diesel engines.

I passed through Bay de Verde once—just briefly, years ago, en route to Grates Cove, where a "solitary sociable" beluga—sociable with human divers, buoys, and dangerously, boats—had taken up residence, as belugas sometimes do. I'd just relocated to St. John's for graduate school, and a friend who had helped me move had never seen a whale before. When we got to the village, the beluga—whom people had begun calling Whaley—was nowhere in sight. There was

a fisherman in a small wooden boat, gutting a thick, square-faced cod the length of his arm. The fish's jutting jaw shook as the man sliced its stomach. We shouted down to him about the whale—or my friends did: I was too busy being surprised that cod was being fished at all. I knew about the 1992 moratorium, the largest industrial closure in Canadian history, which crushed the economy in Newfoundland and did not result in the mass return of cod; I didn't know that a small fishery had reopened ten years earlier, in 2006.[157] Tens of thousands of jobs disappeared with the moratorium; since then Newfoundland and Labrador has also seen the boom and bust of offshore oil. I do not wish to undermine the significance of the moratorium for those who depended on cod fishing for their livelihoods. But three decades later, and despite the fickle price of oil in recent years, Newfoundland and Labrador is a vibrant, bustling place. The end of cod fishing was not the end of everything. Nor would the end of drop-line fishing be the end of everything for the communities that depend on it in Atlantic Canada and along the Eastern Seaboard. But traplines and shipping may soon be the end for right whales; human industry may have already written that end. As for cod, while they are not extinct, it is not certain whether the population is likely to ever return to pre-moratorium numbers.

Some exchange took place between the man and my friends; the man called, "*Whaleyyyy,*" and moments later the small white whale materialized, bobbing placidly below the surface. The man reached out and petted it. He asked if we wanted to pet it. My friends did; I could not bring myself to. I cannot, now, remember why. I remember that it was a sunny September day, and I was happy to be by the ocean. That was before my research and creative life became entangled with whales. I don't think I would have thought about whether it was right or wrong to pet one; I do not, now, think there is a correct answer to that question. Once in a while, as Bay of Fundy naturalists told me during my PhD research, whales seem to ask for our touch. More often, humans touch them when we are trying to help them. Most often, the right thing is to leave them alone.

Like most solitary wandering belugas do, that one eventually moved on.

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[157] More recently, in 2023 the federal Department of Fisheries and Oceans changed its way of modelling cod stocks and changed the status of northern cod from "critical" to "cautious," citing a study that indicated cod stock "has been out of the critical zone since 2016) (Kennedy 2023).

In June 2024, Canada's federal government announced that the cod moratorium was over. The associated increase in fishing activity, after this news, was small—total allowable catch increased from 13 000 tonnes in 2023 to 18 000 tonnes, still a far cry from the 250 000 tonnes that was the limit in the late 1980s. Even so, DFO estimated that while cod stock has stabilized, it will likely decline in the next few years even if no fish are killed (Kennedy & Cole 2024).

DFO and its US counterpart, NOAA, are similarly hampered by their mandates to protect both the inhabitants of the ocean *and* the industries that extract resources from it (Fisheries & Oceans Canada 2022; National Oceanic and Atmospheric Administration 2024). Moore lamented this dual mandate during my interview with him, and has done so during other interviews (see for example Schweitzer 2014). He's begun to believe that regulatory bodies are not the answer for right whales; that the species can only be saved by a shift in market demand for seafood and consumer products, respectively harvested and transported in ways not harmful to whales. But how, Moore has wondered for years, could he incite such a shift in everyday people?

Sarah Schweitzer recounts a sailing trip Moore, feeling bereft, took with his wife on the Bay of Fundy:

> An idea had begun swatting at him, one his younger self would have considered heresy. Science had been superb at documenting the problem of entanglement. But science had not been good at finding a solution to end it.[158]
>
> How many papers had he written? How many necropsies had he performed? How many ideas had led nowhere?
>
> … Maybe if he could communicate what he had felt all the years ago. If people could feel what he felt when he heard the whales singing in his dreams, maybe they would come to share his heartache, and wake up to the need to do more. (Schweitzer 2014)

The singing whales to which Schweitzer refers had come early in Moore's career, and they were more than a dream: humpbacks had been singing just outside the vessel on which he was sleeping (Moore 2021: 30)—an experience he also had with blowing whales off Newfoundland (idem: 25). In both cases, the sounds he thought he was dreaming were real, not dreams, or not exclusively so. Nonetheless, when he narrates the stories, he still chooses to include that he experienced them as both dream *and* waking reality. In his book, he writes, "That moment of

[158] Significant advances have been made in this regard since 2014 when this article was written, notably improvements in ropeless trap technology which, if universally implemented, would put an end to most gear entanglements (see Jones' 2024 article, "We know how to save these beloved endangered whales. Yet we're mindlessly killing them," in which the author also interviews Moore).

confusion between dream and reality is unique" (2021). My research showed that dreamlike qualities—the affective, the intuitive, the ethereal—are present in much knowledge production about whales, and have important impacts on that knowledge. The insights of these ways of knowing, I argued, should be taken seriously, partly because—as Moore suggested—communicating that *feeling* of dreaming whales' singing might help others "share his heartache, and wake up to the need to do more" (Schweitzer 2014). Further, insights that come from such ways of knowing frequently also come in the form of new knowledge about whales which quantitative science, the purpose of Moore's research trips, does not document.

Recall, as I narrated in Chapter 4, the naturalist Amy Tudor's description of "subconscious fantasy narratives" that play through her mind when she encounters whales; recall her description of having whale dreams, events that bring her messages she receives but cannot translate into words. Those who know whales intimately are constantly faced with that which they cannot know about these animals, as well as that which they can know by *feeling*, but struggle to state. Yet conventional science, exemplified by the table of contents I quoted above, makes no attempt to disseminate those intangible elements of whale being, nor the ways in which human researchers feel them.

Moore's betrayal of these conventions, as I noted in Chapter 1, has presented him with significant challenges in publishing, though it has garnered (according to him, surprisingly) largely supportive responses from other scientists. There are many reasons that scientists choose not to publish the more qualitative, dreamlike elements of their knowledge about whales. Among these, set alongside material and practical concerns like career, reputation and the standards of conventional science, is that such elements are difficult to articulate in human language. But it is not impossible to articulate them, and I have argued in this thesis that to attempt to do so is to render whales as something closer to what and whom these beings *are*.

"Right whales are ready for change," Moore wrote in *Time*, noting that calving is rarer and longer in between; that right whales' bodies are shorter than they once were.

> It's up to all of us to decide if we care about sustaining a diverse and healthy planet by demanding ethical supply chains. But above all, we must recognize that the pain and drawn-out suffering that rope entanglement causes to these animals is unacceptable and quickly work together to put an end to it.
>
> The inevitable endpoint of the loss of biodiversity, whether it be whales, birds, fish, plants, or much smaller organisms, is that the human species will be left in a destitute environment, incapable of supporting ourselves. We must turn around

> and start to look at the longer view, and work together to find solutions that allow both the whale and the lobsterman to thrive. (Moore 2023b)

The subtext of those paragraphs seems, to me, to be that Moore does not feel confident that the collective "we" to whom he refers care, sufficiently to make sacrifices in the name of right whale lives, about sustaining a diverse and healthy planet. As with so many such works,[159] Moore's article ends by appealing to humans' desire to preserve our own species. Moore may be correct that this is the only way to incite behavioural change among humans. But I want to hold to the belief that right whale lives are worthy in and of themselves, even if there were no human good to preventing their extinction.

What most strikes me about this article is Moore's call to end suffering "above all," a sentiment also pervasive in his book. I cannot help but wonder if his meaning is that an end to right whales would be better than their continued suffering. When I spoke with Moore, I didn't ask if this was what he meant. It felt like the wrong question, like evoking the possibility of extinction would be an insult to his life's work. That is the risk, perhaps, of feeling an animal's suffering with a particular kind of intensity: One risks coming to the conclusion that the animal would rather die.

I've not seen a North Atlantic right whale. To my knowledge, I have never been up close to a whale in significant pain. But writing this dissertation, as much as the final product refuses to dwell overmuch on whales' suffering, repeatedly made me feel sick. My years of thinking about whales culminated in several months of intensive writing, during which the content of my writing manifested as tension in various parts of my body. Jaw, neck, hips. I would leave my house and squint northward to glimpse the Bay of Fundy. I'd try to estimate the current tide and to feel the sensation of vibrant life that has always suffused me when I look to the ocean. But often, all I could think about was how the life in there is probably becoming less and less vibrant

[159] Exemplary of this tendency is the article "Why is biodiversity important?" published by Conservation International in 2024, which cites five factors: that humans rely on healthy ecosystems; that biodiversity improves human health; that biodiversity will help solve climate change; that biodiversity is good for the economy; and that it is important for human culture and identity (Shaw 2024). See also similar arguments in the *Royal Society's* "Why is biodiversity important?" (2025) and the European Environment Agency's "What is biodiversity and why is it important to preserve it?" (2023).

every day. What to do with all these feelings—what was their place in an academic exercise such as the one I had undertaken?

I tried to harness them in my writing, less their dark affect than their empathetic intensity. I tried to hold onto whales as beings who experience a wide "emotional range," in the words of Lindy Weilgart. Of the individual whales I paid particular attention to, none are right whales. Even so, and even though I have worked hard to understand whales holistically—to attend to, alongside their suffering, their joy, their play, their intelligences to which the anthropogenic world is irrelevant—I am less hopeful than I was when I began. It isn't that I didn't know the dire statistics before.[160] It is that I didn't know the *whales* before, not the way I do now. And even I, a researcher whose project is not, at least not directly, focused on suffering or the attempt to alleviate it, am exhausted by the effort of trying to make structured sense of events and realities that are, though often preventable, chaotic and senseless. The lacerated fluke. The rope around the seal's neck. The species of giant, sentient marine mammals basically being extinguished right outside my front window, in full knowledge of my country's lawmakers. In the end, in my cetacean ethnographies, I placed sense-making second to description.

I argued in Chapter 1, *"Subtle Methods": Qualitative learning at the sidelines of science*, that the scientists and naturalists who know whales intimately know a great deal about what matters to and for them—the suffering created by a rope wrapped around a fin even though the animal can still move and function; that animal's desire for freedom of movement, freedom from anthropogenic sound. My interlocuters learned these things about whales by spending time with whales in the field, and spending time with raw data. Yet that which they cannot shape into conventional scientific form is largely missing from contemporary scientific accounts of whales. This is the case even though this "unpublished qualitative archive," as I think of it, plays an important role in shaping how scientists formulate not only their research questions but the whales themselves—how scientists, often whales' primary advocates against industrial harms,

[160] A small sampling of these statistics: Anthropogenic noise underwater continues to increase (Duarte et al. 2024); for example, in the Arctic Ocean underwater noise doubled in the six years preceding 2021 because of increased ship traffic (WWF 2025). Some baleen whales in the Stellwagen Bank National Marine Sanctuary near Cape Cod experience "auditory masking" of up to 80% of their sounds by anthropogenic noise (Cholewiak et al. 2018). Plastic in the world's oceans is expected to outweigh fish by 2050 (Center for Biological Diversity). Ocean acidification, an effect of heightening levels of carbon dioxide in the air, is increasing, putting coral reefs, shellfish and the entire ocean food chain at risk (Ireland & Hu 2022).

conceptualize who whales are. I argued that leaving these dimensions of knowledge out of formal accounts is a disservice to knowledge and to whales.

In Chapter 2, *Sparse Data and the Spaces Between,* I discussed how, as my cetologist interlocutors described to me, the documentation of whale lives is trending in the opposite direction: toward modelling and AI technologies, styles of research and analysis which distance human scientists from whales and from the environments in which whales live. With reference to my argument in Chapter 1, and to my further argument that cetology is actually *enriched* by the knowledge gaps that pervade it, I posited that something is lost when all the oft-cited abilities of cetology's "technological turn" (Parris-Piper et al. 2023) are gained. Precisely what is lost is difficult to state; it is a particular quality of awareness of whales, including but not exclusively of the extent to which they differ from us, the extent of what we do not know about them—the "so-much-more-out-there," in the words of Tsing (2015: viii). I called it *excess*, and worked in Chapter 4 to articulate both how it is felt by one of my naturalist interlocutors, and what kind of knowledge might be gained by attending to that excess.

First, however, in Chapter 3, *Cetacean ethnography and the potency of strange intimacies*, which contained the first of two "cetacean ethnographies," I demonstrated what a specifically qualitative approach to researching cetaceans could offer to knowledge about them. That ethnography, titled "Cetacean Trauma, Interspecies Calf-care, and a Playful Predator on the Bay of Fundy," documents and disseminates substantive knowledge about a particular orca and his extraordinary near two-decade companionship with various pods of a population of Atlantic white-sided dolphins. What science knows of orcas would suggest that this orca would hunt and eat dolphins. Instead, when I encountered him, he was traveling around with a nursery pod full of dolphin calves, who leapt and played freely in the water around him. While the only mention I could find of this whale in a scientific context (that is, a scientist speaking to a CBC reporter) proposed merely that he was a good beginning for a larger "program on orcas" in the Atlantic (Lyne Morissette quoted in Deer 2023), I argued that this orca is relevant not merely as an indicator, or not, of an orca population, but as *himself*: that his strange life ways demonstrate how cetaceans may adapt, even make choices, beyond what other members of their species do and beyond what science is equipped to anticipate. In rapidly changing oceans, the capacity to defy norms, to find companionship and a way to live despite great adversity, matters. Science should take note. If quantitative science does not lend itself to studying and documenting singularity

among nonhuman animals, I argued, ethnography does. Further, as I worked to demonstrate in this chapter, ethnographic forms of dissemination can document that uniqueness more robustly, and in ways that can be more immediately felt.

I extended this argument in Chapter 4, *Cetacean-human intimacies, vulnerability and what there is to lose*. Chapter 4 is an ethnography of another Bay of Fundy whale, this one a humpback with whom the naturalist Amy Tudor feels a special bond. Here I extended, too, the scholarly risks I took in speculation and creative narration of cetacean experiences. Based on in-depth ethnographic work with a naturalist who knew a particular whale, as well as my own fleeting encounters with that whale, I narrated what amounted to several hours in that whale's life, including imagining some of what took place, during those hours, in the whale's mind. The ethnography I produced, which took the form of several vignettes with some notes on source data interspersed, would be rather conventional, were the protagonist a human. But the protagonist is a whale. In the conventional model of humanist literature and ethnography, when animal experiences are evoked, they tend to be deployed as metaphors to better elucidate human experiences. In my cetacean ethnographies, the human's position is second in narrative priority to that of the whale. In offering this intervention, I hope to expand the ways that we—knowledge producers—are able to understand whales; and the ways we are able to represent them for our audiences: other knowledge producers; policymakers; the general public. As I argued in Chapters 1 and 2, whales are so much *more* than quantitative science can explain of them. Chapters 3 and 4 work to find a form—one of many possible forms—to express more of what whales are. With so many cetacean species at great risk—of imminent extinction; or of the changes enacted by more insidious kinds of violence, changes that may result in physical harms but also social, cultural and emotional ones—documenting who they are now is an important task, one to which ethnographic methods and forms have a great deal to contribute.

Regarding what such forms might contribute to saving whales *before* they are extinct, Moore's work is instructive. His right whale postscripts show how it is one thing to be told right whales are dying, perhaps too rapidly for their species' survival. It is another thing entirely to feel the ways they die, and the suffering that leads up to it; to imagine an "animal swimming in the Bay of Fundy with the line stretched between her armpits, with line and net cutting down into the blubber on her back," stripping off that blubber over the course of at least six months as the whale continued to swim (Moore 2021: 121).

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I am not sure how people in Moore's position cope—those who have witnessed or, like Amy Tudor, heard the deaths of whales; those who repeatedly encounter whales who are suffering or dead; those who, like Moore and his colleagues, are tasked with deciphering, from a wounded carcass, the specific forms of suffering that caused death. It became clear to me over the course of my research that people in these positions are changed by these experiences. Over and over, I witnessed and heard about marine scientists' exhaustion, and about times when the sadness of the work they do overwhelms them. In Moore's succinct words, after he encountered the whale described in the paragraph above, he found it "hard not to be deeply sad" (2021: 121).

Tess Gridley, the scientist with whom I developed the closest personal relationship, has what seems to me an extraordinary ability to be present in a given moment. When she's making food with her children on the weekend, she's fully invested in it, full of joy. She has no qualms about taking apart carcasses—during my time with Sea Search, these were mostly seals, and the occasional otter or washed-up dolphin—and told me about how Cape fur seals' mortality rate is high; that I should not try to understand death for them the way I would conceptualize deaths of humans or whales. Yet when an individual seal life was at stake, Tess would fight tirelessly (and beyond what I think most people would consider reasonable or necessary) to save it—as when, on a boat looking for a reported aggressive seal, she spotted a stranded newborn and insisted the boat's owner scale a cliff to rescue it. Tess described to me moments of being overwhelmed by the suffering she'd witnessed among seals during the mass die-offs of 2020 and 2021, which have still not been concretely explained but are likely attributable (as the seals' aggression was, in the end, not) to the domoic acid that arrives with toxic algal blooms.[161] She described having to hand off a task to another team member, when the team were watching as a newborn seal convulsed, dying, on the beach, and Tess felt, "I *can't*, I just can't."

The affect of Tess's experiences of these die-offs is evident in Instagram posts from November 2021, which Tess wrote, strapped for time, the words raw as she tried to document what was happening and garner some public attention:

[161] This has been the operating hypothesis of scientists involved in seal conservation in South Africa since shortly after the die-offs began in 2020-21,when thousands of dead seals washed up along beaches in Namibia and the Western Cape, including an estimated 5000 aborted pre-term fetuses just before birthing season. Preliminary analysis of satellite image data, shared by DFFE officials during the scientific workshop on Cape fur seals that I attended in July 2024, suggested the same conclusion, showing that "red tides" associated with toxic algae were present during the same time periods.

8 Nov 2021
UPDATE ON SEAL MORTALITY EVENT IN WESTERN CAPE

I was asked for an update. I could give you the facts but there is SO much we don't know (yet)...but it feels like this:

On Friday I awoke to reports of a yearling seal dying between Muizenberg and St James, and another very thin animal at the St James pool. I packed my kids off to school and stopped to find the animals on the drive home.

Watching at the youngster convulsed I phoned Vet Brett Gardner in Australia - who at the end of a long shift he advised me what to look out for as the animals died in front of my eyes. Members of the public passed on by, thinking the seal was asleep, thinking it might bite their dogs - but no, this was one of hundreds of animals which have died over the weekend. I left the animal, and found the second skinny youngster at St James - weak and emaciated. Leaving it to rest I spoke to passing members of the public asking them to report seals along the coastline if they see them. I check my phone - an adult female is convulsing at Witsand (Kommetjie), moments from death phoned in by a fisherman who clearly cared for the animal- what could we do... Another in Melkbossstrand is being put to sleep by the SPCA - the body not available for science and therefore lost without valuable information collected…

24 Nov 2021
Did you try your best?

It might not be perfect - but if you try your best , that's all you can do... in the the last 48 hrs..... a large bull seal at Kalk bay by Tuesday morning, accompanied by another gruesome sight - a dusky shark partly decapitated. The seal though, at 1.79 meter male, -the largest we have looked at so far and a sobering specimen.

Back on the road, another 4 seals scattered along Glen Cairn beach - we stop to photograph a dead cormorant - Did we mention the flu ?every time we find seals, find dead birds as well. Though this one wasn't dead -... but sick and needed to be euthanized.

Lunch - a welcome break? except another call in , Cape St Martin not looking good - many newly dead or sick seals...60 dead seals lying scattered on the beach there and several alive but abandoned pups... . 6 pm - another call, fresh carcass on Clovelly - no one to get it... Wednesday morning - School run - Stop, check the hidden corpse at Clovelly, another two lie close by, washed in on the high tide…. A sick seal on Muizenberg rocks, but no time to check it out - today we head east with the City of cape town... But we don't head far before we find 3 dead at Muizenberg vlei mouth. Carry on... What's that - A chicken with a knife through the heart - if only I was joking... We stop for dead birds, rays, litter, to collect an alive but weak penguin -... But what else.... At least 5 seals skinned, the MO the same in all cases, the carcass lying next to crushed glass... two carcasses with knife slits, one mother died from childbirth... another clearly entangled in life... and the last animal - alive female, sick and thin... What will happen to her?... she will live another day ...

Wash off the dirt, the sand, the blood... Breath... Stop... Eat.... put the phone down, step away ... because it gets to you.... not always... but it does...Despite the media interest - this is not glamorous, despite the wonderful team and fieldwork

> laughs - this is not fun... despite the amazing team, this does not feel supported..... But at least we know we are trying our absolute best...
>
> 27 Nov 2021
>
> Haunted by what we see and what we don't see...
>
> As I prepared for a public talk at the Two Oceans aquarium this week Thursday, I was haunted by images from the previous days - of skinned animals and sick birds...
>
> But as the weekend is upon us, it's the animals we can't get to see which is most haunting.... An update late on Friday afternoon - a message from a dedicated volunteer living in Selly Beach, who has, with his wife, given their time to assist with the seals and seabird die-offs. In it - 38 seals dead, around the Shelly Beach area, many clearly died within the last few days. What can we do - can we drive up, if we do get there what can we get done.. ? We are racing against time, as with every hour which passes important information as to cause of death erodes. The carcasses degrade, animals float back into the ocean and into the ecosystem.... (Sea Search Research & Conservation, 2021c, 2021a, 2021b)

I quote these posts at length because they demonstrate the broad affect that I felt from so many (though not all) of the marine scientists I interviewed and encountered during my fieldwork. Resources—especially in South Africa, but in the North American context too—are slim; there is always more work to do; and it is not always obvious that you are getting anywhere. Too often it feels like progress towards conservation is outweighed by threats to the species one is trying to understand, whether those threats are mysterious, as was the case when Tess wrote these Instagram posts; or whether they are traplines or various kinds of ocean "noise producers" (the term Lindy Weilgart used). Perhaps—though this is speculation on my part—it shouldn't come as a surprise that the biological sciences are trending away from fieldwork. Perhaps being in the field takes too much personal toll. That is one question for future research that, my ethnographic experiences suggest, would merit exploring: *Why* are marine biologists turning to technology? Is it merely the increased capacity for analysis and understanding that new technologies seem to offer, or could there be deeper, more personal factors at work as well?

More broadly, another key future direction for research is investigation into the personal toll of being a biologist in a time of biodiversity loss. In July 2024, invited by Tess, I gave a talk at a two-day event titled "Workshop on Conflict Between Humans and Cape Fur Seals," convened by the City of Cape Town; the national Department of of Forestry, Fisheries and the Environment" (almost always referred to as DFFE, "diffy"); the Two Oceans Aquarium Foundation; and Sea Search. The first day was a series of heavy, highly scientific presentations

and conversations about what had been documented of seal aggression; how rabies and other diseases in seals could be diagnosed and how they should be addressed; and other coastal ecology factors that might be influencing the recent decline in Cape fur seal welfare. The attendees were scientists, veterinarians, government or wildlife conservation officials, and tourism operators, the vast majority of whom were local to various areas along the South African coast where Cape fur seals live; the vast majority among them people who regularly spend time around seals on, in or near the two oceans that converge off the Cape of Good Hope.

The lone social scientist, slated to present on the morning of the second day, I'd struggled over what to say, and had rewritten much of my talk late the evening before. In the end, I decided the most important thing was to make space in the room for the personal grief that I knew most of the attendees must be experiencing, but which—focused on disseminating data, or debating the details of seal euthanasia protocol—no one was speaking about. After my talk, a number of people approached me to say how validating this discussion, of grief specifically, had felt for them. Since then, Tess has reached out to me a few times, mostly via WhatsApp messages, to say that we need to explore it more, "this grief."

As I mentioned in Chapter 1, Moore, too, spoke of what he described as the PTSD that is felt by "people who are in the business of cutting up dead whales and animal welfare"; a complicated emotional stress that is the long-term psychic residue of dealing with dead animals. My question of how researchers and others in this position cope with such stress, with what Tess and I have been referring to as scientists' *grief*—and how this grief may or may not affect their choices around their research—is not in the scope of this thesis. But this question, along with more exploration of the grief itself, is little studied, and merits further research,[162] particularly

[162] A few publications consider this issue as it relates specifically to researchers, including "'Ecological grief' grips scientists: Researchers documenting the decline of the Great Barrier Reef say their work takes an emotional toll," by Gemma Conroy (2019); a four-paragraph letter titled "Grieving environmental scientists need support" (Gordon, Radford, & Simpson 2019); "The ecology of grief," by Phyllis Windle (1992); and Ashlee Cunsolo's Prologue, "She Was Bereft," to the 2017 collection *Mourning Nature: Hope at the Heart of Ecological Loss and Grief* (eds. Cunsolo & Landman). Head & Harada's 2017 study shows how Australian climate scientists employ "emotional denial or suppression of the consequences of climate change… to persevere in their work" despite the pain of witnessing climate change (34). Philosopher Mick Smith writes of "the ecologist" as someone who, simultaneous to mourning anthropogenic climate loss, understands that her feeling of being "bereft… is itself a matter of realising the existence of a sense of an ecological *and* ethical *and* political community with other species" (2013: 29). Writing more generally, Cunsolo and Ellis call ecological grief a "'disenfranchised grief," or a grief that isn't publicly or openly acknowledged… the associated work of mourning [is] often left unconsidered, or entirely absent, in climate change narratives, policy, and research" (2018: 275). Acknowledging it, they argue, echoing Smith, would create space for heightened environmental care and responsibility (ibid: 276). Such acknowledgement might offer someone like Michael J. Moore the space for some catharsis.

because as policy on biodiversity and climate change is currently practiced, the knowledge produced by science is the primary source of information which shapes regulations (even as these regulations so often fall short; even as scientists' knowledge so often is ignored by those with regulatory power); and regulations have huge impacts on animal lives and their ability to continue living.

Aside from this, the key direction toward which this thesis points for further research is in multi species ethnography—both an expansion of the method I have outlined here for *cetacean* ethnography; and further exploration of what could be learned about other nonhuman species by ethnographic methods, including new methods beyond the ones I have developed here. The entities whose call I am feeling most acutely, as a researcher, are North Atlantic right whales, not only because they are nearly gone but because humans have been so often unjust to them, both in the obvious ways of killing and maiming them with our industrial activities; and in the less obvious ways that became evident in my research for this thesis—namely, the dearth of scholarly attention to any dimension of right whale life and being beyond their survival; and the common (but as my research suggests, misguided) belief that right whales are not very intelligent. Saving them is crucial work, but *knowing* them is meaningful, too, perhaps even more so as it becomes increasingly less likely that they will be saved.

The charred pages with which I began this thesis—bits of what was left when my house burned down, the missing words calling to mind how whales' communications are so often fragmented by anthropogenic noise—describe an anthropologist compelled to draw an image of "real people

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None of these works, however, are ethnographic, or much interested in the textures of scientists' lived experiences of ecological grief; and none consider with much detail how grief affects the *work* of science (as opposed to scientists as psychological subjects). The only work I could find that addressed the former question is plant biologist Richard J. Hobbs' 2013 editorial in *Restoration Ecology*. He writes that "people with an interest in species, ecosystems, and the environment in general are constantly assailed with accounts of past or impending loss," not always "actual physical disappearance [but also] the loss of local uniqueness, historical fidelity, intactness, integrity, or naturalness" (146). The result, he argues, is that scientists who are experiencing different stages of ecological grief at a given moment sometimes cannot agree with one another on ways forward—specifically around whether to hold to traditional conventions of restoration biology or to acknowledge that managing ecosystems in the contemporary context will require more accepting and embracing of change and, in certain cases, of the impossibility of real restoration (idem).

In an article subtitled "Anthropology's Role in Ecological Grieving and Conservation Work," Kent and Brondo argue that "documenting and acknowledging grief can serve as a mechanism for increasing environmental stewardship" (2019: 16), particularly in that such documentation creates space to "sit with" loss, and thus respond to loss creatively, making less likely "'expedient reattachment' or attempting to fill the gap with… things that capitalism and modernity promise will make people happy" (2019: 18)—a category which may be related to the trend I noted in Chapter 2, of moving toward remote and machine-based research technologies to try to save whales.

in desperate circumstance." He can perceive something spirit-like emanating from the people. His sketch "bears witness" and hails these spirits, acknowledging "the charge they put in the world" (Taussig 2011: 78).

Perhaps this is what drives me to know more of whales that are so close to extinction. Perhaps an ethnography of North Atlantic right whales could acknowledge the charge they put into the world—the charge that is their suffering, but also the charge that is *them*, beyond suffering. Perhaps their spirits could persist in some small way beyond their deaths.

Are there ways of knowing these whales that could pay them some respect, in this moment that could be the species' last?

The objectives with which I began this work were to learn more about marine biologists' ways of listening to, and knowing, whales; and to use this learning as a way into imagining other modes of listening, both ones scientists do not *do*, and ones they *do* (sometimes, as I learned, because it is impossible not to) but do not *articulate*. I also wished to push the boundaries of ethnographic forms, both the forms of field research and the forms of dissemination, to further ethnography's capacity to gain and disseminate knowledge about species other than humans, specifically cetaceans. I met these objectives, learning not only from whales and those who study them but also from knowledge practices around other marine mammals—namely, but not only, Cape fur seals. Fur seals, as Simon Elwen pointed out to me, are an ideal species for study because, when populations are healthy and normal, they do not mind having humans around. Their behaviour changes very little when a researcher treads softly through a colony. When I trod through a seal colony with scientists, we did not do so as softly as we would have liked, because we were seeking carcasses to cut apart, and living seals were draped on top of these carcasses. Fur seals taught me, among other things I could not get close enough to whales to understand, about nonhuman grief, as I witnessed some animals' reluctance to be parted from their dead companions; and about the precision of nonhuman listening. Observing a colony of nearly seventy thousand near-visually identical animals, I was hit viscerally with knowledge I'd gleaned intellectually some time ago from speaking with scientists: that mother seals can identify the *sounds* of their own young only a couple of hours after giving birth (earlier even than humans can) (Martin et al. 2022)—and how truly extraordinary this is, in the cacophony of those tens of

thousands of seal voices concentrated in a physical space of just a few thousand square metres of rock.

My subsidiary research question was, "How closely can ethnographic writing approach the lifeworlds, or *umwelt* (von Uexküll 2010), of nonhumans, and how closely might it draw its readers into those worlds?" My cetacean ethnographies worked toward a relationship to their protagonists that is close to their senses and mind, but that privileges sensory description over analysis or interpretation. I have worked to bring readers proximate to the lived experience of particular cetaceans, and have suggested that such closeness might offer ways into empathy.

My question did not address the kind of closeness I experienced with seals, living and dead. It was visceral; it lives inside me—an internalized knowledge not primarily of how seals suffer and die (though also that), but how they *live.* This helped me to understand how scientists learn from proximity with their marine mammal research subjects.

My ethnographic insights in this work are limited, of course, by the logistic difficulty of spending time with whales, compounded by the time constraints of a PhD program. Many of my interlocuters, whose qualitative, quasi-ethnographic knowledge of whales I have documented, have been spending time with whales for decades. I could not have gained as extensive a knowledge of whales as they possess, no matter if a global pandemic had not interfered with some of my research plans, no matter if I'd had all the funding in the world. But, as I hope I have demonstrated in these pages, I can learn from my human interlocuters' experiences about the experiences of cetaceans—whom I also consider interlocuters here, though they are of necessity more distant. Perhaps, someday, ethnographers and scientists could collaborate in this wild, tantalizing, crucial, unending, fundamentally gappy work of understanding whales.

July 26, 2024 - Muizenberg, Western Cape, South Africa

On my last evening here, the end of July now—the depths of winter, in the southern hemisphere—Tess, Simon, toddler Roo and I bundle up and walk with Roo's stroller across the vlei to the Muizenberg market, a vibrant, bohemian, rough-around-the-edges space full of vendors of prepared food, plus artisan-made objects and vintage clothing and books. In the market, fairy lights dangle from the ceiling's wood beams; people squeeze around long picnic-style tables with glasses of wine or beer and plates of hot food—Ethiopian, Cape Malay,

Japanese, Greek, and Indian dishes alongside pizzas, burgers, doughnuts, truffles, and biltong, South Africa's fragrant, very chewy cured meat.

A Canadian, I'd several times had inquiries, in my time spent with seal researchers, about whether I've eaten seal. Yes, I would tell them, abashed but unwilling to lie; in Newfoundland I've eaten flipper pie. I would tell them that cooked seal is a dark, oily grey; it is meaty but fishy too; eating it is not an experience I would choose to repeat. But, I'd hastily add, our seals are not like the seals here; they are not really furry; there are too many of them, people say they're preventing the cod from coming back; there are not enough orcas to hunt them so humans do it instead. Also, I would sometimes say, anthropologists are trained to try everything, to always accept the gift of food. This was my recourse when someone, a jetlagged veterinarian, commented to me that it's ethically impossible to know anything about marine ecosystems and still eat fish. Even as I said the words, they felt cheap, because my real belief, the one that has arisen from and been cemented by my attention to marine animals and knowledge practices about them, is that it is impossible to know anything so broad-sweeping with such certainty.

At the market we run into two friends of Tess and Simon, a middle-aged man and a slightly older one. The younger man, clearly shaken, tells us he was mugged that morning, walking his dog on the beach. He struggled to remove his wedding band at the point of what he told us turned out to be a fake gun. Tess and Simon talk with him about this for a while. I am sitting across from them next to the older man, an actor by trade. He tells me about a monologue which he regularly performs, *Whale Nation* by Heathcote Williams. I ask where his performances usually take place and he says: "anywhere I think people might listen. Under a tree, at a festival, on the beach."

He recites:

> From space, the planet is blue.
> From space, the planet is the territory
> Not of humans, but of the whale. (Williams 1988: 8)

We walk home, something I have been told by many people never to do in South Africa at night. None of the streetlights along the vlei are lit; Tess and Simon say they have been out of order for a while. So we walk in relative dark. We can see stars. We hear, then see, an owl. At the end of Tess and Simon's street, Tess says to me: "Let's sit on our bench."

She means a picnic table she and Simon recently had installed on municipal land overlooking the vlei, close enough they can see it from their house; they often bring tea or food here. Some of the neighbours disapprove, but others contributed to the cost. It's meant to encourage the enjoyment of public urban nature. In the context of South Africa, where almost all the homes and businesses I have visited are walled and sometimes guarded, the bench feels like a rebellion.

Simon heads on home. When Tess and I sit, she tells me to close my eyes, lean back, and listen. I feel vulnerable, or at least that I should feel vulnerable, but there is such peace here, in the atmosphere Tess' voice creates—or rather, the atmosphere to which her voice draws my attention: the sedate, expansive quiet; the owl still calling somewhere nearby. I listen, as instructed. There are birds, and a steady chorus of peeping frogs. We hear a few cars, but not much other sonic evidence of humans.

Tess tells me she realized during the pandemic how much nonhuman life there is right outside her door, even here in town. She and some other researchers—all marine mammal scientists by training—had, frustrated by not being able to access beaches or field sites, begun to record birds. Now birds are integrated into Sea Search's research program, and team members work with artists and schoolchildren in various corners of the country to make large graffiti-style paintings inspired by the sounds of wildlife.

We fall silent again and after a few minutes I begin to shiver, lightly, all over.

"What colour is the sound of the wind for you?" Tess asks me, on the bench.

"Grey-green," I say after thinking for a moment, bringing myself back to language after being immersed, briefly, in something else.

"That's interesting," she responds. "For me it's definitely yellow."

We sit in silence, surrounded by what could be mistaken for silence, but is actually a world of sounds. Under all of them is the low lapping of the waves, the Indian Ocean shoreline two hundred metres from where we sit; beyond the coastline, somewhere, the seals in their thousands; the whales too, the sounds of these marine mammals inaudible from here, but their affect, it seems, palpable everywhere.

September 22, 2024 - Ridge Rocks, Brier Island, Nova Scotia

It is a "blanket of slime," the woman at the front desk of the Brier Island Lodge told us—the fin whale carcass washed up at Ridge Rocks. But we—me, my family, a couple of friends, and a couple of other academics we've run into, including a former professor and dear friend of mine, Brian Noble—go looking for it anyway, at a place on the remote southwestern corner of the island. At the headland, we split up to search.

When we find the whale, it seems barely a whale at all, anymore; it hardly even smells. It is a long sheath—ten metres or so, I estimate—of bleaching skin, making mountain-range topography of the cobblestone beach. Someone has placed some larger cobbles on top of the dead whale here and there, apparently to prevent it from washing away. Someone—the same person, I can only assume—has also cut off the whale's huge tail, and sundry other parts of it—parts unidentifiable to me—and dragged them off the beach and onto the grassy trail from which we approached. And someone—I hope not the same person, because I am acquainted with him, the man who collects whale parts, and I believe him to be kind—has shot a number of gulls, mostly juveniles, whose bodies are strewn, wings splayed, across the path; who were, we presume, easy targets as they fed on the dead whale.

There are no longer many birds around. Tide pools have formed on the carcass, where the folds of flesh have sunken to make valleys. Because of the human collector, few bones remain, but the ridges of the whale's upper underbelly—its "ventral grooves," which like an accordion expand when the whale gulps in seawater—are pronounced, rust-coloured shot through with gold at the lowest parts, and catching the sun. Blackened seaweed intermingles with tangled lumps of ligaments.

Brian tells me he spoke the day before with a local man who collects whale parts. He says the man told him that he doesn't like when people dismantle a whale carcass with big power tools like chainsaws; he himself only uses a hand blade, the man told Brian. Standing next to the whale, I can understand this outlook. The carcass does not seem outsized, the way reconstructed whale skeletons sometimes seem in museums. To employ a chainsaw in dismantling this animal would feel gratuitous, unduly violent.

Brian says his conversation with this man who collects whale parts reminded him of a theme in his own research, with paleontologists. So much of dinosaur science is rooted, he'd

learned, as much in what he calls "phantasy" (Noble 2016) as in what we think of as science. Paleontologists try to bracket out this phantasy, but it seeps into their work, and in important ways it shapes and influences it, something like how I have argued cetologists' qualitative, relational experiences with whales play a mostly invisible role in shaping cetology.

The naturalist Amy Tudor spoke, in my interview with her, of how she is no longer willing to try to hide or deny her spiritual-emotional connection with the whales she encounters in her work. Brian theorizes phantasy as a competency—a tool that helps with "abstraction, thinking, imagining, and desire" (Noble 2016: 35), and Amy frames her emotional connection with whales somewhat in that way too. "A subconscious fantasy narrative based on observational knowledge that plays in the back of my head when I observe whales"; "this fantasy to it and you can't be fanatical if you're a scientist." It is to this same quality of "fantasy" that Amy attributes her certainty that the whale protagonist of Chapter 4, with whom she has such a strong connection, would come to her vessel the first day she returned to the sea after being landbound for the first half of the 2021 summer season. Amy was right; the whale did come.

Brian's book points out phantasy is "a dimension of the real" (Noble 2016: 35, citing Laplance and Pontalis). The experiences Amy describes as fantasies are significantly less fantastical than those to which he is referring, the ones that emerge from childhoods spent watching *Jurassic Park*, which so deeply inform the work of paleontologists. If Amy were an anthropologist, I would call her work ethnography, perhaps even auto-ethnography, so deeply involved is she in the ways she comes to know cetaceans. Her "fantasies" emerge from empirical observation, and have a great deal to offer to knowledge about cetaceans.

Part of my work in this thesis has been to try to articulate the empirical significance of knowledge like Amy's, not only her conventionally scientific knowledge like observing how well a particular wound on a particular whale heals from one season to the next, but also the intangible knowledge that she absorbs from time spent with whales, that she struggles to articulate but feels in ways too powerful to deny. I argue that knowledge institutions must expand what counts as knowledge about cetaceans. Such expansion would enrich what we are able to imagine of them, and inform the help we are able to conceive giving them in our attempts at conservation. It would also counter the troubling trend I discussed in Chapter 2, that of

distancing and totalizing forms of data collection and analysis that, despite how they increase science's capacity, I argue in some cases actually *reduces* whales in our formulations of them.

Here, I have demonstrated how what I am calling *ethnographic* attention to cetaceans creates new knowledge about them, while holding open and evident space for that which we cannot know. Literary ethnographic writing is one form of accounting that takes more holistic account than does conventional science of cetaceans' lived experiences and the vastness of their being. There are many other forms that could do this, including different modes of storytelling and limitless possibilities in art.

Whales do not need our touch or our friendship, even though they sometimes offer us theirs. One thing they do need is for us to use all the knowledge practices we can to conserve the possibility of life for them in oceans which, even as sea levels rise, contain shrinking habitable space for them; smaller sonic fields for their sounds; and perhaps other diminishments of capacities whales may have that human science has not even, yet, dreamed.

> Blue seas cover seven-tenths of the of the earth's surface,
> And are the domain of the largest brain ever created,
> With a fifty-million-year-old smile.
>
> Ancient, unknown mammals left the land
> In search of food or sanctuary,
> And walked into the water.
>
> Their arms and hands changed into water-wings;
>
> Their tails turned into boomerang-shaped tail-flukes,
> Enabling them to fly, almost weightless, through the oceans;
> Their hind-legs disappeared, buried deep within their flanks.
>
> Free from land-based pressures:
> Free from droughts, earthquakes, ice-ages, volcanoes, famine,
> Larger brains evolved, ten times as old as man's…
> Other creatures, with a larger cerebral cortex,
> Luxuriantly folded, intricately fissured,
> Deep down, in another country,
> Moving at a different tempo. (Williams 1988 9-11)

These are the lines of Heathcote Williams' book-length poem, *Whale Nation*, that follow what the man at the Muizenberg market recited to me, projecting his voice over the beery crowd. Whales, of course, are not—never were—"free from land-based pressures"; Williams takes ample artistic license in imagining who and what whales are. Even though I have resisted the urge to insist on conventional scientific "proof" for all knowledge about scientific animals, I have attempted, in this thesis, to stay closer than Williams to what could be empirically backed up either by my own ethnographic encounters, or by marine biology's extensive archive. Yet something in the poem, as by-times anthropomorphic and by-times sensational and by-times purely speculative as it is, speaks to that *excess* to whales that I have tried to articulate. "An Odyssey, as information-packed as Homer's," Williams imagines, "Can be told in thirty minutes" of whale song.

> Fifty-million-year-old sagas of continuous whale mind:
>
> Accounts of the forces of nature;
> The minutiae of a shared consciousness;
> Whale dreams;
>
> The accumulated knowledge of the past… (1988: 19-22)

When whales meet, Williams writes,

> They stand, eerily,
> Like benign, long-suffering ghouls;
> Animated standing-stones,
> … Unearthly creatures inhabiting a medium eight hundred times denser than air.
> (1988: 23)

Here is where, as Williams' reader, the bottom drops out of my suspension of disbelief. Though the poem lauds whales' superior intelligence, physical acuity and hunting prowess; though it was clearly written out of *love* for these beings, and a desire to protect them[163]—whales are not unearthly. They are mammals, like us, not "[animate]… stones." There is little reason to believe whales know much more about the forces of nature than we do, though they certainly know these forces differently and perhaps with less (in our case, human) exceptionalist baggage.

[163] As Maureen Duffy points out, with a work of this complexity published in 1988, Williams must have begun writing it before whaling was banned in 1986.

If whales are "long-suffering ghouls," that quality is not inherent but one that human industry has imposed on them. The mysteriousness of whales, the "excess" to which I refer throughout this thesis, is not the same as the mystery of which Williams writes, of which so many poets and others have written, the mystery which offers no way in besides the mystical. I have argued here that many ways into deeper knowledge of whales, the mystical alongside that which is ineffable and intangible of them, already exist; and are (sometimes unintentionally) practiced by many people who have the privilege of spending a lot of time with whales. It is time, I have argued, to begin paying attention to such insights, and to the whales themselves—not in ways that romanticize them or render than as figures of myth or magic, but through the bodily capacities we share with them, and by imagining those we do not. My interlocuters already do that. In this thesis, my work was to write their insights down; to learn from them about how to learn from and about whales; and to try to do so myself.

Whales deserve space in our sciences for our intimacies with them, sparse as those intimacies may be.

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