



Article

Linguistic Representations of Wild Salmon Health Emerging from the Cohen Commission Inquiry into the Decline of Sockeye Salmon in British Columbia

Michelle Riedlinger

University of the Fraser Valley, British Columbia, Canada

E-mail: michelle.riedlinger@ufv.ca

Abstract

This article examines the discourses associated with Sockeye salmon health in British Columbia, Canada. In 2009, the number of wild Sockeye salmon returning to the Fraser River declined to historic lows. The Cohen Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River (the Inquiry) was held from 2010 to 2011. This Inquiry gathered testimonies and documentation about the decline from researchers, natural resource managers, First Nations community members, and commercial and recreational fishing industry representatives. Using corpus-supported methods of pragmatic linguistic analysis and frame analysis, this study found that linguistic representations (noun phrases and metaphors) of salmon health in the Inquiry hearings and the final decision maker reports represented health as a complex set of environmental and political considerations. However, national newspaper reporting from 2011 to 2018 emphasised more traditional representations of salmon health as the absence of disease. It is clear that a wide range of stakeholders must support emerging linguistic representations of wildlife health in order for them to circulate in the public domain. By examining stakeholder needs and acceptance of status quo definitions of health as the absence of disease, we can better understand how to resist these definitions and account for a greater complexity of factors contributing to poor health, including loss of habitat and climate change.

Keywords: wildlife health, representations, pragmatic linguistics, salmon management.

1. Introduction

Wildlife health researchers argue that definitions of the wildlife health now lag over 70 years behind definitions of human health (Hanisch, Riley & Nelson, 2012; Stephen, 2013, 2014). The focus on “health” as the absence of disease is considered to significantly constrain the management options available for wildlife—see, for example, Stephen (2013) who maintains that understandings of wildlife health must be negotiated before any meaningful and acceptable measure of harm and risk can be attempted. Since the 1940s, the World Health Organisation (WHO) has defined human health as the complete physical, mental and social well-being of a person—not merely the absence of disease or infirmity (WHO, 1948). By acknowledging that the way animals are represented shapes the way particular animal species are treated (see, for example, Stibbe, 2012, 2015), this paper focuses on a particular instance of discussions related to wildlife health—the health of Sockeye salmon living on the coast of British Columbia in Canada.

1.1. The representation of salmon: linguistic choices and the treatment of salmon

Researchers have already acknowledged that the way salmon are represented linguistically has implications for the way that they are managed. In early work in this area, Scarce (1997) found that biologists linguistically reduce salmon to utilitarian uses and economic productivity; they often choose to study “the money fish” and conduct research related to production issues because of the funding available to them. In the hatcheries, Scarce found that new fish are literally “constructed” by those working there, and are considered inferior to an ideal or “pure” wild salmon. Again, issues related to production dominate in comparison to wholistic concerns for salmon health. Other researchers have compared linguistic patterns associated with salmon agency, finding similar patterns in representation. Stibbe (2003) looked at the way Atlantic salmon are represented in the Millennium Ecosystem Assessment (MEA) reports and found that these reports remove the agency of salmon by referring to them as “fish stocks”, “fish harvesting”, “commodities”, and “fish productivity”. He compared these representations to Rachel Carson’s representations of salmon in *Silent Spring* where she recognised the intrinsic worth and agency of salmon by referring to them using the plural nouns “fishes” and “they”. According to Stibbe, Carson also used verbs that gave salmon agency by relating salmon to their intrinsic actions in the greater environment such as moving, ascending and feeding, rather than verbs associated with economic productivity.

Of particular relevance for this paper, is research reporting on media representations of salmon. Amberg and Hall (2010), for example, found that media representations focused on the utilitarian uses of salmon—farmed salmon were considered to be a “consumable” (e.g. “serving of farmed salmon”) and either dangerous or important for human health. “Samples” of farmed salmon were contrasted negatively with “ideal” salmon “caught in the wild”. The idea of the “wild” encompasses concepts associated with ecosystems and habitat preservation. These concepts appear to be absent when representations focus on

utilitarian uses. Closer to British Columbia, Bocking (2012) tracked the movement of scientific representations of salmon farming from Norway to Canada via media reporting. He argued that mainstream media play important roles in facilitating the movement of salmon management information, which can result in potentially useful knowledge not always being available to shape salmon management action. According to Bocking, language choices used in media reporting provide cognitive shortcuts for representing complex situations. Those concerned with the well-being of salmon might consider what is included or omitted from linguistic representations, and what these omissions might mean for the ultimate health and well-being of salmon. This is the central concern of the study presented here.

1.2. Sockeye salmon in British Columbia

The story of wild Sockeye salmon is complex and not all of it is known. In 2009, the number of Sockeye salmon returning to the Fraser River in British Columbia declined to lower than their replacement rate. The federal government held a commission from 2010 to 2011 to determine what was causing the decline—the Cohen Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, named after Hon. Judge Cohen who presided over the hearings. The Inquiry gathered testimonies and documentation about the health of Sockeye salmon from government researchers and managers, non-government scientists, First Nations groups, representatives from the fishing industry, the aquaculture industry, and conservation groups (Cohen Commission Inquiry, 2012). In early 2018, the Department of Fisheries and Oceans Canada (DFO) predicted that approximately 14 million Sockeye would return to the Fraser River. In December 2018, the count for returning wild Sockeye was 10.6 million. For the first time since 2014, the commercial fishing sector was granted licences to harvest Sockeye. DFO stated recently that it was doing what it could within the confines of its mandate and the resources available to follow the Inquiry recommendations (Fisheries and Oceans Canada, 2018), however Sockeye salmon stocks remain vulnerable. This paper identifies the linguistic representations (noun phrases and metaphors) of salmon health that emerged from the Inquiry, and circulate in the public domain, and the implications of these representations for Sockeye health management in British Columbia.

1.3. Noun phrases and metaphors as powerful linguistic resources

The work in this paper addresses Jacobs and Stibbe's (2006) call for a better understanding of the process of linguistic representation of animals and how these representations reflect and reinforce societal forces. Noun phrases are powerful linguistic resources associated with representation because they have the capacity to adsorb a lot of meaning (Alexander & Stibbe, 2014; Giltrow, 1998; Halliday, 1990; Halliday & Martin, 1993). Halliday and Martin (1993) were the first to recognise that noun phrases in scientific writing function not only to convey a lot of meaning, but also to convey prestige, control and privilege, and

to depersonalise discourse. Responding to their argument that these kinds of noun phrases are misplaced in bureaucratic writing and contribute to obscurification, Giltrow (1998) argues that bureaucratic noun phrases can function to support dominant interests. Information is framed in recognised patterns, and particular aspects of reality are emphasised or obscured and become established as “facts” about the world or frames (Goffman, 1974; Entman, 1993; Johnston, 1995).

Metaphors are also powerful linguistic resources associated with representation (Lakoff, 2004; Lakoff & Johnson, 2008). Stibbe (2015) argues that metaphors can connect concepts in ways that leave underlying environmentally damaging ideologies unchallenged. Nerlich and Ketyeko (2009) argue for the ecological study of metaphors and lexical compounds, such as noun phrases, as part of Ecolinguistics. They argue that these linguistic features enable and facilitate powerful frames that are employed in environmental debates. This study takes an Ecolinguistic approach to assessing the linguistic representations of salmon health, and considers the relationship of these linguistic representations to the social, economic and political situation in British Columbia.

2. Methods

This study employed corpus-supported methods of pragmatic linguistic analysis looking at the noun phrases for “health/y” and “disease” (e.g. salmon health, healthy streams, fish disease, and disease diagnostics) and metaphors associated with salmon health and disease. I examine the transfer or uptake of representations identified during testimonies given at the Inquiry into the three final Inquiry reports to decision makers, and in national media reporting of Inquiry findings via the *Globe and Mail*.

Four corpora were developed and investigated in this study. Corpus 1 consisted of the 25 Inquiry transcripts (1,019,919 words). This was the base corpus from which the transfer or uptake of linguistic resources was determined. Corpus 2 consisted of the three final Inquiry reports that summarised the findings and made recommendations for policymakers (658,440 words). Corpus 3 consisted of 120 *Globe and Mail* media reports, collected from 6 November 2009 to 1 November 2012 using the terms “salmon” and “Cohen Commission” (74,287 words). Corpus 4 consisted of 31 *Globe and Mail* media reports, collected from 2 November 2012 to 14 October 2018 (25,702 words). Linguistic features related to salmon health (noun phrases and metaphors) were compared across the four corpora to identify patterns of representation, with findings being interpreted through a discussion of social, economic and political interests.

3. Findings

3.1. Noun phrases and salmon health representations

A comparison of the proportions of terms “health” and “disease” (Table 1) in the various reporting mechanisms shows differences between the observed and expected distributions.

If the different reporting mediums were not representing “health” and “disease” differently, then it would be reasonable to expect that these terms would be similarly distributed in the different texts. A comparison of the different corpora found that the Inquiry reports contained significantly more instances of the term “health” and fewer instances of the term “disease” than the original Inquiry transcripts. Over twice as many mentions of the term “health” arose per 25,000 words in the final Inquiry reports compared to media reports published during the Inquiry. Occurrences of the term “health” increased in number in *Globe and Mail* media reporting after the Inquiry but not the number present in the Inquiry reports to decision makers. Conversely, the *Globe and Mail* media reports contained over twice as many instances of the term “disease” per 25,000 words as the Inquiry reports. In fact, occurrences of the word “disease” were greater in number than occurrences in the original Inquiry transcripts.

Table 1: A comparison of the frequency of the terms “health” and “disease” in the four corpora.

NOTE: Counts exclude occurrences of health and disease related to human health or human disease.

	Inquiry transcripts (1,019,919 words)	Inquiry final reports (658,440 words)	Globe & Mail media reporting during Inquiry (74,827 words)	Globe & Mail media reporting after Inquiry (25,702 words)	χ^2	p Value
Health (occurrences)	822	816	16	11		
Health (per 25,000 words)	20.0	31	5.25	10.75	22.8	< 0.0001
Disease (occurrences)	1240	504	142	51		
Disease (per 25,000 words)	30.5	19.3	47.3	49.5	16.9	< 0.0007

Tables 2 and 3 below present the collocations (noun phrases) identified for “health” from the final Inquiry reports and *Globe and Mail* media reporting. As shown, the final Inquiry reports contain richer and more varied representations of health when compared to national media reporting during and after the Inquiry. Noun phrases representing “health” in the final Inquiry reports include new noun phrases not identified in the original Inquiry transcripts (i.e. “healthy stocks”, “healthy riparian zone”, and “healthy fish-bearing streams”).

Table 2: Collocation analysis of noun phrases with “health” as the noun in Inquiry reports and *Globe and Mail* reporting

Cohen Commission Inquiry reports	Globe & Mail media reporting during Inquiry	Globe & Mail media reporting after Inquiry
animal health	animal health	fish health
fish health	fish health	salmon health
salmon health	salmon health	
complete health		
comprehensive health		
ecosystem health		
environmental health		
forest health		
habitat health		
hatchery-level health		
long-term health		
on-farm health		
overall health		
physical health		
population health		
sockeye health		
stream health		

Table 3: Collocation analysis of noun phrases with “healthy” as the modifier in Inquiry reports and *Globe and Mail* reporting

Cohen Commission Inquiry reports	Globe & Mail media reporting during Inquiry	Globe & Mail media reporting after Inquiry
healthy salmon	healthy salmon	healthy salmon
healthy abundances	healthy numbers	
healthy aquatic ecosystems		
healthy ecosystems		
healthy fish		
healthy food		
healthy freshwater ecosystems		
healthy habitat		
healthy natural resource		
healthy populations		
healthy riparian areas		
healthy riparian zone		
healthy stock size		
healthy stocks		
health streams		
healthy tissue		
healthy wild stocks		
healthy wild salmon populations		

Tables 4 and 5 show that the final Inquiry reports contained “disease” noun phrases that particularly highlighted the complexity of monitoring and managing disease (e.g. “certified

disease”, “reportable disease”, “undiagnosed disease”, “disease controls”, “disease-reporting obligations”). The noun phrases associated with “disease” identified in *Globe and Mail* media reporting, while greater in number (see Table 1 findings), exhibited less richness and variety in representation and aligned more closely with existing news values, including those associated with newness (e.g. “newly discovered disease”), danger (“infectious disease”) and mystery (“mysterious disease”). Again, both the Inquiry reports and the media reporting shared noun phrases associated with “disease” that were not identified in the original Inquiry transcripts (i.e. “devastating disease”; “salmon farm disease”). While the number of occurrences of both “health” and “disease” increased in *Globe and Mail* reporting after the Inquiry, the increase in the frequency of these occurrences was associated with fewer noun phrases.

Table 4: Noun phrases associated with “disease” as the noun in Inquiry reports and *Globe and Mail* reporting

Cohen Commission Inquiry reports	Globe & Mail media reporting during Inquiry	Globe & Mail media reporting after Inquiry
devastating disease	devastating disease	novel disease
fish disease	fish disease	fish disease
salmon disease	salmon disease	salmon disease
salmon farm disease	salmon farm disease	spreading disease
active disease	infectious disease	fish genomic disease
actual disease	ISA disease	reportable disease
aquatic animal disease	mysterious disease	potential disease
certified disease	new disease	
clinical disease	newly discovered disease	
communicable disease	novel disease	
endemic disease	other disease	
enhanced disease		
enteric redmouth disease		
exotic disease		
koi herpes virus disease		
induced disease		
lethal disease		
long-term disease		
named disease		
non-reportable disease		
particular disease		
red sea bream iridoviral disease		
reportable disease		
serious disease		
severe disease		
significant disease		
specific disease		
systemic disease		
undiagnosed disease		
viral disease		
whirling disease		

Table 5: Collocation of noun phrases associated with “disease” as the modifier in Inquiry reports and *Globe and Mail* reporting

Cohen Commission Inquiry reports	Globe & Mail media reporting during Inquiry	Globe & Mail media reporting after Inquiry
disease agent/s	disease agent/s	disease outbreak/s
disease incidents	disease incidents	disease transference
disease issue/s	disease issue/s	disease transmission
disease microbes	disease microbes	
disease outbreak	disease outbreak	
disease transfer/ence	disease transfer/ence	
disease transmission	disease transmission	
disease carriers	disease issue/s	
disease concerns	disease links	
disease control/s	disease probe	
disease data	disease problems	
disease development	disease profiles	
disease diagnosis	disease records	
disease events	disease research	
disease expert/ise		
disease exposure		
disease freedom		
disease frequency		
disease hearings		
disease impacts		
disease levels		
disease outbreak		
disease prevention		
disease response		
disease risk/s		
disease screening		
disease spread		
disease staff		
disease studies		
disease treatment		
disease trends		
disease vector		
disease-reporting obligations		

3.2. Health and disease metaphors

Two metaphors related to salmon health/disease were particularly prevalent in the corpora: firstly, “the smoking gun”, and secondly, “death by 1,000 cuts”. Judge Cohen himself framed salmon health considerations in the final Inquiry reports and in media interviews as a complex set of “multiple stressors”; including contaminants, disease and warmer waters (from climate change). He, and other Inquiry participants, represented this complexity metaphorically as “the lack of a smoking gun”.

The *Globe and Mail* media picked up the “smoking gun” metaphor from testimonies and the final report. However, “the smoking gun” was reframed to be associated with disease; media attention was directed to finding a culprit (e.g. “could be the smoking gun”, “Judge Cohen didn’t find the smoking gun” and “unable to find the smoking gun behind the collapse”). This metaphorical shift from “no smoking gun” or “the lack of a smoking gun” to the “inability to identify a smoking gun” aligns with media framings of agents and action, and the reporting of simple problem-solution narratives.

By contrast, some participants testifying at the Inquiry employed the metaphor of “death by 1,000 cuts” to represent declines in salmon health. Those testifying at the Inquiry associated this metaphor with the number of stressors to salmon health that needed to be considered, not just a disease-causing agent. The “death by 1,000 cuts” metaphor was taken up in the final Inquiry reports, however it was not included in *Globe and Mail* media reporting.

4. Discussion and Conclusion

The Cohen Commission has been the most comprehensive review of Pacific salmon management in Canada to date. If we assume that the way in which salmon are represented linguistically has implications for the way that they are managed, then the representations of salmon health in reporting that arose from this Inquiry are important to consider. Findings show that Inquiry reports to decision makers contained a greater number and richer variety of representations of salmon “health” compared to national *Globe and Mail* media reporting. While the final Inquiry reports included representations of salmon health that recognised a complex set of environmental and political considerations, *Globe and Mail* reporting maintained dominant representations of salmon health as the absence of disease. Instances of the terms “health” increased in *Globe and Mail* media reporting after the Inquiry but not to the level present in the Inquiry reports to decision makers. *Globe and Mail* reporting about the Inquiry also contained a greater number of occurrences of “disease” when compared to the final Inquiry reports, and instances of “disease” increased in *Globe and Mail* reporting after the Inquiry. In terms of representations of disease, the Inquiry reports contained “disease” noun phrases that included representations of the complexity of monitoring and managing disease. Not surprisingly, the noun phrases associated with “disease” identified in media reporting aligned with existing news values, including those associated with newness, danger and mystery.

The media uptake of a simple metaphor (a smoking gun) rather than a complex metaphor (death by 1,000 cuts) could be interpreted as an alignment with general media framing favouring a simple problem-solution narrative. However, environmental communication researchers also recognise that stakeholders frame issues to give themselves a possible advantage in debate (e.g. Stibbe, 2015; Wesserlink & Hoppe, 2011)—or at least support frames that help them to be influential (e.g. Cox, 2012). At least some general stakeholder agreement would be needed to maintain dominant representations of salmon health as the absence of disease in media reporting for these narratives to continue

to circulate. In fact, many participants testifying at the Inquiry were cited in media reporting as accepting these dominant representations of Sockeye health as the absence of disease.

For example, Con Kiley, Director of the National Aquatic Animal Health Program, Canadian Food Inspection Agency, was quoted as saying about the health of Sockeye salmon in BC:

The government of Canada in collaboration with the province of British Columbia has completed testing all samples related to the suspected infectious-salmon-anemia investigation in B.C. Based on the final results, there are no confirmed cases of the disease in wild or farmed salmon in B.C. (Hume, 2011)

Conversely, Kristi Miller, molecular genetics researcher, Department of Fisheries and Oceans Canada, stated in relation to declines in Sockeye salmon health:

There is certainly the potential that this virus could have a major impact on salmon declines. (Dhillon, 2011)

Alexandra Morton (independent researcher and activist) also strongly connected representations of salmon health decline to the presence of disease. For example:

If you want to believe habitat loss is the primary impact and completely ignore these lethal Chinook salmon viruses - I can't help you. If you want to take a stand on these viruses, I will do everything I can to give you the evidence that viruses from salmon feedlots are killing wild salmon. (Hume, 2012)

The Inquiry's final reports contained 75 recommendations to government decision makers and natural resource managers that were based on wider linguistic representations of Sockeye health that encompassed their physical, environmental and social well-being. Yet, 18 out of the 20 recommendations with firm deadlines to be met by the end of 2013 passed without government action (Watershed Watch, 2015). These recommendations included greater monitoring of the health of salmon through assessments of river levels, water temperatures, illegal fishing, and habitat health. The agency responsible for the health of wild salmon, the Department of Fisheries and Oceans Canada (DFO) still has no detailed plan for how they will implement Canada's Policy for Conservation of Wild Pacific Salmon. The Inquiry also found that the DFO's promotion of salmon aquaculture was a conflict of interest and should be removed from their portfolio. However, the DFO have stated that promoting salmon aquaculture will remain part of their mandate. They have yet to create a senior position to be accountable for wild salmon policies, which was another recommendation from the Inquiry.

It is useful to consider the findings from the project and the lack of management response to addressing Sockeye salmon health together in light of Bocking's (2012) work on the transfer of knowledge for management action via the media. The representation of

Sockeye health as the absence of disease remains useful for stakeholders, many of whom were quoted in *Globe and Mail* reporting. Dominant representations remain useful to government managers for trade purposes, fish farms for sanctioning their self-regulation activities, disease researchers who focus primarily on disease identification, and environmental groups for advocacy purposes. It could be argued that, without stakeholder resistance to dominant representations of health as the absence of disease, the complex combination of stressors to health that wild salmon experience, including the impact of environmental and political considerations will go unaddressed.

As a field, applied linguistics brings together theoretical and empirical examinations of issues where language is central (Nerlich & Ketyeko, 2009). One of the key limitations to this approach is that micro-level discourse analysis may potentially miss broader picture issues in terms of the contexts in which texts and linguistic resources are produced and circulated. Media reporting aims to provide simplified accounts of what are often complex situations, so it is important to note that representations of salmon health (noun phrases and metaphors) are shaped by the norms of media reporting as much as they are by stakeholder acceptance. It is also clear that, while linguistic choices may influence management action, the degree to which these choices reflect and reinforce action is challenging to determine. The relationship of linguistic choices to pragmatic intent, e.g. intentional or conscious acts versus tacit or learned reflections of group norms or culture, could be further investigated through interviews with key stakeholders. Future research could also usefully investigate wildlife health discourses in places of resistance, such as advocacy efforts associated with social and political action.

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