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Conserving Atlantic salmon ‘after nature’ on Newfoundland’s Gander river

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Abstract. This paper examines the history of Atlantic salmon conservation in Eastern Canada, with a specific emphasis on Newfoundland’s Gander river. Conservation efforts for this iconic species begin in the late 1800s and continue through to the contemporary period. Our work is framed by current debates on the Anthropocene and its implications for environmental conservation. We identify two different historical phases in salmon conservation associated with different socio-ecological assemblages, and different conceptualizations of nature. Drawing on oral histories, we also reveal a third human–salmon entanglement associated with what we call the ‘wilful salmon’. The wilful salmon fits uneasily with the idea of conservation, and in some ways it seems contrary to conservation efforts. It is, nonetheless, a legitimate fish that deserves to be considered and evaluated in a world ‘after nature’.

If one of the signatures of the Anthropocene is the domestication of nature,¹ then we might consider Canada’s Atlantic salmon as an index species for this proposed geological age. More than 98 per cent of the Atlantic salmon population in Canada is farmed in cages along the coast, with only 2 per cent existing in the wild between the Atlantic Ocean and the rivers where they spawn. For every wild Atlantic salmon in Canada there is at least one tonne of farmed salmon.² The relatively small number of wild Atlantic salmon that exist in Canadian rivers and the Atlantic Ocean has not been spared processes of domestication. There are many thousands of farmed salmon that escape from aquaculture cages every year, and these have successfully bred with wild salmon, creating what scientists have called ‘hybrids’ that are biologically neither wild nor farmed.³ The interbreeding

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Thanks to two anonymous referees for their sharp and helpful comments in helping us to substantially revise an earlier draft of this paper. Also thanks to Amanda Rees for her comments on an earlier version of this paper.

1 Rosemary-Claire Collard, Jessica Dempsey and Juanita Sundberg, ‘A manifesto for abundant futures’, *Annals of the Association of American Geographers* (2015) 105(2), pp. 322–330.

2 World Wide Fund for Nature (WWF), ‘The status of wild Atlantic salmon: a river by river assessment’ (2001), WWF US, Marine Conservation Program, Washington, DC.

3 Eva B. Thorstad, Ian A. Fleming, Philip McGinnity, Doris Soto, Vidar Wennevik and Fres Whoriskey, ‘Incidence and impacts of escaped farm Atlantic salmon *Salmo salar* in nature’ (2008), report of the Technical Working Group on Escapes of the Salmon Aquaculture Dialogue, NINA special report No 36, Norwegian Institute for Nature Research

of wild Atlantic salmon with fish introduced by humans is not, however, a phenomenon associated with recent aquaculture development. On the contrary, Atlantic salmon have been interacting with other salmonid species that were introduced into Newfoundland rivers beginning in the 1880s.⁴ These new salmonid species were introduced to provide fish for recreation and food, or as forage for native fish species. There is overwhelming evidence that these ‘alien species’ have not only changed the ecology of rivers in Atlantic Canada, but also irreversibly influenced the gene pool of Atlantic salmon.⁵ As one environmentalist declared, ‘Atlantic salmon is basically extinct: What appears on our dinner plates is a genetic dilution of a once mighty fish’.⁶

For traditional conservation science, the idea that the world may have entered a new geological phase called the Anthropocene is profoundly troubling.⁷ Conservation science has always relied on nature and natural systems as baselines against which to assess the impact of humans on the environment. In practice, conservation aims to protect – and in some cases to restore – species and environments to their natural state. The problem with the Anthropocene is the implication that it is no longer possible to separate nature from society, or natural systems from the impact of humans. In this new proposed geological age of the Anthropocene, there is no nature to be protected and instead we are presented with ‘the image of a fully worked-over world’.⁸

For environmental historians and other scholars interested in environmental change, the Anthropocene poses an altogether different challenge. This challenge has little to do with the problem of a world where it is no longer possible to separate nature from culture.⁹ Environmental historians have, by and large, abandoned the idea of a separate nature and culture thanks in large part to William Cronon’s enormously influential essay on

and World Wildlife Fund, Oslo; V. Bourret, P.T. O’Reilly, J.W. Carr, P.R. Berg and L. Bernatchez, ‘Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon (*Salmo salar*) population following introgression by farmed escapees’, *Heredity* (2011) 106, pp. 500–510.

4 M.C. van Zyll de Jong, R.G. Gibson and I.G. Cowx, ‘Impacts of stocking and introductions on freshwater fisheries of Newfoundland and Labrador, Canada’, *Fisheries Management and Ecology* (2004) 11, pp. 183–193; E. Verspoor, ‘Widespread hybridization between native Atlantic salmon, *Salmo salar*, and introduced brown trout, *S. trutta*, in eastern Newfoundland’, *Journal of Fish Biology* (1988) 32, pp. 327–333. Verspoor found high levels of hybridization of Atlantic salmon in Newfoundland and noted that such high levels of interspecies interaction can ‘lead to massive alteration of native gene pools, and even species loss’ (p. 327).

5 Thorstad *et al.*, op. cit. (3), p. 12.

6 Kathleen McKeoghain, ‘Atlantic salmon is basically extinct: you’re eating a genetically eroded version’, at www.alternet.org/food/atlantic-salmon-basically-extinct-youre-eating-genetically-eroded-version, accessed 16 April 2016. David Jenkins’s work on Atlantic salmon in Maine is also relevant to this point about the genetic dilution of Atlantic salmon. His research examines efforts to include Atlantic salmon in Maine under the Endangered Species Act. Initial efforts failed as some lawmakers argued that Atlantic salmon in Maine was extinct because ‘humans have been manipulating salmon genetics for over a century’ through hatchery stocking practices in Maine rivers. David Jenkins, ‘Atlantic salmon, endangered species, and the failure of environmental policies’, *Comparative Studies in Society and History* (2003) 45, pp. 843–872, 845.

7 Paul Robbins and Sarah Moore, ‘Ecological anxiety disorder: diagnosing the politics of the Anthropocene’, *cultural geographies* (2007) 20, pp. 3–19.

8 Bruce Braun, ‘From critique to experiment? Rethinking political ecology for the Anthropocene’, in Tom Perreault, Gavin Bridge and James McCarthy (eds.), *Routledge Handbook of Political Ecology*, London: Routledge, 2016, pp. 102–114, 107.

9 Bruce Braun, ‘Nature’, in Noel Castree, David Demeritt, Diana Liverman and Bruce Rhoads (eds.), *A Companion to Environmental Geography*, London: Blackwell, 2009, pp. 19–36.

'the trouble with wilderness'.¹⁰ The problem with the Anthropocene is, instead, that it appears to provide legitimacy for an ostensibly more enlightened technological and technocratic response to contemporary environmental challenges. For organizations such as the increasingly influential Breakthrough Institute, the environmental crisis of the Anthropocene requires a more modern response based on geo-engineering, ecosystem services and free-market environmentalism.¹¹ For this new school of eco-pragmatists, the issue is no longer whether humans have had an impact on the environment; it is rather to determine what impact humans can have on the environment. As one of the prominent members of this new school has argued, 'the environment will be what we make it'.¹²

There are several critical and hopeful responses to the 'dream of mastery' that characterizes the eco-pragmatist response to the Anthropocene. Jamie Lorimer has produced a significant body of work on conservation drawing on detailed research in South Asia, the United Kingdom and the Netherlands. Inspired in no small way by Cronon's early work, Lorimer has argued for a reworking of the idea of 'wildlife', which he argues is not the same as wilderness or nature.¹³ Wildlife is, instead, in us and around us, it is dynamic and always in process, it is not fixed or in balance, and it is 'multinatural in its potential to become otherwise'.¹⁴ He has developed the concept of wildlife to examine elephant conservation in Asia as well as efforts to re-wild spaces in Europe. Lorimer's conceptual and empirical work – which stresses the risks of conventional environmental management and the indeterminacy of ecological change – represents a sharp contrast and challenge to the eco-pragmatist approach to conservation. Rosemary Collard and her colleagues are equally critical of the eco-pragmatist response to the Anthropocene, and have proposed an alternative manifesto for 'abundant futures'. Abundant futures are futures that are shaped and informed by a political commitment to post-colonial scholarship, and a strategic commitment to acknowledging capitalist and colonial ruin. At the same time, their manifesto recognizes multiple ways of being in and with the environment, and the importance of animal autonomy. For Collard, Dempsey and Sundberg, abundant futures are 'futures with more diverse and autonomous forms of life and ways of living together'.¹⁵ Becky Mansfield and her colleagues have proposed a third alternative to the new technocratic approaches to environmental conservation after the Anthropocene. For these authors, the apparent 'end of nature' does not mark the end of environmentalism. On the contrary, they argue that it opens the way for a politics of conflicting socio-ecological futures. Their analysis is based on forest conservation in Appalachia, which they argue may be understood as involving different socio-ecological configurations of trees, humans, non-human animals, plants, soil and

10 William Cronon, 'The trouble with wilderness or, getting back to the wrong nature', *Environmental History* (1996) 1, pp. 7–28.

11 Collard, Dempsey and Sundberg, op. cit. (1).

12 Cited in Collard, Dempsey and Sundberg, op. cit. (1), p. 324.

13 Irus Braverman also uses the term 'wild life' to examine past and contemporary *in situ* and *ex situ* conservation practices. See Irus Braverman, *Wild Life: The Institution of Nature*, Stanford, CA: Stanford University Press, 2015.

14 Jamie Lorimer, *Wildlife in the Anthropocene: Conservation after Nature*, Minneapolis: University of Minnesota Press, 2015, p. 7.

15 Collard, Dempsey and Sundberg, op. cit. (1), p. 323.

water. Analysing forests in this way reveals multiple and antagonistic forest configurations characterized by diverse ecologies, management systems, and human and non-human protagonists. Environmental politics in this reframing is not about protecting nature. It is about deciding which social nature – in their case, which forest configuration – should be fostered over others. As Mansfield *et al.* write, this new environmental politics is about ‘attending to the multiple and uneven consequences of particular socio-ecological configurations’.¹⁶

The three hopeful responses to the challenge of the Anthropocene provide different ways of imagining environmental futures that are rich in their potential for informing a new mode of conservation. Yet they share a sensibility that sees humans, animals and other objects and things coming together in situated and embodied entanglements.¹⁷ Understanding human–animal interactions as dynamic and always in the making challenges conventional approaches to animal agency. In this framing, animal agency is not about recognizing animals as ‘agents’, in the same way as humans might be considered to be agents. In other words, this approach does not suggest that we distribute liberal understandings of agency across the human–animal divide. Agency is instead the capacity to act but only through heterogeneous networks of animals, humans and things.¹⁸ In this way, agency is not ‘an innate property that belongs to things, but an emergent effect of the ways in which entities enter into combination with others’.¹⁹ A relational view of agency provides added hope for conservation efforts that are not about human mastery and control, or about humans withdrawing from nature, but are instead about multi-species becoming.²⁰

Our own work on the conservation of Atlantic salmon in Newfoundland is inspired by these efforts to think critically with and through the Anthropocene. While we see interesting possibilities in all three of the alternatives to eco-pragmatism, we find Mansfield *et al.*’s argument about the multiplicity of socio-ecological environments especially helpful in examining the history of Atlantic salmon conservation.²¹ We argue that the concept of socio-ecological futures can also be used to examine and assess socio-ecological pasts.²² To this end, we identify and explore three socio-ecological configurations associated with salmon on the island of Newfoundland. The first is associated with commercial salmon harvesting in rivers and along the coast of Newfoundland. Commercial harvesting starts in the late 1700s, but begins to unravel from the 1960s

16 Becky Mansfield, Christine Biermann, Kendra McSweeney, Justine Law, Calleb Gallemore, Leslie Horner and Darla Munroe, ‘Environmental politics after nature: conflicting socioecological futures’, *Annals of the Association of American Geographers* (2015) 105, pp. 284–293, 291.

17 Lorimer, *op. cit.* (14), p. 7.

18 Jamie Lorimer and Krithika Srinivasan, ‘Animal geographies’, in Nuala Johnson, Richard Schein and Jamie Winders (eds.), *The Wiley Blackwell Companion to Cultural Geography*, London: John Wiley & Sons, 2013, pp. 332–342.

19 Braun, *op. cit.* (9), p. 28.

20 Lorimer, *op. cit.* (14), p. 15.

21 Mansfield *et al.*, *op. cit.* (16).

22 Kristoffer Whitney makes a similar argument in a recent paper on the history of conservation of migratory shorebirds. Kristoffer Whitney, ‘Domesticating nature? Surveillance and conservation of migratory shorebirds in the “Atlantic flyway”’, *Studies in the History and Philosophy of Biological and Biomedical Sciences* (2014) 45, pp. 78–87.

and eventually ends in the early 1990s. Efforts to conserve salmon during this phase begin in the late 1800s and focus initially on reducing the impact of commercial exploitation and rehabilitating salmon rivers that were blocked or degraded through resource development. Later in the twentieth century, fisheries officials begin to introduce fertilized eggs into rivers as a way of further restoring faltering stocks. These more recent attempts to re-establish salmon were not so much to 'conserve' existing populations, but instead an effort to produce new populations of Atlantic salmon. The second phase – or socio-ecological arrangement – of conservation is associated with recreational angling, and specifically catch-and-release methods of fishing. From the 1970s, catch-and-release angling becomes linked to conservation efforts, and is juxtaposed with commercial harvesting, which is considered to pose a dire threat to wild Atlantic salmon. By the mid-1980s, catch-and-release is officially recognized in fisheries policy as a tool for conservation and is used throughout Atlantic Canada to preserve wild Atlantic salmon. While these two phases both involve efforts to conserve salmon, they do so through very different human–salmon configurations.

In the final section of the paper we draw on oral histories and testimonies collected on the Gander river to reveal a third human–salmon entanglement. We use Donna Haraway's insights on the response-ability associated with multi-species becoming to reveal what we call the wilful salmon. Wilfulness is not an independent characteristic of Atlantic salmon, however intuitive that might seem given its renown as a fish that swims tirelessly up strong rivers while overcoming significant physical obstacles. It is, instead, a specific and situated animal–human entanglement that emerged through our in-depth engagements with individuals on the Gander river. The wilful salmon fits uneasily with the category of conservation, and in some ways it seems contrary to conservation efforts. We argue that it is nonetheless a legitimate fish that deserves to be considered and evaluated in a world after nature.

Our analysis of Atlantic salmon in Newfoundland hopes to contribute to these emerging debates on conservation 'after nature'.²³ We also hope to build on a rich tradition of historical scholarship on salmon conservation on the West Coast of North America,²⁴ as well as important work that has focused specifically on Atlantic salmon in North

23 Examples of recent studies include Aurora Fredrickson, 'Of wildcats and wild cats: troubling species-based conservation in the Anthropocene', *Environment and Planning D: Society and Space* (2015), early view, pp. 1–17; Stephanie Lavau, 'The nature/s of belonging: performing an authentic Australian river', *Ethnos* (2011) 76, pp. 41–64; Jamie Lorimer and Clemens Driessen, 'Wild experiments at the Oostvaardersplassen: Rethinking environmentalism in the Anthropocene', *Transactions of the Institute of British Geographers* (2014) 39, pp. 169–181.

24 Examples include Joseph Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis*, Seattle: University of Washington Press, 1999; Matthew Evenden, 'Locating science, locating salmon: institutions, linkages, and spatial practices in early British Columbia fisheries science', *Environment and Planning D* (2004) 22, pp. 355–372; Evenden, 'Social and environmental change at Hells Gate, British Columbia', *Journal of Historical Geography* (2004) 30, pp. 130–153; Evenden, *Fish versus Power: An Environmental History of the Fraser River*, Cambridge: Cambridge University Press, 2004; Richard White, *The Organic Machine: The Remaking of the Columbia River*, New York: Hill and Wang, 2011.

America and Europe.²⁵ Our focus on Atlantic salmon in Newfoundland, with a specific focus on the Gander river, adds an interesting case to the broader literature given its longer history of commercial production, and the practices of enhancement that differ substantially from those that have been documented elsewhere in North America and Europe. Newfoundland is also the site where we were able to reveal what we call the wilful salmon.

The research methods for this paper involved the collection of archival and published material from the Centre for Newfoundland Studies, the Provincial Archives of Newfoundland and Labrador and electronic databases of historical material held at Memorial University's libraries. The research also involved the recording of oral histories and personal testimonies of residents of the Gander Bay region. These took place between June and October 2011 and included interviews with Aboriginal fishery guardians, representatives of organizations involved in salmon conservation, provincial government departments, Aboriginal band chiefs and their members, and employees of local municipalities and regional development organizations. Additional interviews in St John's with key informants occurred between June 2012 and April 2013.

Conserving commercial salmon

Commercial exploitation of Atlantic salmon in Newfoundland started in the mid-1700s and intensified through the century with the establishment of processing facilities built to satisfy European demand for salted fish.²⁶ Although salmon never challenged cod as the island's key export commodity, it quickly became an important secondary export commodity to cod: 'If cod was the gold from the New World, salmon was rapidly becoming the silver'.²⁷ Export volumes were in 'tierces', which was a measure of what could fit into the large wooden barrels that were used to export fish during this time, with one tierce equivalent to around three hundred pounds of fish. By the 1730s, Newfoundland as a whole was exporting up to a thousand tierces a year, a figure that rose to more than five thousand by the end of the century. On the Gander river – widely considered to be one of the island's most productive for Atlantic salmon – exports per year in the 1780s reached four hundred tierces or an estimated 15,000 individual salmon (see [Figure 1](#)).²⁸

25 For the US North East see Jenkins, *op. cit.* (6); for the Canadian Maritimes see Bill Parenteau, "Care, control and supervision": native people in the Canadian Atlantic salmon fishery, 1867–1900', *Canadian Historical Review* (2004) 79, pp. 1–20; Parenteau, "A very determined opposition to the law": conservation, angling leases, and social conflict in the Canadian Atlantic salmon fishery, 1867–1914', *Environmental History* (2004) 9, pp. 436–463; James Kenny and Bill Parenteau, "Each year the Indians flexed their muscles a little more": the Maliseet defence of aboriginal fishing rights on the St. John River, 1945–1990', *Canadian Historical Review* (2014) 95, pp. 187–216; Marianne Lien, *Becoming Salmon: Aquaculture and the Domestication of a Fish*, San Francisco: University of California Press, 2015.

26 V.R. Taylor, 'The early Atlantic salmon fishery in Newfoundland and Labrador', Canadian Special Publications of Fisheries and Aquatic Sciences 76, Department of Fisheries and Oceans, Canada, 1985.

27 R. Dunfield, *The Atlantic Salmon in the History of North America*, Canadian Special Publication of Fisheries and Aquatic Sciences, Ottawa: Department of Fisheries and Oceans, 1985, p. 58.

28 Taylor, *op. cit.* (26), p. 9.

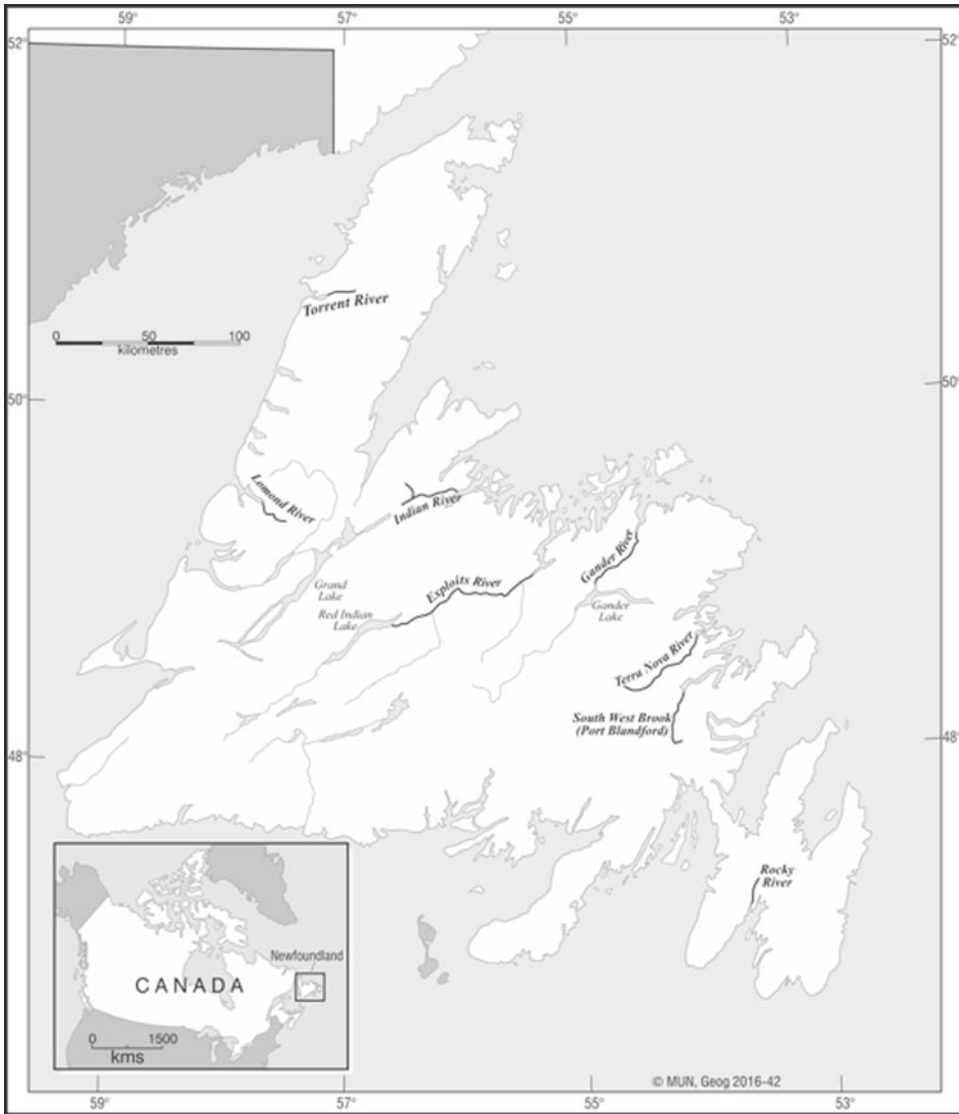


Figure 1. Selected salmon rivers in Newfoundland.

Harvesting practices on rivers in Newfoundland involved netting salmon as they made their way up to their spawning grounds. Stake nets were commonly used and these were usually driven into the stream bed and often remained in place during the fishing season. On some rivers and streams, weirs were constructed from one bank to the other, which provided a barrier to salmon swimming upstream. Harvesting salmon trapped behind weirs was straightforward and highly effective, but also highly destructive of river ecologies. The intensity of harvesting practices on rivers, and the practice of barring all

salmon attempting to reach spawning grounds, had a devastating impact on spawning populations in Newfoundland salmon rivers. It meant that harvesting volumes were often initially very high, followed by a longer period of decline. On many of the island's smaller rivers, salmon were 'extirpated', a term used to describe a local extinction of an animal species. Declining production levels were also seen on some of the island's larger rivers, including the Gander. While production levels had been as high as five hundred tierces a year, by the mid-1800s export volumes from the river were less than thirty tierces. As one official noted in the 1800s, 'The barring of the Gander River with stake-nets, and the numerous nets employed in and outside the estuary ... have caused this excellent stream to be ... almost entirely depleted of salmon'.²⁹

Conserving salmon

Although fisheries officials lacked detailed scientific knowledge on salmon reproduction, they did have enough knowledge to know that barring rivers with stake nets and other 'engines of destruction' compromised salmon reproduction and led to progressively smaller runs on salmon rivers.³⁰ Fisheries officers responded by introducing measures to limit the length of nets and they prohibited the blocking of streams through weirs that prevented any salmon from finding their spawning grounds. Weekend closures and shorter fishing seasons were also introduced to make it possible for some salmon to access higher reaches of river systems where eggs were deposited and fertilized. Commercial harvesters, it seems, ignored these measures that were poorly enforced by fisheries managers who lacked the resources to police the numerous and remote salmon rivers on the island.³¹

By the mid-1800s the commercial river fishery for salmon on the Gander river and many other rivers across Newfoundland had collapsed. Salmon runs were so small and sporadic that they could no longer justify setting up nets across rivers. Rather than abandon what was a lucrative export sector, commercial harvesting moved into the coastal zones around known salmon rivers to capture fish at sea before they reached their spawning grounds. The shift of fishing effort from rivers to the ocean environment led to a rebound of production that lasted well into the next century. Indeed, export volumes during the 1920s and 1930s reached record levels. Export volumes were now measured in tonnes rather than tierces, and in 1930 the industry produced and exported more than six thousand tonnes of Atlantic salmon. High catch rates during the early decades of the century began to falter after the 1930s, and by the 1950s the commercial industry was again in crisis. The discovery of large Atlantic salmon feeding grounds off Greenland in the early 1950s by an international fleet of commercial harvesters was identified as a key cause of this most recent collapse.

29 Taylor, op. cit. (26), p. 17.

30 Taylor, op. cit. (26), p. 19.

31 Larry Felt, 'Barriers to user participation in the management of the Canadian Atlantic salmon fishery: if wishes were fishes', *Marine Policy* (1990) 7, pp. 345–360.

The collapse of commercial production after 1950 led to strong calls from the increasingly powerful recreational angling community to restrict or even ban the commercial harvesting of Atlantic salmon across Canada.³² Up to this point, Atlantic salmon was a resource to be exploited equally by recreational anglers and commercial harvesters who were part of an extensive export infrastructure that involved processing facilities, transport networks and contractual arrangements between suppliers that stretched across the Atlantic Ocean. Atlantic salmon also supported the livelihoods of thousands of fish harvesters across Atlantic Canada. While recreational anglers had started the process of proposing an alternative socio-ecological arrangement with salmon that excluded commercial harvesters altogether, Canada's Department of Fisheries and Oceans (DFO) was initially reluctant to entertain a radically different relationship between humans and salmon. Instead, the DFO began to impose restrictions on commercial harvesting from the 1960s. Before the 1960s, commercial harvesting of salmon was largely unregulated, but this situation changed quickly with new limited licensing for existing harvesters, and a subsequent freeze on new licences. Licence buy-back schemes were brought in for those harvesters willing to give up their licences in return for cash compensation. By the early 1970s, salmon runs on rivers in the Maritime Provinces were so low that a temporary moratorium on commercial harvesting was imposed.³³ In 1985 the moratorium was made permanent and all commercial salmon licence holders in the Maritimes were offered cash compensation in return for withdrawing from the commercial salmon sector. Commercial harvesting in Newfoundland survived the moratoria that affected harvesters in Nova Scotia, New Brunswick, Prince Edward Island and Quebec. Yet this was a relatively short-lived reprieve. Particularly poor seasons in 1990 and 1991 finally led to the 1992 decision to close the salmon fishery in Newfoundland, which marked the end of commercial salmon harvesting in Atlantic Canada.³⁴ The period after 1992 ushered in a new socio-ecological arrangement between humans and salmon: from this date on, the only way humans and salmon could come together, legally, was through a fly rod, a weighted line and an artificial fly.

Producing salmon

Conservation practices before the 1992 moratorium on commercial salmon harvesting went beyond new licensing arrangements, limited quotas and licence buy-back schemes. Fisheries officials across Atlantic Canada were also committed to increasing salmon stocks through the rehabilitation of rivers that had been polluted and degraded by industrial, mining and hydroelectric development.³⁵ Through its Resource

32 Atlantic Salmon Federation, 'A crisis in the management of the Atlantic Salmon', position statement to the governments of Atlantic salmon producing countries and the commissioners of the North Atlantic Salmon Conservation Organization (NASCO), Atlantic Salmon Federation, Montreal, Canada, 1983.

33 Sam Chase, 'Closing the North American mixed-stock commercial fishery for wild Atlantic salmon', in Derek Mills (ed.), *Salmon at the Edge*, London: Blackwell, 2003, pp. 84–92.

34 Chase, op. cit. (33), p. 85.

35 O. Myers, 'The management of transboundary stocks: Atlantic salmon and northern shrimp', in D. VanderZwaag (ed.), *Canadian Ocean Law and Policy*, Toronto: Butterworths, 1992, pp. 91–114.

Development Branch, the DFO was also involved in salmon enhancement, which typically involved introducing hatchery-raised fish into depleted rivers. The hope was that these fish would eventually contribute to new generations of wild Atlantic salmon in rivers where salmon runs were low or non-existent.

Joseph Taylor's *Making Salmon* remains the definitive historical study of salmon enhancement in North America.³⁶ His work traces the emergence and spread of artificial hatcheries for Pacific salmon on the West Coast of North America from the mid-1800s to the early 1990s. The scale and intensity of salmon stocking in this region is extraordinary: by 1940 most rivers and streams in Oregon and Washington states had at least one hatchery. Taylor's argument is that bureaucrats and groups with a direct interest in hatcheries justified hatchery development and stocking as a way to balance the transformation of river environments through dams, hydroelectric facilities, pollution and logging. In the end, however, the effort to balance modern development through large-scale stocking of rivers failed.³⁷ Hatchery development, Taylor argues, did not make up for the environmental degradation and biological damage to salmon caused by modern development on rivers across the region. On the contrary, hatcheries 'helped rationalize the loss of habitat, the narrowing of genetic pools, and the alteration of biology'.³⁸ David Jenkins's work in the state of Maine reveals a similar pattern of intense hatchery development, in this case for Atlantic salmon. As many as 100 million salmon were introduced into Maine rivers over the last century, yet the results in terms of restoring salmon stocks have been extraordinarily poor. Efforts to restore Atlantic salmon through hatcheries in the Canadian provinces of Nova Scotia, Quebec and New Brunswick have been equally disappointing.

While hatcheries were established across North America to stock salmon rivers, the practice of salmon enhancement followed a distinct trajectory on the island of Newfoundland. There was support in Newfoundland for river rehabilitation and the construction of fishways that allowed salmon to access their spawning grounds. Yet there was much less support for large-scale hatchery development that would supply salmon rivers with fish that were fed and cultivated. Part of the reason was that hatchery development required considerable state support,³⁹ and the Newfoundland government was unwilling or unable to provide the funds to support hatchery development. More importantly, perhaps, was the strong opposition to hatcheries from recreational anglers who felt that it would allow the introduction of inferior 'non-native' salmon to Newfoundland waters, which were less suitable as a game fish: 'The Newfoundland salmon was a sporting fish, rising much better to the fly than the Canadian salmon ... Canadian salmon ova would not improve the situation and any mixed breeding

36 Taylor, *op. cit.* (26).

37 As Taylor, *op. cit.* (24), p. 98, writes, 'Fish culture became the preferred tool of management because it offered to produce an endless supply of fish. Salmon hatcheries seemed to facilitate economic progress while alleviating resource conflicts'.

38 Taylor, *op. cit.* (24), p. 251.

39 On the West and East Coasts of North America, hatchery development depended on extensive state/province or federal support. See Taylor, *op. cit.* (24), Jenkins, *op. cit.* (6).

would degenerate the native stock'.⁴⁰ There was also opposition to hatcheries because they interfered with the natural reproductive cycle of Atlantic salmon. A 1905 Newfoundland Fisheries Department Report declared that restoring stocks through hatcheries 'would never be a substitute for the ordinary method of allowing the fish to produce itself in its own natural way'.⁴¹

Opposition to large-scale hatchery development did not prevent fisheries officials in Newfoundland from enhancing salmon production through other practices. These included building spawning channels to support salmon reproduction, transferring adults from one river to another as a way of establishing new salmon populations, and using incubators to introduce fertilized eggs into river systems with low salmon runs. A key difference between hatchery production in other parts of North America and the enhancement practices in Newfoundland was that local enhancement efforts did not involve feeding and raising fish in large-scale facilities. Instead, eggs were fertilized and were then placed in artificial incubators in the stream system. Egg production in these systems was reportedly much higher than in natural conditions. Fisheries officials on one project reported egg-to-fry production rates that were three times the natural rate.⁴² On large rivers such as the Exploits, where there were many years of rehabilitation and enhancement work, millions of eggs were placed in streams over a period of several decades (Figure 1).⁴³

The use of techniques to enhance salmon reproduction was justified by the results of counting fences, which were often placed on rivers to assess the impact of conservation efforts. Counting-fence data showed that stream rehabilitation on its own sometimes led to small increases in salmon runs, but these took years and even decades before significant results were achieved. The same was true in situations where new habitat was made available to salmon. Providing new habitats for salmon through the construction of fishways and fish ladders, without additional interventions, did not attract new salmon populations. When rehabilitation and restoration were combined with spawning channels, the fertilization and incubation of eggs, and the raising of salmon in confined spaces like lakes or cages, the results were more positive. As two fisheries scientists noted, 'the opening of fishways on obstructed streams results in a gradual establishment of a salmon population whereas adult stocking coupled with a fishway opening results in an immediate establishment of a fish population'.⁴⁴

40 Cited in Donald Hustins, *River of Dreams: The Evolution of Fly-Fishing and Conservation of Atlantic Salmon in Newfoundland and Labrador*, St John's: Tight Lines, 2010, p. 83.

41 Cited in Hustins, op. cit. (40), p. 86.

42 V.R. Taylor, 'Egg to fry survival rates for Atlantic salmon using different incubation techniques and their implication for brood stock requirements in salmon development and enhancement programs', Progress Report No 98, Resource Development Branch, Newfoundland Region, St John's, 1973, p. 2.

43 V.A. Pepper and N.P. Oliver, 'Historical perspectives on Atlantic salmon (*Salmo salar*) enhancement activities on Indian Brook, Newfoundland (1960–1980) and their relevance with respect to community involvement', *Canadian Technical Report of Fisheries and Aquatic Sciences* (1986) 1461, pp. 1–66.

44 Fry stocking resulted in the establishment of runs in Exploits river tributaries in roughly one-half the time required for adult stocking and with less than one-half the brood-stock requirement. J.D. Pratt and H.J. Rietveld, 'Atlantic salmon development techniques used in Newfoundland', Resource Development Branch, Newfoundland Region, Technical Report Series NEW/T-73-1, St John's, Canada, 1973, p. 15.

Conserving Atlantic salmon in the period before the 1992 moratorium on commercial harvesting marked a specific socio-ecological assemblage. For the Department of Fisheries and Oceans, Atlantic salmon was a resource that was made available to commercial and angling interests. The role of the department and its employees was to ensure that the resource was shared equitably and used sustainably. This particular view of conservation was revealed in the 1950s when Canada's DFO was being challenged to limit commercial harvesting of salmon. The aim of the fisheries scientist and administrator, the DFO argued, 'is to provide for the maximum long-term use of the *resource* – the only responsible interpretation of "conservation"'.⁴⁵ Conservation within this view also meant finding ways of increasing salmon stocks through stream rehabilitation and through enhancement techniques, including fertilizing eggs and placing them in incubators in rivers. The development of artificially fed salmon hatcheries was – for reasons we have suggested – not considered an option in Newfoundland. Instead, fisheries scientists experimented with enhancement practices that did not involve feeding salmon and were as close to natural processes as possible. In this way, salmon enhancement practices in Newfoundland were markedly different than in other parts of Atlantic Canada or indeed the West Coast of North America.

Fisheries scientists did reflect on the practice of enhancing salmon in Newfoundland in relation to natural reproduction. They argued that natural processes were too slow given the current levels of Atlantic salmon populations, and that 'waiting for nature to do the job unassisted is likely to be a long wait indeed in most cases'.⁴⁶ Scientists described salmon enhancement as a process of 'working (and interfering) with ecological systems'.⁴⁷ In this socio-ecological assemblage, nature was something that was external to humans, but it was a nature that could be interfered with, fostered, nudged along, helped to become more effective. This view of Atlantic salmon as nature that needed assistance changed in significant ways after the 1992 moratorium on commercial harvests in Newfoundland. The origins of this shift date back to the 1950s, but they come into sharp focus from the mid-1980s.

Conserving a 'matchless game fish'

The 1992 moratorium on commercial salmon harvesting in Newfoundland marked an important victory for the recreational angling sector in Atlantic Canada. Recreational anglers had long argued that commercial harvests were the primary reason for faltering salmon runs, and they had campaigned strongly to restrict or ban commercial harvesting.⁴⁸ The voice of recreational anglers was the Atlantic Salmon Federation (ASF),

45 Department of Fisheries and Oceans, 'Comments on "A report on the present position of the Atlantic salmon fisheries of Canada with recommendations for their regulation and improvement, Atlantic Salmon Association"', Ottawa, June 1952, p. 7, original emphasis.

46 V.R. Taylor, 'Egg to fry survival rates for Atlantic salmon using different incubation techniques and their implication for brood stock requirements in salmon development and enhancement programs' (1973), Progress Report No 98, Resource Development Branch, Newfoundland Region, St John's, p. 2.

47 Taylor, op. cit. (46), p. 2.

48 Chase, op. cit. (33).

which had played a key role in promoting angling interests. The ASF was established in 1982 through a merger of the Atlantic Salmon Association, formed in Montreal in 1948, and the International Atlantic Salmon Foundation, established in 1968 in the Canadian province of New Brunswick. The 1982 merger of the two separate organizations created a 'powerful voice for recreational fishermen' with a membership of more than 500,000 anglers in Canada and the eastern United States.⁴⁹ While the ASF and its predecessors were justifiably regarded as representing 'wealthy outdoorsmen' who were able to influence political decision making through their connections and informal networks,⁵⁰ the ASF is now regarded as more inclusive of all anglers in Atlantic Canada and the north-east United States. This greater level of inclusiveness has been achieved in part through its network of smaller local affiliates, including several in Newfoundland.

For the ASF, the moratorium on commercial harvesting was an important decision for Atlantic salmon conservation. But the decision to favour anglers over commercial harvesters, from the ASF's perspective, was insufficient to ensure the survival of wild Atlantic salmon. From the late 1970s the organization has campaigned for no-retention angling in the form of 'catch-and-release', which it promoted as a way of preserving individual salmon and the generations of salmon that will follow the live release of a potentially productive fish.⁵¹

The moratorium on commercial harvesting of salmon, and the ASF's promotion of catch-and-release, represented a new and distinctive phase in Atlantic salmon conservation. After 1992 the object of conservation changed: Atlantic salmon was no longer a resource to be protected and enhanced, it was now a wild species that needed to be safeguarded from a range of human and non-human influences that threatened its status as a wild and genetically distinct animal. The Atlantic salmon was transformed from commercial commodity to wild game fish that comes into contact with humans at the end of a rod and line, but is then released back into the wild to be caught again or to reproduce new generations of wild salmon. This was a fish that represents nature, that needs to be protected from humans trying to destroy it, as well as from other threats including aquaculture and enhancement practices that intervene in the natural processes that may threaten the genetic integrity of wild Atlantic salmon. Drawing again from our conceptual framing outlined earlier, salmon conservation after the moratorium represented a different socio-ecological assemblage between humans and salmon and a new set of priorities required to maintain it into the future.⁵²

49 Felt, *op. cit.* (31).

50 Prime and Parent, *op. cit.* (27), p. 60; For the early history of elite sports fishing and its relation to Indigenous claims to salmon see Kenny and Parenteau, *op. cit.* (25). For an outstanding analysis of sport fishers in British Columbia see Arn Keeling, 'Crying in the wilderness: Roderick Haig-Brown, conservation, and environmental justice', in Samuel Snyder, Bryon Borgelt and Elizabeth Tobey (eds.), *Backcasts: A Global History of Fly Fishing and Conservation*, Chicago: The University of Chicago Press, 2016, pp. 237–251.

51 Details on the ASF and its work in Atlantic salmon conservation may be found on its website, which contains a wealth of information on its policy and its support of research aimed at conserving wild Atlantic salmon, at www.asf.ca/main.html, accessed 26 October 2016.

52 Mansfield *et al.*, *op. cit.* (16), p. 284, describe the different Appalachian forests and the 'dynamics deemed essential to maintain them into the future ... to highlight inherent antagonisms and alliances as each forest

Conserving an animal that is defined as wild or natural, as is the case with Atlantic salmon, required boundary work that separated nature from human influence, from non-native species, and from other species that have the effect of diluting or polluting naturally occurring wild salmon. This is Kay Milton's important insight, and she argues that conservation is a 'boundary maintaining exercise'.⁵³ We develop Milton's argument and point to the specific forms of boundary making involved in this new phase of conservation for Atlantic salmon. Our emphasis is on the boundary work undertaken by recreational angling interests. Separating nature from human and other non-human influences is never settled and is constantly in the making. Recreational angling interests were, and are, in an ongoing struggle to construct and maintain boundaries that enact salmon as a wild and natural species that needs to be conserved.

Catch-and-release

Newfoundland has a strong connection to the origins of catch-and-release angling through Lee Wulff, widely considered to be the 'father' of fly fishing in North America. Wulff was an American sports enthusiast, and was drawn to Newfoundland in the early decades of the twentieth century as angling on the island gained in popularity. Through his formal association with the Newfoundland Tourism Board, he promoted Newfoundland to Canadian and American tourists as an excellent place to fish for Atlantic salmon, the 'king of the river'. Salmon stocks in Newfoundland were stronger than elsewhere in the region and all of the rivers were accessible to the public, unlike the situation in other parts of North America where most rivers were leased to private groups. Wulff was well known for promoting the use of artificial flies and weighted lines as the highest challenge for the sports fisherman. The lighter the tackle relative to the size of the fish the better, and Wulff was famous for catching impossibly large fish on the lightest of lines and flimsiest of rods. Wulff also promoted catch-and-release, stating famously that 'the Atlantic salmon was too valuable and precious to be caught only once'.⁵⁴

Wulff's promotion of catch-and-release was not primarily as a method to conserve Atlantic salmon as a species. It was instead a moral issue that favoured the challenge involved in playing a fish as a sportsman over the act of consuming protein. Catching a salmon more than once, which was theoretically possible though catch-and-release, also supported Newfoundland's reputation as a sportsman's paradise, and it was in line with Wulff's obligation to promote Newfoundland as a tourism destination for anglers. Yet from the late 1970s, catch-and-release as an angling method was promoted increasingly as a way of conserving individual salmon, and the future generations of

jostles for position in the landscape'. As we note in the introduction, while Mansfield *et al.* are contrasting antagonistic forest assemblages that are in contemporary conflict, our research traces human-salmon assemblages over time.

⁵³ Kay Milton, 'Ducks out of water: nature conservation as boundary maintenance', in J. Knight (ed.), *Natural Enemies: People-Wildlife Conflicts in Anthropological Perspective*, London: Routledge, 2010, pp. 229-246.

⁵⁴ Hustins, *op. cit.* (40), p. 153.

salmon that may come from a fish that is released rather than killed and consumed. This shift is evident in the *Atlantic Salmon Journal*, a monthly magazine produced by the ASF. From the early 1980s, images of salmon that are caught and killed by anglers give way to images showing fish that are carefully released back into the water for the conservation of this wild species. Wulff himself is transformed from sports enthusiast and adventurer to conservationist through the ASF's annual Lee Wulff Atlantic Salmon Conservation Award, first awarded in 1987.⁵⁵ Catch-and-release as a human–salmon entanglement is enacted as an engagement between a conservation-oriented angler and a highly prized wild game fish.

The idea that catch-and-release angling is good for salmon conservation becomes embedded within the DFO. From the late 1970s, the DFO begins a series of reviews on Atlantic salmon management and policy. In 1980 the department released a 'blue-print' for the future of Atlantic salmon, followed by a series of annual management reports through the decade on progress and policy developments on the conservation of Atlantic salmon. The documents reveal a growing acceptance of catch-and-release as a method of conservation. In the 1982 management plan, for instance, new measures are introduced to shorten the recreational harvesting seasons and to reduce daily catch limits. At the same time the report advocates, 'where desirable and practical, the practice of hook and release'.⁵⁶ Several years later the policy documents reveal more explicit statements about catch-and-release for conservation:

If done properly catch and release is an excellent conservation tool while permitting anglers the pleasure of hooking large salmon ... To assist anglers in cooperating with the hook-and-release program, the Department of Fisheries and Oceans will work with anglers' organizations to inform their members of proper methods and the need for hook-and-release.⁵⁷

By the late 1980s, catch-and-release is entrenched as a conservation tool, and the DFO supports initiatives to instruct anglers on best practice for catch-and-release angling. The DFO has since used catch-and-release as a conservation tool on specific rivers that are considered to have dangerously low salmon populations, and across entire regions where salmon stocks are threatened.

Wild populations of Atlantic salmon did not rebound as fisheries officials hoped or expected following the 1992 moratorium. Indeed, in the Canadian Maritimes, salmon runs are now lower than they were during the period of commercial harvesting. The failure of salmon stocks to recover following the moratorium has strengthened the hand of the recreational-angling lobby, who have successfully convinced federal fisheries officials to impose no-retention angling in the Maritime Provinces of New Brunswick, Nova Scotia and Prince Edward Island. Yet in Newfoundland, fisheries policy still

55 The Lee Wulff Award is presented annually by the ASF in recognition of Wulff, 'who dedicated 60 years of his life to conserving wild Atlantic salmon and advocating live-release angling to help safeguard their future'. See www.asf.ca/lee-wulff-conservation-award-recipient.html.

56 DFO, 'Management of the Atlantic salmon in the 1980s', Department of Fisheries and Oceans, Ottawa, Canada, 1992, p. 9.

57 DFO, '1985 Atlantic salmon management plan for recreational fishery announced', News Release NR-HQ-085-014E, Department of Fisheries and Oceans, Ottawa, 1985, p. ii.

allows anglers to take limited numbers of Atlantic salmon through a strictly regulated licensing and tagging system. Perhaps not surprisingly, the ASF has come out strongly against a policy that continues to allow anglers to take Atlantic salmon. The Newfoundland policy, they have argued, is out of line with the conservation needs of wild salmon and unfortunately supports an angling sector that is trying to ‘hang onto the ability to hook and retain, angling for meat at all costs, and is without a shred of sportsmanship or conservation involved’.⁵⁸

While the ASF has been enormously successful in convincing fisheries officials of the need for catch-and-release as a conservation tool, it faces strong opposition from hook-and-retain anglers in Newfoundland. The Newfoundland and Labrador Wildlife Federation has been particularly active in resisting catch-and-release. In a report titled ‘Hook & release: the silent killer of salmon’, they contest official estimates that only 10 per cent of salmon that are caught and released die after the encounter, suggesting instead that the figure could be as high as 50 per cent or more when variables such as high temperature and poor release techniques are taken into consideration.⁵⁹ The official mortality rate is also based on a twelve-hour assessment, which is not long enough to assess the full impact of catch-and-release on salmon mortality. Those supporting catch-and-retain have emphasized the enormous stress and energy expenditure associated with catch-and-release, which can make salmon vulnerable to predators and can lead to lower egg deposition for those salmon that survive the event. Drawing on research conducted in Norway, the ‘silent-killer’ report argues that salmon are so confused after being released that they often head back to the ocean rather than to their spawning grounds upriver. Finally, the report suggests that although there are legal limits to how many salmon can be caught and released, in practice anglers will catch and release as many fish as they can, which leads them to the conclusion that this method is ‘poaching, not a conservation tool’.⁶⁰

The boundary work required to maintain wild salmon as the ‘king of the river’ goes beyond protecting it from being harvested by commercial or angling interests. The ASF has also worked hard to ensure that the wild salmon is protected from other fish species that might pollute its genetic structure. The most significant threat to wild salmon in Atlantic Canada in this context is the escape of thousands of domesticated salmon from aquaculture. Interestingly, the recreational-angling lobby in Canada initially welcomed aquaculture developments as they hoped that it would support the call to close commercial harvesting and restrict hook-and-retain angling of wild salmon. If consumers had access to farmed Atlantic salmon, they argued, there would be no need for a commercial industry and an angling community that harvested wild fish. For this reason, recreational anglers came out in support of aquaculture in the early 1980s and in fact recommended that ‘aquaculture developments must be accelerated to their full potential’.⁶¹

58 Marvin Barnes, ‘Hook, line and sinker’, *Western Star* (Cornerbrook, Newfoundland), 29 June 2015, pp. 14–15.

59 Rick Bouzan, ‘Hook & release: the silent killer of salmon and trout’, Newfoundland and Labrador Wildlife Federation, St John’s, Canada, 2011.

60 Bouzan, *op. cit.* (59), p. 12.

61 Atlantic Salmon Federation, *op. cit.* (32), p. 7.

The relationship between recreational angling and aquaculture has, however, shifted dramatically since the 1980s. As a recent Worldwide Fund for Nature report notes, 'salmon aquaculture now constitutes a major threat to wild salmon stocks – if not *the* major threat'.⁶² Highly publicized large-scale escapes of farmed salmon into the wild, disastrous disease outbreaks, and the spread of pests from aquaculture pens into wild populations have led to a highly confrontational relationship between recreational anglers and the aquaculture sector in Eastern Canada. The adversarial relationship between aquaculture and recreational angling is fuelled by the fact that the majority of aquaculture developments in eastern Canada are in regions where wild stocks have been declining rapidly.

Recreational anglers have been able to draw on a very large scientific literature on the impact of farmed salmon escapes on wild salmon stocks.⁶³ When considering the impact of farmed salmon escapes, scientists usually distinguish between direct genetic effects and the competitive dynamics between farmed and wild salmon in river systems. On the direct genetic effects, there is consensus that farmed and wild Atlantic salmon can successfully breed to create new genetically hybrid species. Over time, this process effectively homogenizes the genetic heterogeneity of wild salmon, with important implications for adaptability and species sustainability.⁶⁴ Scientists have also identified indirect effects of salmon escapes on wild salmon populations. Salmon that are fed and maintained in containment systems, according to a number of studies, behave differently when they are released into the wild.⁶⁵ Farmed salmon tend to be more aggressive and grow faster and as a result outcompete their wild counterparts for resources and habitats. Finally, research has suggested that farmed salmon are more vulnerable to diseases and parasites, which may be passed on to wild populations. While the competitive interactions between wild and farmed salmon are regarded as ecological processes, over time they have the potential to alter the genetic structure and diversity of wild Atlantic salmon that are considered to be crucial to their adaptability in a changing environment.

The recreational-angling lobby that promotes no-retention angling has been traditionally more accepting of the release of hatchery-raised fish for conservation and restoration purposes. Yet recent scientific work on the impact of hatchery releases suggests that cultured salmon raised in hatcheries often behave in similar ways to salmon that escape from aquaculture pens. Several scientists have suggested that introducing any artificially raised fish into the wild – including the enhancement work undertaken in Newfoundland in the period after the 1950s – should be restricted and interventions should focus only on restoring and rehabilitating salmon habitat: 'habitat restoration should always be the first choice in fish conservation efforts, and hatchery releases should only be considered in cases where there are no other realistic ways to save or maintain sensitive natural

62 World Wide Fund for Nature, *op. cit.* (2), p. 10, original emphasis.

63 It is important to note that the ASF also funds research into the effects of farmed salmon escapes. Details of their research activities may be found on their website, Atlantic Salmon Federation, *op. cit.* (32).

64 Hitoshi Araki, Becky Cooper and Michael S. Blouin, 'Genetic effects of captive breeding cause a rapid, cumulative fitness decline in the wild', *Science* (2007) 318(5847), pp. 100–103.

65 J.I. Johnson, S. Brockmark and J. Naslund, 'Environmental effects on behavioural development consequences for fitness of captive-reared fishes in the wild', *Journal of Fish Biology* (2014) 85, pp. 1946–1971.

populations'.⁶⁶ Conserving salmon as a 'matchless game fish'⁶⁷ represented a profoundly different socio-ecological arrangement from an earlier phase when the object of conservation was salmon as a resource. After the 1992 moratorium on commercial harvests, the object of conservation was a wild species that required protection from a range of interventions that threatened its survival and its status as an object of nature. The boundary work of powerful angling interests has been dynamic in response to existing and new threats to wild salmon. It has also shifted, most notably around the issue of enhancement. Organizations such as the ASF are now increasingly concerned about any form of salmon enhancement beyond stream rehabilitation, including the specific types of enhancement carried out in Newfoundland from the 1950s.

The socio-ecological arrangements we have presented for Atlantic salmon become visible when we attend, as Mansfield *et al.* have suggested, to the various ways in which humans, other animals and materials and technologies hold together around a shared concern for conservation. These two socio-ecological configurations – associated with commercial fishing and catch-and-release angling – represent more than different policies for conserving Atlantic salmon. Instead, they represent competing ways in which human protagonists and salmon should be fostered for conservation. In the final section of the paper we add to the complexity of socio-ecological arrangements in Newfoundland by introducing the wilful salmon. The wilful salmon allows us to reveal more substantive forms of animal agency, as well as the affective relations between salmon and anglers on the Gander river.

The Gander river's wilful salmon

How does the Gander river's wilful salmon contribute to our analysis of salmon agency and the affective relations between humans and salmon in Newfoundland? Salmon were key actants in the commercial fishery, and so too in its ultimate closure. Salmon bodies have been counted along dozens of counting fences in Atlantic Canada, located along various river tributaries providing critical data in assessing the health of the population. The low numbers, combined with the strong lobbying efforts of recreational salmon anglers, rendered the act of taking salmon bodies out of the water with a net illegal. Certainly the 'king of the river' is a charismatic species, which played a key role in its conservation through catch-and-release and recreational angling. The salmon is determined, putting up a tremendous fight against the current of the river – or at the end of a fishing line – in order to reach its spawning grounds.

During the course of field research on the Gander river, we encountered a different and largely hidden human–salmon entanglement on the river. Through this encounter we reveal the wilful salmon whose determination and wildness are not features of a predetermined genetic species, nor of an emblematic nature, but instead relational properties

⁶⁶ Johnson, Brockmark and Naslund, *op. cit.* (65), p. 1947.

⁶⁷ John Crosbie, *Statement by the Honourable John C. Crosbie, Minister of Fisheries and Oceans on Canada-Newfoundland Atlantic Salmon Initiatives*, Ottawa: Department of Fisheries and Oceans, 1992.

in which to explore non-human agency.⁶⁸ This encounter brings about a different kind of fish – a salmon that is ontologically distinct from the fish that is caught and released – where death is not the ultimate cruelty. The wilful salmon is intimately cared for in a way profoundly different from the conservation efforts applied to the catch-and-release salmon and the 'safe' care used in catching the salmon and releasing it back into the water. The wilful salmon emerges from a specific encounter with an angler, and through this encounter a response-ability is evoked in the angler that troubles traditional conservation science and engenders an entirely different form of care.⁶⁹ Through this encounter we explore agency as a more-than-human achievement which emerges from specific encounters between intra-acting 'critters' – be they human or non-human.⁷⁰

The agency of the wilful salmon is revealed through its affective encounter with an angler. On the Gander river, such a fishing encounter looks like this: the lure (and hook), which is attached to an angler's rod, catches the interest of a passing salmon. The salmon takes the bait and engages, and the hook sets in its mouth. The battle of wills – between that of the fish and that of the angler – begins. While the angler may be equipped with the correct gear and technical knowledge, landing an Atlantic salmon is a significant challenge: 'for its size it is the strongest fish in the water because there's no man [*sic*] that can hold a salmon if it wants to get away'.⁷¹ The encounter can go one of two ways: the salmon breaks the line (or evades the hook) and escapes or the salmon tires of the play and is reeled in by the angler. This is not to suggest that the salmon that gets away is unharmed by the fishing encounter. It too could suffer and its death is likely not as immediate and swift as that of the salmon that is caught and retained. If the salmon tires completely, it becomes played out. At this point, and only at this point, the salmon will resign itself to the struggle, ceasing to fight any longer as the angler finally pulls it out of the water. This is a wilful salmon and because its will has been undeniably broken, the angler will land and kill her as quickly as possible. There is an intimate kind of wildness in this encounter, not because the result of the struggle is undetermined ahead of time, rather because it is an affective site – an attachment site – between intra-acting human and non-humans.⁷² This wildness is not a revision back to nature, where the natural is separate and distinct from the social and political; rather it is inherently political and places ethical demands on those affected.

Such an affective encounter involves a 'transfer of power from the affecting body to the affected body', which invokes both the capacity to relate and the capacity to act.⁷³ Duff argues that the greater we are affected (i.e. the more power we have to be affected),

68 Jamie Lorimer, 'Nonhuman charisma', *Environment and Planning D: Society and Space* (2007) 25, pp. 911–932.

69 Donna Haraway, *When Species Meet*, Minneapolis: University of Minnesota Press, 2007.

70 Bruce Braun, 'Environmental issues: writing a more-than-human urban geography', *Progress in Human Geography* (2005) 29, pp. 635–650; Haraway, *op. cit.* (69).

71 Interviews, RES2, Gander Bay, 2011.

72 Donna Haraway, *Staying with Trouble: Making Kin in the Chthulucene*, Durham, NC: Duke University Press, 2016.

73 Cameron Duff, *Assemblages of Heath: Deleuze's Empiricism and the Ethology of Life*, Dordrecht: Springer, 2008, p. 45.

the greater our capacity to act.⁷⁴ The encounter is about being in relationship, and for any desired effect to come about, whether it is conservation or some other kind of care, it cannot be preordained or assessed from a position outside the enactment itself. In Haraway's terms, the salmon and the angler are companion species that evoke response-ability through their encounter, which brings them into being.⁷⁵ That is, the wilful salmon and the angler emerge from their encounter in a very particular way. Response-ability is a process where 'becoming-with, not becoming, is the name of the game; becoming-with is how partners are, in Vinciane Despret's terms, rendered capable'.⁷⁶ The symmetry of response, or at least the capacity in which to respond, is not necessarily equal between those entities involved; however, response-ability insists on some kind of 'sharing of suffering' between ontologically heterogeneous partners involved.⁷⁷ In this case, the human angler is undeniably affected by the encounter.

In what specific ways does the wilful salmon invoke an affected response on the part of the angler? In addressing this, we must restate the critical difference between playing out a salmon only to release it, as is the case with catch-and-release salmon, and playing out the salmon and killing it. Conventional salmon conservation, particularly that espoused by the ASF, suggests that killing salmon is detrimental to salmon conservation. Our field interviews reveal that the wilful salmon invoked a different response from anglers. Once the salmon is hooked it struggles to get free from the line and playing the salmon involves the angler successively pulling in and letting out the line. The salmon becomes played out until it is exhausted:

By the time you can get that salmon and pull it alongside to take the hook out of it, there's not too much life left in him, being sloughed and being beaten around, that takes the good out of it, you have to unhook the hook out of the salmon and let him go overboard and go on down [stream], he's stunned.⁷⁸

Through the fishing encounter the salmon has been physically exhausted and often physically damaged.⁷⁹ Once the salmon abandons the will to fight it is also morally destroyed, which is in part a consequence of how hard it is to land a powerful Atlantic salmon using a hook, line and rod. When the wilful salmon is morally broken it concedes to having been overcome in the encounter by the human angler and gives up the fight. When the angler finally lands the beaten salmon the option to simply release it back into the river, in the name of conservation, is no longer tenable. While the angler is moved by the encounter it is of a different magnitude compared to the salmon: the angler is not morally destroyed when the salmon breaks free and evades being caught. Reciprocity, while binding, is not evenly shared among those involved.⁸⁰

74 Duff, *op. cit.* (73).

75 Haraway, *op. cit.* (72).

76 Donna Haraway, 'Playing string figures with companion species: staying with trouble', working paper presented for the Institute for Humanities Research (2012), p. 4.

77 Haraway, *op. cit.* (69).

78 Interview RES1, Gander Bay, 2011.

79 Gutted fish often have burst gall bladders, an indication of severe stress. Interview RES1, Gander Bay, 2011.

80 Haraway, *op. cit.* (69).

For the angler, killing the wilful salmon is kindness. At this moment, the best thing for the particular salmon's well-being is to acknowledge that the salmon has exhausted itself in the encounter and to end its struggle. Anglers who encounter the wilful salmon find it difficult to accept that this fish should be released after the encounter. In the autumn, some rivers in Newfoundland are declared to be 'experimental catch-and-release' fisheries, but these raised questions for our research participants: 'The fall fishery is an experimental [catch-and-release] fishery, but there's a lot of salmon killed from that. I don't want to see anything destroyed [after a catch-and-release encounter]. I don't like to see wildlife destroyed because I'm a hunter and fisherman right to the bone.'⁸¹ While our research participants made no specific reference to the salmon 'giving themselves' over to the fishers, this claim is similar to that made by Indigenous hunters in Canada.⁸² The wilful salmon is such that it compels the human anglers to take receipt of its fleshy salmon, leaving little room to question the idea that death is a far greater kindness than being returned to the water with a broken will.⁸³

For the wilful salmon on the Gander river, killing is care. At the point the wilful salmon's will and body have been broken, death at the hand of the angler is the best way to conserve what is good for the fish. This type of conservation has been occurring on the Gander river for hundreds of years and is inextricably connected to eating. Eating salmon does not necessarily require the salmon to be caught using a hook and line – it could involve the use of a net – but the act of eating the fish is an important form of physical and cultural nourishment on the Gander river:

Growing up – you lived off the land – if you wanted a salmon, even though it was illegal in the eyes of people, you'd always go down to the brook and get a feed of salmon, and you didn't do it so you would take all of the fish, but you would go get a meal of salmon for yourself ... You take what you needed. It wasn't taken to sell or barter or anything like that. You'd take it for your own consumption.⁸⁴

Eating salmon is not merely an automatic assimilation; it deepens the entanglement between the wilful salmon, the angler and all other eating messmates. Companion species, for Haraway, 'must learn to eat well, or at least well enough that care, respect and difference can flourish in the open'.⁸⁵ In this framing, we are affected by and accountable to the non-human entities we consume. Eating, then, is perhaps one of the most transformative of everyday, banal activities: eating and ingesting are acts

81 Interview, RES2, Gander Bay, 2011.

82 Adrian Tanner, *Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters*, London: Hurst Publishers, 1979; Hugh Brody, *Maps and Dreams*, Vancouver: Douglas & McIntyre, 1992.

83 In Newfoundland the legislation and policies that define whether an angler can retain an Atlantic salmon have played a key role in the encounter of the wilful salmon described here. Anglers who catch fish legally on a catch-and-release river must by law release the fish. Yet the wilful salmon does not need to be, nor is it exclusively, caught legally. Fleshy salmon bodies can be caught and killed on the river in several ways, where reverence and care are tied to an intimate act of sustenance through eating.

84 Interview, AFG3, Gander Bay, 2011.

85 Haraway, op. cit. (69), p. 287.

which require the presence of others – especially the wilful salmon.⁸⁶ For example, when Annemarie Mol points out when ‘I eat an apple ... is the agency in the *I* or in the *apple*? I eat, for sure, but without apples before long there would be no “I” left’, she illustrates the transubstantiation that occurs in eating.⁸⁷ The apple, or the salmon, literally becomes a part of oneself, wherein the subject and object are once more blurred.

As humans, and companion species, we are not solitary at all, but rather completely interdependent on the agency of non-human others, and thus our shared lives demand from us a responsiveness, or a practice of reckoning.⁸⁸ No community ‘works without food, without eating *together*. This is not a moral point, but a factual, semiotic and material one that has consequences ... Driven by [the desire for a ‘pure diet’] a diner’s only permitted food would be oneself, ingesting, digesting and gestating the same without end’.⁸⁹ It is the charisma of the wilful salmon that allows its human companion to respond with care towards the fish. The care-full response is to acknowledge the salmon’s will and to kill the salmon when this will has been broken. The act of eating on the part of the human is a further instance of becoming-with in a more-than-human encounter.

In acknowledging this more-than-human encounter, subsequent decisions around what is good care for the Gander river’s salmon must move away from so-called ‘matters of fact’ about a pristine or baseline nature and towards a more ‘powerful descriptive tool that deals this time with matters of concern and whose import then will no longer be to debunk but to protect and to care’.⁹⁰ Doing good for the river and its salmon cannot be expressed through bare facts and arguments; instead it must involve experimentation with possible goods, by overlaying realities in productive ways.⁹¹ In doing so, we must slow down reasoning, and go about tinkering – to see where points of contention, convergence and partial recuperation emerge among these salmon – not in order to line them up and find ‘common understandings’, but to acknowledge and keep track of these differences.⁹² In Haraway’s terms, we should strive for ‘staying with the trouble’, which can be defined as a commitment to ‘the more modest possibilities of partial recuperation and getting on together’.⁹³ Staying with the trouble requires a commitment to seeing things through, to accepting responsibility for the consequences of particular action (or inaction), because there will always be some form of consequence in living together, and the ability to change one’s mind in the face of new evidence, scientific or otherwise. These may seem vague, but that is

86 Annemarie Mol, ‘I eat an apple: on theorizing subjectivities’, *Subjectivity* (2008) 22, pp. 28–37; Marilyn Strathern, ‘Eating (and feeding)’, *Cambridge Anthropology* (2002) 30(2), pp. 28–37.

87 Mol, op. cit. (86), p. 30.

88 Haraway, op. cit. (69).

89 Haraway, op. cit. (69), p. 294–295, original emphasis.

90 Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy*, Cambridge, MA: Harvard University Press, 2004, p. 232.

91 Annemarie Mol, *The Body Multiple: Ontology in Medical Practice*, Durham, NC: Duke University Press, 2002.

92 Marisol De la Cadena, ‘Indigenous cosmopolitics in the Andes: conceptual reflections beyond “politics”’, *Cultural Anthropology* (2010) 25, pp. 334–370.

93 Haraway, op. cit. (69), p. 2.

precisely the point: doing a good thing, and providing good care, are achievements that happen at specific attachment sites.

Conclusion

The present analysis of Atlantic salmon conservation in Newfoundland represents a contribution to a long tradition of historical scholarship on salmon conservation in North America. Our research has been framed through recent engagements with the idea of the Anthropocene, and what it means to conserve 'after nature'. These engagements with the crisis that is the Anthropocene represent a critical and hopeful response to an eco-pragmatist approach that aims to remake environments through technocratic interventions. While these hopeful approaches are being used to examine and to experiment with socio-ecological futures, we have used this framing to articulate three socio-ecological arrangements between humans, salmon and other materials in Newfoundland that are in tension, and which propose antagonistic ways of conserving salmon. An implication of our research is that contemporary approaches aimed at addressing the urgent need to articulate hopeful socio-ecological futures can be deployed to analyse historical practices of conservation.

Conservation practices in Newfoundland were substantially different from those of other parts of Atlantic Canada or the West Coast of North America. Restrictions on commercial harvesting were imposed much later, and enhancement efforts did not involve feeding and raising salmon in large hatcheries for subsequent introduction into salmon rivers with depleted stocks. The familiar narrative of massive hatchery stocking of rivers with salmon in an effort to mitigate large-scale dams and other modern developments, including logging and mining, that affected the sustainability of salmon in North America does not hold traction in Newfoundland. Fisheries officials on the island lacked the financial support for hatcheries and opposition from anglers thwarted efforts to establish large-scale hatcheries. Instead of hatcheries, enhancement efforts in Newfoundland involved introducing fertilized eggs and incubators into rivers, as well as the construction of fishways and the rehabilitation of streams. The Newfoundland case points to the importance of recognizing the way in which socio-ecological arrangements can be site-specific, emerging from particular historical and social processes.

The third socio-ecological assemblage that we identify has allowed us to introduce the wilful salmon. For us, this salmon surfaced after listening carefully to our research participants, who view the encounter between salmon and human as profoundly affective. The wilful salmon is enacted when care and responsibility are guiding principles rather than an unwavering belief in our ability to conserve a wild animal like the Atlantic salmon. For this reason, the wilful salmon sits uneasily alongside our earlier socio-ecological assemblages, both of which aim to conserve salmon, albeit in very different ways. Yet in a world that may soon be called the Anthropocene, the wilful salmon is a fish that deserves attention if we are to live well in a more hopeful multi-species world.