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Article

Two Rivers: The Politics of Wild Salmon, Indigenous Rights and Natural Resource Management

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Abstract: This paper compares two rivers, Tana River in Northern Norway and Columbia River on the northwest coast of the United States of America. Both rivers host indigenous populations, the Sámi and the Nez Perce, whose cultural and material existence depends upon salmon. Because these people live indigenously within highly industrial, postcolonial societies, their lives have been part of larger economic, political and legal structures for substantial periods of time. In these rivers, peoples have been, and are currently dealing with the possibility of salmon extinction. This article is concerned with how such a crisis has been interpreted and acted upon within two nation's natural-resource management regimes. We observe how the threat of extinction has initiated commotion where nature, economies, legal instruments, politics and science have come into play, in ways that reveal differences in the Norwegian and American constellations of interests and powers, manifested as differences in natural resource management regimes' hierarchies of positions. The outcome is the protection of different entities, which could be labeled cultural and biological sustainability. In the Columbia River, cultural sustainability was promoted while in the Tana, biological sustainability became prioritized. By way of our comparison we ask if the protection of one kind of sustainability has to be to the detriment of the other.

Keywords: politics of nature; cultural and biological sustainability; salmon; indigeneity; postcolonial epistemology

1. Introduction

This paper seeks to compare two rivers, the Tana and Columbia, each celebrated salmon rivers, and amongst the largest Atlantic and Pacific salmon rivers in the world, both with an indigenous population (Sámi and Nez Perce) whose cultural and material existence continues to depend upon salmon. In both rivers threats of salmon extinction exist, and have existed in the past. This article is concerned with how such a crisis has been interpreted and acted upon within the two nation's natural resource management regimes. The threat of extinction in our two locations, has initiated commotions where nature, economies, science, legal instruments and politics come into play, in ways that reveal differences in constellations of interests and powers, manifested as hierarchies of positions [1–4]. Within these hierarchies of positions, biological and cultural diversity are attributed different values. The result is two very different configurations of human–salmon relations, implying different possibilities for the salmon and the indigenous groups in question.

Connections between biological and cultural diversity were first internationally recognized in the 1990s with the Brundtland report, "Our Common Future", presented by the World Commission of Environment and Development (WCED) in 1987 [5]. As a term, cultural diversity brought opposition to the natural science hegemony in natural resource management [6,7]. In the Brundtland report, cultural diversity was made a prerequisite for biological diversity. It was acknowledged that local ecological knowledge, based upon long-term co-existence within local environments, was a valuable supplement to the existing use of science-based knowledge. The symbiosis of cultural and biological diversity was moreover recognized. While knowledge, as part of cultural diversity, became considered necessary to protect the environment, biological diversity was also acknowledged as central to maintain local language, knowledge and cultural practices [8–12]. Internationally, this dependency between cultural and biological diversity has since been acknowledged in the Millennium Development Goals [13,14], by the work of IUCN/CEESP (International Union for Conservation of Nature and its Commission on Economic, Environmental and Social Policy), UNESCO, as well as the UNEP 2007 report [14]. However, this does not mean that loss of cultural diversity has received the same attention as the loss of biological diversity [11,14,15]. Although the term cultural diversity has become firmly established, it remains controversial [16], and it is often pointed out that connections between biodiversity and cultural diversity are not given. For example, many cultures, both in the past and the present, have not been particularly eco-friendly [12,14,17,18]. In our opinion, the existence of non-eco-friendly cultures does not make the term cultural diversity less relevant in relation to biological diversity. As emphasized in this article, as relational categories these terms remains valuable for efforts to observe how natural resource management is practiced.

Through the Tana–Columbia River comparison we will explore how two nations' resource management regimes, as they are enacted, entail different opportunities to promote and protect cultural and biological diversity. The cultural diversity we are interested in here is the diversity within

language, knowledge and the practices that are part of local human-salmon relations. Our use of these two entities, to classify the practices of two natural resource management regimes points to a significant difference: In the Norwegian context, biological diversity is constructed in a way that leaves little room for the protection of cultural diversity. In the Columbia River, room has been made to emphasize cultural diversity within the activities undertaken to maintain biological diversity. Comparing these rivers confirms what the geographer Hinchliffe reminds us; that facts of protection and conservation invariably are saturated by human values, politics, cultures and ways of seeing things [19].

For our purposes, we will first describe the history and the circumstances behind the disappearance of salmon in the two rivers. In the comparison of these two rivers, the difference in scale is striking. Although Tana is one of the world's largest Atlantic salmon rivers, its proportions are dwarfed by the size of the Columbia River and its salmon-runs. Despite differences, much is shared by these two rivers. In both places salmon fishing marks the beginning of a new season. Salmon is essential to indigenous diets, not just in the fishing season, but also as a festive food throughout the year. In both indigenous locations, human–salmon relations enact gender, kinship and identity. In this article, we situate the two rivers, their people and the salmon, in their respective networks of national historic, economic, scientific and political events, including the divergent indigenous politics and two increasingly incommensurable politics of nature. This, to explain how, in Columbia, the diversity co-produced in the complex and durable entanglements of natural resource management policies, national and international economic interventions, as well as Native American rights politics, is of a cultural kind. In the Norwegian entanglements on the other hand, it is nature, as the biological diversity of salmon that is prioritized, to the detriment of Sámi cultural practice and knowledge.

Methods

The comparison that this paper involves is based upon the anthropological fieldwork of its authors Ween and Colombi. The collaboration between these two researchers came about as part of the research project, "Newcomers to the farm: Atlantic salmon between the wild and the industrial". As an interdisciplinary research project "Newcomers to the farm" included three academic traditions; social studies of science, anthropology and fish biology. The project explored the topic of domestication across the farmed–wild divide, focusing on the knowledge and practices enacted with regards to wild and farmed salmon. As part of this project, Colombi and Ween jointly completed a short joint fieldwork in the Tana River in Norway. Separately, however, both have a long-term engagement with human–animal relations in indigenous contexts in several locations.

2. Two Rivers

2.1. Tana River

Its size and salmon population makes the Tana River the third largest Atlantic salmon river in the Northern hemisphere. Its size is reflected by the name. The original *Deatnu*–the Sámi name of the river–in time became the Finnish *Teno* and the Norwegian *Tana*, simply meaning "big" river [20]. Size reflects its length as much as its salmon catches. Since the 1970s, catches have varied between 40 and 250 tonnes of caught salmon. In a year with optimal conditions, as many as 1.5 million

salmon enter the river to spawn [21]. The river Tana has its origins in the Sámi core areas. As the tributaries Anahrjohka, Iesjohka and Karasjohka join up in Karasjok, the river becomes the border between Norway and Finland. To the local Sámi, however, this border is non-existent. Tana families on both sides of the river have inter-married since time immemorial. Local Sámi declare that the river does not separate people, it joins them.

The oldest dated Sámi settlements in the Tana valley area are considered to be over 4000 years old. Archaeologists, however, place human habitation of the area back 10,000 years [22,23]. As in the Columbia River, salmon has been central to people's livelihood since time immemorial. Early first-hand written accounts of the Sámi (between 11th and 16th century) tell us that the population was organized in *siidas*, flexible and egalitarian social organizations, based upon family structures, each *siida* with its own land, associated with particular subsistence practices. For this society, connections with a particular place did not imply a sedentary existence. Up until the 19th century, Sámi moved between seasonal settlements, primarily following the reindeer and the salmon, but also combining this with numerous other hunting, fishing and harvesting activities [24].

Records from between 900 a.d. to 1500 show that Sámi paid taxes, in dried fish and fur, to Norwegian, Russian and Swedish kings. The priest botanist, Peder Claussøn Friis wrote in 1599 that the natural wealth of the Sámi was such that if a Sámi was killed, compensation had to be paid to all three kings [25]. Up until the 17th century, the Sámi had sole access to fishing in the river. This was also recognized by the Norwegian colonizers in the sense that the new settlers had to pay the *siidas* for the privilege of fishing for salmon [26–28]. Towards the end of the 17th century, however, the Danish king realized there was money to be made from leasing out the rights to tax, or rent out, salmon fishing in the large northern rivers [27–29].

The position of the local Sámi fishermen was further weakened at the turn of the 20th century, with the establishment of the new Norwegian nation. For the new nation it became important to establish clear boundaries between Norway, Finland and Russia in the far north. For this purpose, Norwegian settlers were encouraged and provided with net fishing privileges, at the cost of local migrating Sámi. However, over the last hundred years, movements of people and fluid ethnic boundaries have caused net fishing privileges to become associated with Sáminess. Today, the holders of such rights are powerful stakeholders locally.

Despite all outside interventions, salmon fishing is still what men do during the early summers in Tana. For Tana people, the start of the salmon run demarcates the beginning of spring. Even now, the salmon run puts an end to all other subsistence activities [30]. Salmon is fished by most men, although with different technologies. In the fjord and the river delta, it is fished with pursed seine. In the river it is fished with weirs or standing nets, with rods from boats, or by anglers from the riverbanks. In the pools at the top end of the river, salmon is also fished with dragnets from boats. Over the last century, locals have increasingly had to compete with visiting anglers. Presently, the anglers catch half of all the fish in the river [31].

Even today, when spring is about to return, local people's longing for salmon becomes a constant theme. Everyone talks of the taste of salmon. In the salmon season, salmon is eaten at all meals and it is eaten thoroughly and always shared. Rules detail how salmon should be killed, how the dead body should be handled and how the salmon flesh should be treated, how it should be shared; first with non-humans and then with humans. These rules not only explicate the morality of local human–salmon

relations, emphasizing such as respect for the kill and the necessity of a humble appearance in the hunter. These rules of behavior confirm the value of salmon as a co-species. Sanctions moreover underline the agency of salmon in relation to human lives. Local fishermen know that if the rules of the kill are not upheld, salmon will not return, or will not let itself be caught again. Such rules also include the salmon's social life after its death. As flesh, the salmon is circulated, in ways that confirm masculinity, marriage, kin and friendship relations [32].

Salmon catches are not what they used to be. In 2009, the future death of Tana wild salmon was prophesized with increasing frequency by natural scientists and environmental institutions [21,32]. According to official catch reports, the annual catch from 2009 was less than 30 tones [21]. This implied an almost fifty-percent decrease from the year before. Comparing 2009's catch with the top seasons in the 1970s when catches could be up to 250 tones, the alarming nature of the situation was further underlined [21,33]. The weight of the average fish was also reduced from a legendary 30 kilos to a meagre 3.27 kilos. To the scientists, this showed a dramatic decrease in the large salmon that the Tana River previously had been so famous for [21,33].

2.2. Columbia River

The Columbia River produced more salmon than any other river in the world, with pre-1850 calculations of that 10 to 16 million salmon entering the river each year [34,35]. The early American anthropologists, Kroeber, reasoned that before the arrival of Europeans in the U.S. Pacific Northwest region, the Columbia River system probably supported some 700,000 indigenous peoples diversified into 47 cultural sub-areas and representing 11 language groups [36]. In this river system, indigenous peoples and salmon have co-evolved between an estimated 6000 to 10,000 years. Salmon and water also continue to serve as material and ideological foundations for Nez Perce knowledge and survival [37].

The Columbia River originates in western Canada, in the interior Northern Rockies of British Columbia. The river runs northward and then it turns abruptly south, crossing the Canadian and U.S. border, and meeting the Snake River (the Columbia's largest tributery) in south-eastern Washington. It then runs in a westward direction, flows slightly north again, forming the present-day border between Oregon and Washington, before it drains itself into the Pacific Ocean.

The colonial history of the Nez Perce was not only more recent but also more violent and abrupt than that of the Sámi. Prior to the 19th century, Nez Perce lived in on the Columbia River plateau, in the interior, in small-scale, highly egalitarian, and democratic society [38,39]. Population densities throughout much of the past remained low, with people organizing themselves into linguistically affiliated bands, interspersed throughout the region by correlating watersheds, or sub-basins. Present-day indigenous families retain such place attachments.

In the salmon season, the salmon was caught in a number of ways. Men dip netted or speared fish with leisters or harpoons from wooden platforms. Fish walls and rock piers were built out in to the salmon's underwater trails to divert and hold fish that would otherwise simply swim by. The fish was eaten fresh, but also smoked, dried and pulverized, to last throughout the winter [37]. It is therefore not surprising that fish was and still is a substantial part of local diet [37,40–46].

Salmon and water are present in Nez Perce ceremonies and are necessary for the fulfillment of individual and community daily life [37]. The Nez Perce use salmon in ceremonial events performing

relations and identity with regards to family, band and tribe. The salmon takes part in ceremonies for births; funerals; testimonial "giveaways" for the first anniversary marking an individual's death; weddings; "name-giving"; "first salmon"; "first kill"; "first roots"; marking adulthood; "pow-wows"; and other celebrations, conducted to share and give thanks to the joy of life [37]. Elaborate salmon economies and circuits of trade and commerce continue to exist [39,42,44].

While the reductions in salmon populations in the Tana are a recent phenomenon, the salmon populations in the Columbia were significantly more affected at an earlier point. Since 1850, Euro-American settlement brought mining, farming and logging, substantially reducing the spawning range of salmon in the Columbia River basin. They also introduced extensive industrial fishing, where settlers competed with the Nez Perce and the other tribes for salmon resources [46]. These interventions have at several points in history dramatically impacted on salmon stock. Salmon depletion first became a public issue in the Columbia River in the 1880s. At the beginning of the 21st century, salmon runs were down to two percent of their historic levels. Prior to European and American contact, ten to sixteen million salmon returned each year to the Columbia Basin. This year only 650,000 salmon are expected to return [47]. This is however an improvement since 2007 when the number was down to 200,000. The current decline in salmon is attributed to the impact of hydroelectric dams, irrigation projects, as well as overall habitat loss [34,48,49].

2.3. The State of Salmon in Tana

As opposed to Columbia River fishing, fishing in Tana was predominantly local up until the 21st century. Anglers have only recently become a dominant presence. Although Sámi and other local inhabitants employed a number of different netting techniques, the size of the local population and the state of the technologies meant that the catches up until the 1970s were relatively low. The hundred tone mark was not surpassed until the mid-1970s when catches suddenly boomed, reaching as high as an estimated 250 tones. At this point, high catches coincided with very good prices, resulting in a local bonanza [21].

Reductions in the number of salmon caught were first registered in the early 1980s. In response to catch reductions, environmental authorities introduced restrictions in the number of fishing days allowed, particularly with nets. Fewer salmon fishing lots were renewed, and there were restrictions on fishing gear allowed [21,49,50]. In the last few years, the threat of future extinction of Tana wild salmon has been voiced with increasing frequency by natural scientists and environmental institutions [21,32].

These alarming reductions in Atlantic salmon catches did however not only occur in the Tana River [32]. Since the 1960s, world Atlantic salmon populations are calculated to have been reduced by as much as 75 percent. By the 1970s there was already growing international concern with the rapidly expanding industrial Atlantic salmon fisheries at sea. In 1983, bilateral negotiations succeeded in establishing an inter-governmental organization—the North Atlantic Salmon Conservation Organization (NASCO)—along with the Convention for the Conservation of Atlantic Salmon in the North Atlantic Ocean. The convention introduced restrictions on salmon fishing at sea by creating a protection zone beyond 12 nautical miles off each contributing nation's coast. One immediate effect was the cessation of the salmon fishery in the Northern Norwegian Sea that, at its peak in 1970,

harvested almost 1000 tones of salmon. NASCO, however, did not stop at that. In 1989, salmon drift net fishing was also banned within each contributing nation's 12-mile zone. Next, the use of bend nets in coastal salmon fisheries was advocated [32] (NASCO Fisheries Management Focus Area Report). NASCO's focus on the regulation of bend net fisheries was connected to its efforts to restrict what was known as "mixed stock fisheries". The term "mixed stock fisheries" was introduced with the increasing genetic precision of contemporary salmon fish biology. "Mixed stock fisheries" as a term signals the possibility of genetically identifying each salmon population, as well as the ability to trace particular sub-species salmon travels from particular rivers, to the sea and back. Such mapping practices brought awareness of that fjord fishing, particularly with nets, involves fishing on several salmon stocks potentially including the endangered [32]. River fishing on the other hand, involves fishing on, at least, fewer salmon populations. This fishery, therefore, is better suited to ensure the protection of endangered salmon populations from particular rivers.

Other causes than the long-term consequences of industrial line fishing have also been attributed to the reductions in Atlantic salmon populations. After industrial sea salmon fisheries were stopped, the focus in Norwegian natural resource management shifted to the expansive salmon farming industry as a significant, negative influence [51]. According to the environmental authorities, salmon farming was problematic because farming conditions, creating disease outbreaks and large collections of sea lice. The mixing of wild and farmed species was also emphasized as problematic. Escaped farmed salmon, reproducing with wild salmon, could cause genetic changes to finely tuned locally adapted species [32], reducing their survival skills. From a river perspective hybrid salmon became considered a threat to overall salmon biological diversity and hence its resilience. Towards the end of the 20th century, physical separation of wild and farmed salmon became increasingly important [51]. One significant measure to achieve this was the establishment of Norwegian Salmon Rivers and Fjords [52,53], spatially separating the farmed fish from the wild, to avoid the possibility of their genetic mixing [32]. The threat of farmed salmon to the wild within Norwegian salmon management was further noted in 2007, when the 'Norwegian Black list', published by the Norwegian Biodiversity Information Centre (*Artsdatabanken*), listed farmed salmon as a sub-category of alien species [54]. These separation efforts were not just present in policy documents. In all Norwegian rivers where escapees and hybrids are considered a threat, there are posters and pamphlets circulated to local fishermen, to educate them to partake in efforts rid the river of farmed fish and hybrids. When large numbers of fish escape, fishing licenses are immediately issued in order to catch the escapees as soon as possible [54].

In our comparison, this point is crucial, as it demonstrates how biological diversity within wild salmon genetics became a dominant theme in the Norwegian management of Atlantic salmon. Since the 1970s, industrial fish farming, the building of genetics as a science, the establishment of the Biodiversity Act, and of NASCO, all contributed to enforce the separation of wild and farmed Atlantic salmon. Coming together these created a particular understanding that made impossible the hatchery practices that, also in Norway, was encouraged at the start of the last century.

2.4. Columbia River: Treaties, Salmon Hatcheries and Nation Building

Since the start of the 20th century, U.S. federal agencies and private institutions have erected more than 400 dams in the Columbia Basin. The control of water enabled a non-indigenous society to support urban populations, increase industrial output and raise the production and consumption of hydropower, as well as transport global commodities. This has, however, caused further declines in the Columbia River salmon populations [55].

Dam building along with the increasing industrial salmon fisheries that came about with the popularity of canned salmon, caused rapid declines in the salmon stocks of the Columbia River. The solution introduced was, as in Europe at this point in time, to establish salmon hatcheries [46,22]. Although the success of the hatcheries in these early days was disputable, steady increases in dam building did for a long time shield hatcheries from the consequences of scientific criticism [46]. In the 1950s, however, the scientific criticism of hatcheries was mounting. Hatcheries did not produce the large numbers of salmon expected. In a number of tributaries there were marked population changes and the salmon was becoming less hardy [46]. Here as elsewhere, hatcheries kept on producing new numbers of salmon without awareness of coming themes such as the consequences on native salmon genetic stock, or to present criteria for success, such as the upkeep and regeneration of biological diversity. The purpose of this salmon was not to naturally reproduce, but rather to be fished. In the 1960s the invention of the pellet vastly increased survival rates in hatcheries and enabled fry to be kept in ponds until they were ready to migrate to sea [46]. The problem with the increasing number of dams was surpassed by barging the smolt out to sea, passing the dams, and passing the sections of the river that functioned as industrialized transportation corridors [46,56]. Soon, Coho production rose from 7.5 million smolts in 1960 to 24 million in 1982, enabling the continuation of industrial salmon fishing.

The political position of the Nez Perce was in part a result of the same hydraulic history of the American west [57]. These historical events had provided the Nez Perce and other Columbia Basin indigenous peoples with an advantage. The 1855 treaties between the United States and the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes and Bands of the Yakama Nation, and the Nez Perce Tribe, reserved and guaranteed the Columbia Basin indigenous peoples the rights to fish for salmon, the right to water, including the right to fish at all their “usual and accustomed places”. This was, however, a right that the tribes outside the reserve land shared with “citizens of the United States”. For the next hundred years, fisheries, damming, river transport and agriculture would result in a steep decline in salmon numbers. What the Columbia Basin indigenous peoples felt to be encroachments on tribal rights continued up until the 1960s, when a variety of court cases and legislative actions were initiated that with time would reaffirm the tribes’ treaty fishing rights. The most prominent of these initiatives was *U.S. v. Oregon* and *U.S. v. Washington*. With these legal actions, the tribal treaty fishing rights became further articulated. It was established that the tribes were entitled to a fair share of the salmon harvest and that a fair share meant half of the harvestable fish. Other, unrelated legal processes further contributed, such as the Indian Self-Determination and Education Assistance Act of 1975. The rights situation that these actions gave rise to did provide the tribes with new resources, but also with new management demands. To cater for this new political situation, the four treaty tribes created

the Columbia River Inter-Tribal Fish Commission (CRITFC) in 1977. With CRITFC the salmon treaty tribes set up an organizational structure to encourage cooperation amongst indigenous fishery managers beyond a tribal level in regional, national, and international matters. The Commission would further provide coordination and technical assistance to the Columbia Basin salmon treaty tribes, and ensure that treaty fishing rights issues were resolved in ways that guaranteed the continuation and restoration of tribal fisheries into perpetuity [58].

By exercising the sovereign powers of the tribes as fishery managers in the Columbia, CRITFC engaged in indigenous nation building. This level of inter-tribal organization also provided the salmon treaty tribes with new opportunities to extend their political emancipation. Towards the end of the 1990s the Nez Perce successfully used the *Reserved Rights Doctrine* [59] to demand further self-determination over the restoration of the Columbia River salmon runs. The Nez Perce travelled to Washington DC and argued for their cultural rights and their way of life. Arthur Taylor, a former member of the Nez Perce Tribal Executive Committee (NPTEC) and past Chairman of the Nez Perce Fish, Water, and Wildlife Subcommittee, testified on the importance of water and salmon to Nez Perce life in 1997 before a U.S. House of Representatives sub-committee on Water and Power [60]. In such efforts, Nez Perce stressed the centrality of salmon for their culture and way of life, to politicians and bureaucrats. Generally speaking, this battle was aided by social scientists with long-term relations to the nations of this region, stressing the significance of salmon for the survival of Native American cultures, such as the Nez Perce, by introducing the term “keystone species”, then later “cultural keystone species” to describe the key significance of salmon to the Columbia Basin salmon treaty tribes cultural lives [47,61–64]. By use of such biological metaphors these social scientists were able to describe a cultural world where salmon connected everything, a world that would change beyond recognition should the salmon no longer be available.

In addition, the recent appeals of the Columbia River Salmon treaty tribes were successful. The Bonneville Power Administration, the federal agency responsible for marketing hydropower to regional consumers, agreed to fund Nez Perce restoration work as well as the “tribal hatcheries”. Presently, the CRITFC partnership operates 15 fish hatcheries. CRITFC has also formed collaborations with various federal agencies such as the National Oceanographic and Atmospheric Administration (NOAA) and the National Fish and Wildlife Service (NFWS).

Each tribe is responsible for its’ own fishery programs and its’ fish hatcheries. For example, the Nez Perce operate a total of six anadromous fish hatcheries located on the Clearwater, Salmon, Snake, Imnaha, Grande Ronde and Wallowa Rivers, and co-manage several salmon projects with the U.S. Fish and Wildlife Service at the Dworshak National Fish Hatchery Complex, located just below Dworshak Dam on the lower North Fork of the Clearwater River. The salmon treaty partners did however not stop at producing fish in hatcheries. They changed the focus of the salmon management to producing salmon for fishing purposes, to other efforts, to a more articulated focus on sustainable salmon diversity. Their plan called *Wy-kan-ush-mi Wa-kish-wi* [58] included the monitoring the harvest of their 50% of the available adult salmon, migrating in the Columbia drainage each year, and the providing of recommendations for the protection and restoration of critical habitat for salmon populations listed under the federal Endangered Species Act.

In establishing the hatcheries, the Nez Perce did not leave biological diversity unquestioned. They emphasized that their hatcheries differ from those operating on the basis of an industrial

agricultural logic. One such difference promoted between tribal hatcheries and standard hatcheries, is the difference in the hatcheries' purpose. While tribal organizations view hatcheries as a tool to restore naturally reproducing populations, standard hatcheries are oriented towards increasing production for fisheries. In their work to develop fish farming, the Nez Perce argue that they draw upon their local knowledge of salmon as well as past knowledge derived from their horse breeding activities and former resource-management practices, all developed prior to European American settlement. To avoid inbreeding and the lack of genetic suitability to the particular river environment, tribal hatcheries regularly incorporate wild fish as broodstock into their hatchery programs [65]. Tribal hatcheries moreover aspire to 'think like a salmon.' For this purpose, Nez Perce hatchery design have developed a 'natural' rearing pond, informed by Nez Perce cultural understandings of the 'needs of the salmon,' says Ed Larson of Nez Perce Fisheries. While conventional hatchery pens are straight concrete structures, Nez Perce supplemental fish hatcheries are designed to mimic healthy riparian areas while utilizing local knowledge of salmon–human relationships in the Nez Perce watersheds of the Snake and Columbia rivers. The replacement of conventional hatchery pens with natural rearing ponds is thought to reduce the genetic effect of captivity over generations [64]. As Dave Johnson, Nez Perce Fisheries Program manager, stated "We will treat these fish with the respect they deserve. They are not ours to do with what we will".

2.5. Fishing Opportunities, Knowledge and Management in Tana

Since the mid-19th century, the Norwegian state has impacted enormously on local Tana salmon fishing practices. At first, the King and the state intervened in local management of natural resources and forced changes in local fishing practices. For the next hundred years, fishing technologies would also change dramatically. This trend also continues. In more recent times, national salmon management policies have come to favor tourist anglers in front of traditional Sámi net fishing [32]. Several arguments have been used to support this strategy. As already mentioned, this is also not simply a Norwegian policy. In line with NASCO regulations, net fishing has been prohibited on the coast, in all nations that have signed the NASCO convention, but in the two northernmost counties of Norway. In Norway, environmental institutions increasingly point to that the tourist fisheries are both more biologically and economically viable. In environmental policy documents it is calculated that a salmon fished by an angler is worth as much as hundred times more than salmon fished by local net fisherman [32]. As cheap farmed salmon floods the supermarkets, the economic potential of wild salmon fishing has been dramatically reduced.

Today, the results are evident. Wooden weir structures that previously were found around every bend of the Tana River have almost disappeared. Even their modern variety, constructed with iron bars and nets, are becoming rarer. Today, few of the younger generations of Sámi men are interested in learning traditional fishing techniques. Young men feel that with the few fish left in the river, the limited economic opportunities, along with the continuous reductions in fishing times, there is little reason to invest in equipment, nor in salmon fishing knowledge. This is particularly true of the sea salmon fisheries. The average age of a fisherman practicing net fishing in the fjord is now 65 and increasing by one year annually [32,49]. It is becoming apparent that the continuous reductions in net fishing opportunities also have consequences for local men's knowledge [49]. The reduction in fishing

opportunities also affects the possibilities of practising particular parts of Sámi language associated with the practice of fishing, such as the many words describing the salmon, size, gender, coloring, the sub-species from the different tributaries or from other rivers, as well as knowledge of interaction between salmon, other animals in the local ecosystem or the influence of other environmental factors [33]. Moreover, lack of fishing opportunities has consequences for the enactment of masculinity [49]. Being a competent fishermen and catching lots of salmon is not only an indication of skills, but also of morale. Salmon was a significant part of men's gifting to women [48], and through the work of their wives, gifts that in turn was further redistributed to produce and confirm extensive kinship and friendship structures [49]. When there is no longer an abundance of salmon to be exchanged and feasted on, this has consequences for local cultural practices.

As noted, the lack of awareness of the importance of salmon for Tana peoples is *not* a result of the Norwegian state's lack of recognition of Sámi rights. The Tana River lies within the Sámi core territories. Norway was among the first nations in the world to sign ILO 169 (Indigenous and Tribal Peoples). Since the 1980s, Norway has amended its constitution to include Sámi rights to culture, and recognising land and resources as the material grounds for culture (§110a). For the last almost 30 years, the Sámi Rights Commission has made ongoing inquiries into how indigenous rights to land and resources should be articulated. As part of these rights processes, the Sámi Parliament was established in 1989. In 2005, the Finnmark Act was instituted. This Act was written in recognition of the injustices involved in the State appropriation of the Finnmark commons [30]. With this Act, the formerly state-appropriated land, in what is currently the county of Finnmark, was returned to a foundation established for this purpose, the Finnmark Estate (Finnmarkseiendommen/ Finnmárkkuopmodat) [65]. It was emphasized that land had been returned to the population of Finnmark on the basis of continued settlement and use. With time, recognition of local rights to co-management of natural resources resulted in the founding of the Tana Fisheries Management (TF) in 2011. The establishment of Tana Fisheries Management was also made necessary by a commitment to local knowledge, and particularly Sámi knowledge, written as part of a revision of the Norwegian Nature Diversity Act (2009). These legal processes has made Sámi salmon fisheries and associated cultural practices and a significant theme to the Sámi Parliament. Still, the inclusion of local knowledge and its ability to influence and take part in local management remains limited.

2.6. Salmon Futures

Does the comparison imply that the promotion of cultural diversity and local knowledge works against the protection of biological diversity of salmon? This article is written by two anthropologists making use of tools offered by the social studies of science tradition. Our intention is not to argue for the promotion of one of these two protection regimes in front of the other. Instead, our intention is simply to make note of the differences that this comparison makes apparent, and to explore how exactly these difference have come about.

In Tana, as in the rest of Norway, salmon management is practiced according to the recommendations of the Scientific Council for Salmon Management (Vitenskapelig råd for lakseforvaltning). Instead of hatcheries, it is biologically sustainable species management on the basis of precise mapping regimes that is the Norwegian management strategy. Every year the Scientific

Council for Salmon Management publishes reports of every salmon population in Norwegian rivers. These overviews present calculations of how many salmon there are in a river. They map each river according to its salmon habitats, calculate how many eggs on average each mature female has, and how many salmon eggs each particular river can hold per square meter at its different spawning sites. Given each rivers chances of reaching its maximum spawning capacity, the number of fish that can be caught is calculated. Spawning capacity measure not only involves considerations of how many fish that can be caught without risking reductions to a river's salmon population. In its entirety, the national report of the Scientific Council also provides advice on which rivers that can sustain more heavy fishing and be exposed as tourist rivers. This becomes important, as Norwegian nature management works on the premise that sustainable use should be closely associated with efforts to capitalize on Norwegian nature [32,33].

The new Tana Fisheries Management must manage the river according to the structures and guidelines set up by the Ministry of Environment and the Directorate of Nature Management, on the advice from the scientists in the Scientific Council for Salmon Management. As other authors have also recently pointed out, there is little room for local knowledge to partake within such fine-tuned scientific regimes [66]. In the Tana, river and salmon management remains based upon scientific knowledge and upon Norwegian nature management structures. Compared to the economic argument stated above, little attention is paid to the significance of salmon for local Sámi language and knowledge, and even less to the implementation of such local knowledge into management. Instead, the Tana Fisheries Management is left with the unpopular task of further reducing local fisheries, according to the instructions of the Ministry of Environment and the Directorate of Nature Management.

In the Colombia River, CRITFIC and its science collaborators have argued that tribal hatcheries, with their use of local knowledge, are able to improve existing hatchery technology. Generally speaking, hatchery produced Pacific salmon is known to have both very low return and reproduction rates. Tribal hatcheries, however, claim to be able to produce salmon with higher reproduction rates [65]. In an early study, undertaken by molecular biologists, members of CRITFC and the Nez Perce tribe's Johnson Creek Artificial Propagation Enhancement Project, researchers found that hatchery-reared salmon spawned with wild salmon, had the same reproductive success as salmon left to spawn in the wild, in the same generation [67]. The study used DNA from all returning adults collected over a 13-year period to track parents and their offspring, to determine how successful hatchery fish were at mating in the wild when compared to wild fish. This success was connected, by Hess and her team [67], to the fact that tribal hatcheries were able to limit genetic changes during captivity, by steadily incorporating wild individuals adapted to local environmental conditions into the captive stock each year [67]. A key finding in this study was that hatchery-origin fish that spawned naturally with a wild fish had an equivalent reproductive success as two wild fish. Hess and her team were therefore able to suggest that Chinook salmon reared for a single generation in this supplementation hatchery did not reduce the fitness of wild fish. Similarly, productivity of two hatchery fish spawning naturally was not significantly lower than for two wild fish [67].

The success of this study should not be overrated, it is an early result, and it clearly would not satisfy the genetic precision aspired to by Norwegian Directorate of Natural Management. It is the combination of existing preconditions in the Columbia River that makes this strategy an improvement,

such as the impossibility of sustainable natural reproduction, the already existing large-scale use of hatcheries, and the intention to keep up large-scale fisheries. Its success might actually say more about traditional salmonoid hatchery programs that primarily have had harvest objectives, with its consequences in the use of hatchery-origin fish reared for multiple generations in an artificial environment, often with an out-of-basin (*i.e.*, non-local) brood stock [68]. The tribal hatcheries however mark a change in strategy. As they themselves note a right to maintain cultural diversity was employed to confront the strategies of existing hatcheries. An insistence on the relevance of other kinds of knowledge was used as a tool to change the format and the purpose of hatcheries, to restore naturally reproducing populations.

3. Conclusion: Salmon Stories, Co-Production of Cultural and Biological Diversity

This comparison describes two cases where similar threats of salmon extinction were solved in very different ways, despite a number of central commonalities. Of course, a number of factors in this comparison differ, such as the size of the rivers, the size of the populations that live alongside, and their state of industrialization. Still, we consider it worthwhile to engage these differences; the constellation of actors and entities made relevant in the resulting strategies employed to counter prospects of salmon extinction. In our comparison of the Tana and Columbia River we note the relative strength of science, natural resource management and capitalist forces and how these interface with indigenous rights regimes.

Through our comparative exercise, two different approaches to salmon conservation emerge, where the interface between cultural and biological diversity is negotiated differently.

In the Tana River example, the genetic diversity of salmon came to be promoted to the detriment of cultural diversity, as the knowledge, language, skill and cultural practice associated with salmon fishing. Here, salmon stock was first threatened much later than in Columbia River, after the industrial line fishing, the 1970s Tana salmon bonanza, and the introduction of industrial salmon farming. By this time, salmon as food was established as produced elsewhere than the river. This move resulted in two significant redefinitions: Wild salmon became reserved for recreation, and hatchery salmon became akin with farmed salmon, and came to represent a threat to wild salmon. Here, the human–salmon relations were co-produced as particularly nature-centric. The artificially selected salmon became a threat to the biodiversity of salmon in entire river systems. In the salmon management systems that came to be developed quantitative scientific precision was foregrounded, and there was is little or no room, for the inclusion, protection nor development of local knowledge and culture.

The sheer size of the Columbia River, its history of industrialization, both manifested as dams, agriculture and industrial fisheries, brought early hatcheries constructed by capitalist rather than scientific forces, aiming solely to produce salmon in large numbers. Given the many dams of the Columbia River, hatcheries have continued to represent a solution to ongoing salmon troubles. Here, however, tribal rights processes did with time secure rights to manage salmon and water. Arguments of the need to maintain culture and economies prevailed. Here, salmon was successfully re-appropriated within a postcolonial context and re-indigenized. Cultural diversity was promoted, in ways that sought to accommodate the genetic diversity of salmon. Within these new structures, Nez

Perce knowledge of salmon was not only acknowledged, it was provided with new opportunities to transgress spheres of existing use and to develop new purpose.

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Conflict of Interest

The authors declare no conflict of interest.

References

1. Jasanoff, S. *States of Knowledge: The Co-Production of Science and Social Order*; Routledge: London, UK, 2004.
2. Wynne, B. May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide. In *Risk, Environment and Modernity*; Lash, S., Szerszinsky, B., Wynne, B., Eds.; Sage Publications: London, UK, 1996; pp. 44–84.
3. Latour, B. *Politics of Nature: How to Bring the Sciences into Democracy*; Harvard University Press: Harvard, MA, USA, 2004.
4. Asdal, K. Enacting things through numbers: Taking nature into account/ing. *Geoforum* **2008**, *39*, 123–132**.**
5. Ween, G.B.; Riseth, J.Å. Doing is learning: Analysis of an unsuccessful attempt to adapt IK methodology to Norwegian Sámi circumstances. *Act. Borealia* **2011**, *28*, 228–242.
6. Agrawal, A. Dismantling the divide between indigenous and scientific knowledge. *Dev. Change* **1995**, *26*, 413–439.
7. Berkes, F. *Sacred Ecology*, 2nd ed.; Routledge: New York, NY, USA, 2008.
8. Gadgil, M.; Berkes, F.; Folke, C. Indigenous knowledge for biodiversity conservation. *Ambio* **1993**, *22*, 151–156.

9. Posey, D. *Cultural and Spiritual Values of Diversity*; UNEP and Intermediate Technology Publications: Nairobi, Kenya, 1999.
10. Maffi, L. *On Biocultural Diversity*; Smithsonian University Press: Washington, DC, USA, 2001.
11. Tsing, A.L. *Friction: An Ethnography of Global Connection*; Princeton University Press: Princeton, NJ, USA, 2005.
12. Maffi, L. Linguistic, Cultural and Biological Diversity. *Annu. Rev. Anthropol*. **2005**, *29*, 590–617.
13. Millenium Development Goals Report 2005. Available online: http://unstats.un.org/unsd/mi/pdf/mdg%20book.pdf (accessed on 5 June 2011).
14. Pretty, J.; Adams, B.; Berkes, F.; Ferreira de Athayde, S.; Dudley, N.; Hrenn, E.; Maffi, L.; Milton, K.; Rapport, D.; Robbins, P.; *et al*. The intersections of biological and cultural diversity: towards integration. *Conservat. Soc*. **2009**, *7*, 100–112.
15. Dudley, N.; Higgins-Zogib, L.; Mansourian, S. *Beyond Belief: Linking Faith and Protected Areas to Support Biodiversity Conservation*; WWF and Alliance of Religions and Conservation: Manchester, UK, 2006.
16. Posey, D.; Dutfield, G. *Beyond Intellectual Property. Toward Traditional Resource Rights for Indigenous Peoples and Local Communities*; International Development Research Centre: Ottawa, Canada, 1996.
17. Ellen, R.F. What black elk left unsaid: On illusory images of green primitivism. *Anthropol. Today* **1986**, *2*, 8–12.
18. Kalland, A.; Sejersen, F. *Marine Mammals and Northern Cultures*; Canadian Circumpolar Institute Press: Edmonton, Canada, 2005.
19. Hinchliffe, S. Reconstituting nature conservation: Towards a careful political ecology. *Geoforum* **2008**, *39*, 88–97.
20. NOU. *Naturgrunnlaget for samisk kultur (The natural resource base for Sámi culture)*; Samerettsutvalget (Sámi Rights Commission); Report 4: Department of Justice, Oslo, Norway, 1997.
21. Niemelä, E.; Länsman, M.; Hassinen, E.; Brørs, S.; Sandring, S.; Johansen, M.; Muladal, R. *Den Atlantiske laksen i Tanavassdraget. Svingninger i fangstmengder i kilo og antall etter fangstmetode samt faktorer som påvirker fangsten (in Norwegian)*; Report No.6; County Governor of Finnmark: Vadsø, Norway, 2009.
22. Treimo, H. Laks, kart og mening. Det norske laksegenomprosjektet. Ph.D. Thesis, University of Oslo, Norway, 2007.
23. Ween, G.B. World Heritage and Indigenous rights: Norwegian examples. *Int. J. Herit. Stud*. **2012**, *18*, 257–270.
24. Hansen, L.I.; Olsen, B. *Samenes Historie fram til 1750*; Cappelen Akademiske Forlag: Oslo, Norway, 2004.
25. NOU. *Bruk av land og vann i Finnmark i historisk perspektiv. Bakgrunnsmateriale for Samerettsutvalget. (Use of land and water in Finnmark in historical perspective. Background material for the Sámi Rights Commission)*; Samerettsutvalget (Sámi Rights Commission); Report 21; Department of Justice: Oslo, Norway, 1994.

26. Tønnesen, S. Retten *til jorden i Finnmark, rettsreglene om den såkalte Statens umatrikulerte grunn og undersøkelser med særlig sikt på samenes rettigheter (in Norwegian)*; Universitetsforlaget: Oslo, Norway, 1979.
27. Pedersen, S. Varangersamenes fiske i Tana for 300 år siden. In *Varanger årbok (in Norwegian)*; Sør-Varanger og Vadsø Historielag: Kirkenes, Norway, 1988.
28. Pedersen, S. *Bruken av land og vann i Finnmark inntil første verdenskrig. Bruken av land og vann i Finnmark i historisk perspektiv*; Report 21; Norsk Offentlig Utredning (NOU): Oslo, Norway, 1994; pp.13–133.
29. Solbakk, A. *Deatnu-Tana. Den beste lakseelva (in Norwegian)*; Cállidlágádus: Karasjok, Norway, 2011.
30. Ween, G.B.; Lien, M.E. Decolonisation of the Arctic? Nature practices and rights in sub-arctic Norway. *JRCD* **2012**, *7*, 93–109.
31. Ween, G.B. Performing Indigeneity in Human-Animal Relations. In *Eco-global Crimes: Contemporary and Future Challenges*; Ellefsen, R., Larsen, G., Sollund, R., Eds.; Ashgate: London, UK, 2012.
32. Ween, G.B. Domestisering, fenomenologi og ANT. *Norsk Antropologisk Tidsskrift* **2012**, *3–4*, 261–273.
33. Ween, G.B. Resisting the Imminent Death of Wild Salmon. In *Fishing People of the North: Cultures, Economies, and Management Responding to Change*; Carothers, C., Criddle, K., Chambers, C.P., Cullenberg, P.J., Fall, J., Himes-Cornell, A., Johnsen, J.P., Kimball, N., Menzies, C., Springer, E.S., Eds.; Alaska Sea Grant; University of Alaska Fairbanks: Fairbanks, AK, USA, 2012.
34. Lichatowich, J. *Salmon Without Rivers: A History of the Pacific Salmon Crisis*; Island Press: Washington, DC, USA, 1999.
35. Netboy, A. *The Salmon: Their Fight for Survival*; Houghton Mifflin: Boston, MA, USA, 1974.
36. Kroeber, A.L. *Cultural and Natural Areas of Native North America*; University of California Press: Berkeley, CA, USA, 1939.
37. Marshall, A.G. Fish, water, and nez perce life. *Idaho Law Rev.* **2006**, *42*, 763–793.
38. Ackerman, L.A. *A Necessary Balance: Gender and Power among Indians of the Columbia Plateau*; University of Oklahoma Press: Norman, OK, USA, 2003.
39. Walker, D.E., Jr. Nez Perce. In *Handbook of North American Indians, Plateau*; Walker, D.E., Jr., Ed.; Smithsonian Institution: Washington, DC, USA, 1998; Volume 12, pp. 420–438.
40. Walker, D.E., Jr. *Mutual Cross-Utilization of Economic Resources in the Plateau: An Example from Aboriginal Nez Perce Fishing Practices*; Report of Investigations no. 41; Washington State University Laboratory of Anthropology: Pullman, WA, USA, 1967.
41. Anastasio, A. The Southern Plateau: An ecological analysis of intergroup relations. *NW Anthropol. Res. Notes* **1972**, *6*, 109–229.
42. Hewes, G.W. Indian fisheries productivity in pre-contact times in the Pacific Salmon area. *NW Anthropol. Res. Notes* **1973**, *7*, 133–155.
43. Hunn, E.S. Mobility as a Factor Limiting Resource Use in the Columbia Plateau of North America. In *Resource Managers: North American and Australian Hunter-Gatherers*; Williams, N.M., Hunn, E.S., Eds.; Westview Press: Boulder, CO, USA, 1982; pp. 17–43.

44. Schalk, R.F. Estimating Salmon and steelhead usage in the Columbia Basin before 1850: The anthropological perspective. *NW Environ. J.* **1986**, *2*, 1–29.
45. Campbell, S.K.; Butler, V.L. Archaeological evidence for resilience of Pacific Northwest Salmon populations and the socioecological system over the Last ~7,500 Years. *Ecol. Soc.* **2010**, *15*, 7. Available online: http://www.ecologyandsociety.org/vol15/iss1/art17/ (accessed on 4 May 2011).
46. Taylor, J.E. *Making Salmon: An Environmental History of the Northwest Fisheries Crisis*; University of Washington Press: Seattle, WA, USA, 1999.
47. Augerot, X. *Atlas of Pacific Salmon: The First Map-Based Status Assessment of Salmon in the North Pacific*; University of California Press: Berkeley, CA, USA, 2005.
48. Blumm, M. *Sacrificing the Salmon: A Legal and Policy History of the Decline of Columbia Basin Salmon*; BookWorld Publications: Den Bosch, the Netherlands, 2002.
49. Colombi, B.J. Dammed in region six: The Nez Perce tribe, agricultural development, and the inequality of scale. *Am. Indian. Q.* **2005**, *29*, 560–589.
50. Ween, G.B. Sjølaksefiskets betydning for sjøsamisk kultur. In *Sjølaksefisket i Finnmark i et historisk perspektiv*; Pedersen, S, Ed.; Utredning for Finnmarkskommisjonen; Sámi Allaskuvla & SEG: Tana, Norway, 2010; pp. 85–107.
51. NOU. *Til laks åt alle kan ingen gjere: Om årsaker til reduksjonen i den norske villaksbestanden og forslag til strategier og tiltak til å forbedre situasjonen (On the causes of the reduction in the Norwegian wild salmon stocks and the proposed strategies and measures to improve the situation)*; Report 9; Ministry of Environment: Oslo, Norway, 1999,
52. St.prp. no. 79 (2001–2002). *Om opprettelse av nasjonale laksevassdrag og laksefjorder* [About the establishment of national salmon rivers and fjords]; Ministry of Environment: Oslo, Norway, 2002.
53. St.prp. no. 32. 2006–2007. *Om vern av villaks og ferdigstilling av nasjonale laksefjorder (About the protection of wild salmon and completion of national salmon fjords)*; Ministry of Environment: Oslo, Norway, 2007.
54. Lien, M.E.; Law, J. Emergent aliens: On Salmon, nature, and their enactment. *Ethnos* **2011**, *76*, 65–87.
55. Colombi, B.J. The Economics of dam building: Nez Perce tribe and global capitalism. *Am. Indian Cult. Res. J.* **2012**, *36*, 123–149.
56. Rother, H. *The Pacific Northwest Salmon Crisis: Snake River Drawdown and the Impact on Multimodal Transportation with an Emphasis on Wheat Movements in Nez Perce County, Idaho*. MSc Thesis, University of Idaho, Moscow, ID, USA, 2001.
57. Colombi, B.J. Salmon and His People: Nimiipuu Encounters with Global Capitalism. In *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*; Colombi, B.J., Brooks, J.F., Eds.; School for Advanced Research Press: Santa Fe, NM, USA, 2012; pp. 183–206.
58. Columbia River Inter-Tribal Fish Commission. 2010. Available online: http://www.critfc.org/ (accessed on 25 August 2012).
59. Wilkins, D.E.; Lomawaima, K.T. *Uneven Ground: American Indian Sovereignty and Federal Law*; University of Oklahoma Press: Norman, OK, USA, 2001.

60. US House of Representatives Testimony of Arthur M. Taylor, Chairman of Fish, Water, and Wildlife Subcommittee, Nez Perce Tribal Executive Committee. *Committee on Resources, Subcommittee on Water and Power*, Field Hearing, Lewiston, Idaho, ID, USA, 31 May 1997.
61. Paine, R.T. A Conversation on Refining the Concept of Keystone Species. *Conserv. Biol*. **1995**, *9*, 962–964.
62. Cederholm, C.J.; Johnson, D.H.; Bilby, R.E.; Dominguez, L.G.; Garrett, A.M.; Graeber, W.H.; Greda, E.L.; Kunze, M.D.; Marcot, B.G.; Palmisano, J.F.; *et al*. Pacific Salmon and Wildlife-Ecological Contexts, Relationships, and Implications for Management. In *Wildlife-Habitat Relationships in Oregon and Washington*; Johnson, D.H., O'Neil, T.A., Eds.; Oregon State University: Corvallis, OR, USA, 2001; pp. 628–684.
63. Garibaldi, A.; Turner, N. Cultural Keystone Species: Implications for Ecological Conservation and Restoration. *Ecol. Soc.* **2004**, *9*, 1. Available online: http://www.ecologyandsociety.org /vol9/iss3/art1/ (accessed on 4 May 2011).
64. Colombi, B.J.; Brooks, J.F. *Keystone Nations: Indigenous Peoples and Salmon across the North Pacific*; School for Advanced Research Press: Santa Fe, NM, USA, 2012.
65. Ot.prp. no. 53, (2002–2003). *Om lov om rettsforhold og forvaltning av grunn og naturressurser i Finnmark fylke* (The Finnmark Act); Norwegian Parliament: Oslo, Norway, 2003.
66. Porsanger, J.; Guttorm, G. Working with Traditional Knowledge: Communities, Institutions, Information Systems, Law and Ethics. Writings from the Árbediehtu Project on Sámi Traditional Knowledge. *Diedut* **2011**, *1*, 20.
67. Hess, M.; Rabe, C.D.; Vogel, J.L.; Stephenson, J.J.; Nelson, D.D.; Narum, S.R. Supportive breeding boosts natural population abundance with minimal negative impacts on fitness of a wild population of Chinook salmon. *Mol. Ecol.* **2012**, *21*, 5236–5250.
68. Araki, H.; Cooper, B.; Blouin, M.S. Genetic effects of captive breeding cause a rapid, cumulative fitness decline in the wild. *Science* **2007**, *318*, 100–103.