

# Indigeneity, science and difference: notes on the politics of how<sup>1</sup>

Solveig Joks<sup>a</sup> and John Law<sup>b</sup>

<sup>a</sup> Sámi Allaskuvla, Sámi University of Applied Science,  
Hánnoluohkká 45, NO-9520 Guovdageaidnu, Norway  
solveig.joks@samiskhs.no

<sup>b</sup> Department of Sociology, The Open University, Walton Hall,  
Milton Keynes MK7 6AA, UK, [John.law@open.ac.uk](mailto:John.law@open.ac.uk)  
and  
Centre for Science Studies, Department of Sociology,  
Lancaster University, Bailrigg, Lancaster LA1 4YN

11<sup>th</sup> October 2017; ThePoliticsOfHow20171011.docx

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<sup>1</sup> We are grateful to Nils Henrik Måsø, Sonja Måsø, Eva Måsø and Ole Johan Gaup for their hospitality and their willingness to share their knowledge of Deatnu salmon. Solveig would also like to thank the many fisherpeople who so willingly shared their knowledge with her in the course of her fieldwork, the Sámi Allaskuvla for financial support for the PhD-research on which this paper is based and her supervisor Britt Kramvig for her support during the fieldwork and the writing of her dissertation. John would like to thank the Centre for Advanced Study in Oslo, Norway which funded and hosted the research project 'Arctic Domestication in the Era of the Anthropocene' during the academic year of 2015/2016 and the work of writing of this paper.

## Abstract

This paper explores a colonial controversy: the imposition of state rules to limit salmon fishing in a Scandinavian subarctic river. These rules reflect biological fish population models intended to preserve salmon populations, but this river has also been fished for centuries by indigenous Sámi people who have their own different practices and knowledges of the river and salmon. In theory the Norwegian state recognises traditional ecological knowledge (TEK) and includes this in its biological assessments, but in practice this does not happen, so Sámi fishing practices and the realities that they enact are disappearing. The paper explores how to conceptualise colonial differences in knowing. Drawing on recent anthropology, it asks how (scientific) ‘settler’ and (Sámi) ‘nomadic’ enact worlds and their realities, suggesting that unlike the latter, the former create a single reality intolerant of alternatives. The focus is thus on a ‘politics of how’, and the ways in which colonial realities and knowledges might intersect less destructively.

## Keywords

Nature, environmental controversy, indigenous knowledges, biological modelling, TEK, Sámi

## Ontology

Ontology, once a branch of philosophy, is now central to STS where it typically comes in the form of three claims: one, that realities are enacted in practices; two, that since there are different practices there are also different enacted realities; and three, that these practices and realities overlap and weave together to generate ontological multiplicity.<sup>2</sup> Several political correlates follow. First, since reals are embedded and enacted in webs of practices, realities cannot be easily shifted or willed into being: there is no comfort here for ‘alternative facts’ (Law 2009). Second, since realities are not given and there are different reals, it becomes important to attend to a ‘politics of what’ as well as a ‘politics of who’ (Mol 2012). And third, as a part of this, it also becomes important to attend to the way in which practices engage or fail to engage with difference, or to what we might think of as a ‘politics of how’.<sup>3</sup>

In this paper we explore the political and analytical whos, whats, and hows of a colonial controversy: the imposition of state rules to limit salmon fishing in a Scandinavian subarctic river. These rules, which reflect biological salmon statistics and the projections of fish population models, are intended to preserve salmon populations. But this is a river that has also been fished for centuries by indigenous Sámi people who have their own different practices, and understandings of the river and salmon. In theory the Norwegian state recognises traditional ecological knowledge (TEK) and this is included in the assessments made by biologists, but in practice this does not happen. As a result, a range of Sámi fishing practices including driftnet fishing (on which we focus) are being extinguished, and the realities that go with those practices are also disappearing.

We are not neutral observers, and take it that there are several reasons why Sámi fishing practices and the realities that go with these should be sustained. Most obviously, this is a matter of colonial

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<sup>2</sup> There are many accounts. See, for instance, Mol (1999, 2002), Viveiros de Castro (2004), Latour (2004b, a), Law (2004), Henare et al. (2007), Thompson (2007), Escobar (2008), Green (2013), Woolgar and Lezaun (2013), and Pickering (2017).

<sup>3</sup> A sensibility to the ‘politics of how’ underpins much contemporary work in STS. See, for instance, Callon *et al.* (2009), Latour (2013), Waterton and Tsouvalis (2015) and Verran (2002).

politics: a wrong is being inflicted on Sámi fishers and long-standing practices are being stifled. Again, since Sámi fishing practices have been sustainable for centuries, it seems likely that there are lessons here for outsiders that it might be sensible to explore (Berkes 2012). But underpinning our account is another concern that is both political and practical. As we have just noted, we are interested in how to work, and work well, across difference (Verran 2002). Thus, if the practices of Sámi fishers on the one hand, and fisheries biologists (and policymakers) enact different worlds, then the issue is: how might these intersect in ways that are less destructive? Our core focus, then, is on difference and on how this is done.

### Drift net fishing

An ethnographic moment. We are in the heart of Sápmi, the Sámi area in northern Scandinavia. We have driven more than 200 miles across the tundra and along the banks of the Deatnu River in Finnmark, the northernmost county in Norway, to Solveig's childhood village.<sup>4</sup> We have been warmly received by her friends Nils-Henrik and Sonja, and their daughter Eva. Eva, who lived and worked for fifteen years in Oslo, is now back in Sápmi with her reindeer-herding partner and their child. We are sitting in their kitchen fifty metres from Deatnu looking across to Finland, for though it was not always so, Deatnu now forms the (colonial) border between Norway and Finland. Nils-Henrik has fished since childhood, and John is asking him about the names for different sizes of salmon. Yesterday they caught a large male fish, a goadjin, which is not so good to eat, though okay to smoke. Better, says Nils-Henrik, are small luossa, up to ten kilos, though there are many names for different kinds of salmon. As he talks about where they swim, the various kinds of salmon, and how you catch them Eva listens attentively. At one point she says: 'When I was young I didn't learn about driftnet fishing. My brother learned, but I didn't.' Now, however, she wants to learn. In fact, she is just starting. Yesterday she went out in the boat with her father for the first time. The reason she is not out with him now is that it is windy and difficult to control the boat.

In driftnet fishing two people go out in a narrow boat around five metres long. When they get to the right place in the river they cut the outboard, and the person sitting on the bow sculls very gently downstream with the current. The second person stands towards the stern and pays out a net. The net, thirty or forty metres long, spreads out across the current towards the middle of the river. Held up by small floats, it also trails along the bottom of the river, making a gentle upstream curve as it drags between the boat at one end and a big float at the other. A part of the skill is to hold this curved shape as you drift slowly downstream, but you also need to know where there are rocks on the river-bed so that might catch the net. So one person rows, and the other holds the end of the net in one hand. S/he senses if it has snagged, or whether a salmon is caught in the net. In the other hand s/he holds a long pole feeling the river bed, punting, and occasionally banging the side of the boat to frighten fish into the net.

### Rules

Deatnu, which is one of the great salmon rivers of the world, has been attracting tourists since the 1850s (Solbakk 2011). Those who live there may fish with a rod from the bank or from a boat (many tourists do this too), use a driftnet, or a weir to drive the salmon into a v-shaped net. There are strict rules about who can and cannot fish with which techniques in which periods and at what time of day (Joks and Law 2017). Roughly speaking, only a particular group of local people can net. Various points arise.

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<sup>4</sup> Deatnu is known in Norwegian as the Tana, and in Finnish as the Teno.

1. These rules are complex. Indeed, though there is co-ordination, the regulations are relevantly different on the Norwegian and the Finnish sides of the river.
2. They are deeply restrictive. Everyone is constrained, but for many local – often Sámi- – people the consequences are profound. Driftnet fishing is limited to a smallish number of people who live along the river, and the times when they can fish have been cut, and cut again. Sámi historian Aage Solbakk (2016) reckons that fixed net and weir fishing have fallen 70% since the middle nineteen eighties but the cuts continue: in 2017 driftnet fishing was restricted to four days a year.
3. These rules are seriously enforced by the Deanučázádaga Guolástanhálddahus / Tanavassdragets Fiskeforvaltning (The Tana Watercourse Fish Management Authority).
4. The restrictions reflect the authorities' concerns about overfishing together based on salmon population data and the projections of fish stock models. A Deatnu 'Working Group' of Finnish and Norwegian experts collects statistics, models fish stocks, and runs population projections (Erkinaro et al. 2012). Their concern (and conclusion) is that many Deatnu salmon subpopulations are under threat from overfishing. Sami people tend to agree that there are fewer salmon, but worry about overfishing in quite different ways.

So this is a policy controversy that is also a disagreement between the practices of biology and those of TEK, where there is an almost complete power asymmetry between the protagonists, and the policy being imposed will push Sámi drift net and weir fishing to extinction. Perhaps, then, Eva is only just in time to learn the craft of fishing from her father. Or perhaps it is already too late.

### History, politics, and difference

To understand this better we need some context. Briefly, over five centuries Sápmi, the area lived in by Sámi people, was colonised by five nation states: Denmark, Norway, Finland, Sweden and Russia. Unequal trading relations were imposed. Borders were created which cut long-distance annual paths of reindeer migration and kinship relations. Settlers came from the south. Extraction industries became important (most recently oil and gas). Farming was patchily attempted though often abandoned. Christianity became obligatory (though nineteenth century Laestadian Lutheranism also became a tool of Sámi resistance). In many places it became shaming to talk Sámi, and the language was forbidden in school. Indeed, it became shaming for many to be known as Sámi. And then, as the states tightened their grip they did all the things that states do: they taxed, they mapped, they counted and they regulated.<sup>5</sup> Land, people, fishing, the numbers of reindeer, and most recently, biodiversity, all were tallied, known through those tallies, and were – are – subject to state regulation. Sámi ways of being were and are being squeezed (Sara 2009, Benjaminsen et al. 2015, Johnsen, Benjaminsen, and Eira 2015).

Other factors have also been at work. Economic prosperity and technical change mean that most of the time reindeer herders live in houses, not lávvu (tents), and use snowmobiles and quad bikes. And though some would argue about the allocation of resources, since 1945 Scandinavian social democracy, viciously normalising though it has also been, has brought the benefits of a welfare state. But the last thirty years – and large scale protests – have seen other kinds of changes too. Norway now formally recognises the rights of its indigenous people (Norway signed ILO Convention 169 in 1990.) Education in the Sámi language is available in some schools in Sámi speaking areas, and in the Sámi Allaskuvla specific subjects – journalism, teacher and kindergarten training, duoji (handicrafts), and reindeer herding – are taught at university level in Sámi. There is a Norwegian

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<sup>5</sup> The exemplary account is Mitchell (2002)

Sámi parliament, the Sámediggi.<sup>6</sup> Around 95% of the land in Finnmark has been returned to the joint administration of the Sámediggi and the county. Land right claims by traditional owners are only patchily recognised and the process works badly, but the doctrine of legal terra nullius in absence of settlement has disappeared.

So, here is the bottom line. On the one hand, in some ways things have changed for the better in the relatively recent past. But on the other, Sámi ways of being are still under pressure, and Sápmi is in many respects colonial. So fishing restrictions are matched by draconian rules about reindeer herding and nature conservation while there is also constant pressure on land and land use. But what to make of this? And what to make of the limits to fishing by people such as Nils-Henrik?

### Dwelling and difference

To think about this, we need a strategy for thinking about the significance of difference. Two contrasting points catch why getting this right is so difficult.

First, difference is ubiquitous. Albeit often unrecognised, it is also within. As Annemarie Mol (2002) notes, it is hard at work even within the practices in a single hospital. But if it is everywhere, then when does it count as significant and when does it not? How and when should it be brought out? How can we avoid the danger that no particular divide is taken to be significant? Such is the first issue.

The second tugs in the other direction. This is because unless we are careful, significant difference becomes essentialised and/or binary: there is 'Sámi' this versus 'Norwegian' that. Though some indeed propose that division, both theory and the colonial history that we have just sketched suggest that however significant they may be, differences are multiple, all ravelled up and fractal (Mol 2002, Law 1999, Strathern 1991). So in north Norway anything that is 'Sámi' includes 'Norwegian', and vice-versa. And this reasoning applies just as much to the question: who is Sámi? If identities are mobile, complex, often blurred, and the effect of histories of power, then the answer cannot be straightforward. In practice, for instance, the Sámediggi treats this as a matter of both self-perception and language. If you, your parents, grandparents or great grandparents had Sámi as a home language, and you also perceive of yourself as Sámi, then you can register to vote (Sámediggi n.d.). Overall, however, the lesson is clear. There is no one good way of making such cuts. They are fractal and each includes the other at every level of scale. The lesson is that what is best in terms of making divisions depends on what you are trying to achieve.

So how to think about what is happening for fishing people? To think about this in the context of a politics of how, we want to make an analytical cut between two modes of living and their social, spatial and temporal logics. To do this we borrow from Mazzullo and Ingold who distinguish between nomadic and settled forms of dwelling. They write that for people who are settled:

'To leave one's place of abode is ... to take a step upwards, from a smaller, more exclusive place to a larger, more inclusive one'. (Mazzullo and Ingold 2008, 30).

Here the world is experienced as a set of nested boxes. In STS language, we might say that settlers enact regional forms of spatiality (Mol and Law 1994) in which the world is experienced and performed as an isometric space-time box, a single 'one-world world' (Law 2015). This box-world is partitioned into spatial and temporal sections containing people, animals and other somewhat stable objects with particular attributes that relate together in more or less predictable ways. And at least in principle it is possible to identify those attributes and relations in ways that are relatively

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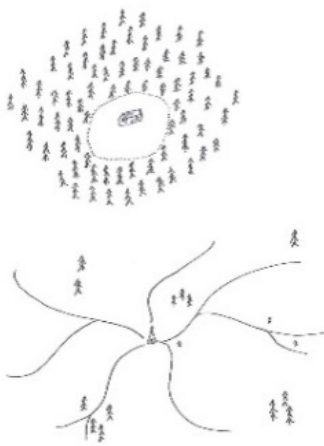
<sup>6</sup> There are also Sámi parliaments in Finland and Sweden.

general. Such, for instance, is the assumption that underpins the biology of salmon populations discussed below.

However, Mazzullo and Ingold are much more interested in the alternative way of being, that of nomadism. For herders, at least in the past, the world was not like this:

‘For what is called the forest, meahcci ..., is understood not so much as a tree-covered expanse as a texture densely interwoven from the paths along which people carry on their activities of herding, fishing, berry-gathering.’

Ingold visualises the distinction so:



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The message is that for herders the world is a set of relations arising from embodied movements. People do not ‘exist in places’, but ‘places occur along the life-paths of people.’ (Mazzullo and Ingold 2008, 32). Notice the reversal. Movement comes before space and place. Tasks arise when they arise and clock time has little or no relevance in this world. Indeed, the weather is ‘[t]he only master of deadlines’ (Mazzullo and Ingold 2008, 34). Nothing can be anticipated – except the unexpected.

‘[W]hat counts is not punctuality but readiness, not the precise targeting of a point in time but a continual monitoring of the way things are going, in a world in which everyone and everything is in movement, each at their own pace, along alternately converging and diverging paths.’ (Mazzullo and Ingold 2008, 34)

Put in STS language, the spatial logic of herding and its taskscapes is not regional, but variably relational or fluid, enacting realities that are contingent and uncertain (Mol and Law 1994, de Laet and Mol 2000). They are far removed from the single world with its space-time isometry being enacted (but simultaneously presupposed) by the practices of regionalism. This also means that the aspirations to general explanation that belong to settlement do not arise. There is no single hidden order behind experience waiting to be revealed. This is not a one-world world. But there is something else too. Mazzullo and Ingold do not explore this, but central to this world of encounters with powerful actors is the importance of respect. Lively and powerful entities such as the weather, or forests and lakes are to be treated with caution – indeed with deference. Life is uncertain. As it unfolds it depends on such actors. Failure to show respect may lead to disaster. In practice, then,

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<sup>7</sup> Mazzullo and Ingold (2008, 31).

Sámi people often thank those actors, or bless them (Law and Østmo 2017), and they also set limits to what they ask and expect of them.

### The logic of fishing

Nils Henrik is not a nomad. He has lived all his life in a house on the banks of Deatnu. But though the terminology needs adjusting, this focus helps us to understand his practices of fishing.<sup>8</sup> So, following Mazzullo and Ingold we want to argue that the logic of fishing is relationally fluid. To use drift nets is to live in an unfolding world that is in a state of constant change. Nils Henrik knows about water levels in his part of Deatnu. He knows about the significance of the time of day, the moment in the seasons, the way they have unfolded, the predispositions of the many kinds of salmon, the activities of others on the river, the temperature, sun or cloud, wind, and the rain or snow. All are on the move, and all have to be handled together. Moment by moment, when you are out in the boat with the net in your hand. But also when you are thinking about whether or not to go fishing, or where. '[W]hat counts is not punctuality but readiness, not the precise targeting of a point in time but a continual monitoring of the way things are going', Mazzullo's and Ingold's words exactly describe the realities of driftnet fishing on Deatnu. This is not a world in which there is much predictability.

At the same time fishers such as Nils Henrik worry about the salmon. They don't work with numbers, but they do ask: will the salmon come? Will they keep on coming? And, importantly, if there are fewer of them coming, then why? There are debates (Joks and Law 2017), but caution and respect for river and salmon are central to drift net fishing. This expresses itself in a range of ways. First, you never take more salmon than you need. So Nils Henrik used a weir to catch fish but stopped, partly because he needed to check it each morning, but partly because he didn't need the fish. Respect, then, is partly about setting limits: you take what you need but no more.

And then there is a sense of place, of modesty. Here is an excerpt from Solveig's field notes. She is out on the Deatnu fishing with Petter Somby:

'We take a break. Petter rows to the bank, and we drink coffee. And then, while we are sitting on the bank, we see a boat. They are fishing. We watch as they catch a salmon. Solveig calls out. 'Can you see? If we'd been on the river that fish could have been ours.' 'No,' says Petter. 'That's not right. Because that fish was not meant for us' He adds: 'We can't catch the fish that are already caught.'<sup>9</sup>

Modesty, a sense of limits, a relational respect for individual fish, about what is proper and what is not, about what is possible and what is not, all of these are at work. A sense of propriety, of what is fitting, respect for what is appropriate, these are threads that run through Sámi fishing practices. A fish gives itself, or it does not. This expresses itself, too, in an aversion to numbers: you do not count the fish you have caught. To do so would be disrespectful. But neither do you take the wrong kind of salmon. So you do not take breeding salmon, čáhppes guolli (black fish). Probably you do not go fishing when salmon are about to breed anyway, but if you catch a black fish you return it. And then again, it is also important to fish in ways that leave the salmon in peace. Petter Somby:

'Nowadays there are so many people fishing. And of course they will catch fish if they fish day and night. The problem is that the fish never get any peace, not even for an hour.' (Joks and Law 2017).

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<sup>8</sup> Despite the Deleuzian resonances, we here confine our commentary to Mazzullo and Ingold.

<sup>9</sup> For this quote in another context see Joks and Law (2017).



All this means that you do not go to the river as a pastime. You never play with fish. Fishing is emphatically not a recreation, a hobby, or a form of sport. The idea of catch and release is morally repugnant. Instead, fishing is a serious task, a part of living, a way of coping with, and living from and in relation to a difficult environment. It is an activity conducted respectfully with appropriate and respectful limits.

## Collision

The following morning we talked again with Nils Henrik. Using the big Sámi-Norwegian/English dictionary he commented that many young people don't know the right words or use them properly. They may, for instance, use the term goadjin for any male salmon, not just those that are very large. As we talked he was looking from time to time at the Deatnu out of the kitchen window hoping to fish – and when he found a neighbour to row the boat he was off. All of which is Mazzullo's and Ingold's nomadism in practice. But it tells us only one half of the story. The fluid part. Because alongside this there are the rules and regulations. And now we get to the crunch.

In 2016 Nils-Henrik was limited to eleven 24-hour fishing periods. (As we noted above, in 2017 the figure was four).<sup>10</sup> So as we drank coffee with him on a Thursday morning he also knew that unless he got out on the river before midday he would not be fishing again until Monday. Even without the rules he would have been keen to get out on the river. The state of the weather, the river, the activities of other fishers, and yesterday's excellent catch all told him that this was a good moment to fish. But here the division signalled by Mazzullo and Ingold also comes powerfully into play. Because what is happening in this fractal world is that a fluid logic with its responsive opportunity-seizing temporalities is colliding with the bounded clock time embedded in the state and its regulations. The latter has no place in the fluidities of fishing, is ignorant of those fluidities, and knows nothing of the competence of local people and their unfolding preparedness because it forces them to fish at predetermined and possibly inappropriate times.

Solveig has witnessed this collision many times. The rules stop you fishing when the conditions are right. Or they stop you fishing in another section of the river even though conditions are right there but not in your own. Or the rules allow you to fish but there is no point in doing so, or you can't because there is no one to fish with, the water is too low or high, or there are too many tourists. Thus though they are both present, the world of rules and the world of fishing are indeed, just that, worlds apart. As we have just said, the world of the rules is ignorant of the fluidities of the world of fishing and their relational contingencies. It enacts another kind of reality, a partitioned space-time container, a one-world world.

So why does this matter? The answer is encapsulated in Eva's predicament. She wants to learn how to fish so she can pass the skill to her son. But this is not going to happen unless she can go out in the boat with her father and watch and practise and talk with him. Learn from him not only how to control a boat and handle a net, but also how the river works, where the deep channels run, where the salmon are likely to be swimming, and where there are rocks that might snag the net. And all this will take time and patience and practice – together with the ability to seize the moment. But this relational time is being taken away. This matters to Eva and her family, but it matters more broadly too. And here is the bottom line. With fishing limited to four days a year it will become nearly impossible for young people to learn the art of driftnet fishing. Indeed, perhaps it already is. A fluid set of reals, a tradition, its knowledges, and a whole way of living will all have disappeared. The settled reals of power will have choked a fluid alternative. And this is why we choose to attend to

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<sup>10</sup> The regulations restricted fishing to between noon on Monday and Thursday from 20<sup>th</sup> May to 15<sup>th</sup> June. In 2017 fishing has been further restricted from 1<sup>st</sup> to 5<sup>th</sup> June between noon on Monday and Wednesday.



this particular difference and make our analytical cut in this particular way. We want to protest about this process of ontological suffocation. We want to understand it as a malevolent expression of the politics of how.

## The Working Group

To see how this works we need to move to the world of fish stock modelling:

‘The basic procedure of this approach is (1) the definition of stock-specific spawning targets (i.e. the number of spawning female salmon needed to fill the production potential of a stock), (2) an estimation of the number of spawning females in a stock after a fishing season, and (3) a comparison of the target and the spawning stock estimate.’ (Erkinaro et al. 2012, 5)

This comes from the official Tana River Working Group which adds that Deatnu production potential<sup>11</sup> and stocking targets are not being fulfilled (Erkinaro et al. 2012, 5), that the number of returning salmon is falling, and that some of **its** thirty genetically distinct salmon populations are under threat. The thrust of the report is that fishing (‘exploitation’) needs to be urgently reduced, and we have seen that this is reflected in policy.

For many Sámi the findings of the Working Group are contentious. For instance, they are concerned about the predators now protected by environmental legislation. Against this, the Working Group argues that:

‘There is very little biological basis for arguing that naturally occurring predators are a threat to salmon, and predation must rather be viewed as an integral and natural part of the ecosystem.’ (Erkinaro et al. 2012, 5)

Sámi critics worry, too, about the statistics, noting that in some years there are more salmon than others. The Working Group indeed wants to improve those statistics (these mostly come from less than ideal sample catch statistics (Erkinaro et al. 2012, 45ff)), but argues that despite annual variations the long-term trend is clear, and it is down. Then there are debates about the role of tourist fishing (Erkinaro et al. 2012, 26). And finally, there is the status of TEK itself. Though the Working Group is legally required to consider this, locals find that their knowledge being marginalised, and the Working Group argues that the role for TEK is necessarily limited:

‘LEK and TEK is largely oral and visual, intuitive, experience based, subjective and highly qualitative, while science is based on systematic data within a model- or hypothesis-based framework which, through the use of a strict sampling design, are [sic] largely objective and quantitative.’ (Erkinaro et al. 2012, 29-30).

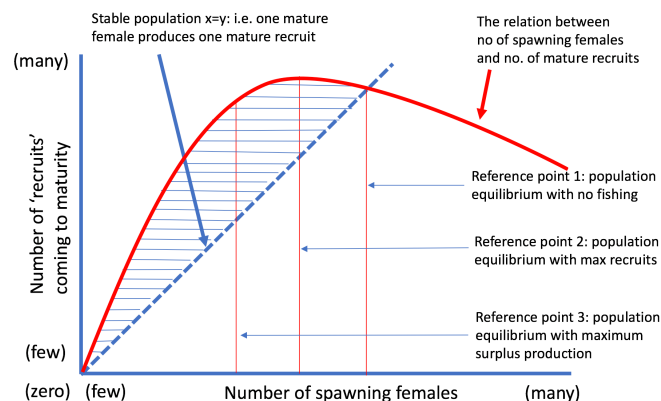
As is obvious, this represents a particular and contestable view of the character of scientific inquiry (Law and Joks 2017). There is no space for the qualitative in this world but, and more important for our argument, the models are also enacting a regional, settler, logic. How do they work? The answer is that they assume that there is a single one-world world. Then they assume that behind that world there are discoverable mechanisms and/or correlations which generate the complexities of everyday experience. And this leads us to the politics of how, because there is little space for alternative stories about fish in this world, and there is certainly no space for alternative realities. ‘There is very little biological basis for arguing that naturally occurring predators are a threat to salmon.’ Extra-biological reality-differences are not being tolerated here.

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<sup>11</sup> Production potential is the maximum number of smolt that can be produced (Erkinaro et al. 2012, 61)

## Stock-replacement modelling

The history of fish population modelling is complex (Holm 1996) and lies beyond the scope of this paper. However, its general approach can be illustrated by this figure which is typical of many that appear in the literature.<sup>12</sup>



This sets the number of spawning fish (x axis) against the number of mature 'recruits' (y axis). The issue is: how many recruits join the population for each spawning fish? If one spawner generates one recruit the result is the diagonal hatched line running from the origin. Above that line and stock size increases; below and it falls. The hump-shaped curve indexes the idea that if there are few breeding salmon they are likely to produce more than one recruit, while if there are many then density-dependent competition for scarce resources will reduce that number. The basic suggestion is that any given environment can only sustain so many salmon.<sup>13</sup> The reference point lines show three different possible equilibria between new recruits arriving in the population and old fish departing. If there is no fishing then number one applies: lots of spawners are just reproducing themselves because there are no resources for additional recruits. If you cut the number of spawners (for instance by fishing) then the number of new recruits is maximised. That is the middle line, number two. And if you cut the number of spawners yet again then you get fewer new recruits in total but you get more per spawning adult. The adults are more productive. That is number three.

There are many uncertain biologically relevant issues here. Determining the maximum carrying capacity is an art that depends, *inter alia*, on knowledge of river conditions and the area covered by the river. And again, determining what will count as a population is usually less than obvious and has often been debated in fisheries science. Generally, however, with the increasing concern with genetic and behavioural biodiversity, what counts as a population has become more locally specific. As we saw earlier, the Working Group sees the need to protect up to thirty separate salmon populations in the Deatnu and its tributaries.

So what are the implications of stock modelling? We want to make three observations. First, as we have noted, you cannot enter the world of fish stock modelling and the policies that follow from this unless you are also willing to count. The reasoning within those models can often be narrated, but their inputs, their mechanics, and their outputs are quantitative. As we have seen, this is one of the

<sup>12</sup> We have composed this ourselves, but for similar figures see, for instance, Milner *et al.* (2003), Potter *et al.* (2003) and Hinder *et al.* (2007)

<sup>13</sup> Many parametric stock-recruitment models assume an n-shaped recruitment curve of this form, though the shape of that curve varies and those differences are not trivial. See Hinder *et al.* (2007).

reasons why TEK is marginal to the thinking of the Working Group. It is also one of the reasons why Sámi fishers, for whom counting is immodest and disrespectful, find the reasoning of the biologists alien.<sup>14</sup>

Second, fish stock modelling is not just about fish populations. It is also about economics. Unsurprisingly, then, ‘nature’ and ‘culture’ are being done together.<sup>15</sup> What counts as fishing too much? How many fish should you take if you want to minimise effort-to-catch ratios on a long-term basis? Or is this beside the point for tourist fishing? And what is the maximum sustainable yield? These are the kinds of questions that the models address – often in the context of catastrophic over-fishing (Walters and Maguire 1996). Crucially, then, they are about both production and biology. And it is this double focus – fish and economics – to which the three reference equilibrium lines in the figure above are pointing. This is thinking in a productivist mode (Reinert 2014). In the context of Deatnu it is about the level of fishing that can be sustained taking tourists and local people together. Again, this is far removed from the Sámi world of restrained and respectful fishing.

Third, while different rivers have particular attributes, fish stock modelling belongs to the logic of settlement. There is no space for alternative realities, because it assumes that the same kinds of population dynamics are at work in different populations (Hindar et al. 2007, 12ff). This is why knowledge can be generalised, and models created for one river can be moved to another. Put performatively this means that fisheries science modelling enacts a world in which general causal mechanisms are at work behind the specificities of particular rivers. Populations are being animated by general mechanisms such as density-dependent competition, or rates of exploitation. Again we see that this a world quite unlike the fluidities of Sámi fishing practices. The differences between the two are simultaneously political, epistemological, ontological and stylistic. They are about the ways in which realities are assembled. About recognising difference, or not. About tolerating difference, or not. In short, they are also about the politics of how.

### Consequences

We started by saying that we are partisan. Our position is that Sámi driftnet fishing is being wrongly squeezed out of existence by a dominant set of fisheries management practices. Our view that this is unacceptable is stiffened by the fact that analogous forms of pressure are unfolding across Sápmi, in contexts that include reindeer herding (Benjaminsen et al. 2015), duck hunting, and lake fishing (Law and Østmo 2017). This is unacceptable in a country that has signed ILO Convention 169 and claims to recognise the rights of its indigenous people. We have suggested that it is also unwise even in terms of state-sponsored conservation policy. We do not need to subscribe to an Edenic vision of Sámi fishing practices to suggest that it is perverse to extinguish a tradition that has maintained sustainable relations between people, river and fish for centuries. But we want to conclude by returning to the politics of how.

We have seen that the Tana River Working Group argues that TEK is unlike biology because it is oral, visual, intuitive, experience-based, subjective and qualitative. This argument reproduces an asymmetrical version of the divide explored by Mazullo and Ingold which may, with the STS-inflected additions discussed above, be summarised so:

SETTLER	NOMAD
region	fluid

<sup>14</sup> There are similar differences about quantification in reindeer herding. See Reinert (2014).

<sup>15</sup> There are large literatures on this. For a seminal text see Cronon (1995).

time and space within which there is movement	movement before time and space
clock time	encounter
partition	pathways
scale	fluidity
underlying mechanisms	contingency
prediction	opportunistic preparedness
mastery	modesty
a single world	?openness
nature and culture separate	'nature' and 'culture' indistinguishable

This table is less than satisfactory. Its binary form enacts a partitioned 'settler' way of being, ignores the fractal character of difference discussed earlier, and the fact that science in practice is fluid, heterogeneous and impure (Latour 1993). These cautions noted, its binarism is useful in thinking about a politics of how. To recap, the 'politics of who' is about people, individually and collectively, their rights and duties, and about how they are or should be treated within the polity. The 'politics of what' reflects the widespread STS, feminist, and anthropological sensibility to performativity to argue that realities are not given but are generated in practices, and asks whether alternative and better realities might be enacted. Then the 'politics of how' attends to the ways in which realities are enacted in practices, how those practices recognise and handle difference, and how the latter might be better handled (Verran 1998).

Now consider the administrative, science-based 'settler' practices on the left of the table. As we have seen, these classify, order, partition and enact a one-world world. They usually distinguish culture from nature, treating culture as multiple, subjective, normative, and contested, and nature as a single reality shaped by general mechanisms that may be discerned by specialists who tend to be unforgiving of alternative accounts of natural reality and intolerant of difference with respect to the one-world world of nature.

Mazullo and Ingold's nomadism works quite differently. As we have seen, here the world is fluid, a set of non-binary pathways and encounters with powerful and lively actors worthy and demanding of respect. Movement precedes time and space, and action grows out of responsive and contingent preparedness. The world is somewhat patterned, but it is also more or less unpredictable and there are no underlying general causes. Here knowing practices are modest: what is known is known in and about a place. And this modesty extends to reality. What there is, is done here and now in this place and in this context. There are no general mechanisms, knowledge is not readily displaced, and there is space for other versions of reality. This moulds their politics of how: unlike biology, these are practices broadly tolerant of difference.

The dispute that we have described is simultaneously about a politics of who and a politics of what. But it is also about a politics of how because it is about the different procedures by which realities, human and otherwise, are practised and intersect with one another. Our argument has been that in colonial encounters it is crucial to attend to how reality-enacting works – and how it works across difference. Does it deny difference? Does it seek to domesticate it? Does difference lead to conflict? Can different realities be kept apart? Or can they be cared for alongside one another? All of these are possibilities (Law et al. 2014).

So what is to be done? In a world of difference this is a question that affords no general answer. It becomes a matter of time, place and circumstance. Thus, in Sápmi it has often been wise to press a politics of who to argue that indigenous rights are being ignored. And indeed, in 2017 this became a hot political topic in the context of fishing restrictions with direct action by Ellos Deatnu.<sup>16</sup> Alongside this, it has sometimes been possible to work effectively with a politics of what, for instance by attending to differences within science. We do not at present see how to do this with Deatnu fish biology, but reindeer herding policies are now being prised apart because different ecological models offer quite different ways of thinking about the size of sustainable reindeer populations (Benjaminsen et al. 2015). Finally, it is also possible, STS-wise, to imagine a politics of how that crafts small practices that open biology to moments of difference. This has sometimes been achieved in other locations (Verran 2002, Waterton and Tsouvalis 2015), but not thus far in Sápmi. However, the tactics are clear. The need is to create down-to-earth material practices that juxtapose the 'settler' offices, laboratories, models and quantifications of biology with the nomadic practices of Sámi experts. The need is to 'soften' the realisms of biology. And this is work in progress.

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<sup>16</sup> For details of this activist group see, <https://www.ifinnmark.no/tana-avtalen/tanadalen/ellos-deatnu/norskfinsk-aksjonsgruppe-har-inntatt-holme-her-gjelder-ikke-tana-avtalen/s/5-81-525757>.

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