Emergent aliens
Performing indigeneity and other ways of doing salmon in Norway[1]

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(Working paper, March 2010)

[1] We are grateful to the anonymised 'Sjølaks AS' for their kind agreement to let us locate our study within the firm, and for its additional generous practical support. We would like to thank all those who work for Sjølaks (they too are anonymised) for their warm welcome, their help, and their willingness to let us watch them and take part at work. In many cases their kindness has vastly exceeded any reasonable expectation or need. The project, 'Newcomers to the Farm, Atlantic salmon between the wild and the industrial', is funded by Forskningsrådet, the Norwegian Research Council (project number 183352/S30), with additional research leave and financial support from Lancaster University, and we are grateful to both.

Abstract

Atlantic Salmon aquaculture has become one of the most profitable industries in Norway, a country which is also known for its large population of wild salmon. In this article we explore some ways in which salmon is currently being done and differentiated. Using an approach that draws on material semiotics, we treat domestication as a continuing set of practices whose character defines and enacts farmed Atlantic Salmon in different albeit overlapping ways in different locations The article also addresses what counts as 'nature' when icons of wilderness are enrolled in regimes of domestication. A central claim is that the salmon and nature are performed together, through various acts of differentiation that constitute what they both are. The article is based on ethnographic fieldwork in West Norway.

On the 31st May 2007, the Norwegian Institute for Marine Research placed an article[i] on their website with the heading: *'Escaped farmed salmon is not an alien species'. ('Rømt oppdrettslaks er ikke en fremmed art')*. The statement was a direct challenge to the Norwegian Biodiversity Information Centre (Artsdatabanken), a new governmental agency responsible for monitoring biodiversity in Norway, and their recent publication on alien species called 'Norwegian Black list' (Gederaas et.al. 2007), in which Atlantic salmon was listed. The Black list, published in 2007, was the first attempt ever to name and order all alien species in Norway based on their threat to local biodiversity. The statement was quickly followed by a clarification from the Norwegian Biodiversity Information Centre, which explained *why* it is that farmed Atlantic salmon *is* in fact included in the Black list, even though farmed salmon are only seven generations removed from their ancestors upriver.

This article is about salmon in the making. It is based on ethnography from a current project on salmon in Norway, a country known for its large remaining population of wild salmon. Atlantic salmon has spearheaded the expansion of aquaculture for nearly four decades, partly driven by the Norwegian salmon industry which has made Norway the

leading producer of farmed Atlantic salmon for the global market (Lien 2010). These two modes of salmon, wild and farmed, tend to occupy the same waterway systems, and certain moments in the wild salmon's life cycle bring them into fairly close proximity with one another. Yet, the relations between them, the domesticated and the wild, vary from place to place and from practice to practice. As the above quotation indicates, the relation between the two is often ambiguous too, how they should be classified in relation to alien species discourse is highly controversial. In this article we explore some of the ways in which salmon is currently being done and differentiated. We argue that what nurtures this debate is more than the experts' failure to agree on a classificatory order. Rather, it is about what counts as 'nature' in situations where species that are icons of wilderness are enrolled in regimes of domestication. In our project 'Newcomers to the farm; Atlantic Salmon between the wild and the industrial' we attend to ways that salmon are done, not only in talk and scientific or environmental writing, but also on and around the salmon farms at this moment in the twenty first century in what is undoubtedly a much longer history of 'salmonness' in the fjords of Norway'.

Salmon as a scientific fact

So what *is* a salmon?

Biologists Stead and Laird's state-of-the-art Handbook of salmon farming leaves little doubt that salmon is an entity in and of itself, with its own historical and evolutionary trajectory. Salmon belong to a group of bony fish known as the Teleostei that first appeared 150 million years ago, prior to the emergence of mammals (Stead and Laird 2002:1). Wikipedia tells us that 'Atlantic salmon, known scientifically as *Salmo salar*, is a species of fish in the family Salmonidae[ii], which is found in the northern Atlantic Ocean and in rivers that flow into the north Atlantic and (due to human introduction) the north Pacific [iii]. Similar descriptions abound in both natural science and popular accounts. Such descriptions tend to sound authoritative, and their jargon is matter-of-fact, concise, and to the point. In these accounts we are being told what salmon *is.*

The database www.fishbase.org[iv], for example, provides a set of morphological criteria that includes physiognomic features, including the number of dorsal spines (3-4), the number of dorsal soft rays (9-15), body shape ('fusiform') and colouring during various stages of the life cycle. Another section on this website with the title of 'biology' provides more detailed information about what an Atlantic salmon does. We learn where it spends its life, what temperatures it prefers, the kinds of waters it inhabits, its patterns of feeding and returning to

the river, spawning and various modes in which it may be eaten ('Marketed fresh, dried or salted, smoked, and frozen; eaten steamed, fried, broiled, cooked in microwave, and baked').

This is all under the fishbase heading *''Salmo Salar Linnaeus 1758'* and '*Atlantic salmon'*. This reference to the Swedish botanist and zoologist Carl Linnæus (1707-1778), founder of modern biological taxonomy, reminds us that its current classificatory boundary as a species within the family of *Salmonidae* has an historical origin. We are invited to imagine salmonness in the Atlantic prior to 1758, a time when neither 'salmon' nor 'north Atlantic salmon' had emerged as distinct entities separable from other forms of salmon and other living beings of the Atlantic Ocean. Different vernacular terms were applied to salmon then, but we are made to understand that this was a matter of incomplete knowledge, an expression of epistemological naivety, rather than a function of the non-existence of Atlantic salmon. Atlantic salmon as a scientific category is unambiguous. It is *one*, and it is clear. The beast has been present for tens or hundreds of thousands of years, and probably a lot longer. To mention a date, 1758 makes no difference. Atlantic salmon were there with their attributes before this date. It is just that we have known more about them now than we did before.

But there is another way of looking at this. It is to say that scientific classifications don't simply describe, but are also *performative*: that is, that they are productive and help to shape and condition the world (Bowker and Star 2000, Waterton 2002). Looked at in this way, the main achievement of the texts has less to do with accurate description than with their *enactment* of Atlantic salmon in a particular way. It is being *done* as a single, unambiguous class of entity that can be differentiated from alternative life forms. It is a species that transcends spatial and temporal trajectories, instruments of measurement, or the ways in which these are put to use. So, for instance, farmed salmon in Tasmania are labelled as Tasmanian Atlantic Salmon, whether they are fried, steamed or baked, and irrespective of any relations they might have with other entities in this non-Atlantic environment such as Australian fur seals, or sea trout (see Franklin this volume). So the scientific classification does salmon in a way that seeks to transcend the specificities of time and space: it is a *universalising* discourse (Harvey 2007, Lien 2007). To put this differently: in this mode scientific description has the effect of enacting universal knowledge (Verran 2002). Performatively, it does itself as generally true across time and space, even though (in practice) it is confined to specific locations such as laboratories, the pages of textbooks, and popular texts[v].

The idea that scientific knowledge is produced in specific places and that it has effects, is the focus of several academic literatures. *Constructivists* tend to explore the foundations of knowledge, note that these are socially shaped, and that (even) scientific knowledge can therefore be understood as a social or cultural product (e.g. Bloor 1976, Bowker and Star 2000). They also attend to the ways in which scientific meanings are negotiated both within and beyond science. They usually assume that forms of knowledge such as classification systems may be understood, pragmatically, as tools for handling or living in the world[vi]. Finally, and as a part of this, they often argue that concepts or ideas in part reflect the operation of social interests.

An alternative to constructivism is more radically performative. Sometimes called *material semiotics*, this argues that social structures are being generated at the same time and in the same moment as scientific (or other) forms of classification or knowledge: that the social, the natural, and classifications are being enacted together in material practices. This approach, developed in different forms by writers such as Latour and Woolgar (1986), Latour (1987), and Haraway (1989) is reflected by Barad (2003) in a recent paper where she rejects a 'representionalist belief in the power of words to represent pre-existing things' (2003:802). Discourses, she says, have effects, though this is not an invitation to turn everything into words, but rather a 'contestation of the unexamined habits of mind that grant language and other forms of representation more power in determining our ontologies than they deserve' (2003:802) . This argument, familiar in material semiotics (Law 2008, Mol 2002, Haraway 2007 and Verran 2001), and to a lesser extent in anthropology (e.g. Escobar 2008, Miller 2005, Strathern 1991, Viveiros de Castro 2004, Willerslev 2007), involves what Henare et.al. have called, with reference to ethnography, a quiet revolution from epistemological angst ('am I representing them appropriately?') to questions of ontology (2007:7). The implication is that it is important not only to explore such intensely contested but hard-to-avoid distinctions as nature vs. culture, technology vs. society, but also a further series of binary divides that are even more fundamental to Euro-American ways of knowing and being. Examples of the latter would include divisions between concepts and things, humans and non-humans, and subjects and objects. These, it is being suggested, are not foundational: rather they are enacted into being – and refracted through – material-semiotic practices.

In this article we follow this performative logic. We suggest that through attention to practices and performativity, we may contribute to an anthropology which is more sensitive to relations between humans and other living beings than is possible in a more anthropocentric approach. Most importantly, it helps us approach dualisms of nature and

society empirically, without making the same dichotomies part of our analytical toolkit. As Gísli Pálsson (2006:7) notes, 'dualisms just don't disappear because people stop talking about them'. As our ethnography shows, such dualisms are indeed enacted in salmon practices in Norway. The challenge for us, as for others who engage in what is often referred to as 'anthropology at home', is to find a way to approach these realities, without assuming beforehand what kinds of categories we will find.

In what follows we explore various 'coming-into-beings' of salmon in practice, and challenge the idea that it, the salmon, is 'given in the order of things' (Law 1999, 3). Instead we treat it emerging in practices of association and dissociation that implicate and generate sets of things including divisions between the human and the non-human, and the material and the immaterial. There's a further twist here. If an object does not 'stand by itself' (Mol 2002, 31-32) but emerges in the relations of practice, then we need remember that there are *many practices*. This is true for natural science. This is not a homogeneous set of practices. But, and more relevant to our discussion here, if we think of salmon, then beyond science there are also practices on the farm, in commercial fisheries, in the marketplace, and in sports angling to name but a few. The complication is this: If there are lots of practices then it is likely that how salmon are done is will vary from location to location, even if these versions of salmon also overlap. Hence, we have to find ways of handling the complexities and unpredictabilities of what, following Mol, we might think of as 'the salmon multiple'[vii], and without forgetting that other realities are being done too. Thus, the 'alien salmon' enacted in the vignette above is a single salmon reality that also has to do with ordering Norwegian nature. The two are being done together

Managing salmon domesticates through numbers

Let us start where it is most crowded: We walk along the metal walkway that connects together eleven cages of Atlantic salmon in the middle of Hardangerfjord. Ripples on the water, swift dark shadows below the surface, and the occasional fish leaping in the air, indicate the presence of what, according to the operation manager Fredrik, is more than 500,000 Atlantic salmon, or about 10% of all Atlantic salmon currently being fed in fiords in Hordaland County[viii]. This lively concentration of activity, gathered around a platform, a handful of people, and an assemblage of sea-cages and netting, is only one of several marine production sites in this part of the Hardangerfjord. With each fish approaching 5 kilos, the preferred size for slaughter, this city of fish beneath our feet weighs more than 250 tonnes.

But right now these numbers are merely heuristic devices, verbal exchanges intended to help the newcomers (us) get a sense of what this activity out at Vidarøy[ix] is all about.

We find ourselves scribbling down such numbers because the main characters of this study[x] are mostly invisible to us, still elusive. The inscription of a number in a notebook serves as a first faint attempt at making them real. This doing of salmon somewhat resembles what happens in the small office in the building on the platform at the end of the walkway, where Fredrik spends a substantial part of the day in front of two computers. Here, he routinely enters numbers that provide various fragments of information to head office on shore, such as the estimated number of fish in each cage, their estimated average weight, their estimated growth this month, the number of lice on a random selection of 20 salmon (he distinguishes between 'faste' (fixed), 'hoa' (female) and 'bevegelige' (mobile)), and the numbers of dead fish sucked out from the bottom of the pen each the morning. These figures emerge from the morning activities, which involve the manual handling of salmon, together with a pencil and a metal plate with a sheet of paper attached that serve as outdoor inscription devices (Latour and Woolgar 1986; Latour 1998). The average weight of fish in each pen is produced by a device that is dropped a few meters down into the cage and measures the weight of the first random 100 salmon that swim through it: we register this as 4.8 kilos, up from 4.2 the previous month. The number of lice can be counted on the slippery scales of salmon that have been fished out of the pen with some difficulty by another farm worker and dropped into a container filled with water and anaesthetic. The fish need to be anaesthetised because they have to be still for as long as it takes us to count the lice: we make a note that there are five. The number of dead fish is tallied as they are lifted from beside each cage and put into the wheelbarrow: we count twenty. These are some of the ways in which salmon are done for a moment on the farm[xi]: dead or alive; lice-infested or lice free; and, most importantly for the firm: as entities putting on weight, expressed as biomass.

Biomass is the key concern at head office. Sjølaks farms salmon for profit, and calculations about the profitability of various operations gravitate around a range of ways of juxtaposing costs and projected income. Biomass at Vidarøy is aggregated with biomass from other Sjølaks sites into sequences of translation that convert flesh into projected income, and feed into calculated cost. Here, then, biomass is essential in the translation between the ecology of aquaculture and its economics. It also makes salmon manageable in relation to the authorities that issue licenses based on the maximum permissible biomass at a particular location. In short, biomass is a way of managing salmon, both in relation both to business and regulatory concerns.

'Fishtalk' (c) by AKVAgroup ASA, is a computer program which provides an overview of organic input and output, in the form of fish feed and salmon biomass respectively. Fishtalk *produces* biomass by multiplying the estimated number of fish by their average weight. Calculated at regular intervals, biomass provides a measure of growth, which in turn is combined with information about feed consumption to produce a relation called Feed Conversion Ratio (FCR, forfaktor[xii]). Through the production of FCR and other forms of translation, head office becomes a centre of calculation (Latour 1987) and its figures are used to make management decisions. From the perspective of head offices and their world of economics, we might say that biomass is what farmed Atlantic salmon *is*. All the rest is noise. But biomass is also a heuristic device. It works to distinguish between salmon as hungry-beings-putting-on-weight and the fish-meal and fish-oil compound that is fed as pellets to farmed salmon and becomes, or transforms into, the weight that they eventually put on. In this perspective, biomass is a means towards enacting FCR, which expresses the *relation* between salmon and feed. Thus it is through the calculations of FCRs (in which biomass is a key figure), that what Barad calls agential separability is enacted, and that 'the boundaries and properties of the "components" of phenomena become determinate and that particular embodied concepts become meaningful' (Barad 2003:815) in head office.

Feed and salmon. Salmon and feed. Their relations are crucial: Feed makes up about 60% of the running cost of growing salmon. No wonder then, that back at the marine site Fredrik spends a great time on issues relating to feed. Feeding is done by pressing buttons on the computers first thing in the morning, and is continuously attended to during the day on screens, but also outside, where feed pipes transport a steady flow of pellets from the storage containers to individual cages. Feeding involves calibrating the computer to make sure that it counts the amount being delivered correctly to produce the FCR. Feeding is also done down in the basement, where the pellets are held in a metal hopper before being blown out by a pump powered by a noisy generator. And feeding is done, too from the cab of the fork lift truck as it lifts 500 kg white plastic bags marked 'Ewos' and bursts these by impaling them on the spike above the hopper.

An FCR can be calculated for a single pen. It can be done for an entire farm. It can also be done for a particular site or region, and for different species of farmed fish. In this way FCRs may be abstracted from particular locations, which facilitate comparisons with other sites whose practices have to do with management or economics. In these locations it is turned into a standard, it becomes normative, and works to maintain a particular order: Operational managers report their respective FCRs to head offices which in turn assess

economic performance. Individual salmon farmers in Norway gain local esteem on the basis of their FCRs. An FCR also facilitates evaluation for investors with limited knowledge of aquaculture, since it represents a tool for comparing cost-effectiveness. In this way, the FCR mediates between the lively assemblage of marine life and the practices of business economics.

Performing salmon through an FCR is an instance of how '*numbers manage mess and heterogeneity'* (Verran 2001:43) It involves clever forms of shifting and plurality. Individual salmon are counted and become a 'many' and then transformed into 'biomass' which is again a unity, that enables comparison through the FCR. In her book Science and an African Logic Helen Verran describes the census in Ibadan in 1921, and how it achieved a connection between all places in the empire, as it: '*transported inhabitants, albeit in a highly abbreviated form, directly to the imperial headquarters in revealing the empire to itself*' (Verran 2001:99), Mitchell makes a similar argument about colonial Egypt (Mitchell 2002). Similarly, the FCR can be said to transport salmon into 'imperial' sites, i.e. business headquarters, revealing the business to itself. Subsequently, through a plurality of calculations of FCRs in different regions, the field of aquaculture can continuously work towards improvements. The strength of the business '*can be expressed ... as a number* '(2001:98)[xiii]. Numbers make domesticated salmon manageable, tractable, knowable. They enact salmon in particular ways. Though it is also more complicated.

Domestication as a two-way process

The term 'villlaks' (wild salmon) is a recent addition to Norwegian vocabulary. Prior to the establishment of salmon farming in the 1970's, the common name for *Salmo Salar* was simply 'salmon' (laks). Thus, the new term evolved with the emergence of the young salmon industry, and served to distinguish farmed salmon from that which was caught by anglers or net fishermen in rivers and fjords[xiv]. Hence, 'wild salmon', 'villlaks', is relational, defined in contradistinction with domestication, but also the notion of wilderness. It draws on – and we'll argue, re-enacts a particular version nature that has its specific historical origin in European thought (see also Cronon 1996). Specifically, it relies on and helps to perform a distinction between the human on the one hand and nature as a non-human realm on the other.

The enactment of two forms of salmon where before there was only one, relies on a particular form of absence. More precisely it silences the cultural history of salmon in Norway, which tells of sustained human intervention in Norwegian salmon rivers for more

than a century. Henrik Treimo, for example, points to a tradition of hatching, cultivation and release of salmon fry in Norwegian rivers that goes back at least as far the 1860's (Treimo 2007 see also Osland 1990)[xv]. Millions of fry have been released, and broodstock from one river was used to supply fry for another, while man-made salmon runs facilitated salmon trails. These activities indicate the importance of extensive human-salmon interactions long before the emergence of aquaculture, and remind us that animal domestication has many paths, and that a clear distinction between the wild and the domesticated may be hard to draw.

So what *is* domestication? A standard anthropological text defines domesticated animals as those 'bred in captivity for purposes of profit to a human community that maintains complete mastery over its breeding organization of territory and food supply (Clutton Brock 1989:7, cited in Cassidy 2007:5). This anthropocentric approach emphasises particular qualities of the human-animal phenomena on the basis of relations of asymmetry marked by animal subordination. In other words it separates 'culture' (human) and 'nature' (non-human) on the basis of unequal distribution of agency. This understanding of domestication has recently been challenged by more symmetrical approaches that treat domestication as a two-way process comprising different paths, distributed forms of agency and emphasise its unintended consequences rather than human mastery (Cassidy 2007, see also Haraway 2007). Archaeologist Helen Leach, for example, has described how both humans and animals have been modified by selection pressures that were not under conscious control by humans, and which lead to morphological changes in both (Leach 2003, 2007). And so it is with farmed salmon. To say that they are under 'complete [human] mastery' would be to ignore the uncertainty and unpredictability associated with marine husbandry. Inside the cages, salmon are elusive, hardly ever seen and only partially known. They are 'slippery' (see Law and Lien 2010 forthcoming). And they also escape not infrequently when netting is torn by a propeller or by seals, or if the pens drag their moorings (Reid 2007). Once outside the cages they become even more elusive. Farmed Atlantic salmon do not necessarily depend on humans for survival. Some may find their way upriver and be attracted by the fly of an angler fishing for 'wild' salmon. A few may even drop their roe on the riverbed upstream, with a somewhat uncertain outcome. Milt from a non-domesticated salmon may fertilize the roe. In practice the boundaries are unstable; categorical distinctions are hard to maintain.

From the perspective of material semiotics domestication is an effect of socio-material practices that arrange and produce objects, subjects, people, institutions, and ideas. And since those practices vary, so too does domestication. In the 1970's, when marine aquaculture was

still in its infancy, one of the predecessors of Sjølaks in Hordaland caught salmon in a small river near one of the Sjølaks sites, and placed these in pens to grow. Locals recall how fish scraps were converted into feed in cement mixers, sometimes with garlic added to keep away sea-lice. In other words, less than forty years ago husbandry was experimental, interactive, and open-ended. A few salmon were selected as broodstock in the young industry, which rapidly developed a program of selective breeding. Inspired by the success of Norwegian Red Cattle, a hybrid race of cattle designed to produce high yields of milk (Risan 2009), the reproduction of salmon quickly became a scientific practice, comparable to that of other farm animals. So how did this work? What kind of salmon was engendered?

During most of the early history of animal husbandry the ability to survive nutritional stress, crowding and disease acted as unintended selection pressures that favoured smaller animals (Leach 2007:80). In Norway, prior to the emergence of Norwegian Red Cattle, cows were selected partly as a consequence of their ability to endure periods of starvation: the ones surviving annual shortages of food in spring were more likely to bear offspring, and the breeds became stunted and hardy (Risan 2009). The conditions of 21st century salmon aquaculture are quite the opposite. Though traits such as disease resistance and flesh quality are also important, farmed salmon are bred with one main purpose: to put on weight. The economic rationale of fish farming favours individuals that have a good appetite and grow fast, both in breeding and in practices of husbandry[xvi].

Standing beneath what sounds like a hailstorm as feed pellets are blown through pipes to the pens, we watch a few salmon move quickly where those pellets hit the water surface. But most salmon feed a few meters beneath the water surface, beyond the gaze of their human caretakers. Like salmon in the river, the vast majority inside the cages are elusive, out of sight. So when Fredrik wants to check how they are doing, he takes a bucket of feed and runs up the gantry and along the walkways. He scoops up pellets and flings them at the surface of the water to see how the fish respond. This is a ritual he performs four or five times a day, or more often if there is a visitor such as the vet or a senior manager, or if he suspects that there is a problem. Referred to locally as '*sjekke foringa'* ('check the feeding'), it involves some moments of quiet observation, a few minutes of visually and physically engaging with each pen. Thus, he throws a few pellets on the water, not in order to feed the fish (the feed distributor is probably running) but to watch how they behave. He looks intently at the surface. And his uncertainties concern questions as old as the history of domestication. Are they doing OK? Are they hungry? Is there a problem? And what should I be doing next?

Following his gaze, we ask what we are supposed to look for. Fredrik explains that he looks at the way they respond, how quickly they come up to eat, how much activity he is able to trigger, in short he checks their appetite. Are the fish in cage number ten suffering from disease? Have the smolt that arrived a week ago adapted to their new marine surroundings? Triggering their appetite – or absence thereof – is simply another way of making 'fish talk' (cf. Akvagroup ASA), of producing a visual sign in a situation in which most fish are constantly out of sight.

Feeding, then, takes many forms. From the perspective of business management it makes salmon visible through the production of an FCR. From the perspective of the operation manager who is responsible for a lively assemblage of fish, a form of 'companion species', feeding is a form of interpellation, an invitation for the fish to come close to the surface and make themselves known. The former is an economic calculation of a fairly recent kind. The latter is resonant with domestication as it might have been done thousands of years ago. In both cases, however, salmon is done, not simply as a hungry animal, but as an animal willing and able to satisfy its own hunger. In other words, the animal enacted through these practices is not a passive entity, but an animal with a certain form of agency. It has nothing to do with the passive and subordinate animal enacted in standard definitions of domestication.

So what is it, then, that makes a farmed salmon in Norway different from its non-domesticated relatives? Whatever the answer, domesticated salmon is certainly not completely mastered, and far from known. An important difference between domesticated salmon and their non-domesticated relatives that emerges from the practices we have described, is that the former have become enrolled in a more sustained relationship with people. In particular, on the farm – and at the breeding station, but also in the company offices – domesticated salmon are being done as hungry, and systematically so, in a series of different practices. And the argument could be extended, for instance, to health and sickness: disease control is crucial too. So it is tempting to argue that domestication has to do with sustained relations, and that it is the continuity of relations that in part distinguishes the domesticated salmon from its 'villlaks' cousin. But to make this argument would be to deny the systematic and sustained interrelations that also characterise hunting practices (see for example Willerslev 2007). Instead, we share Cassidy's view that 'domestication is an ongoing and unruly relationship, and that failing to appreciate it as such risks confusing what is contingent with what is fixed'(Cassidy 2007:20).

And besides, something else is going on too: the enactment of sustained but very patchy *separations*. To see this we return to The Norwegian Blacklist 2007 (Norsk Svarteliste 2007; Gederaas et.al. 2007)

Performing alien species

Look at the cover of the Blacklist.

It features an image of Iberian snails – in Norway an alien and unwanted species. The report is the work of the Norwegian Biodiversity Centre. It includes an up-to-date list of alien species ('fremmede arter'), 2483 in total, and an analysis of the ecological risks posed by 217 of these. It uses the definitions of the World Conservation Union (IUCN), which defines alien species as follows:

> 'an alien species (non-native, non-indigenous, foreign, exotic) means a species, subspecies or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any art, gametes or propagule of such species that might survive and subsequently reproduce'. (cited in Gederaas et.al. 2007, 9; our emphasis)

This distinction between alien and indigenous species rests upon notions of geographical spread. Alien species, are quite literally 'species out of place'. The extension of a species' 'natural range' is defined in relation to humans: species remain within their 'natural range' if their dispersal is not caused by humans. If they are 'natural' then this is because humans have had no role in spreading them: because humans are absent. Indigeneity rests on this separation: presence without people; nature without society. Look at this list:

a. Species intentionally released into the wild

b. Species escaped from captivity and breeding, or run wild from cultivation and commercial activity
c. Species arrived as stowaways during transportation or movement of animals goods and people
d. Species dispersed from wild populations in neighboring countries whose origin is due to a, b or c.
e. Species spread with the aid of human beings
f. Norwegian (indigenous) species spread to new parts of Norway by human activity
g. Improved, indigenous species spread in Norway (Gederaas et.al. 2007, 16-17)

It is all about territory, human agency, and invasion. But there's an oddity as well. The last item (and possibly the second) point to a different and non-territorial form of invasion. In Norway at least, farmed Atlantic salmon are within their 'natural range'. So why are they alien? Why are they not 'natural'? Challenged by the Norwegian Instiutte of Marine research, The Norwegian Biodiversity Information Centre responded, on a website called 'Escaped Atlantic Salmon – clarifications from the Biodiversity Centre'[xvii] that they had decided to included improved, indigenous species under the category of alien species because such 'alien genotypes may represent a serious environmental problem' and that it is necessary to respond to 'threats to biological diversity at all levels, including ecosystems, habitats, species and genes'. They also note that domesticated farmed salmon have had their hereditary material changed, through '*artificial selection with the aim of creating fish with the best possible characteristics for being raised as food*' (our translations). It is the word 'artificial' that is pivotal. There is always genetic selection, but industry selects for particular traits. As we have seen, growth is particularly important. Biologists know less about 'natural selection' as this takes place in the river, though it is unlikely that rapid growth or flesh quality add to adaptability in most riverine environments. Again the difference has to do with human intervention – or its absence. Human activity may *move* species beyond their (non-human and therefore) natural geographical range. Or, as with salmon, it may intervene in ways that alter the *constitution* of species. Either way, humans have intervened in what was a 'natural' process which means that it no longer counts as natural. In the present context this turns farmed salmon into a threat to the natural gene pool:

> '*Some indigenous species are domesticated and have had their genes altered by artificial selection. If such species escape or run wild, domesticated individuals may hybridize with individuals in the wild populations. The wild forms may thereby be*

supplied with genes that are poorly adapted to the natural conditions. Such hybrids can result in decreased survival of offspring and a generally poorer adaptation to natural conditions. Examples of this from Norway are the wild salmon (salmo salar), and the arctic fox which can receive genes from farmed animals. Aquaculture in particular has a number of species belonging to this category.
(Gederaas et.al. 2007 p. 40).

As the citation indicates, nature is being divided from the social and its forms of cultivation, and the human is being kept away from the non-human.

The Black List is performative. It re-does the division between nature and culture in a set of scientific practices that are more or less novel, possibly contentious, and in some degree uncertain. Most biologists agree that salmon has become genetically different as a result of domestication (Huntingford 2004) but the significance of these differences is a matter for debate in the journals of fish biology. But the division between domesticated Atlantic salmon on the one hand and 'villlaks' on the other is enacted in other practices too. For instance, most anglers are convinced that they can tell the difference between wild salmon and escaped farmed salmon. For such individuals catching farmed salmon is a disappointment. Though licenses are issued for catching escaped farm salmon, the latter does not count as an appropriate 'other' (Nustad, personal communication, see also Franklin this volume). At the same time, however, distinguishing farmed from wild Atlantic salmon may be less than straightforward.[xviii]

Fig. 1. Escaped farmed salmon (*Salmo salar*) (right) often show wavy fin rays, while wild salmon (left) has more even rays, photos by Roar A. Lund.

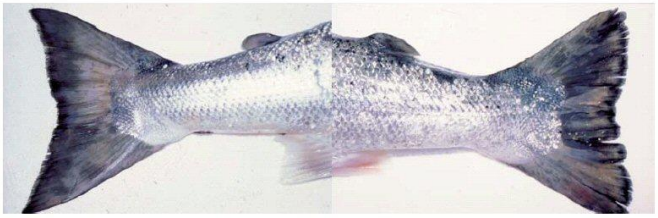

Fig. 2. Salmon that recently has escaped from net pens (right) often have rounded tails, while wild salmon (left) have more sharp tails, photos by Roar A. Lund.

[xix]

Readers of this particular document, which comes from NOBANIS, the European Network on Invasive Alien Species, are being taught how to see difference in picture and words:

> ‘Farmed salmon look similar to their wild con-specifics, but they often have worn fins with wavy fin-rays and more spots both above and below the lateral line than wild salmon, both of which have a less defined outline than that of the wild’[xx].

There is a well-worn literature on the complexities of learning to see appropriate similarities and differences[xxi]. ‘Worn fins and ‘wavy fin-rays’, if they are to recognise the distinction readers need to attend to these. But the very fact that anglers need to be tutored to see the difference tells us both that it is often less than obvious, and that it takes some effort. As indeed it does down on the farm at Viderøy’s city of fish. Here, some 50,000 salmon are being held in place by nets attached to an arrangement of rollers and cables, hooks and eyes. It’s quite robust, this arrangement, but also rather intricate. It needs to be intricate because the nets can’t be left continuously in the water. They have to be rotated every few weeks so they can dry out in order to inhibit the growth of algae and shellfish. This involves sliding each net, unhooking and hooking it up again, and holding it on large rollers. It takes two or three people a whole afternoon to do this for each pen. Mostly things don’t go wrong, and there were certainly no escapes during the period of our ethnography in Sjølaks. Nevertheless, across Norway there are escapes every year[xxii], and maintaining the division takes effort and care.

So here again is a set of boundary practices that hold nature and culture apart – a distinction that is also crucial to the economics of production. But as the same time it is also thoroughly permeable and of little relevance to the messy assemblage of organisms that gather in and around the Vidarøy platform. Smaller fish such as young pollock, come and go. There are schools of mackerel that gather outside of the pens to feed off the dust from pellets. The circulation of microorganisms is endless and sometimes problematic, since salmon within and outside the pens may and sometimes do exchange pathogens. The circulation of parasites – and in particular the sea lice that we mentioned above – is a problem for both farmers and anglers, but mostly, of course for the salmon itself. Thus if the nets perform a boundary between the salmon that are fed and those that pass through the fjord on their way from the river to the sea or back again, this is porous in character. Enacting the distinction between the realm of domestication and the realm of non-domesticates is always uncertain. It is always practical. And, as we hope we have shown, it comes in many forms: it is multiple.

Afterword

We started with the question: what is a salmon? Then we offered a suggestion for tackling this question. This was to attend to the practices that define it; or to play with words, to attend to how salmon are done in practice. Then we looked at some salmon-defining,

salmon-constructing, or salmon-enacting practices. We touched on textbook definitions, processes for feeding, techniques for counting, practices for defining alien species, methods of identification, and the technologies for containing farmed salmon. Some, but not all, of these practices were about separating and distinguishing 'villlaks' from farmed salmon. Again some, but not all were about distinguishing culture or domestication from nature.

Why attend to practices? Part of the answer is that this is a methodological but also a philosophical choice. The somewhat counterintuitive assumption of material semiotics is that realities and distinctions are always done in practices: that they simply do not exist outside practices. Indeed it is that even theory that claims to be universal is being done in practices here and there. Several implications follow from this performative position.

- First, and methodologically it means that there are no short cuts. If we want to understand what a salmon is then we need to attend to practices. The same is true for the larger divisions, for instance between nature and culture: the latter takes form and emerges in practices.
- Second, it means that since there are many different practices, what emerges is likely to vary between those practices. What a salmon is in one place will be different from what it is in another. How culture is divided from nature in one practice will be unlike that division in a second. The result will be a kind of patchwork. This patchwork may sometimes have a spatial dimension, that somewhat resembles traditional anthropological notions of culture as bound to particular geographical locations. Or it may not.
- Third, we are likely to find overlaps and interferences between the different practices. What happens on the farm is not innocent of what happens in the practices for defining alien species. The result, then, is an overlapping patchwork. On the one hand, since there are many practices, what a salmon (or a domesticated Atlantic salmon) *is*, is a complex set of more or less overlapping practice-generated realities. On the other hand, what a salmon is, is also related to an equally complex practice-based set of versions of (say) the distinction between nature and culture, resembling what in anthropology is often told as cultural difference.

All of this is difficult to say, and it is also difficult to think, but it follows once we assume that realities are done in practices. We have tried to show that realities in practice – for instance domesticated Atlantic salmon – are indeed emergent, complex and historically contingent. If we want to understand what salmon are we have no choice but to track it through its complexities and contingencies. We argue that by approaching salmon through its various enactments, through practices, we also learn something about the great foundational

categories of Euro-American thought. The one that we have touched on here is the division between nature and culture.

Euro-American practice has always happily generated complex and messy realities whilst pretending to itself at the same time that the categories and divisions embedded in those realities were clear, concise and stable. None of the realities we have been discussing – the indigenous *salmo salar*, the domesticated north Atlantic salmon, or the division between nature and culture – count as any kind of exception.

So what do we learn about nature? Most straightforwardly we learn that it is being done, done again, and done again in the fish-related practices, personal, economic, governmental, and scientific of a country such as Norway. We learn that, like salmon, it shifts its shape and form from practice to practice. It is done multiply. Does this mean, then, that the nature/culture divide is no longer foundational? The answer is: it depends what you mean by foundational. If foundations are invariant and immovable structures then the answer is: these do not exist. If, on the other hand, foundational dichotomies are forms that reappear, in different but related ways in endless practices, then the answer is yes: these do exist. The nature/culture divide is messy, it is heterogeneous, it is complex, and it isn't coherent. But it is endlessly consequential for everyone involved in fishy practices and other forms of relations that involve non-human beings. A performative approach to nature practices is one way in which we can begin to understand these consequences.

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[i] http://www.imr.no/nyhetsarkiv/2007/mai/romt_oppdrettslaks_ikke_fremmedart/nb-no, accessed March 20th, 2010.

[ii] This image of branching family relations is one of the most powerful metaphors of modern biology. Verran writes: 'This linear, branching, tree-like figure of 'botanical family' is taken by science as an ideal, immanent in the biological world, a found structure or pattern of the biological world (Verran, 2202:752)

[iii] http://en.wikipedia.org/wiki/Atlantic_salmon, accessed March 1st 2010.

[iv] http://www.fishbase.org/Summary/SpeciesSummary.php?id=236, accessed March 1st 2010.

[v] For this argument about science more generally see Law and Mol (2001).

[vi] This approach is developed in a particular mode in Thomas Kuhn's celebrated Structure of Scientific Revolutions (1970)..

[vii] Mol's book is entitled The Body Multiple. In a case study of lower limb arteriosclerosis, Mol shows how this condition is done differently in the practices of difference hospital departments. It is important to note, however, that these practices – and their enactments of the condition – overlap with one another. 'The body multiple', then, is not a 'body plural'. It is not single, but neither is it many. Perhaps it might be understood as'fractional', more than one but less than many.

[viii] According to aquauculture statistics produced by the Directorate of Fisheries, Norway, 50.754.000 Atlantic salmon were registered in Hordaland in 2009. Source: http://www.fiskeridir.no/statistikk/akvakultur/statistikk-for-akvakultur/laks-regnbueoerret-og-oerret (accessed July 27th 2010). http://www.fiskeridir.no/statistikk/akvakultur/biomassestatistikk/biomassestatistikk.

[ix] Vidarøy is a fictitious name, as are most other names of places and people in this account.

[x] This snippet of ethnography is from the summer of 2009, and is drawn from the first couple of weeks of fieldwork. Fieldwork in the salmon farming industry is done jointly by the authors and is funded by the project 'Newcomers to the farm, Atlantic salmon between the wild and the industrial' (NRC 2008-2012).

[xi] 'Done' rather than 'made' or 'constructed' because the practices need to keep going if these salmon realities are to be sustained.

[xii] Defined as quantity of feed / biomass gain

[xiii] As with the Ibadan census, this is displaying rather than collecting, '*in this doing of number, the territory is the map'* (Verran 2001:73).

[xiv] Fairly soon, the prefix 'vill' (wild) also became an indicator of quality, to the extent that a majority of Norwegian consumers claimed that they could easily tell the difference in taste, in spite of numerous trials with blind tests, in which such differences turned out to be difficult to detect.

[xv] Around 1850, the regulation, cultivation and control of salmon resources had become a significant national issue in Norway, and by the end of the 19th century, new hatcheries produced as much as a million fry per year. (Treimo 2007)

[xvi] Growth is a key parameter in selective breeding. In addition, young salmon of similar age groups are sorted according to size, and in this process, salmon that are much smaller than the rest are systematically sorted away.

[xvii] www.artsdatabanken.no, /ArticleList.aspx?m=6&amid=2718 (accessed 28th August 2008)

[xviii] It took about 20 years and several shipments of salmonids between Australia and London to ascertain that the Atlantic Salmon (*salmo salar)* that was released in the rivers in the 1860's had not been able to reproduce, and that the species they caught was actually Sea trout (*salmon trutta).* Their afforts to acclimatise salmon in the Southern hemisphere had failed (Lien 2005).

[xix] http://www.nobanis.org/files/factsheets/salmo_salar.pdf

[xx] The author of the fact sheet on Atlantic Salmon, Peter Fiske is part of the Network of invasive Alien Species, and is also the author some of the scientific articles cited in the Black List to document the threat involved to salmon hybridisation.

[xxi] For an example in the context of bird watching see Law and Lynch (1990).

[xxii] 170000 farmed Atlantic salmon escaped in 2009, according to Norwegian Directorate of fisheries' statistics http://www.fiskeridir.no/fiskeridir/statistikk/akvakultur/roemmingsstatistikk.