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RESEARCH ON THE
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MORE THAN HUMAN

AURA WORKING PAPERS / VOLUME 1

AURA'S OPENINGS

AURA (Aarhus University Research on the Anthropocene)

Applying insights and methods from anthropology, biology and philosophy, AURA aims to open up a novel and truly trans-disciplinary field of research into the Anthropocene. It focuses on the 'co-species landscapes' that humans and other species come to co-inhabit in the Anthropocene and suggests that a descriptive and trans-disciplinary approach is needed to understand the kinds of lives that are made and the futures that are possible in the ruined, re-wilded, and unintended landscapes of the current moment.

AURA is part of the Niels Bohr professorship (between 2013 and 2018) for Anna Tsing. The financial support from the Danish National Research Foundation for the Niels Bohr professorship is gratefully acknowledged.

Citation:

AURA's Openings. More-than-Human. AURA Working Papers Volume 1, 2015. A. Tsing, ed.
<http://anthropocene.au.dk/working-papers-series/>

ISSN 2596-7282

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TABLE OF CONTENTS

ANNA TSING	1
Catachresis for the Anthropocene: Three Papers on Productive Misplacements	
MARIANNE LIEN	11
Salmon Multiple: Creating Dialogue across Disciplinary Boundaries	
HEATHER SWANSON	22
Landscapes, by Comparison: Practices of Enacting Salmon in Hokkaido, Japan	
ANNA TSING	43
AURA's Openings: Unintentional design in the Anthropocene	

AURA WORKING PAPERS VOLUME 1: AARHUS UNIVERSITY, SCHOOL OF CULTURE AND SOCIETY, RESEARCH
ON THE ANTHROPOCENE

COVER PHOTO OF AURA'S FIELD STATION BRUNKULSLEJERNE IN SØBY: ANNA TSING.

ANNA TSING

CATACHRESIS FOR THE ANTHROPOCENE:

three papers on productive misplacements

Catachresis is a figure of speech in which words are misused from their conventional usages. Marianne Lien's "homeless salmon," described in this volume, is a classic example: we don't think of salmon as homeless, even when they escape farm pens, and so we are surprised and provoked by the usage. Heather Swanson's description of Hokkaido's "frontier spirit" is another, since frontier spirit is so identified with the American West that it seems strange to hear it refer to Japan. This example suggests, too, the practices of comparison at the heart of most of our categories, which catachresis can bring to light through interruption. If we imagine "Japan" in contrast to "frontier spirit," it is because of a history of connections in which these terms have been forced together and yet imagined apart. Swanson urges us to rethink "frontier spirit," with its strange salmon management, by throwing in Japan. Furthermore, for both Lien and Swanson, these self-conscious disorientations are necessary to learn about salmon as exemplary organisms for our time. Salmon today are never just "nature" or "culture"; they refuse and confuse these basic categories, making us do the work of imagining the world through inappropriate words. In a time of massive human disturbance to life on earth, what words could be appropriate? Play with catachresis may be just what we need to consider the contradictions and dilemmas of the Anthropocene, that is, the time of the big human mess. Perhaps too it can lead us into other figures of speech, including the oxymoron, the internally contradictory phrase. My use of "unintentional design" to describe human-disturbed, but not *just* human-disturbed landscapes, has the pleasures and dangers of that closely allied figure.

This opening essay has two purposes: first, to offer a small introduction to the papers by Lien, Swanson and myself that follow; and, second, to introduce Aarhus University Research on the Anthropocene (AURA) as a program for studying

human-disturbed landscapes. I am in debt to Lien and Swanson for showing me catachresis as a feature of Anthropocene research. Catachresis helps me as I grope for language to describe AURA as an impossible program: a program dedicated to confusing disciplinary boundaries and to describing the challenges of life within the ruins created by modernization's vast "improvements." Following their guidance, I allow salmon to lead the way, saving AURA and landlocked landscapes for the sections that come after.

Salmon tell stories, Lien explains. (Right away it seems clear that we can only hear them through catachresis.) They "speak" through the categories they are made to enact in engagements between human and salmon, whether through salmon farming, conservation, or fishing. Are farmed salmon that pass through their nets into the ocean "escaped" or "homeless"? The choices we make matter. Words make worlds. Salmon are enacted in the semiotic and material practices we weave through them. An exciting conclusion for AURA is that this insight might open possibilities for common work between scientists and humanists. Lien and her collaborator, Gro Ween, were able to do something rather difficult: form a bridge for dialogue between scientists concerned with farmed and wild salmon, respectively. How could Norwegian rivers and waterways host threatened wild salmon and a thriving fish industry at the same time? What would it take for the two to "live together" – or as they put it in Norwegian: *Kan vi leve sammen*? Because scientists studying conservation, on the one hand, and fish farming, on the other, were attuned to different salmon stories, dialogue had proved nearly impossible. Lien's and Ween's concerns with how salmon are enacted in practical arrangements opened new ground for conversation. Lien explains (page 10-11):

[B]ecause we were *not* biologists, and because our ethnographic affiliations were equally grounded in rivers and on farms, we enacted a kind of neutral ground in this battlefield.... We did not need to rehearse any abstract debate on the theory of science, or actor-network theory, or material semiotics and multiplicity, all we did was really to relate the practical difficulties that all biologists face in simply knowing salmon. And somehow, it worked!

What magic was this? Central to the story is their willingness to use language out of place, and to invite participants to think of each story as partial and patchy,

allowing the scientists on either side of the divide to hear salmon stories that had earlier been silenced or discredited. Perhaps plain speaking was not *just* plain: the concrete details of salmon lives took on multiple meanings as common talk, as social theorist's "material-semiotic practice," and as a non-threatening descriptive biology. In this multiple rendering of salmon, there is something productive to pursue—something generally applicable for our attempts to move beyond discursive fences.

Swanson offers a complementary, yet radically different account of salmon enactments. For Swanson, Pacific salmon are made not just in local practices; they come to embody the whole history of the Pacific, human and not human. Yet exploring this regional history also requires a crisis in language. Swanson is forced to insert the intrusive word "Japanese" into her salmon—who are, after all, just salmon. Salmon do not raise the flag; this is surely catachresis. Yet it is essential. The salmon Swanson describes become "Japanese" through nagging reminders of both their trans-Pacific connections and their difference.

Consider Swanson's description of the strange Hokkaido device called an "Indian water wheel." Hokkaido fisheries expert Ito Kazutaka visited Oregon's Columbia River in 1886 and observed water wheels used to capture salmon; when he returned home, he combined the American technologies he noted with a Honshu-style (i.e., central Japanese rather than Hokkaido-based) fishing weir to create what he called the Indian water wheel. And what was "Indian" about this hybrid? Ito meant Native American, unselfconsciously commemorating the indigenous people whose access to salmon was interrupted by frontier-conquest technologies such as the water wheel. Certainly, "Indian" is catachresis. It usefully makes us pause. Japanese salmon are enacted in historically shifting hybrids of U.S. and Japanese frontier technologies recalled through the indigenous displacement they have in common. (In this regard, it seems useful to note that the water wheel was eventually outlawed in Oregon because it also killed off too many salmon.) Inappropriate language appropriately startles us. Connection, comparison, and displacement are wound together in forging modes of being both human and salmon; this is the condition of our times.

Swanson offers "landscapes, by comparison" as her tool for seeing regional histories in both the human and nonhuman enactments of the mixed up, messed up worlds we have made. Landscape as a lens refuses the abstraction of human-

nonhuman relations in a vacuum; it requires that we place any given organism in the set of encounters in which it becomes itself. It draws together big and small geographies as well as multiple scales of time, from short-term disturbances to deep histories. Landscapes are not passive backdrops; they act and enact. In all this, Swanson's agenda informs the AURA program, and so this is a useful hinge to introduce that program.

ANTHROPOCENE ON ITS HEAD: THE STILL-LIVING AS A SERIES OF MISPLACEMENTS

If we have talking fish and acting landscapes, perhaps it is not too much to suggest that the world produces its own catachresis. Or at least this is one way to think about the problem of massive human disturbance in our times. The modernist program has triggered massive extinctions, dangerously sudden climate change, and new forms of pollution, such as radioactive cesium, that reduce the chances of life, human and not human. So why is anything still alive? In this time of destruction, still-living entanglements might be seen as a breach of etiquette, a gaffe, and thus a kind of catachresis without language.

To explore these messy mistakes we call life is the challenge of the Aarhus University Research on the Anthropocene program (AURA). Rather than begin with the massive destructive forces of our time, we ask about what is still living; that is why I can speak of "Anthropocene on its head." The project joins Danish willingness to sit down together to the table with California dreaming. In this happily awkward intersection, we explore new forms of scholarly engagement. Here, too, working papers are a privileged form: they represent thoughts in progress, notes from the journey rather than fully developed theses.

The papers in this first *More Than Human: AURA Working Papers* volume emerge from our first season of engagement together, fall 2013. On November 6, 2013, AURA held an opening conference at which, after my opening remarks, we heard three papers: Marianne Lien's "Salmon multiple: Creating dialogue across disciplinary boundaries," Jens-Christian Svenning's "Biodiversity in a world of human dominance and rapid change: Anthropocene challenges and opportunities," and Kirsten Hastrup's "A world of walrus: High Arctic socialities in the Anthropocene." The program highlighted cross-disciplinary dialogue: Lien and Hastrup are anthropologists; Svenning is a biologist. Furthermore, each speaker

discussed opportunities for finding overlapping concerns across disciplinary divides. Svenning and Hastrup had committed their papers to other publication venues, so only Lien's address and a few bits of my opening remarks are included here. Thus, the AURA Working Papers board thought it useful to include another, fuller paper offered during this first season: Heather Swanson's "Landscapes, by comparison: Practices of enacting salmon in Hokkaido, Japan." Both Swanson and Lien address cross-disciplinary communication, and both use salmon as their model for thinking about knowledge production. In this volume they guide AURA's openings through thinking with salmon.

How shall we explore the world's misplacements? One way to produce knowledge about the fate of the earth is for scholars to continue doing what they each do best: climate modelers can model; biologists biologize; ethnographers do ethnography; etc. In contrast, however, AURA is taking the chance to explore if something else is possible. Are not these divides part of the mess in which we find ourselves now? Our goal is to play across disciplinary space despite its dividing fences. Our play takes place, too, in a little-explored place: a jumbled terrain that violates the 200-year divide between the humanities, arts, and social sciences, on the one hand, and the natural sciences, on the other. This divide has seemed a particularly impermeable barrier, a wall. It's built into our institutions. But the split is more than institutional; it's also intellectual. More than fifty years ago, C.P. Snow spoke of the divide between "the two cultures," humanities and sciences, across which intellectual work has seemed incomprehensible (Snow 2001 [1959]). Things have not changed very much.

Of course, there were plenty of 20th century attempts to bridge this divide, but many of them focused on *form* instead of substance. Social scientists tried to be more "scientific" by counting and putting things into boxes. They wanted to look like scientists, but they missed all the interesting stuff in the sciences—including our relations with other species. Scientists joined ethics committees to address what they thought of as the humanities. But it was decoration, missing the important insights of these fields, such as the fact that ethics is useless as long as the categories it assesses are already set in place. Such exercises in appearances did not much interest scholars from the other side of the wall. They ended up shoring up the very barrier they thought they challenged.

Spurred on by 21st century challenges and using 21st century tools, AURA comes at the problem in a different way. We ask if there are overlaps in what really matters to scientists and humanists. We alight on common excitement to learn about the world and its goings on. You could call this *curiosity*. On both sides of the divide, we care about observation. We are also interested in staying with our observations until we find frames for thinking about pattern and trajectory. You could call this *imagination*. We've stocked the project particularly well with anthropologists and biologists because historically both fields have excelled in these arts of noticing. We are hoping that curiosity and imagination will form small pores in the two-culture barrier, which might allow diffusion. My attention to figures of speech such as catachresis and oxymoron in this introduction is a gesture toward the kinds of play that will be needed.

We are particularly alert to the failures of the social science produced by 20th-century attempts to scientize the humanities, that is, to require the humanities to take up faux-scientific genre expectations. Perhaps because this requirement disallowed what the humanities do best, this form of collaboration produced some of the most meaningless social science in the history of knowledge. Learning from this experience, AURA instead explores two other alternatives: first, by respecting genre differences across disciplinary traditions, we can use them to create new genres of translation and play; and, second, we can build on the methods of life sciences—such as field biology—that have always valued direct observation and fieldwork. Methodological overlaps between field-based biology and field-based anthropology are at the heart of our explorations.

And here an important research object suggests itself: human-disturbed landscapes. Of particular interest to AURA is the intersection of human and nonhuman histories on such landscapes, which I refer to as “unintentional design.” It may be useful to quote from our original project proposal, which I wrote in 2011 together with Nils Bubandt:

We have entered a new geologic epoch, defined by human disturbance of the earth's ecosystems—the Anthropocene. The scale of human disturbance has created unprecedented new crises: a wave of species extinctions, the global spread of emergent pests and diseases, and rapid and unpredictable climate change. New approaches are required to consider these Anthropocene dilemmas.

At the heart of our confusion is the problem of unintentional design on anthropogenic, i.e. human-disturbed, landscapes. Human projects do not always result in the landscapes of which we dream. Climate change is one example of unintentional design; new zoonotic diseases are another. As these examples suggest, we tend to imagine unintentional design as a danger to human survival. But what if anthropogenic landscapes were sometimes also sites of new designs for living—unplanned but still life-enhancing? This proposal initiates a project to investigate the ways that humans and other species live together in anthropogenic landscapes.

We suggest that in order to discover this potential of co-species landscapes we need to pay close descriptive attention to human interactions with other species—to seek a complementary and fruitful scientific dialogue partner to the big-data approaches that are being spear-headed at AU. The model landscapes for this project are disciplinary in-between spaces beyond the normal gaze of biology, such as human-disturbed forests and cities full of feral life. Here puzzles of how humans and other species live together beckon. Yet we do not know either the ethnographic or the natural history dynamics of these kinds of places. Our first step is to re-learn the arts of description, arts that were sidelined in the 20th century due to the success of quantification and modeling in both social and life sciences. Population genetics and neoclassical economics each made description unnecessary through a calculus in which self-contained individuals could be posited without attention to social relations and histories. These sciences were enormously powerful. However, they are designed specifically not to tackle problems of living together, the topic of this proposal. This project sponsors an interdisciplinary revival of descriptive methods for the study of social relation and histories— involving both humans and other species—on anthropogenic landscapes. For this we draw on a range of relevant sciences: anthropology, with its expertise in ethnographic methods; history, in its turn to environmental narration; biology, especially the ecological evolutionary-developmental trends that have shown how species come into being with each other; and science studies, with its lively juxtaposition of technological and philosophical methods.

Within this brew, anthropology has a special role as the host for AURA's transdisciplinary explorations. Yet anthropology is necessarily changed through such collaborations. First, this is a more-than-human anthropology, in which nonhumans sit beside humans as protagonists of our stories. In this transformation, we share a space of discussion with Science and Technology Studies, which pioneered the "symmetrical" study of humans and nonhumans (See Callon 1986.) In contrast to most contemporary STS, however, our goal is not just to study scientists. Our second transformation of anthropology, then, is to learn about the kinds of objects natural scientists study—not just within scientists' knowledge formations but also as part of our own fieldwork methods. Most STS-and-anthropology scholars feel perfectly confident asking scientists about their research, but they shut the door on their own direct knowledge about those research objects. AURA argues that this is a mistake; there is no reason that anthropologists cannot study nonhumans using some of the very same methods we use to study humans—or close parallels to them (see Swanson n.d.; Tsing 2012). Such a move does not require positivism; knowledge practices still participate in one's analysis. However, the analysis can thus address not just knowledge practices but also the world of humans and nonhumans—the world we have jointly made. Furthermore, only by learning directly about worldly objects can we take part in the kinds of creative play that are the hallmark of the research in the humanities, which draws readers outside common-sense assumptions. Playing with figures of speech is just one example. Creative play—alongside serious attention—are necessary features of research tackling the urgent challenges of the Anthropocene. This volume of *More Than Human* shows some of what is possible using this approach.¹

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¹ For an AURA-initiated review of recent anthropological responses to the Anthropocene, see Swanson, Bubandt, and Tsing, n.d.

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MARIANNE LIEN

SALMON MULTIPLE:

Creating dialogue across disciplinary boundaries²

Atlantic salmon multiply as we speak, not only numerically, but categorically as well. Through the project “Newcomers to the Farm; Atlantic Salmon between the Wild and the Industrial,” we³ have traced salmon on and off salmon farms and salmon rivers along the Norwegian coast. Neither fully domesticated, nor completely wild, Atlantic salmon have co-evolved with humans for generations, through inter-species relations that are only partly known, and often contested. In this way, salmon sites offer rich opportunities for thinking about how to live well in dynamic human-disturbed landscapes.

In this paper, I draw on our experiences in knowing salmon with and along with biologists, veterinarians, fishermen and fish farm workers, and focus especially on how the notion of “salmon multiple” can offer a platform for dialogue among different groups of scientists in a contested field. Let me begin with an ethnographic vignette:

Two Fishermen walk the slope up from the river Namsen - towards a small cabin, each carrying a big salmon. The man in front has a black hat with feathers.. he is the fisherman proper. Behind him is a man more broadly built, referred to as the rower. The rower is being paid by the day, to guide the fisherman to the best spots for salmon angling. Such colonial asymmetries have been foundational in

² The ethnographic snippets presented here draw on far more substantial ethnographic material which will be published by University of California Press in 2015, in a book titled: ‘Becoming Salmon; Aquaculture and the Domestication of a Fish’.

³ John Law and Marianne Lien have done fieldwork on and off aquaculture production sites in West Norway. Gro B. Ween has done fieldwork along the Tana River, while three master students have traced salmon along different rivers: Line Dalheim along the Vosso river, Anita Nordeide along the Namsen river and Merete Ødegård along the Alta river. Kristin Asdal has studied the domestication of cod, while biologists Børge Damsgård and Sunil Kadri, and veterinarian Cecilie Mejdell have taken part in seminars and discussions. This paper draws on our collaborative work. The project was funded by Research Council Norway.

salmon rivers in Norway since the arrival of British Lords in the mid-19th century. But the salmon are different too: “**One salmon** is placed carefully in front of river owner, who has been waiting to admire the catch. The **other salmon** is carried past the group and over to the side of the cabin, where it is placed it on the ground, clearly separated from the first.” Why?

“One can easily tell that this is farmed salmon”, says the fisherman, who drops it on the ground.

The rower adds that he is glad he got that shit out of the river. The river owner pulls out some brown envelopes, and says they have to take scale samples, and send them to the lab for genetic analysis. The rower then pulls out a big knife, kneels down over the fish he just referred to as shit, and scrapes off scales that he then seals inside the brown envelope “There is no doubt about this one, its dorsal fin is clearly worn”.

Welcome to the Norwegian coast and to the world of Atlantic salmon. I have cited this story from anthropologist Anita Nordeide (2012⁴), one of the master students that finished her thesis last year as part of our project. I borrow her story from the Namsen river because it captures a very common practice in which farmed and wild salmon are enacted, and made separate in Norway today. Before the 1980s the main differentiation in Norwegian rivers was between trout and salmon. But following the growth of commercial salmon farming, differentiations have multiplied. Farmed salmon inhabit the Norwegian coastline from Stavanger in the South, to Tromsø in the North. Most of the time they are contained in double lined net pens, in the fiords. But accidents happen, a propeller rips the net open, and a few thousand salmon get out. These salmon – referred to as “escaped” are now considered “alien species” in their Norwegian rivers of origin.

⁴ Available here: <https://www.duo.uio.no/handle/10852/16273>.

If the Anthropocene denotes an epoch of increased human impact on the earth's eco- systems, and challenges us to think about how to live well in disturbed landscapes, then the salmon waterways of Norway are relevant sites to consider. Since its emergence in the early 1970's salmon farming, has grown exponentially. Consider this figure:

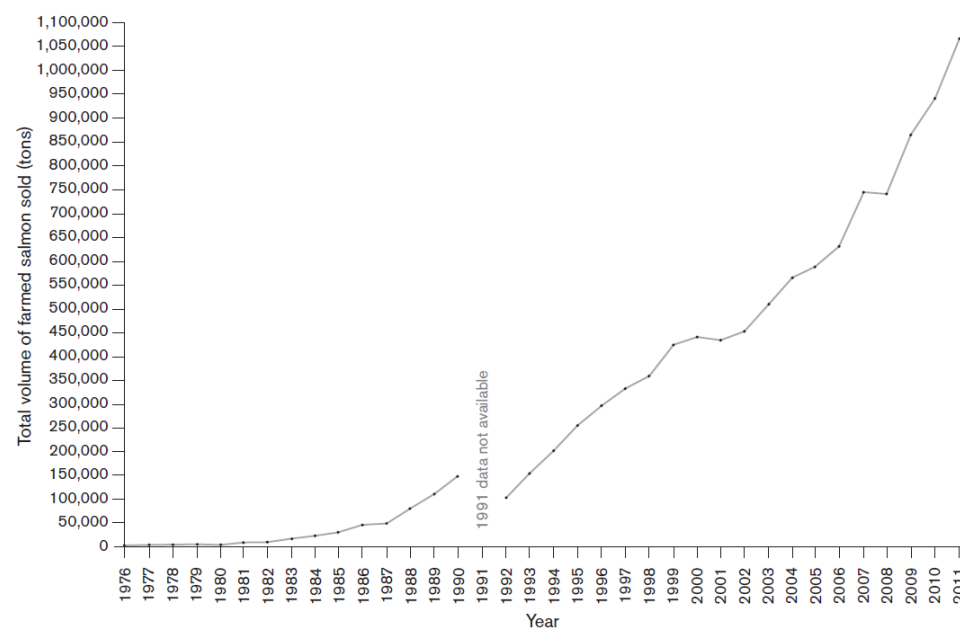


Fig. 1 Farmed salmon production in Norway, total volume 1976-2011 (Source: Statistics Norway)

And the growth continues. The total production of farmed Atlantic salmon in Norway in 2013 was well over 1,16 million tons. This equals more than 12 million meals of salmon per day, and is more than four times the Norwegian production of meat. It is a mind blowing, profitable and a huge ecological experiment. Only 8 generations removed from their wilder cousins, escaped farmed salmon can still interbreed and produce offspring that are a concern both for fishermen and for biologists, especially in relation to their commitment to preserve genetic biodiversity.

In our project, we describe this expansion of intensive marine aquaculture as the most recent turn in the human history of animal domestication. Salmon's relatively recent emergence as husbandry animal in its Norwegian fjords of origin makes it ambiguous: neither quite domesticated, nor completely wild, it upsets the ordering binary of "Nature" and "Culture" that domestication otherwise sustains:

But it is not exactly as if the wild salmon evolved in isolation, until the 1980's. Fishermen and their associations have diverted salmon spawning journeys for generations, at least since the 1800s. They mixed eggs and milt indiscriminately and distributed young salmon fry across watershed, and fjords and mountain ranges. Such diversions complicate current restoration projects, and cast some doubt over the historical depth of salmon's genetically evolved fitness in relation to particular rivers. So in the flow of these seemingly pristine salmon rivers, like Namsen, or Alta, where a couple of days of fishing were recently auctioned off for 150.000 kroner, there is also, a long, and shifting history of co-species evolution, which has recently intensified.

In what follows, I will give a few examples of some of the questions that we have explored in this project. I will dwell especially on how we as social scientists work with themes that are otherwise at the heart of the research agenda of biologists, how we carve out a space for inquiry that is "ours". I will do this by means of two examples, one from the river, the other from the salmon farm. And finally I will give an example of how our approach helped establish a platform for public dialogue, which was a rather unexpected outcome of our project.

HOMELESS SALMON IN THE VOSSO WATERSHEDS

Vosso used to be known for its large Atlantic salmon. Old, black and white photographs of fishermen posing with freshly caught salmon tell stories about local pride, and have become a symbol of the natural splendor of western Norway. Today, they also serve to document what has been lost, and to mobilise around the ongoing Vosso salmon rescue project.

By the late 1980's the Vosso salmon was on the verge of extinction. Original salmon stock was then taken out of the river, and placed in a so-called live gene bank, in a mountain lake, and a moratorium on fishing was put in place in 1992. A rescue plan was later developed, and it is the current implementation of this rescue

project which I have had the chance to follow on and off together with one of our master students, Line Dalheim.

The decline of Vosso salmon is explained as the result of many factors, some of which have been mitigated, others not. These include hydroelectric development, acid rain, road construction, and – more recently - salmon farming: through increased prevalence of sea lice in the fjord, and through hybridization and competition between wild salmon and escaped farmed salmon during spawning.

The rescue project rests on two pillars:

1. Cultivation and release of genetically distinct roe, fry and smolt.
2. Measures to reduce the current threats to Vosso salmon.

The first release of eggs, fry and smolt from the Vosso salmon rescue project, took place in 2009, and already in 2011, there was a significant increase of salmon returns, triggering enthusiasm among everyone involved. But what does it mean that salmon returns? With a moratorium on salmon fishing, how do the salmon appear?

One technique involves the use of underwater cameras that register the number of salmon bodies passing a point in the river in a defined time period. High counts are promising, but not enough, because a camera does not reveal the kind of salmon that return, they only count. Before the 1980's, further details would have been irrelevant, a returning salmon was a simply a salmon. Since then, entities of salmon have multiplied: wild has become a distinct entity, and so has the so-called escaped farmed, also known as “alien” (see Lien and Law 2011⁵).

But even within the broad category of “wild”, new distinctions have emerged. One such category is “cultivated” salmon, meaning those that were hatched from broodstock from the gene bank and released as smolt as part of the Vosso salmon rescue project. These are easily recognized as they are fin-clipped. Fin-clipped salmon are wild in relation to escaped farmed salmon, but not quite wild in relation to the common definition of wild salmon as being autonomous, or as my some biologists put it, being able to complete the cycle from egg to egg independent of human intervention. Hence, the “cultivated” salmon returns that have the adipose fin intact but no visible signs of being raised on a fish farm. The latter could be

⁵An early version is available here:

<http://www.sv.uio.no/sai/english/research/projects/newcomers/publications/working-papers-web/Emergent%20aliens%20Ethnos%20revised%20WP%20version.pdf>

various things: it could include salmon whose biography has unfolded independently of the project, in which case it is what project workers (probably for lack of better words) call “wild wild” (Dalheim 2012, 99⁶). But they might also include salmon released by the project as fry, or roe planted in the river. In order to find out, the fish must be killed and cut open, its brain scrutinized for a colored ring, the result of a marker that has been added to the water around the eggs in the hatchery, precisely to leave a visible sign that the fish is, in fact, not quite wild after all.

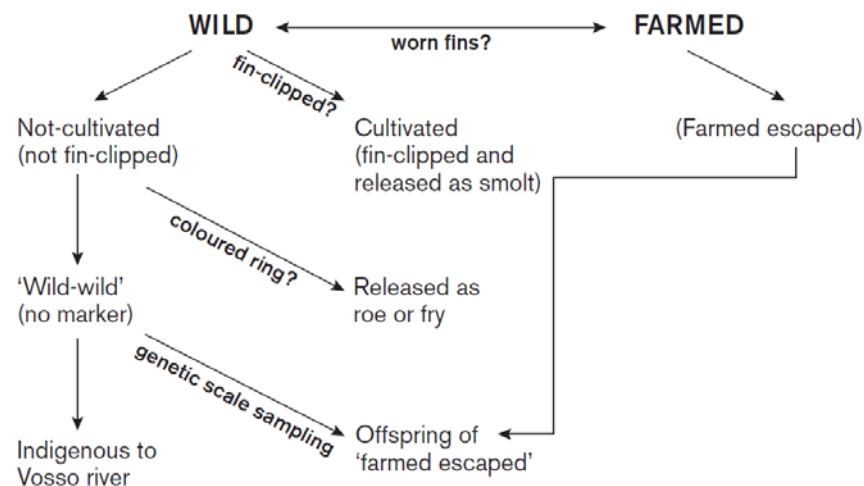


Figure 2. Distinctions multiply

Through all of these forms of differentiation, salmon are made to tell particular stories. On the basis of such stories, a choreography of salmon movement is produced, rendering the Vosso river more or less successful as a salmon river habitat. All of this indicates that the Vosso Salmon rescue project yields not only salmon returns, but also a considerable amount of data. Salmon are eclipsed by an ever expansive vocabulary, and of scaling devices, which highlight particular sets of connections and silence others.

⁶ Also available here: <https://www.duo.uio.no/handle/10852/16271>.

These are clever and creative devices designed to make the silent salmon speak. And yet, as I follow people tracing salmon in rivers, I am haunted by a sense that there are generative forms of life that we will never know about. The problem is not that the biologists have an incomplete image of the river, but rather the opposite: a river which becomes over-determined, and excessively generating human-salmon stories of a particular kind. As salmon yield data, they help cultivate an entire river watershed, but what is rendered visible here are fragments of an imagined whole, which resonates with what my collaborator John Law calls a singular “One World World” (Law 2011⁷).

How can we tell a story that remains sensitive to the indeterminacy of unfolding underwater lives? How can we add to the story, in a way that does not simply reproduce a precise, but perhaps also excessive vocabulary? My hunch here is to search for the cracks, or moments of indeterminacy when things don’t add up. Or to ask questions that others don’t ask, which means attending to what is otherwise ignored.

ESCAPEES OR HOMELESS?

Let me give one example of the latter. Many years ago, when I studied the marketing department of a major food manufacturer, it took me about four months of fieldwork, to actually think of asking the question: what is a market? Once I did, interesting things emerged. It took about four years of on-an-off fieldwork before I began to seriously question the term “escaped farmed salmon” (Norwegian: *rømt oppdrettslaks*). The term is part of Norwegian salmon statistics, it is used by farmers and fishermen alike, and points to a contested field, but the term itself escapes attention of most people involved, so it escaped my attention too. Until I learned more about salmon trajectories and realized that a farmed escaped salmon is never “escaped” at all. Unlike farmed cod, which are notorious for actively breaking out of pens (the “Houdini” of aquaculture), salmon make few, if any attempts to break out. Accidental “escapes” happen because their home at sea, the netting that surrounds them is broken open. It could be a propeller getting caught in the net, or a similar incident, that ruins the enclosure. So salmon may have agency, but they

⁷ Also available here: <http://www.heterogeneities.net/publications/Law2011WhatsWrongWithAOneWorldWorld.pdf>

hardly “escaped”. It was their world that simply opened up, or shattered, and they dispersed. Within a few hours, they will probably feel hungry, check out the water surface and wonder where the pellets are. So rather than being escapees, perhaps they are simply hungry, lost, or perhaps they are more accurately referred to as homeless?

Some salmon stay close to the pen, and continue to feed around the farms. Others move farther away, and learn to find their own food. Perhaps we should describe the latter as refugees, or survivors. Because the pen is not necessarily a prison, it is their home so far, and the waterways that they explore, are more than the damaged habitat of their distant native relatives but also the place – the only place – where these homeless survivors can get on with the task of living.

But their chances of survival are slim. Within hours, you can see small boats with local people fishing, hoping to fill the freezer in no time at all. The salmon farmers encourage this and offer a small payment for every salmon (head) that is caught. If the salmon make it past the first few days, it may migrate upstream, where another obstacle is waiting: The river anglers, or the biologists, with their smolt screws, their bend nets, and other devices designed to catch salmon for research purposes. For the salmon, the result is the same: they die. I wonder about whether we could add another label to the vocabulary: outlaw, “fredløs”, protected by no one. They are impure, and unfit to take part in the future imagined by those currently defining what the Vosso salmon watersheds shall look like.

This small intervention is not so much a critique, as a reminder that words are political, they are sometimes excessive and they help make up the world we perceive. Playing with words, as I have just done, invites us to ask other questions, and engage different connections.

Let me turn briefly to the previous home of the homeless, the salmon farm, which is where John Law and I spent most of our time.

DOWN ON THE FARM

While goats and chicken have been farmed animals for thousands of years, salmon are indeed Newcomers to the farm. In less than 50 years, they have gone from being a highly valued prey, to being one of the most profitable sources of farmed animal protein. The number of wild salmon returning to spawn in Norwegian rivers every year is estimated to be around 500.000. That is about the same number of fish that

occupies a single marine grow-out site, - such as this one in the middle of the Hardanger fjord. Each square cage holds about 50.000 there are ten cages linked together and sometimes a circular pen at the end.

To think about aquaculture as another turn in the human history of domestication allows particular comparisons to be made, both historical but also cross-species and not least, across elements. We can imagine for example, that the questions that the salmon farm-workers ask themselves are not all that different from what people must have always asked when they extend their household, to include animals: “How are you doing today? What do I need to do next to make sure you stay alive and well?” These are practical questions. And they inevitably involve another question: “Who are you? Are you edible, and what makes you grow?”

During our fieldwork we have traced such questions (and answers), as they emerge through socio-material practices and concerns. The answers that are collectively assembled can be thought about as ways of knowing, but only if we understand knowledge as something which both embodied (residing in the gaze, and in our coordination skills), distributed across the salmon domus and beyond (sometimes finding its way into scientific papers) and emergent in heterogeneous practices (involving various mechanical and electronic devices and inscriptions).

The questions are fairly common across relations of human-animal domestication. But the ways they are asked, and answered, are specific, and draw our attention to how salmon farming differs from some other husbandry practices that most of us are familiar with.

Firstly, scale matters. Like bees and battery hens, farmed salmon are many. You know the batch by its recent statistics. You never know them one by one. Secondly, unlike most husbandry animals, salmon occupy a different element. They swim in three dimensional space. They are always other, simply because of the water surface. This means that they are quite literally out of sight. Any attempt to move them into the open air, comes at the risk of their survival. It only happens once or twice during their entire life-span. Hence, caring for salmon involves caring for water. It is about constantly monitoring their environment. Thirdly, salmon are fish. Unlike cows and dogs, their body language is difficult for us to read. For all of these reasons, caring for fish is fundamentally different from caring for four legged animals. It calls for different devices, different practices that are in the making as

we speak, and as they take on new shapes and forms, different salmon is enacted. Studying aquaculture at this historical moment, allows us a glimpse into co-species histories, salmon in the making after their first initiation as husbandry animals.

The salmon domus is more than what meets the eye. As a global commodity: feeding on Peruvian anchovietta, and destined for Chinese consumers, farmed salmon defies any attempt to pin it down, to a particular place. But the domus is extended in other ways too: Sampling, measuring, and comparing numbers are crucial practices in the ongoing making of farmed salmon. One of the more surprising findings for us, was the extent to which scientific practices are not confined to laboratories, but are part and parcel of what is going on, on the salmon farm. So much so that it is hard to tell where production ends and science begins. And as they are enrolled as objects of science, farmed salmon and their distant river relatives come together in a broader narrative of Norwegian fjords and watersheds, and what it takes, to enhance and preserve these coastal regions as habitats for salmon, both wild and farmed.

A PLATFORM FOR DIALOGUE?

This brings me to the final point: Norwegian rivers are spawning grounds for about a third of the world's remaining populations of Atlantic salmon, while Atlantic salmon are globally threatened. Norway is also the leading producer of farmed Atlantic salmon worldwide. This is – briefly – the dilemma that Norwegian authorities face: Is it possible to imagine that wild and farmed salmon can occupy the same waterways? Can they live together? Or is it an experiment destined to fail.

Throughout our project, we experienced, that the perspectives on this problem varied widely, not only among industrial farmers and fishermen, but even more so, among bureaucrats, and among biologists. Gro Ween and I, who worked on wild and farmed salmon respectively, often experienced that things we had been told, about the realities at the other side of the divide were often so completely off the mark, and so incompatible with our own ethnographic experiences of being there that we found ourselves in heated discussions about how things are. We learned that our disagreements were just the tip of the iceberg, because the skepticism between different biologists for example, was sometimes even greater, and they did usually not occupy offices next door to one another.

So we decided, to bring them all together, at a conference which we called: *Kan vi leve sammen?* (Can we live together). The title alludes to the salmon of course, but also to their people, their patrons, and their respective camps and practices of inquiry. Our aim, was simply to make a small contribution towards dialogue, because we imagined, that any chance of successfully hosting these different salmon along the same coastline, will require generous sharing of knowledge. We found that precisely our role as social scientists made it easier to do this. Participants told us, if this would have been hosted by the ministry or the environment or the ministry fishery, or this or that applied research institution, the “other camp”, would simply not have come. But because we were NOT biologists, and because our ethnographic affiliations were equally grounded in rivers and on farms, we enacted a kind of neutral ground in this battlefield. We also made sure that we stirred enough media attention, to make it seem important to be present, and dangerous to be absent.

But there is a final twist to the story. Because how do you create a platform for dialogue among natural scientists who do not quite believe in each other’s data. One thing that science studies does, is that it reminds us to slow down, and to notice and make explicit the socio-material practices by which data are being made. Inspired by this approach, we laid out the field as one in which salmon remains elusive, and hard to get to, and how each scientific encounter, relies on a particular enactment, a particular place, a particular river and so on rendering salmon multiple. We did not need to rehearse any abstract debate on actor-network theory or material semiotics, all we did was really to relate the practical difficulties that all biologists face in simply knowing salmon. And somehow, it worked! We found that when we encouraged this awareness of the specifics that always travel with the stories, be present in the debate (most often it is made absent) then it is also easier to appreciate how each presentation is a view from somewhere, and that one fact does not necessarily refute another (both can be true, at the same time). It is difficult to say whether and how such meetings matter, in the long run. But it was appreciated, and participants told us, that without our efforts such a meeting would hardly have taken place. For us, it was another, and rather unexpected kind of intervention that one can make across disciplinary divides, an intervention which is at the same time, a kind of collaboration.

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HEATHER SWANSON

LANDSCAPES, BY COMPARISON:

Practices of enacting salmon in Hokkaido, Japan

INTRODUCTION⁸

The Aarhus University Research on the Anthropocene (AURA) project, of which I am a part, asks what kinds of multi-species living are possible in the midst of radical human disturbance. Drawing inspiration from both ethnography and natural history, we seek to address such a question through the careful description and critical analysis of *anthropogenic landscapes*. Landscapes are one of the most important objects for AURA because they demand simultaneous attention to what we tend to think of as “biology” and “culture” and show us their constant imbrication. Landscapes – with their nonhuman ecological relations and layers of human histories – can never be neatly classified as either natural or cultural. Consider the Danish farming landscapes that surround us. One cannot possibly even begin to understand their multispecies arrangements without knowing something about plant physiology and local soils. Yet one equally cannot understand them without knowing something about Danish cultural histories. For the AURA team, we study landscapes because they demand that we work collaboratively to bring together biology and ecology, human social formations and cultural histories.

This paper takes up one of the AURA project’s key questions about landscapes: How are landscapes made? The answer to such a question is, of course, multiple; it also varies depending on the particularities of a given landscape. In this

⁸ Parts of this paper are adapted from Chapters 1 and 2 of my dissertation, *Caught in Comparisons: Japanese Salmon in an Uneven World* (Swanson 2013).

presentation, I want to delve into one specific kind of practice – that of cross-cultural comparison – and its role in the making of a particular landscape – that of Hokkaido, Japan’s salmon-bearing watersheds. In doing so, I hope to highlight the critically important, but often overlooked role, that practices of comparison play in the making of multispecies relations. At the same time, I aim to demonstrate that close attention to how landscapes are made by comparisons also offers important insights for how anthropologists think about comparison – insights that have the potential to be relevant, I hope, even to those scholars who are not directly interested in questions of multi-species landscapes.

When one thinks of landscapes, cross-cultural comparison is not typically the first thing that comes to mind. Landscapes conjure up a simplistic sense of the “local” – of either indigenous knowledges or traditional rural life ways. We tend to think of landscapes as more-or-less self-contained entities rooted in particular places. As anthropologists, however, we should know better. Consider what we have learned about human cultures. Cultures, we now realize, are not separate and independent entities, but are instead made through encounters. Cultures do not precede encounters, but emerge out of them. I am reminded particularly of the work anthropological historian and critic James Clifford who, in his book *Routes* (1997), beautifully illustrates how routes come before roots, rather than the other way around. Clifford opens *Routes* with an excerpt from an autobiographical story by author Amitav Ghosh. In it, Ghosh describes his surprise when the rural Egyptian town he visits – ostensibly a traditional and settled place – turns out to be as cosmopolitan as an airline transit lounge. Its people, Ghosh shows, are constantly caught up in cross-cultural encounters as they travel to Libya, Jordan, and Syria as laborers, to Yemen as soldiers, to Saudi Arabia as pilgrims. It would be easy, Clifford points out, to read such a story as symbol of late 20th century globalization – of an increasingly hybrid world. But, if we look again, we see the situation otherwise. As Ghosh continues with his story, we see that cross-cultural encounters are nothing new for the people of this rural Egyptian village. For generations, these people had travelled widely – to Turkey, the Levant, and Nubia. Their community – their so-called “local” and “traditional” culture – had been built through cross-cultural encounters. Clifford offers up this story as an example of a general pattern, rather than as an oddity. “Virtually everywhere one looks,” Clifford

writes, “the processes of human movement and encounter are long-established and complex. Cultural centers, discrete regions and territories do not exist prior to contacts, but are sustained through them” (Clifford 1997: 3).

If we think of cultures in this way, why not think of landscapes this way, too?

Indeed, landscapes – like cultures – are made through travels that link together geographically far-flung places. And, for landscapes – as for Amitav Ghosh’s Egyptian villagers – such movements and the encounters they produce are nothing new. For millions of years, pollen grains have floated on wind currents and migratory birds have transferred diseases from one continent to another. But while long-distance encounter itself has long been a part of landscape formation, the epic changes that some call the Anthropocene and others call modernity have generated radically new kinds of encounters. For both Egyptian villagers and landscapes, encounter itself may be a constant, but the specifics of encounters are not.

Since the beginning of the 19th century, landscapes around the world have been thrust into new kinds of encounters on an unprecedented scale. Some of the stories of these new landscape encounters are already familiar to us. We know, for example, how the links forged between landscapes of production and consumption have transformed both – think of extractive relations between European nations and their colonies, as well as rural areas newly connected to the metabolisms of industrial cities. We also know stories of the human-introduced species that, when they encounter new ecologies, end up completely remaking them – think of the European rabbits in Australia that have decimated a good portion of the continent’s native plant life.

To what we have not yet paid enough attention, however, is how such human-driven landscape encounters are often deeply intertwined with practices of cross-cultural comparison. Cross-cultural comparisons are always part and parcel of human encounters. When people meet others, they make comparisons through which translations, borrowings, and differentiations come into being. And while such cross-cultural comparison may be itself a human practice, its effects are multi-species ones. Comparisons get embedded in material practices, in objects, and in landscapes – remaking human and non-human relations. Tracing how this happens is of critical importance for understanding Anthropocene landscapes.

If one is going to study landscapes in this way, salmon are particularly good creatures with which to start. Rather paradoxically, water and its inhabitants provide a great way to learn about land. Although salmon spend much of their adult lives feeding in the ocean, they spend the beginnings and ends of their lives in small freshwater rivers that are intimately connected to the lands that surround them. Throughout their freshwater phases, salmon are incredibly sensitive to the changes in water and stream morphology that land use alteration generates. Dams can divert water for irrigation and block salmon migration, agricultural runoff can pollute rivers, and logging-related erosion can cause rivers to fill with silt, smothering the fish's eggs. If any such alterations occur, they reshape salmon behaviors, modify patterns of fish survival, and rework the genetics of salmon populations. Landscapes processes – and any changes to them – are thus literally written into the genes of these fish. If cross-cultural comparisons are a key factor in making of landscapes, as I suggest in this paper, then we should find such comparisons in the bodies of salmon.

STRUCK BY COMPARISON

Let me begin again, this time with comparison.

When I was initially designing my dissertation research, my advisors encouraged me to consider structuring my project as a cross-cultural comparison. I was planning to research salmon fisheries management and salmon-human relations in both the United States and Japan. Comparison, they said, seemed like a natural framing device. But as an anthropologist who came of age during the deconstructionist 1990s, my ears couldn't hear cross-cultural comparison as anything other than an anachronism, a heuristic for the theoretically un-savvy. Comparison was too intertwined with outdated ideas of bounded, reified cultures. It conjured up specters of armchair anthropology and the Human Relations Area Files. It couldn't *possibly* be interesting. I was going to do "multi-sited ethnography," studying a single, interconnected salmon world in the North Pacific. Or I was going to trace a transnational "network" of salmon production and consumption. Or I was going to use literature on migration, movement, and place-making to study the salmon "diaspora." Comparison was too "fishy," I thought, too stale and suspect.

But regardless of my efforts to keep comparison out of my project, it snuck its way in through the back door. When I arrived in northern Japan to conduct my

fieldwork, I quickly discovered that one could barely do anything in Japan without engaging with practices of cross-cultural comparison. In Japan, comparison was not the stuff of academic analysis; it was an explicit and ubiquitous part of everyday life. Although the comparisons I encountered were varied, the most common were between what Japanese people called “Japan” and “the West.” Such categories were at once pervasive and material. Even simple daily tasks such as ordering breakfast at a restaurant or using a public restroom required selecting a configuration that was labeled either “Japanese” or “Western.” Cross-cultural comparison was everywhere.

When I dove into my formal research on salmon in Hokkaido, the comparisons did not go away. Salmon, like everything else in Japan, were done in ways that were radically transnational and comparative. I encountered members of a salmon fishing cooperative who had designed their business practices in comparison with models from Russia, salmon scientists who tried to distinguish their theories of sustainability through comparisons with Canadians, and a university fisheries school modeled after an American land grant college. I was almost literally struck by the comparisons. Everywhere I went, people cited relations between their own fisheries practices and those of people in the Norway, France, New Zealand, and Chile. These were “place-based” practices of salmon management, but thoroughly cosmopolitan ones!

Let me quickly situate these practices of comparisons in historical context. After the arrival of U.S. Commodore Perry’s ships in the mid-19th century, the Japanese – fearful of European or American domination – embarked on a massive project to transform Japanese lands from a collection of feudal domains into a globally powerful and internationally legible nation-state. After the Japanese watched the British force unequal treaties onto China, they were scared. If they were going to avoid colonization, they had to become a legible state in the eyes of Europeans. The Japanese saw comparison as essential to this project; they did not yearn to *become* Euro-American, but they needed to *become comparable* to Europe – militarily, politically, and culturally – in order to be *recognizable* as a modern power. For the Japanese, the process of modernization was, above all, experienced as a process of learning how to make transnational comparisons and to articulate oneself within them. Sending numerous missions abroad and inviting countless foreign experts to

Japan, the Japanese government built their new state in a comparative dialogue between what they came to experience as “Japan” and the “West.”

The new Japanese state saw their own imperial expansion as a critical component in such projects, and the first place they colonized was Hokkaido – the location of my fieldwork. Although the Japanese had traded with the island’s indigenous Ainu people for centuries, they did not stake an official claim to the island until 1869. The colonization of Hokkaido was a comparability project from the get-go; it was an attempt to demonstrate that Japan was an inappropriate place for Western colonization though a display of Japan’s own colonial powers. But the colonization of Hokkaido required a complex set of cross-cultural comparisons. The Japanese state strongly desired to bring Hokkaido into the fold of the Japanese nation, but the island’s terrain and history put it at once inside and outside the body of “Japan proper.” This northern territory was very different from the main Japanese islands: it was too cold for growing rice, inhabited by indigenous peoples, and covered with frightening wilderness.

Nineteenth century Japanese government officials thus sought other models for colonizing such an area. The nearby Russian Far East provided a climactic equivalent, but the Japanese government did not think Russia a suitable source of inspiration. It was not the type of place to which they wanted to link Hokkaido through explicit comparison.⁹ Despite Russian knowledge about cold-weather farming, drawing a comparison between themselves and a late-developing empire itself on the margins of Europe was unalluring. As a result, Hokkaido officials opted instead to stress the parallels between what they saw as the unambiguously “modern” American West and their own efforts at colonization. Using the American West as a model, Japanese officials began to see Hokkaido as a frontier where they could test and refine the most cutting-edge Euro-American ideas of the times – including forms of scientific agriculture and modern natural resource management. Hokkaido was, from the start, a comparative project in which landscape could not be ignored because the grounds of comparison were often literal ground.

⁹ The Japanese government officially classified Russia as a second-rate country, and they sent few officials and students there (See Togawa 1995:215).

EMBEDDED COMPARISONS

Today, when one travels through Hokkaido's landscapes she feels as if she is traveling not in Japan, but in some liminal warp-space. One recent description of Hokkaido puts it this way:

In many ways, Hokkaido is the least “Japanese” of all the main islands. It's Texas and Alaska rolled into one. It's Siberia. Switzerland. The last frontier and the end of Japan. . . Hokkaido even *looks* like the American West (Ferguson 1998: 365).

Indeed, most Japanese people consider vacationing in Hokkaido as an experience that mimics the exoticness of international travel without the hassles of dealing with passports and foreign languages.

One of the reasons for this is that comparisons between Hokkaido and the American West have been literally built into the island's landscapes. In the next section of this paper, I present four material objects that help us to understand such comparisons and the ways that they have come to be embedded in Hokkaido's landscapes and fish. I argue that paying attention to the details of the comparative stories enfolded within Hokkaido's salmon and their environs helps us to understand both landscapes and comparisons in more expansive ways.

Object 1: Hokkaido farm



Figure 1: A Hokkaido farm. Photo by author.

In 1871, the Japanese government sent Kuroda Kiyotaka on a study tour of the U.S. and Europe. Kuroda, a former samurai from Kyushu who had helped to

overthrow the Shogunate, was appointed to head the *kaitakushi*, or Hokkaido Colonization Commission, the organization charged with opening the Hokkaido frontier. Kuroda was intrigued by American settlement practices, and he saw American advice as essential to Hokkaido's development. During his stay in the U.S., Kuroda managed to convince General Horace Capron, the sitting federal Commissioner of Agriculture, to resign his post and travel to northernmost Japan that same year to serve as an advisor to the *kaitakushi*.

During his two years in Hokkaido, Capron sparked a revolution in the island's agriculture and land use by introducing American crops and livestock. The lists of species that made their way across the Pacific by steamship at his request are truly impressive. Some came in the form of cuttings: cherries, nectarines, plums, peaches, apricots, raspberries, currants, black gooseberries, strawberries, rhubarb, quinces, and grapes (Russell 2007: 129). Others arrived as seeds: onions, turnips, carrots, cabbage, lettuce, tomatoes, beets, celery, spinach, corn, peas, beans, and potatoes (Russell 2007: 129). Still others arrived on the hoof: Devon and Durham cattle, Berkshire and Suffolk pigs, Cotswold, Merino, and Southdown sheep, and Arabian horses (Russell 2007: 132, 134). Their numbers were not small. For example, by the end of 1873, more than 32,000 young fruit trees had been shipped to Hokkaido (Russell 2007: 129). This was a foundation for the large-scale industrial agriculture that both the Americans and the *kaitakushi* imagined might take root in Japan.

Capron was just one of a cadre of American men that the Japanese government hired to survey the island, map its geology and rivers, lay out the grid system for its capital city, build mechanized sawmills, foster the development of mining industries, and help with road, bridge, and railroad construction (Fujita 1994 and Duke 2009). One of these foreign pioneers was Edwin Dun, an Ohio rancher, whom Capron selected to introduce modern livestock production to northernmost Japan. Tokyo officials understood the symbolism of powerful horses and meaty cattle. Moreover, for Hokkaido's colder and more marginal climates, livestock rearing seemed more promising than rice farming. Dun, with years of practical experience in the U.S. Midwest, became their guide. He brought more than 100 cattle and 100 sheep to Japan, including some from his own farm (Hokkaido Prefectural Government 1968: 44-45). But once he arrived in Hokkaido, he faced a serious challenge: the island was no pastoral paradise. Its grasses were poor, its farms

lacked fences, and wolves prowled its mountains. So Dun and the *kaitakushi* set out to make the landscape safe and hospitable for modern animal husbandry. They introduced Kentucky bluegrass, red top, timothy, and clover; they built miles of split-rail fences; and they exterminated wolves and wild dogs with strychnine, a chemical poison widely used for predator control in the Western U.S. (See Fujita 1994: 60 and Walker 2004, 2005). Through such practices, they helped to build industrial-scale beef, dairy, and military horse industries in Hokkaido, while decimating the island's canine populations. They successfully turned miles of hills and plains into parcels of pasture.

Although the *kaitakushi* did not follow all of the Americans' advice, they took much of it very seriously. In doing so, they made countless comparisons with the American West that materially remade Hokkaido, pulling actual bits of U.S. agriculture into the island's landscapes.

Object 2: Hokkaido University



Figure 2: Bust of William Smith Clark prominently displayed on the Hokkaido University campus. Photo by author.

Although the American advisors clearly sparked significant changes in Hokkaido's social and natural landscapes, they did not stay long enough to see their projects to fruition. Most of them returned home at the end of their one to three year contracts. But another institution – the Sapporo Agricultural College – kept the comparisons alive, ensuring that the American-inflected logics of modern

scientific agriculture and natural resource management would continue to transform Hokkaido's lands and waters for decades to come.

In 1875, Kuroda asked the Japanese ambassador in Washington, D.C., to secure the services of an American educator capable of establishing a first-rate agricultural college in Hokkaido. The Japanese government managed to recruit a consultant of the highest caliber, William Smith Clark, then-President of the Massachusetts Agricultural College (MAC), now the University of Massachusetts, Amherst. In summer 1876, Clark arrived in Hokkaido along with two other MAC professors (Fujita 1994). Immediately, they began creating Sapporo Agricultural College (SAC). The curriculum that Clark created for SAC emphasized practical agricultural education, but not at the expense of more scholarly pursuits. In the school's early years, the courses included geometry, English, German, elocution, and political economy, along with drainage and irrigation, manures and crop rotation, vegetable pathology, stock farming, and veterinary science. Notably, students also took classes titled "History of Colonization" and "Political History of Europe," with much of the instruction in English (See Nitobe 1893: 35-42 for complete list of courses). SAC's efforts to create citizens of the world also extended to the cafeteria, where the college made school meals into a tool to craft students who would be at home with one foot in the East and one in the West. In addition to Japanese-style rice-based meals, the students were introduced to Western-style staples, such as chicken, venison, coffee, bread, butter, and ice cream, served on flat plates.

One of the primary goals of the college was to make men who were skilled in the arts of comparison – and who could thus become Japan's first generation of modern, cosmopolitan nation-builders. The SAC instructors, New Englanders steeped in the gospels of Protestant Christianity and liberal education, believed that the students needed to be inculcated with a certain kind of desire – a yearning for continual improvement at the scale of both the self and nation. That desire required comparisons – between the backward East and the modern West, between what Japan was and what it could be. For the students, as well as for many Japanese, "modernity" itself came to be experienced as a practice of cross-cultural comparison.

As a result of their "Western" educations in Sapporo, the school's graduates were exceptionally skilled in such comparisons. They became Japan's translators,

making a place for themselves and their new nation in an increasingly “global” world. The SAC students went on to become diplomats and statesmen. One of them rose to the position of prime minister, another to that of Under Secretary-General of the League of Nations. With the knowledge they gained in Sapporo, they guided Japan’s colonization of Taiwan and Korea, suggesting plans for their agricultural development. They introduced Hawthorne to Japan, developed a Shakespearean theater, authored bilingual dictionaries, and founded English language newspapers (Willcock 2000: 1015).

SAC also directly influenced Hokkaido’s development. More than a third of the school’s pre-1900 alumni remained in Hokkaido permanently, becoming the leaders of its businesses and institutions. The logics and practices that they both preached and performed set off a cascade of landscape changes. They drained the marshlands around the Ishikari River, converting them to agricultural land. They cut forests and processed wood products in sawmills and pulp plants. They built coal and gold mines. But most importantly, they institutionalized the comparative spirits of the American advisors and their visions of modernist development.

Today, SAC remains Hokkaido’s most important educational institution, although under its new name of Hokkaido University. On its webpage, the university continues to cite “frontier spirit” as the first of its four guiding principals. It is not mere rhetoric. Echoes of SAC’s original philosophies remain, especially in the university’s agricultural and fisheries departments, which train the majority of the island’s natural resource scientists. The making of comparative subjects continues.

Object 3: Salmon canning label

Web link 1 (A Hokkaido salmon canning label):

<http://www.maruha-nichiro.co.jp/salmon/gallery/>

Web link 2 (A Columbia River salmon canning label):

<http://arcweb.sos.state.or.us/pages/tm/salmon/salmon74.html>

As much as the new comparative Japanese elite wanted to emphasize their ability to make modern comparisons, the world of the late 19th century was no comparative tabula rasa. They often had to contend with all kinds of comparisons not of their own making – comparisons in which they were caught. Of course, the

“big” binaries between the savage and the civilized and between the West and the rest were one set of comparative practices with which the Japanese had to contend. But there were many others, including those related to salmon.

Although the American advisors to Hokkaido initially stressed agricultural improvement, Japanese officials were not about to neglect the island’s abundant fisheries. Hokkaido administrators saw the island’s seafood as a potentially lucrative export. Less than a decade earlier, in 1866, two brothers built a small salmon cannery near the mouth of the U.S. Columbia River, tucked in a corner of the American West. Almost immediately, it spawned a new industry. With salmon safely preserved in metal vessels, Columbia River fish could be shipped to markets anywhere in the world. By 1873, customs records show that Columbia River salmon were already being directly exported to England, China, and Australia (Penner 2005: 10). The Columbia River salmon industry created a buzz among entrepreneurs on multiple continents – one that Hokkaido administrators had heard. By the mid 1870s, Hokkaido bureaucrats had decided that they wanted a canned salmon industry of their own – one comparable to that of the Columbia River.

But they quickly encountered a problem: the texture, taste, and color of Hokkaido salmon were slightly different from those of the Columbia River fish, which had already become a *de facto* standard. Hokkaido’s officials had to grapple with the fact that their fish were always going to be compared to a Columbia River “norm” – and, if they were going to sell their salmon for a good price, they needed to compare well. The *kaitakushi* sent their first attempts at canned salmon to American ambassadors and European merchants for their opinions on how Hokkaido’s salmon measured up to those from the U.S. Aiming to impress foreigners, the Hokkaido factory wrapped their first cans in bright red bilingual labels, with directions for use in both English and Japanese. But despite such efforts, no one liked Hokkaido’s canned fish. A British merchant reported: “As to the sample of tinned salmon sent, the reports both from London and the Continent are unsatisfactory. The salmon . . . could not be brought into competition with the preserved salmon from America” (Ahrens 1877). Another merchant made the comparisons with which Japanese salmon had to contend even more explicit:

We think that the people of Europe, who have become accustomed to the appearance and taste of the Oregon Salmon, would not

consider the Hokkaido fish as equal to it either in quality or value. The Hokkaido Salmon is no doubt very good food, but the Oregon fish would probably be much preferred, and it might be difficult, at least in the beginning, to introduce, or to obtain a fair price for, the Japanese product. . . . We would suggest that you should yourself make a comparison between the Oregon and the Hokkaido fish, remembering that the toughness or firmness (hardness) of fibre which in Japan is considered a merit in fish, is not so considered in foreign countries . . . (Walsh 1877).

The *kaitakushi* took this merchant's advice – to make comparisons with the Columbia River in order to make themselves more comparable. After all, the stakes were high. The Dutch ambassador to Japan had discouraged the *kaitakushi* from trying to sell Hokkaido's fish in Europe, advising that the fish would likely find “a better and more profitable market in British India and Java” (Bauduin 1879). The *kaitakushi* did not want either their fish or themselves condemned to second-class colonial status.

The *kaitakushi* both commissioned reports about and sent Japanese emissaries to observe all aspects of the Columbia River salmon industry. By tinkering with their own practices, the Hokkaido government soon brought their own canned salmon into line with that of the Columbia River. As they did, their sales took off. By 1932, approximately 80 percent of Japanese-exported canned salmon was bound for the high-prestige market of England, with the remainder headed to France, Holland, Belgium, and South Africa (Canned Foods Association of Japan 1934: 31-32). In 1934, the Canned Foods Association of Japan was pleased to report steady increases in exports, “indicative of the fact that Japanese canned salmon has maintained its good reputation in foreign lands” (Canned Foods Association of Japan 1934: 33).

Object 4: The Indian water wheel



Figure 3: "Indian" waterwheel in the Chitose River.

The wheel is located toward the bottom left of the image. Photo by author.

Because they are built into industrial practices and into landscape, comparisons have resilience. As material arrangements in the world, they actively shape both presents and possible futures. Consider the Indian water wheel, a device used today to capture salmon in Hokkaido's Chitose River. The river's hatchery association uses the wheel to capture returning adults to use as broodstock for its fish propagation efforts. It is a device with a history of comparisons.

Ito Kazutaka, a member of the Sapporo Agricultural College's first graduating class, revolutionized Hokkaido's fisheries by instituting the salmon ranching system that remains the backbone of today's salmon industry. In 1886, at the request of the Japanese government, Ito traveled to North America to study U.S. and Canadian fisheries practices, particularly those related to fish cultivation, with an eye to improving those of Japan's north. During his 12-month whirlwind tour, Ito traversed the continent, visiting more than 15 states and provinces.¹⁰

By the time Ito returned to Hokkaido, his notebooks were filled with meticulous and detailed line drawings of hatchery incubators and fish capture devices, his mind racing with new ideas. Modern fisheries science was still so embryonic in North America that it stood in sharp contrast to agricultural and canning pursuits, where Hokkaido was "behind" the West. Ito's job was less to help Hokkaido "catch

¹⁰ The information on Ito in this section is from the displays and conversations with staff at the *Chitose Sake no Furusato-kan* (Chitose Salmon Aquarium) in Chitose, Hokkaido, as well as from the book *Ito Kazutaka to tsunagaru hitobito* (Ichiryu Kai 1987). See also Ito's original report *Beikoku gyogyo chosa fukumeisyo* (1890).

up” than it was to help the island to join in the mounting wave of late 19th century fish culture. During his trip to North America, Ito saw much that interested him, but he did not chose a unified model or make a singular comparison. Instead, he compared and contrasted fragments from different places he visited, trying to both situate his own projects in relation to them and to improve upon them.

For example, when he visited the Columbia River, Ito had observed fish wheels, which were used to harvest salmon there at that time. Although he very accurately understood the functioning of the fish wheels, Ito misunderstood their origin, assuming that they were an American Indian technology when they were actually an invention of Euro-American fishermen. When he returned to Hokkaido, Ito combined the design of Columbia River fish wheel with a Honshu style weir to create a method for harvesting fish for the new hatcheries he was also working to create. He called the device he built the Indian water wheel, explicitly citing its American reference point. Today, a version of the device remains in use.

The Indian water wheel was a part of the wider salmon cultivation system that Ito developed. In the U.S. state of Maine, Ito had seen a fish hatchery and thought it represented a bright future for scientific fisheries management. With inspiration from the Maine facility, the Columbia River fish wheel, and the Honshu weir, among others, Ito became a pioneer in the practice called sea-ranching. Hokkaido’s salmon hatcheries raised young fish until they were ready to migrate to the sea, then released them into rivers and the ocean, as if turning cattle out to pasture. Because salmon are a homing species, they returned to the rivers of their birth, where their hatcheries were located. Hatcheries could then take a small portion of the returning fish, propagate their eggs, and begin the cycle again.

Hatcheries were a technology redolent of Japanese modernity; technologically impressive, comparable and legible to the West, and full of Japanese innovation, they were a scientific management practice that would ostensibly improve nature. In Hokkaido, hatcheries were well-loved, and between 1888 and 1908, Hokkaido’s fish cultivation program grew to a network of 50 hatcheries, a faster expansion than that seen on the U.S. West Coast (Kobayashi 1980: 97). Ito seems to have strongly felt that such innovation and modernization required comparative thinking. In addition to setting up Hokkaido’s first hatchery, he also founded a fisheries society that shared information from around the world about evolving fish technologies. As a result of his technical innovations and efforts to place Hokkaido into global

fisheries conversations, Ito became hailed as father of modern fisheries in Hokkaido – as the man who set Hokkaido’s salmon on a new path.

LANDSCAPES, BY COMPARISON

By paying attention to the bodies of salmon, we can see how such “new paths” and the comparisons from which they emerged have created a cascade of nonreversible changes in Hokkaido’s salmon and their associated ecologies. Today, 95 percent of Hokkaido’s salmon are the progeny of Ito’s hatchery ranching system. Their lives, their population structures, and their genes are all markedly different than they were in the 1860s. Technologies such as weirs and fish wheels have blocked salmon from swimming upstream and spawning on their own, instead funneling them into holding pens for hatchery use. By modifying salmon reproduction, hatcheries have left a direct imprint on the fish. Hatchery workers consistently spawned the first fish that returned to the rivers each year, gradually shifting the timing of runs earlier in the season. They also swapped eggs from all over the island, on the assumption that salmon eggs were interchangeable. Such acts co-mingled the genes of populations that were in fact highly adapted to their specific rivers, creating what one might call motley hybrid fish.

But the comparisons that have shaped Hokkaido’s salmon are not limited to those that have tracked through Ito’s hatcheries. Hokkaido’s salmon populations have also been completely remade by changes to the island’s rivers and landscapes – those linked to the comparisons made by the kaitakushi and the students of the Sapporo Agricultural School. The irrigation dams, the denuded stream banks, and the agricultural pollution that have flowed from their comparisons have dramatically reduced the possibilities for salmon to spawn anywhere other than a hatchery. Through such processes, cross-cultural comparisons have undoubtedly shaped the evolutionary futures of these fish in ways that cannot be undone. All salmon restoration or management efforts will have to reckon with the comparisons within the bodies of the fish themselves.

However, the practices that have remade salmon populations cannot be understood simply as generic forms of “modernity,” “progress,” or “environmental degradation.” Rather, they must be understood in relation to the specific cross-cultural comparisons through which they have come into being, in case of

Hokkaido, those with the American West, and in the case of the salmon, with the Columbia River in particular.

When we take seriously the idea that landscapes are made by comparisons, it changes our sense of *what a landscape is*. For quite a while, both natural and social scientists have been interested in cross-landscape connections. But nonhuman migrations and supply chain capitalism are not the only processes that link landscapes together. Comparisons do, too. Salmon do not migrate between the U.S. Columbia River and Hokkaido; neither are there supply chains that directly connect these regions. Yet, in the case of landscapes like Hokkaido, one cannot understand its configurations of species or its histories of management separate from those on the other side of the Pacific. This is because places like the American West and the Columbia River are not *external*, to Hokkaido, but already materially *within* it. The histories sedimented into the island's landscapes include layers of comparison.

When we take seriously such an idea, it requires that we study landscapes differently. It demands that we do not take landscapes as either isolated patches or “local” places. Rather, we must understand how landscapes are formed in relation to each other, often across large geographical spaces. We must understand how landscapes, like cultures, are made in cross-cultural and cross-landscape encounters.

CONCLUSION: COMPARISONS THROUGH LANDSCAPES

Now that we have seen how thinking about landscapes with comparison can change how we see landscapes, I want to turn things around and ask how thinking comparisons through landscapes can change how we see comparison itself.

I want to do so by briefly engaging the work of Marilyn Strathern, one of our most exciting thinkers and practitioners of comparison. Strathern has challenged anthropologists to make comparison interesting by making interesting comparisons.

According to Strathern, past cross-cultural comparisons have dulled our thinking because they are too quick and confident, too sure of their own categories. In contrast, in her own work on the knowledge practices of Melanesian peoples and Western academics, Strathern aims to demonstrate how “comparative analysis might be more than a nostalgic reminder of past certainties” (2004 [1991]: 48). By

making seemingly “off-category” comparisons, she shows us instead how comparisons can trip us up, make us doubt our own knowledge practices, and create moments of surprise.

But while Strathern’s approaches to comparison contribute immensely to revitalizing anthropological conversations around cross-cultural comparison, they remain limited in an important way: Strathern doesn’t allow her Melanesians to do comparisons. In her texts, comparison is an analytical act that remains the province of Western academics. This problem is not limited to Strathern. The concerns and debates about comparison that take center-stage in anthropology have located the problems of comparison with “the desk” rather than with “the field.” In focusing on our angst about how we make comparisons when we are analyzing and representing cultures, we have largely overlooked comparison *as an ethnographic object*.

As soon as we see comparison as a practice in the world – as something people other than scholars are doing – our whole sense of what comparison is and what kinds of conversations we might have about it broadens. As anthropologists, we tend to think of comparison as process linked to the creation and shoring up of categories. But when we take other peoples’ comparisons seriously, it no longer makes sense to think of comparison as first and foremost an act of abstraction and reification. When we look to Hokkaido’s landscapes, we see how comparisons produce relentless heterogeny in addition to reified categories. When we look at how comparisons are embedded in Hokkaido’s landscapes, we see an ostensibly “Japanese” landscape that is radically cosmopolitan; one that is made not by some internal, self-produced logic, but by a set of comparative encounters in which comparisons continually bring other landscapes and other cultures inside that which is called Hokkaido. Anthropological common sense tells us that comparisons create bounded reified cultures, that they do not block our ability to see cultures as emerging out of encounters. Hokkaido, however, shows us that this is wrong. Attention to practices of comparison in the world (and not just as forms of analysis) actually improves our ability to understand how places and peoples are made through encounters.

Hokkaido’s landscapes also show us something important about the materiality of comparison. Strathern and others who engage with comparison in creative ways typically take the material world seriously – engaging in artifact-oriented

anthropology and “thinking through things.” But in such work, comparisons are not themselves material. Comparisons appear to be laid on top of an already existing material world. Yet, Hokkaido illustrates that this is not the case. Comparisons, Hokkaido shows us, are already inside the material stuff of the world, even as it is being compared anew. They make their way into metal, plant fiber, and flesh.

I leave us then with a final question: If we take seriously the notion of comparison as a material, multispecies practice that reveals co-constitution at every turn, how might we further open up anthropological conversations about cross-cultural comparison?

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ANNA TSING

AURA'S OPENINGS:

Unintentional design in the Anthropocene

The following short essay is taken from the opening remarks I made at AURA's opening conference on November 6, 2013. I include it in these working papers to offer further introduction to the AURA program and the working papers, and to "unintentional design." Since it is not a fully worked out formulation (and the AURA team has gone on to develop both ideas and research that cannot be more fully reported here), I maintain the informal, oral voice of my original framing comments.

Anthropocene refers to a proposed geologic epoch in which human disturbance to the geophysical earth exceeds even that of the glaciers. The term is far from perfect—but it alerts us to the massive environmental problems of our times, including the wave of extinctions caused by human disturbance, anthropogenic climate change, and the spread of life-threatening pollution and radiation, among many other issues. The livability of the earth is in danger from human disturbance, and we are going to have to decide if we will do anything about it.

To explain the seriousness of our environmental problems, it may be useful to comment on two common misperceptions about the term Anthropocene. First, the term does not refer to *just any* human disturbances to the earth's environment. Ever since the evolution of *Homo sapiens* some 200,000 years ago, humans have been affecting the environment. So has every other living being. We know that beaver create ponds and wetlands through dam building, for example, which changes the environment for fish. Every species does this kind of environment-changing work. If we look at the collective changes bacteria have made to the earth, human effects are dwarfed. We are not the only ones shaping the earth, intentionally or otherwise. Anthropocene refers to the recently emerging scope and scale of our disturbance, and its threats to multispecies life. We see such threats not just in global climate change, but also in the extinction of so many

plants and animals, in massive pollution, in eutrophication, and in the continuing release of radioactivity and toxic wastes. This is the Anthropocene problem, not human disturbance per se.

Second misperception: the Anthropocene is not the era of human mastery of nature. It is not the fulfillment of dreams of progress. On the contrary! The point of the term is to make us aware of how much we do *not* control, and of what a mess our species has made without really thinking about it. Far from mastery, even intentionality is not a useful guide once we take Anthropocene seriously. This is why it makes sense to begin with unintentional design, that is, the situation we've helped to kick up with or without planning. Intentionality leads us in the wrong direction. First, it makes us forget that other species make the world too. Second, it lulls us into thinking that good intentions are all we need. Our problem was not caused by an evil genius, as in a children's movie. Even when you think about the most environmentally dangerous practices, such as fracking or industrial genetics, these are not practiced in order to destroy the earth. The situation is more like this: investors, focused on short-term gains, don't care, and no one else has been able to stop them. In fact, I might argue that this is a reasonably good description of how we got into such trouble in the last 200 years: investors, focused on short-term gains, don't care, and no one else has been able to stop them.

This 200 years is the same time period that hosted the knowledge divide between the humanities and the sciences, and it is hard not to see these issues as intertwined. Unrealistic dreams of the reach of human mastery fueled the scholarly divide between humans, ready to conquer, and nonhumans, waiting for conquest, just as these dreams encouraged the programs of irresponsible investors. Messes, people thought—if they thought at all—would be cleaned up later. Well now we are all down inside the mess, with no signs of clean up. I don't have the hubris to imagine that AURA will change everything. But the least we can do is take another look at the world we find ourselves in. Instead of beginning with unrealistic dreams of mastery, we might explore the mess to appreciate what possibilities it still holds.

The object of AURA research is unintentional design on anthropogenic landscapes, that is, landscapes that have been shaped by human activity. Unintentional design is not just about humans; many other species, as well as non-living stuff such as water and wind, shape the landscapes we study. Unintentional

design is the emergent pattern of all these forms of activity, human and otherwise. This is our Anthropocene world.

We can't possibly know what is assembling on these landscapes without help from both scientists and humanists. Human histories and activities and nonhuman histories and activities are equally relevant. This is where curiosity and imagination come into play; we need the observational skills of both humanists and scientists to appreciate what comes together—and therefore, too, what might yet emerge.

WHERE HUMAN DISTURBANCE IS EVIDENT—YET LIFE CONTINUES

Let me take you to a particular place to show you what I mean—and to introduce some 21st century tools for tackling this challenge. AURA has recently started fieldwork in a place in central Jutland called Søby Brunkulslejerne, the Søby Brown Coal Beds.¹¹ Between World War II and 1970, brown coal was mined here. Mining meant digging a big hole to find a few thin layers of compressed Miocene trees. When the miners were finished, they stopped pumping out the ground water, and acid lakes filled their holes. Around them were the piles of sand they dug up from the ground. The place was abandoned: like much of the earth, it is a site of industrial ruins.

AURA's work at this place is double. On the one hand, we are showing each other methods to work out our collaborative approach. Biologists and anthropologists have so far dominated; each works the possibilities of this site for learning what's possible on human-damaged landscapes. On the other hand, we are excited to see if real research results might be possible. It's too early to offer them, but I can introduce four new research tools that make us optimistic. Each tool has roots in a particular discipline, but each addresses transdisciplinarity as it tells us both *what to notice* and *how to notice*. These are tools, then, for reshaping the imagination.

¹¹ The fieldwork reported in this paper is the joint product of 2013 AURA team members, here listed in alphabetical order: Nathalia Brichet, Nils Bubandt, Maria Dahm, Peter Funch, Elaine Gan, Colin Hoag, Jens Mogens Olesen, Katy Overstreet, Pil Pedersen, Heather Swanson, Jens-Christian Svenning, and Anna Tsing. In 2014, we have been joined by Filippo Bertoni, Rachel Cypher, Pierre Du Plessis, Natalie Forsmann, Mathilde Højrup, Thomas Kristensen, and Pernilla Naundrup. We also have benefited greatly from our consultations and collaborations with Frida Hastrup, Hans Jensen, Henning Knudsen, Andrew Mathews, and Mikako Sasa.

One tool is what I here call “interspecies bodies.” At the intersection of developmental biology, evolutionary theory, and ecology, a revolution has happened in the last few years. Throughout the 20th century, biologists treated organisms as autonomous units, which allowed the algorithms of population biology. Now it turns out that the bodies of most organisms are multispecies landscapes. No organism can become itself without the assistance of other species. This changes a great deal in the practice of biology. Among other things, it brings observation of interspecies relations back into professional importance. In Figure 1, the relationship between these teeming mushrooms, *Paxillus involutus*, and the lodgepole pines behind them, *Pinus contorta*, illustrates what I mean.



Figure 1. *Paxillus involutus* growing with lodgepole pine (*Pinus contorta*),
Søby Brown Coal Mining Area, 2013.
Photograph by Elaine Gan.

Pines colonize the bare sand of the abandoned brown coal beds—but only because they have the help of a mushroom. That sand does not have many nutrients; the fungus forages for them, giving them to the pine. In turn, the fungus uses the pine’s carbohydrates. Without fungi, pines could not colonize nutrient-poor spots such as this. Without the pines, these fungi could not live. They form interspecies-bodies with joint organs both pine and fungus. It turns out most life is like that. We are lucky, because without such collaborations, ruined places might just remain empty. To watch landscapes in the process of becoming, we need to notice interspecies bodies.



Figure 2. *Paxillus involutus* growing with lodgepole pine (*Pinus contorta*),
Søby Brown Coal Mining Area, 2013, photograph by Elaine Gan.

A second tool is disturbance ecologies. For most of the 20th century, ecologists focused on ecological communities, imagined as stable configurations seeking equilibrium. By the end of the century, however, attention had turned to disturbance, that is, the disruption of ecological relations. Disturbance is now understood not just as a problem but also as an opening for the formation of new ecologies.

There are plenty of kinds of disturbance that have nothing to do with humans. But it is good to think about human disturbance within this framework: disturbance is not just an end; it is also a beginning. What ecologies might develop in human-disturbed places?



Figure 3. Søby Brown Coal Mining Area, 1970 (Working Group of the Forest and Nature Agency 2000: 6).

The photograph in Figure 3 was taken in 1970, at the closing of the last brown coal mines. Take a close look at where the water is, and where the fields take over in the background. The picture appears to show us winter, so you need to take that into account. Figure 4 is the same place in the year 2000, but now it seems to be summer. The fields in back are now green. The water is in the same place. But now a lot of plants are growing on what just recently was sand. Some of those were planted. But many moved in by themselves, using the dynamics I showed in the last pictures of fungi and trees turning sand into forests.



Figure 4. Søby Brown Coal Mining Area, 2000 (Working Group of the Forest and Nature Agency 2000: 7)

In 1970, there was sand. In 2000, a forest had emerged. Disturbance can give rise to new species assemblages. Humanists and scientists come together in learning *historical* and *dynamic* landscapes.

Luckily for us, indeed, the minute humans allow a little room for maneuver for other species, those other species are likely to begin colonizing human ruins. Consider this formerly human space: a rug.



Figure 5. Cup fungus growing on rug of abandoned house, Søby Brown Coal Mining Area, 2013, photograph by Anna Tsing

At the Brown Coal Beds, workers gathered from across Denmark. One lady stayed until two years ago. Since then, her house has remained empty, and the roof has caved in in places, allowing water on to the rug. A few weeks before giving the presentation on which this paper is based, I found this cup fungus, beginning the process of returning the house to multispecies life. The possibilities of disturbance ecologies are everywhere.

Let me turn to new tools from the humanities. Too often, we think of humans as capable of just one kind of relation to the natural world; in fact, human actions form a mosaic and a multiplicity. Common sense still tends to push human diversity to something from archaic times, something overcome by progress, but diversity today is thoroughly modern, even when it makes use of ancient legacies. We can only begin to address human environmental disturbance within the tapestry of multiplicity.

After the brown coal mining was abandoned, the area was considered a loss, and polluting industries, including the waste disposal facility in the background here, were allowed entry. Yet other human projects continue to shape this landscape. Forest management has included the planting of trees—many of them promising exotics. At first, those trees charmed foresters, promising fast growth. In some cases, such as that of the lodgepole pines, they spread far beyond initial

expectations, becoming invasive weeds. Another important human disturbance is hunting—and management for hunting. Over the last ten years, red deer have returned to this area, and from a small initial start, they have come to define the landscape for a new cohort of landowners, who buy lands for hunting rights. They feed and encourage the deer, allowing unsustainable populations to grow up. Since the deer eat farmers' crops, farmers object; but hunters continue to feed the deer.

Figure 6 shows a pile of sugar beets left to attract red deer.



Figure 6. Sugar beets left as feed for red deer, Søby Brown Coal Mining Area, 2013, photograph by Anna Tsing

Lodgepole pines and red deer, together with their human advocates and detractors, come to play important parts in remaking the landscape. The landscape is made up from the sum of these quite different human activities—as well as the nonhumans who take advantage of the opportunities each offers. This is unintentional design.

Here is one more example. One economic activity situated on the mining remains is a waste disposal facility. There is a garbage dump, now covered with humus, next to the waste disposal facility. On it, we found a profusion of garbage-related species, ranging from ornamentals emerging from human-discarded seeds, to wild things that happen to like the mess of nutrients humans can offer. We saw a profusion of fungi that love nitrogen-rich spaces, including paddy straw mushrooms (*Volvariella volvacea*) and shaggy manes (*Coprinus comatus*). We also found a mushroom that does not occur naturally in Denmark at all, a *Stropharia*. It has been imported into the country in growing kits, and these garbage-dump

mushrooms are products of that import. No one asked these mushrooms to grow there; the spores from people's garbage germinated in what for them is an auspicious space. All this unintentional design, then, from the human project of dumping garbage. It's only one among many.

What will it take to get to know these multiple projects and their results in unintentional design? The first task is to recognize that humans are not the only species that explores the environment. If we imagine "curiosity" not as a psychological state but as a willingness to explore, then many species exhibit curiosity. This is my fourth tool. Consider again fungi. The body of most fungi consists of thread-like filaments that spread out across soil or wood, exploring. Far from thinking of fungi as "rooted" in a single place, we are better off watching their explorations, even what we might call their curiosity. As the price of wood chips has risen, landowners in the Brown Coal Beds have cut down their invasive lodgepole pines and turned them into piles of chips. Even as the chips are sold, however, they leave enough for fungi. This adventurous *Hypholoma* has found the wood chips attractive, and it has spread out, exploring the medium and then erupting into fruiting bodies, the mushrooms.



Figure 7. *Hypholoma capnoides* on *Pinus contorta* woodchips, Søby Brown Coal Mining Area, 2013, photograph by Elaine Gan

Recognizing the explorations of others is one way to encourage our own curiosity about multispecies landscapes, even in the midst of human disturbance. When we arrived at the wood chips, I said with embarrassment to my fungal biologists, thinking it would be boring, "We don't have to go here." But the wood

chips turned out to be a wonderland of multispecies life—and a great place for revitalizing all our curiosity about the ecological potential of human-disturbed places. Such multispecies adventures are the stuff of AURA projects. They might bring us to appreciate not only the problems but also the possibilities of *living* in the Anthropocene.



Figure 8. Mikako Sasa gathering *Hypholoma capnoides* on *Pinus contorta* woodchips, Søby Brown Coal Mining Area, 2013, photograph by Elaine Gan

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