

The Care of Migrants: Telemetry and the Fragile Wild

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ABSTRACT Drawing on a multi-sited study of transnational efforts to safeguard the highly endangered Lesser White-fronted Goose (*Anser erythropus*), the text develops an argument about a certain “biopolitics of the wild”—a particular mode of governing nonhuman life, rooted in certain conditions of visibility and engagement. As a wild avian population, the Lessers are known and managed primarily through practices of *asymmetrical intimacy*, such as field observation and telemetry. These practices, in turn, determine the emergence of biopower in a specific modality, as a power that takes hold of its object—and generates it—in a mode of *constitutive withdrawal*. Outlining the shape and parameters of this withdrawn presence, the essay locates “the wild” at a complex, awkward juncture in contemporary human-nonhuman relations: simultaneously an object of control and withdrawal, absence and intimacy, wildness and impurity; a site of complex and intractable controversies—but also, perhaps, of hope.

Like Ghosts

Order *Anseriformes*, family *Anatidae*, sub-family *Anseridae*: *Anser erythropus*, the Lesser White-fronted Goose—LWfG, or simply “Lessers” to their friends—is an endangered migrant of the northern hemisphere; specifically, of the Western Palearctic. The International Union for the Conservation of Nature (IUCN) classified the species as globally Vulnerable (VU) in its 2008 Red List assessment, and the Lessers are included in Annex II of the Bern Convention, Annex I of the European Wild Birds directive, Appendix I of the African-Eurasian Waterbirds Agreement (AEWA) as well as both Appendix I and Appendix II to the Convention on Migratory Species.¹ Current estimates place the global population at somewhere between 28,000 and 32,000 individuals, mostly distributed across the Eurasian landmass, with a strong declining trend.² Globally, its migrations span from the Netherlands to eastern China, and Lessers have been spotted as far afield as the United States in the west and Japan in the east: the species is considered a native of over 30 countries and a vagrant in another 16.³ For a long

¹ Convention on Migratory Species, “Convention on Migratory Species,” accessed 16 October 2013.

<http://www.cms.int/documents/index.htm>

² BirdLife International, “Species Factsheet: *Anser erythropus*,” accessed 16 October 2013,

<http://www.birdlife.org/datazone/speciesfactsheet.php?id=377>

³ BirdLife International, “*Anser erythropus*,” in *IUCN Red List of Threatened Species*, Version 2012.2, accessed 16 October 2013. <http://www.iucnredlist.org/details/100600377/0>

time, the vast migration loops of the species remained largely unknown—shielded by enormous distance and remote roosting sites, many behind the Iron Curtain, but also by the birds themselves: by their inconspicuous behaviour and unremarkable appearance, neither striking nor particularly “valuable.”



Figure 1 Lesser White-fronted Goose (*Imre*).
Photo © Norwegian Ornithological Society.

In the wild a Lesser can be difficult to recognise, even more difficult to catch.⁴ On a northern Siberian shore, for example, under the bright sun of a cool Arctic summer, a motley team of international birders in their mosquito veils move in slowly, ever so slowly through the reeds, homing in on a roosting couple, encircling them, ready to spring the trap ... But hang on, where are they? Where did they go? The birds have vanished, but no one saw them take off. “Like ghosts,” grumbles one of the Russians, “Lesser White-fronted Ghosts.”

Like ghosts: barely there, on the cusp of non-existence. Like ghosts, suddenly, they may be gone: vanished, in the blink of an eye. By the time the Lessers had begun to attract sustained attention from the scientific community, in the last quarter of the 20th century, their routes—much like the species itself—were on the brink of collapse, formerly continuous ranges broken into an archipelago of residual populations. The decline had been precipitous, and the trend has remained sharp ever since. Year by year, the record speaks clearly: flocks shrink, the numbers dwindle at their regular sites. Today, after decades of decline, the situation is precarious. In Russia and East Asia—where roosting sites are often remote, poaching extensive and counts logistically difficult to carry out—the two main wild populations continue to decline; despite positive developments in recent years, a third wild population that breeds in Northern Norway is still teetering on the brink of disappearance, with a classification of Critical (CR) in the Red Lists for Norway, Sweden and Finland (see figure 2).⁵ BirdLife International

⁴ Hugo Reinert, “Face of a Dead Bird: Notes on Grief, Spectrality and Wildlife Photography,” *Rhizomes: Cultural Studies in Emerging Knowledge*, Issue 23 (2012).

⁵ Ulf Gärdenfors, ed, *Rödlistade arter i Sverige 2010*, Stockholm: Artdatabanken, 2010; John Kålås, Åslaug Viken, Snorre Henriksen and Sigrun Skjelseth, *Norsk Rødliste for Arter 2010*, Trondheim:

classifies the European Lessers as SPEC 1, denoting a European species of global conservation concern. During the 2011 spring census, at the tail end of their northbound migration from Greece through Eastern Europe to the Arctic, researchers in northern Norway counted 12 breeding pairs in this population: precarious, by any standard.

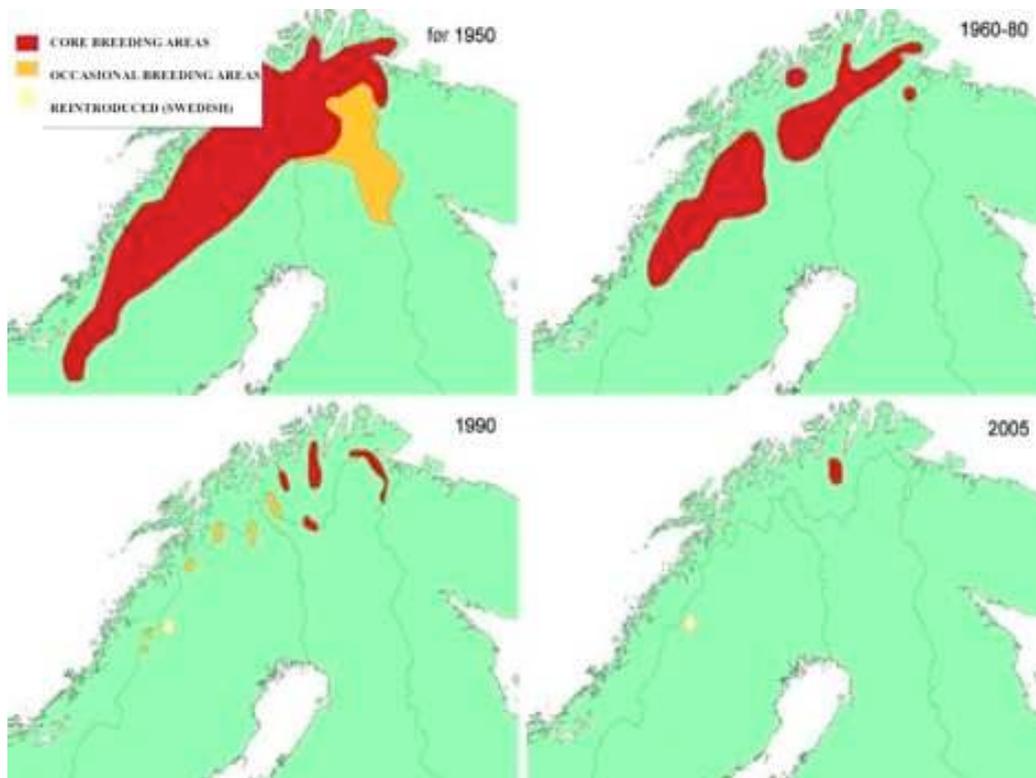


Figure 2 Distribution of LWfG breeding areas in Norway, 1950-2005.
Image © Norwegian Ornithological Society.

By that point, as part of a multi-sited ethnographic project on extinction and transnational conservation, I had been “following” the Norwegian Lessers for a while, trailing the people who concerned themselves with the birds—activists, scientists, birdwatchers, conservationists, government experts, officials, sometimes most of these at once—and the various conservation initiatives invested in them.⁶ The present text issues from that project, and tries to delineate some of the key threads emerging from the material. The argument concerns itself with what happens when humans and their biopolitical machines look skyward,⁷ when the transnational trajectories of a dwindling airborne species intersect with human concerns and become one of them—and with describing as well the powers that *resist* becomings at this point, that place themselves in the way of constitutive mechanisms, blocking their straightforward operation and shaping them through contradiction. In a minor key, it also

Artsdatabanken, 2010; Pertti Rassi, Esko Hyvärinen, Aino Juslén and Ilpo Mannerkoski, *Suomen laijen uhanalaisuus 2010*, Helsinki: Ympäristöministeriö & Suomen ympäristökeskus, 2010.

⁶ Estonian Science Foundation Grant MJD3, 2009-2012.

⁷ Peter Adey, *Aerial Life—Spaces, Mobilities, Affects* (London: Wiley-Blackwell, 2010).

contributes to the growing ethnography of wildlife surveillance,⁸ drawing in an interplay between the materiality of surveillance technology and its capacity to *spectralise*, to render wild birds into ghost-like digital signals⁹ that remain linked to the bodies they represent through the mesh of a kind of adhesive indexicality—an unresolved quality continuously refreshed, in the case of wild birds, by the entanglement of measurement (and capture) with death. Constrained by the complex fragility of their nonhuman object, human powers run up against the unruly wild, unfolding in novel and unexpected ways—sometimes indirectly, or covertly, as if by stealth or misdirection.

At the same time, it also seems important to try and capture some of the affective textures in this distributed, transnational multi-species assemblage that has formed around the Lessers: a transient meshwork¹⁰ of entanglements and material connection, of birds and men and satellites, of data sets and workshops and funding streams and policy documents, carefully built up around certain core practices of withdrawal and staged absence, asymmetrical techniques of disappearance. This mesh extends out across the steppes and plains and river deltas of the Eurasian landmass and up, into the orbit of geostationary telemetry satellites and across, from the marshlands to the corridors of bureaucratic power and the intricate tangles of policy documents—and all brought into being around a flock-population so fragile, so precarious that a determined hunter could “wipe them all out in an afternoon,” as one researcher put it. To me at least, it seems that an altered, uncanny quality permeates the points and spaces of this mesh, connecting them, tinging them with loss and infusing the urgent relationships that traverse them. In its mesh of absence and textures, the assemblage tells a story of interspecies love,¹¹ of a certain kind: doomed perhaps but also joyful, a story of extinction and lopsided hope, entangled and impossible, of grief and pleasures, of expectations snatched from looming defeat, of daily striving, resigned to hope and constant compromise—a love that consigns itself to loving a vanishing object, and a vanishing world, on the cusp of their still-avoidable disappearance. In an age of human footprints and mass extinction, perhaps the story of this small, disappearing goose can tell us something: the story of a goose that is almost a ghost—but not quite, not yet.

Observation

Late April 2010 and here I am, on the edge of a marshland in north-Western Estonia (see figure 3). News came to me a couple of days ago that the Fennoscandian Lessers were on their way north—headed for the Arctic, from their wintering grounds on the border between Greece and Turkey. Passing through Hungary on their way to Finland, by the middle of May the flock was expected at their roosting sites in Valdak, a marshland in northern Norway: their last stop before moving on to the breeding areas a few miles inland from the coast of Finnmark. Despite

⁸ Etienne Benson, *Wired Wilderness: Technologies of Tracking and the Making of Modern Wildlife* (New York: Johns Hopkins University Press, 2010).

⁹ Charles Bergman, “Inventing a Beast with No Body: Radio-Telemetry, the Marginalization of Animals, and the Simulation of Ecology,” *Worldviews* 9, no. 16 (2005): 255-270.

¹⁰ Tim Ingold, *Lines: A Brief History* (London: Routledge, 2007).

¹¹ Anna Tsing, “Unruly Edges: Mushrooms as Companion Species,” *Environmental Humanities* 1 (2012): 141-154.

thinning funds, and the precarious conditions induced by the ongoing financial crisis, a monitoring expedition would be mounted this year to Matsalu, in Estonia, for a spring census.



Figure 3 Bird tower at dawn, Estonia. Photo by the author.

Habitual stopover spots in Estonia and Finland would afford monitors a chance to count the flock en route, as part of an ongoing effort to establish their precise migration routes. Despite satellite data and decades of tracking, there are still blank spots on the map: invariably some birds “disappear” en route only to turn up again later at the breeding sites, their whereabouts in the meantime unknown. For me, the expedition would be a first opportunity to observe the Lessers and their watchmen in the field: previously I had met captive-bred Lessers, in a German zoological park, and birds from a Swedish reintroduced population, in a nature reserve on the Dutch coast, but I had not yet encountered one from any of the so-called “wild” populations.

According to its recent national action plan for Lesser White-fronts, Estonia is committed to monitoring the annual spring and autumn migrations of the species, as well as managing key coastal wetlands, raising public awareness of the species and training hunters to recognise and avoid shooting the birds.¹² Implementation is not straightforward: the Lessers are diminutive in size and morphologically indistinct, very similar to cousin species such as the Greater White-fronted Goose (*Anser Albifrons*). To the untrained eye, they can be difficult to spot among the greater crowds of migrating geese from other species—Greylags, Greater White-fronts, Barnacles, Pink-Footed Geese. Only a few people in Estonia have the skill and

¹² Maire Toming, “New National Action Plan for the Lesser White-fronted Goose in Estonia,” in *Conservation of Lesser White-fronted Goose on the European Migration Route*, eds. P. Tolvanen, I. Øiyen and K. Ruokolainen (Helsinki: WWF, 2009): 86-87.

technical expertise to reliably identify and count the Lessers as they pass through. Because of this, the Estonian Ministry of the Environment usually hires in seasonal labor from across the gulf, Finnish birdwatchers from WWF Finland or the Finnish national chapter of BirdLife, the international bird protection organisation: these are my contacts in Matsalu.

By the time I arrive in Matsalu, the Finnish team have already installed themselves near the key staging area: roosting in the restored farmhouse of a Finnish birder, who lends it out as a base camp for tourism and birdwatching visitors. I spend the night in my sleeping bag, in an annex to the main farmhouse; by five am the next morning we are on the road, two Finnish birders and me, in a battered blue van, racing the sun as it rises in the east. The hours around dawn are the ideal window for observations: the birds are still sleepy and the wet grass quenches their thirst. As the sun rises and the grass dries, the birds become restless and spend less time at each site. My two driving companions chatter away in Finnish, throwing out occasional explanations to me in Swedish or halting English: pointing to unusual birds, or ruminating on changes in the landscape and the threat of local farmers, many of whom interpret the appearance of birders in their fields as an omen of new bans or restrictions and chase them off with shotguns and angry dogs. Every so often we reach a field, and pull over to survey: windows are rolled down, binoculars come out and a hush descends on the car, broken only by a quiet stream of mumbled commentary: “one, two, three Greaters; four, five Barnacles there ...” To me, the thousands of birds still look almost indistinguishable; not so to my companions. Most of our stops are brief: less than a minute and the binoculars come down, a shake of the head, “no Lessers here,” we move on to the next field. Sometimes, however, there is a hushed exclamation, a silencing wave of the hand. We leave the car, hunch down and move along the side, stealthily, closing the doors as quietly as possible. The vast silence of the fields lends tactile impact to the slightest sound, slammed doors erupt across the world like gunfire. A passing car, a tractor or a barking dog can snap the moment like a thread and in the blink of an eye, the whole field comes alive, rising like a wave through the treeline and beyond, out and away. As long as the moment lasts, however, the fields remain silent and the geese graze undisturbed. Hushed, crouching in the shade by the side of the car, we bring out the tripods.

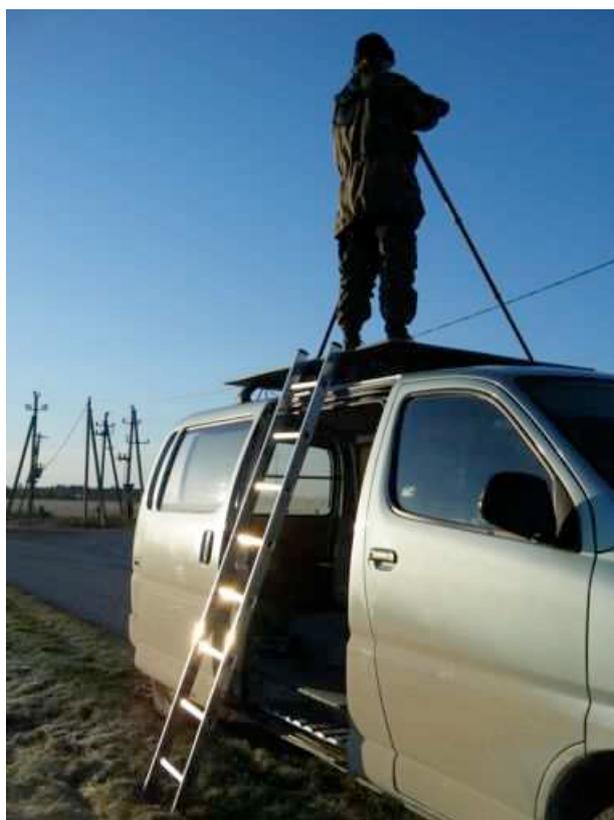


Figure 4 *Birder on an improvised tower, Estonia.*
Photo by the author.

From its rise in the late 19th century,¹³ the history of recreational and scientific birdwatching has been a kaleidoscope of changing technologies: telephones, pagers, air travel, digital photography, bulletin boards, databases, mobile internet—all deployed and redeployed to overcome the limits of earthbound human bodies in their pursuit of airborne prey. In the field, telescopes and binoculars form a backbone of this toolkit. Both supplement and enhance the naked human eye, altering the parameters of its visual field: compressing distance, tunnelling through space to create a unilateral visual intimacy—transforming distance into proximity but only asymmetrically, in a manner that conceals itself from the observed. No serious birder travels without either piece of equipment; not being one myself, however, much of my time in Matsalu is spent watching the Finns hover over theirs: silent and immobile, sometimes for hours at a time, adjusting their focus in imperceptible increments, attentions pinned to far horizons. Distant bird-calls, the sound of the wind, the soft murmur of commentary as the birders “annotate” their video recordings in hushed voices, speaking into the microphones. The descriptive commentary assists subsequent analysis and identification, but watching the footage later I can not shake the odd feeling that I am intruding on something private, an encounter of sorts between birder and bird: the tone is hushed, intense, almost affectionate; there is intimacy in the blurred syllables, the proximity of mouths to microphones.

Occasionally the birders raise their eyes from the telescope, shaking their heads almost apologetically, and attempt to share some of what they have just witnessed—but for the most part, it is as if I am not there. Birders observe, the birds are (unwittingly, mostly) observed—but the observation is a fragile moment, easily broken by any unexpected movement, any sudden sound that might startle the flock and send them flying over the distant trees, elsewhere, into other fields. Attempting to suspend the moment, the birders conceal themselves, withdrawing from the possibility of a reciprocal gaze—reversing the physiological advantage of their quarry, their “bird’s eye” honed to acuity by epochs of selective pressure and relentless predation. Distance, silence, fabrics and colour, body language, features of the landscape, qualities of the light or air are all enlisted, skilfully rolled into the moment of observation—to produce, as far as possible, the effect of an invisible eye, a gaze that hides from its object, that renders itself invisible: an eye that occupies, at least for a short span, the position of an absolute other, the asymmetrical alterity of the one that “sees without being seen.”¹⁴ Birding, in this mode, is an aesthetic of stalking: a patient and asymmetrical art.

Pursuit

Breaths held, the moment of observation endures as long as the birds remain still, and in sight: inevitably it passes. Soon—in a few minutes, or a few hours—the birds will take off again and disappear: first to the next field, out of sight, then in a few days northward, continuing their migration. From here their trajectories become elusive, difficult for human bodies to follow.

For much of human history, long-range bird migration was an object of mystery or awe, topic of speculation and wild conjecture. Authorities argued over whether swallows hibernated or spent the winter underwater, in torpor;¹⁵ Barnacle Geese received their name from the

¹³ Stephen Moss, *A Bird in the Bush: A Social History of Birdwatching* (London: Aurum Press, 2004).

¹⁴ Jacques Derrida, *The Gift of Death* (Chicago: Chicago University Press, 1995), 2.

¹⁵ Tim Birkhead, *The Wisdom of Birds: An Illustrated History of Ornithology* (London: Bloomsbury, 2008).

common medieval belief that they grew from driftwood, like limpets.¹⁶ Over the last century or so, however, technologies have emerged that demystified the matter, rendering bird migrants traceable along their onward trajectories. The simplest and oldest of these is *ringing*, or *banding*: the use of colour-coded leg-bands for identification. The practice dates back to 1899, when the Danish zoologist Hans Christian Cornelius Mortensen first bent some hand-made aluminium rings into shape around the legs of 165 starlings and released them into the world, to track them through the reports of observers who might find them and send notice.¹⁷ Since his day, this practical innovation has spread worldwide and become closely identified with the practice of scientific birding itself.¹⁸

Marking captured migrants with identifiable metal rings before releasing them, ornithologists are able to identify and recognise specific individuals elsewhere, reconstructing their movements as they move from site to site along their migration routes—as long, that is, as human observers are present at each site to make the necessary observations. Through the movements of individuals, scientists are then able to infer and study the complex migratory lives of populations and entire species. In this sense, one might think of ringing as a biopolitical technology, rough-hewn and elementary—reframing migratory birds through a biometric modality that produces entire populations as graspable *through individuals*, using “methods that differentiate between one person [or bird] and the next.”¹⁹ For this to work, however, observation depends on the presence of humans along the migration route of the species: observers, more or less reliable, equipped (at the very least) to spot the birds, appropriately note down the identifying markers and report these to the correct authorities—ringing centres, project managers, scientific researchers—for further analysis and aggregation. With a target species such as the Lessers, who roost on remote peninsulas along the northern coast of Siberia, sometimes hundreds of miles from human habitation, this method has obvious drawbacks. As I noted earlier, identifying the Lessers in the first place is also a skilled, technically demanding practice, with trained observers in relatively short supply.

Radio and satellite telemetry address the problem of human presence and detection, at least in part, by redistributing the work of tracking and identification across a complex global meshwork of satellites, computers and algorithms that triangulate signals emitted by transmitters, boxes attached to the birds with small rucksacks. Recent technological developments have given unprecedented scope and forensic precision to such forms of surveillance,²⁰ enabling researchers to track the Lessers over the vast expanses of Siberia, across the Black Sea and the Aegean, through Europe and back to the Arctic and cross-

¹⁶ John Buckeridge, “Of Trees, Geese and Cirripedes: Man’s Quest for Understanding,” *Integrative Zoology* 6, no. 1 (2011): 3-12.

¹⁷ Niels Preuss, “Hans Christian Cornelius Mortensen: Aspects of his Life and of the History of Bird Ringing,” *Ardea* 89 special issue (2001): 1-6.

¹⁸ Mark Brown and Dieter Oschadleus, “The Ongoing Role of Bird Ringing in Science—A Review,” in *Proceedings of the 12th Pan-African Ornithological Congress 2008*, edited by D. Harebottle, A. Craig, M. Anderson, H. Rakotomanana & M. Muchai (Cape Town: Animal Demography Unit, 2009).

¹⁹ Adey, *Aerial Mobilities*, 89.

²⁰ Etienne Benson, *Wired Wilderness: Technologies of Tracking and the Making of Modern Wildlife* (New York: Johns Hopkins University Press, 2010).

reference their signals with imaging services such as Google Earth.²¹ In one sense, it is tempting to consider these technologies as an amplification that “scales up” the withdrawn, asymmetrical qualities of the birder gaze.



Figure 5 Image “Map showing the whole autumn migration of the satellite tagged lesser White-fronted Geese caught at the Valdak Marshes in May 2006. Red line shows the migration route of Imre (tagged 23 May) and the blue line shows the migration route of Finn and Nieida (tagged 18 May). Green line shows the migration of a pair of Lesser White-fronted Geese caught and tagged during the moult in the Polar Ural (Russia) in July 2006.”

Image © Norwegian Ornithological Society.

Through carefully managed distance, and the continuous erasure of presence, the birding encounter in the field maintains itself as a holding-at-bay,²² an enabling condition for certain forms of intimacy through which birds (and trajectories) can be studied, and known, with minimal disturbance or effect on the observed. Similarly, technologies of wildlife surveillance suspend not only reciprocity, but ideally all their own material effects on the surveilled. Wildlife surveillance technologies minimise themselves continuously, approaching an impossible, ghost-like condition of spectrality—a dematerialisation that, in theory, would be coextensive with the “god-trick”: the position of the “pure” observer, a microphysical variant of the disembodied gaze.²³ The erasure of presence is not complete, however. Even the most

²¹ Ingar Øien, Tomas Aarvak and Morten Ekker, “Imre er død—Leve dverggåsa!” *Vår Fuglefauna* 30, no. 1 (2007): 26-28.

²² Matei Candea, “‘I Fell in Love with Carlos the Meerkat’: Engagement and Detachment in Human-Animal Relations,” *American Ethnologist* 37, no. 2 (2010): 241-258.

²³ Donna Haraway, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,” *Feminist Studies* 14, no. 3 (1988): 575-599.

ghostly of these technologies have *some* heft, a language of marks and traces that alter their object: from harnesses that may hamper birds' wings, to radio transmitters surgically implanted in their bellies.²⁴ The observer remains embodied, acting on the observed at a distance, and the data ghosts that scatter as disembodied blips across the screen are still moored to physical bodies—bodies that remain frail, vulnerable, all too mortal.

Ringed and telemetry can provide vital information on migration routes, movement patterns and survival factors—but for the birds to be ringed, or fitted with telemetric rucksacks, they must first be captured. With the Fennoscandian Lessers, such captures are usually made in Valdak, an Arctic wetland near their breeding sites in Northern Norway. The birds are caught there using enormous finely-meshed nets, fired from cannons up to half a kilometre away. The quality of the mesh is important, tailored to each species of quarry, to their proportions and behaviour. Leave the mesh too wide and a wing may slip through, get caught in the force of the impact and snap; too thick, and the net itself may become damaging, through sheer impact. Birds are delicate creatures, with hollow bones: however careful the calculations, however swiftly birders rush to the impact site to begin disentangling the trapped birds, there is still always a risk. Wings can get caught at odd angles in the impacting mesh, bones snap in the frantic struggle before the bird realises it is trapped and surrenders to the new parameters of its situation. Once caught and disentangled, the trick is to simulate nightfall by stuffing the birds into dark sacks, pacifying them for the short drive back to the local museum —where they can then have their measurements taken, their blood samples extracted and their telemetric equipment fitted. The telemetric transmitters are light and get lighter by the day, as their weight drops with every iteration of the technological cycle—but with such precisely calibrated anatomies, even the tiniest addition of mass can have noticeable effects. The devices are secured in place by robust harnesses: biopolitical rucksacks, sturdy, designed to resist the birds' incessant struggle with the straps.



Figure 6 LWfG with satellite transmitter, Valdak.
Photo © Norwegian Ornithological Society.

²⁴ See for example Daniel Mulcahy and Daniel Esler, "Surgical and Immediate Postrelease Mortality of Harlequin Ducks (*Histrionicus histrionicus*) Implanted with Abdominal Radio Transmitters with Percutaneous Antennae," *Journal of Zoo and Wildlife Medicine* 30, no. 3 (1999): 397-401.

Transmitters are regularly lost to chewing, gnawed off by irritated carriers and dropped over water. As most such equipment is very expensive, every tagging of a bird represents a significant investment, and a risk, for monitoring organisations. The procedure also entails risks for the birds themselves. Prospective carriers are assessed for build and condition, health, speed and age, males generally get the heavier transmitters because they are larger— but birds are fragile, built for rarefied currents, and the possibility always remains, however minute, that the harness may impair mobility at a crucial juncture; that straps and antennas may get caught; that the added weight may lose them those precious extra seconds against a fox or a human poacher.

Because of the risks, most Lessers are never ringed or equipped with transmitters, and thus remain anonymous—although if the resources are available, it is possible to identify the birds by their belly markings. Each Lesser possesses a unique and distinctive pattern of motley black stripes across its belly. Using a labour-intensive combination of observation, field sketches and digital film analysis, researchers can record these patterns and share them between teams working in different countries.

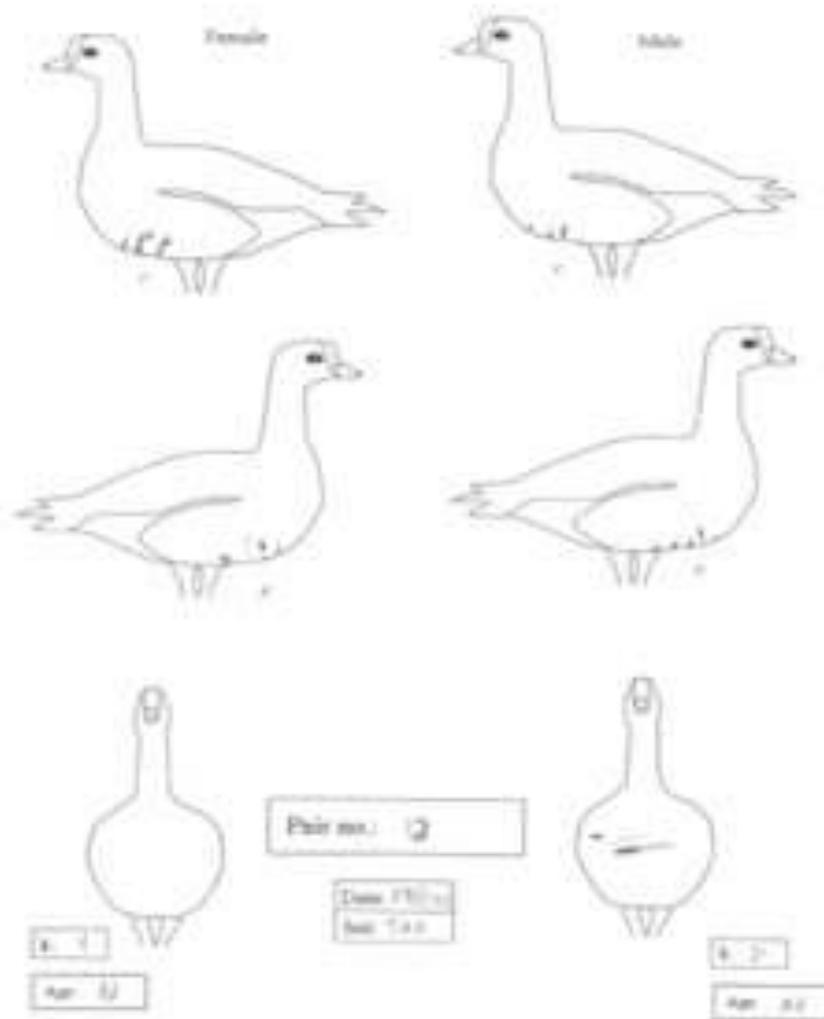


Figure 7 Field diagrams of belly markings.
Image © Norwegian Ornithological Society.

Comparing footage taken at different sites, by different teams, it becomes possible in hindsight to follow individual geese along their migration trajectory—identifying which birds arrive and depart where and at what times. Unfortunately, every year the geese moult and grow new feather coats: the markings change and identification has to begin from scratch.

In practice, it is thus impossible for humans to follow a Lesser from year to year by belly markings or by visual means alone, without technological augmentation: physical capture and invasive technologies remain key to tracing and discovering their routes—but every capture entails risk to the bird, and the risk persists beyond capture or release, inherent in the material heft of surveillance. As this surveillance extends beyond the line of sight, so too does the potential threat it poses—because it is “sticky,” it adheres to (or in) its object: in a sense, this is gaze rendered mass, made lingering haptic fact.²⁵ Every capture has consequences, and must be carefully weighed against the health of the individual and the species body alike. The immanent possibility of extinction creates a double bind, as much moral as epistemic: collect insufficient data and the species may die out, through the failure to act correctly and in time; collect too much, and risk pushing the tiny, super-exposed population over the brink, crossing some invisible threshold—visible only with hindsight—that sends it into an irreversible feedback spiral of extinction.

Capture

Let me consider this surveillance in more detail. For the Lessers, migration tracking began in earnest towards the end of the 20th century, with programs for ring-marking in several European countries. Conservation work with the species in Scandinavia started in the late 1970s, with a reintroduction project led by the Swedish ornithologist Lambart von Essen.²⁶ The Norwegian Ornithological Association (*Norsk Ornitologisk Forening*, NOF) started its own Lesser White-fronted Goose project (*Prosjekt Dverggås*) a few years later, in 1985. Since 1990 they have been regularly monitoring the Fennoscandian population around their breeding areas in the Norwegian Arctic.²⁷ Human involvement with the species took a dramatic leap in 1995, when the first satellite transmitters were mounted on four birds from the Fennoscandian population, to follow their autumn migration route to their wintering areas in south-eastern Europe. This initial monitoring served to document a European migration path via the Kanin peninsula, through Hortobagy in Hungary to the Evros Delta in Greece, on the border to Turkey.²⁸ The work continued in 1997, with four more Scandinavian birds. In 1998, three breeding Lesser White-fronts from the neighboring Western Siberian population were captured on the Taimyr Peninsula in Central Siberia. An alternative route continued east from the Kanin

²⁵ Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008), 5-6, 164.

²⁶ Åke Andersson and Tor Larsson, “Reintroduction of Lesser White-fronted Goose *Anser erythropus* in Swedish Lapland,” in *Waterbirds around the World*, edited by G Boere, C. Galbraith and D. Stroud (Edinburgh: The Stationery Office, 2006), 635-636.

²⁷ Ingar Øien and Tomas Aarvak, *Dverggås i Norge: Kunnskapsstatus og Forslag til Nasjonal Handlingsplan* (Trondheim: BirdLife Norway, 2008).

²⁸ Svein-Håkon Lorentsen, Ingar Øien and Tomas Aarvak. “Migration of Fennoscandian Lesser White-fronted Goose *Anser Erythropus* mapped by satellite telemetry,” *Biological Conservation* 84 (1998): 47-52.

peninsula, crossing the Ural mountains and heading down the wide Ob valley to a staging area in northern Kazakhstan. Satellite tagging in the 2004 to 2005 season established that this route continues along the Caspian sea, to wintering quarters in Mesopotamia, in Iraq. The next attempt at satellite monitoring proved something of a breakthrough, both scientifically and in terms of media and public attention to the species. In May 2006, three adult birds—one couple and a male—were caught on the Valdak marshes and equipped with transmitters. As a publicity coup, WWF Finland ran a naming competition in a Finnish newspaper. Readers baptised the couple Finn and Nieida—a typically Norwegian boy’s name, coupled with the indigenous northern Sami word for “girl”—while the solitary male was named Imre: a male Hungarian name, referencing one of the key known stopover sites in Hungary, on the migration route through Eastern Europe.²⁹ At the end of June, all three birds left the breeding grounds and proceeded east, on their moult migration to Siberia. Their movements over the next few weeks are known in detail, thanks to the curious, remote blow-by-blow intimacy of satellite tracking technologies.

Imre was the first to leave. On June 29 he departed Valdak, arriving on the Taimyr peninsula in Siberia on 6 July. En route, he stopped over at the Kola and Kanin peninsulas, at Malosemelskaya and Bolshesemelskaya, and the Gydanskiy bay. He reached the Pyassina Delta, on Taimyr, on 7 July, where he remained until 21 August. Finn and Nieida, meanwhile, left the last roosting area in Finnmark somewhat later, on 6 July, and arrived in Taimyr on 8 July, at the Malaya Logata river. At the end of August 2006, the three birds started their autumn migration. All three chose the so-called Western main flyway, following the Ob River towards their staging areas in northern Kazakhstan.



Figure 8 *Movements of the 2006 satellite tracked geese.*
Image © Norwegian Ornithological Society.

²⁹ Øien, Aarvak and Ekker. “Imre er død—Leve dverggåsa!”, 26-28.

In mid-October, en route to Greece, they moved through the Volgograd region in Russia. Finn and Nieida were located in Ukraine on 24 October, at the base of the Crimean peninsula. On 31 October, Finn was in Greece, at Lake Kerkini, one of the traditional winter staging areas for the species. In November, during a visit from the international EU-LIFE project team, Finn and Nieida were both observed in Kerkini, in a flock of 42 Lesser White-fronts. The two would rest in the area for some time, before undertaking their spring migration back to Finnmark. The signal from Imre, meanwhile, had begun to behave erratically. The blips that marked the path of his westward migration began to spiral, then they stopped. His final transmission, on 30 October, came from Bolshoy, a Russian village in the region of Volgograd. After that, only silence. Researchers were alarmed, the media notified, couriers and press releases dispatched: “Is Imre well? Or has the valuable device dropped off?”³⁰ Soon, Russian collaborators confirmed that Imre had indeed been shot, in that area, “in the last days of October.”³¹ Imre was never seen (or heard from) again³²—but using the signal from his transmitter, researchers in Norway were able to pinpoint his final location to the backyard of a specific house in the village: eventually, working with colleagues in Russia, they were able to retrieve the device and fit it on another goose.



Figure 9 The final coordinates of the Imre transmitter.
Image © Norwegian Ornithological Society.

³⁰ Tore Høyland, Morten Ekker and Petteri Tolvanen, *Lesser White-fronted Goose: Anser erythropus* (Helsinki: WWF Finland, nd), 6.

³¹ Ingar Øien, Tomas Aarvak, Morten Ekker and Petteri Tolvanen, “Mapping of Migration Routes of the Fennoscandian Lesser White-fronted Goose Breeding Population with Profound Implications for Conservation Priorities,” in *Conservation of Lesser White-fronted Goose on the European Migration Route*, edited by P. Tolvanen, I. Øiyen and K. Ruokolainen (Helsinki: WWF, 2009), 13-15.

³² Although see Reinert, “Face of a Dead Bird,” 2012.

From the moment they were captured, the three Valdak geese had passed from anonymity into the workings of a vast transnational assemblage—a global machine of labs, data-streams and satellites circling the earth, which reached across the Eurasian land-mass and into orbit. Attached to the bodies of the Lessers, telemetric machinery could reproduce their migratory movements as traceable routes, patterns of blips cutting intelligible arcs across the screens, maps, digital schematics—digital signals, captured in the visual field of two-dimensional cartography and real-time GPS rendering. Telemetric rucksacks enabled a novel and instantaneous proximity, a kind of “sticky” surveillance that adhered to the bodies of the geese, infusing them with charisma and transforming them overnight into “international celebrities,” “important informants” for the work of conservation.³³ The satellite data showed the territorial range of the Lessers as a system of discontinuous but interdependent sites—where events in one location could have dramatic and life-threatening effects in another, months later and thousands of miles away. Through their migrations, the birds thus occupied (and reproduced) a form of space that was fluid, transversal, distinctly at odds with the bounded, territorial spatiality of the sovereign states whose airspaces they traversed. In their work to mobilise action, influence policy and develop appropriate regulatory frameworks, the birders translated the logic of this nonhuman space into human political and social realities—turning themselves into advocates for a spatiality rooted in the affordances of nonhuman bodies.³⁴

Since the last known couple of Lessers breeding in Finland died, in 1995, Norway has become the last breeding ground for the species in Europe; elsewhere in the world, wild Lessers only breed in Russia. The Lessers are also the only endangered waterbird that breeds in Norway. The recent national action plan for Norway outlines the “unique responsibilities” that these conditions entail for the country, as the “nursery” [*fødestue*] of a “flagship species”³⁵—simultaneously proof of care, and proof of concept for experimental methods on the cutting edge of conservation. In line with these commitments, Norway has taken up a leading role in conservation of the European Lessers: serving as a key player and principal sponsor outside the EU system and providing significant funding for national and international initiatives—including a dedicated post at the secretariat of the African Eurasian Waterbird Agreement (AEWA), as well as financial support for national and international projects.

Such state expenditures bring the Lessers into view as a biopolitical object and a matter of concern (a responsibility, even a ward of the state) at the juncture between emergent technologies and biopower, with its protective imperative to “make live”—and yet, precisely in the gesture of rendering the Lessers visible in this way, graspable, these technologies also manifest their own limits, and the limits of the power(s) that act through them. Telemetry makes the birds and their borderless nomadic trajectories visible: tracking brings them forward, into view, rendering their bodies into signals—intelligible, decipherable, traceable—while also compressing the immense distances they cross into the two-dimensional coordinates of a screen, or a digital map. In this revelation, however, telemetry also places their freshly-known

³³ Øien, Aarvak and Ekker, “Imre er død—Leve dverggåsa!”, 27; see also Reinert, “Face of a Dead Bird.”

³⁴ Hugo Reinert, “Landscape as Ontological Rupture: Perspective and Extinction in a Norwegian Fjord,” in *Ruptured Landscapes*, edited by Sooväli-Sepping, J. Miles-Watson and H. Reinert (London: Springer, forthcoming 2014).

³⁵ Øien and Aarvak, *Dverggås i Norge*, 6.

bodies *beyond reach*. The field of knowledge, or surveillance, exceeds the jurisdiction and material reach of the State, and of the myriad biopolitical machines that compose it. Simply put, telemetry forces out an awkward disjunction in the field of biopolitical power itself—a fissure, or space, between knowledge and power, designation and execution, sight and presence, between bodies and the law—by which the birds are put within “sight,” but out of reach.

A Sacrifice at the Marshes

A couple of weeks after leaving Matsalu, I find myself at the edge of another marsh, this time in the Norwegian Arctic—perched on the edge of a hill overlooking the inner Porsanger fjord, just south of the Stabburselv river where it runs into the sea. This is Valdak, where Imre and his fellow birds were captured a few years ago—and there, not half a kilometre away, scattered in small clusters along the edge of the land, are the Lessers that have made it to the annual rendezvous this year: the same birds I saw a couple of weeks ago in Estonia, thousands of kilometres to the south.



Figure 10 Valdak. Photo by the author.

This area is a key juncture in the migratory cycle of the Lessers, their last stop before they head for the breeding areas in the inland. Every year the birds arrive here, on the cusp of the brief northern summer, when the area is still patchy with melting snow. Each couple stops over at

the marshes for a week, maybe 10 days. While the males stand guard, necks raised like periscopes to the horizon, the females graze almost continuously, storing up their fat reserves for the demanding task ahead.



Figure 11 Male and female LWfG grazing.
Photo © Norwegian Ornithological Society.

Watching from a ledge above the marshes, the ornithologists estimate departure dates for the various couples by the size of the females' backsides, ranking them on a scale from one to six: "oh, those two will be leaving soon, she is definitely already a five." This "bulking up" that the females undertake on the marshes is absolutely essential to their subsequent energy budget: any disturbance or unnecessary expenditure here can dramatically reduce their chance of successfully breeding later in the summer, or of raising their hatchlings and protecting them from predators.

This makes the site vital to the human observers, too: a key node in the conservation assemblage for the species, essential to ensuring the reproductivity and continuation of the population. In line with this, the site has been monitored regularly by BirdLife Norway (formerly the Norwegian Ornithological Association, NOF) since the 1980s. Monitors usually spend about a month on site in the early summer, while they conduct other forms of "bird-work"—counts and monitoring, ringing other species and so on—and return for another count in the late summer, when the fledglings are preparing to undertake their first migration. Birders coordinate closely with local State representatives, particularly the State Nature Monitoring Agency (*Statens Naturoppsyn*, SNO) and the Directorate for Nature Protection (*Direktoratet for Naturforvaltning*, DN). Acting both as scientists and as steward-activists, the monitors are granted some minor boons through their collaboration—including special dispensation to set up their camp within the restricted area of the nature reserve, not to mention free coffee and waffle privileges at the nearby nature museum.

So there I am, on the edge of the Valdak marshland, binoculars in hand. Of course, much as in Matsalu, I find the birds difficult to distinguish: not so much from other geese this time— compared to the migratory traffic junction of Matsalu, these northern marshes are practically desolate—so much as from the various rocks, shrubs and indeterminate landscape features that lie down there, dispersed across my binocular field.



Figure 12 Binocular view of the Valdak marshes. Photo by the author.

There are fewer birds than ever this year: by the end of the spring migration the monitors have registered some 30-odd individuals, just short of a dozen breeding pairs. The mood is somber, the proverbial light at the end of the tunnel elusive.

Though long recognised as a key migration node for the Fennoscandian Lessers, Valdak grew in significance through the 90s and early 2000s—as the Lessers continued to dwindle, and other breeding areas across northern Scandinavia were gradually abandoned. As the importance of the site became clearer, so also the need grew to understand the remaining Fennoscandian Lessers as a populational object: intelligible, with graspable patterns, subject to manipulation based on solid, reliable data and sound analyses. Somewhere, in the steadily accumulating mass of data accreting around the species—biometrics, breeding habits, demographic composition, mortality causes and their distribution throughout the population, precise migration trajectories, extinction drivers—might lie some key to their fate, a chance to arrest their decline. Back in 2006, the death of Imre had confirmed long-standing suspicion that “the central Asian autumn migration route is far more dangerous than the European one, and that the threat from illegal hunting along this route is considerable.”³⁶ At the same time,

³⁶ Øien, Aarvak and Ekker, “Imre er død—Leve dverggåsa!” 27.

the surviving female from the group, Nieida, had brought data that was to prove even more crucial. Unlike the two males, Finn and Imre, she had been captured and ringed before, in May 2002: subsequent observations had already produced some very interesting conjectures, hinting at a link between migration route and breeding success—and possibly, just possibly, offering a novel scope for intervention.

In years when Nieida had failed to breed, in 2002 and 2004, she left the breeding grounds in Finnmark early, flying east to undertake the distinctive “loop migration” of the Fennoscandian Lessers, from Siberia through central Asia to Greece: a long, complex and dangerous route, passing through all the major poaching hotspots for the species. As the death of Imre showed, this was a potentially lethal route, with high mortality risk for the birds that chose it. In years when she bred successfully, on the other hand, in 2003 and 2005, Nieida had moulted with her goslings in Finnmark and undertaken a shorter, safer migration route to Greece, passing through the Baltic and Eastern Europe.³⁷ From this it seemed as if breeding outcome might determine the migration choices of adult Lessers: failure to breed, or the death of a brood early in the season, might send the birds along the longer route through Asia, exposing them to unregulated poaching in the remoter parts of Russia and Kazakhstan.

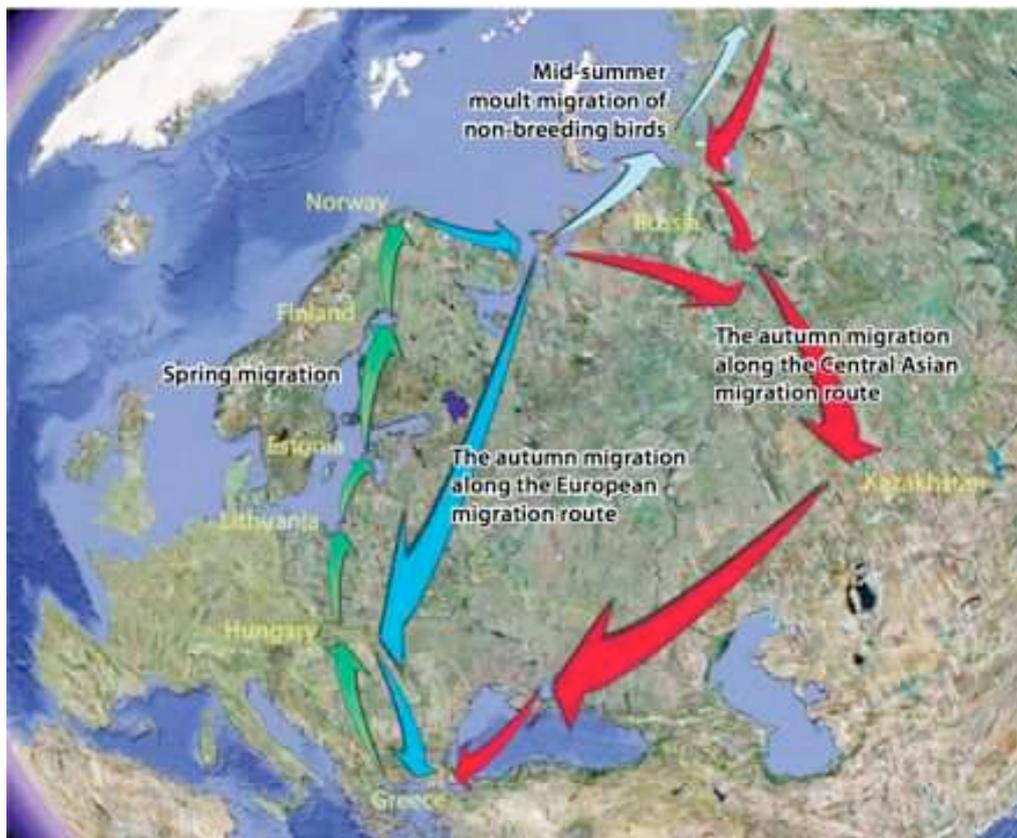


Figure 13 The two autumn migration routes of the Scandinavian LWfG.
Image © Norwegian Ornithological Society.

³⁷ Ingar Øien, Tomas Aarvak, Morten Ekker and Petteri Tolvanen, “Mapping of Migration Routes of the Fennoscandian Lesser White-fronted Goose Breeding Population with Profound Implications for Conservation Priorities,” 12-18.

If this correlation held up, it would mean that disturbances at Valdak and in the nearby breeding areas—predators, human traffic, feed shortage, disease, competition from other species, anything that affected breeding success— were determining not only the annual productivity of the population, but also the mortality risk of sexually mature adults: a vital variable, given the generally high juvenile and sub-adult mortality of the species. Interventions that enhanced breeding success would provide an indirect way of manipulating the Lessers' migration routes: nudging the otherwise ungovernable birds along desired routes, into safer areas, with effects reverberating through the entire migration system—opening, in turn, for novel forms and strategies of management. This was particularly important in the case of the Lessers, as a wild and prestigious “flagship species” that refused to remain within the territorial jurisdiction of its protector state, ignoring porous borders—and the best of human intentions—to get poached in the remotest areas of other states.

As it turned out, the flight of Nieida did prove sufficient to justify action: based on her data, the question became not *whether* but *how* to maximise the breeding success of the Lessers. Armed with years of close observation, detailed logs and scientific training, it took researchers little time to come up with a plan. At the time, the area around Valdak hosted a growing population of Red Fox (*Vulpes Vulpes*)—a recent, highly expansive arrival that threatened to outcompete the native Arctic Fox (*Vulpes Lagopus*), as well as being a ferocious predator of eggs and juvenile birds. A single Red Fox could ravage an entire breeding area, moving from nest to nest, killing the young and burying their bodies nearby, for later retrieval—sometimes, as if with a macabre sense of occasion, right below the original nest. Birders recounted the visible distress of parents returning to the nest and searching for hatchlings that all the while lay buried under their feet. In this account, the Red Fox was not only an invader and a clear threat to the geese, but also an indiscriminate killer: ruthless, thorough, insatiable. The campaign against the Porsanger foxes began in 2008, with bounties and hired hunters, and was enormously successful. By May 2012, some 500 foxes had been eliminated in the area, and the Lessers had increased to a maximum potential count of 61 individuals, the highest level seen since counting began in 1991.³⁸

Globally, perhaps, this was a small campaign, with only a few hundred dead bodies to show for itself—but significant nonetheless, not only in conservation terms but as a mirror, held up to the necropolitical microphysics entailed in biodiversity: a perfect showcase for how the biopolitical imperative to “make live” can authorise, even render indispensable, the symmetrical exercise of a sovereign power to kill, even to exterminate. Circumscribed by the territorial borders that form simultaneously their theoretical limit and the condition of their existence, the Norwegian State and its biopolitical machines had found a way to achieve their objective—of protecting the Lessers as a species—by intervening *indirectly*, by deflecting their agency onto a suitable proxy: a population of ideal targets, bodies that were simultaneously ubiquitous, reprehensible and available to destroy; not so much a substitution as a sacrificial deflection, with causal efficacy, forced into place at the very edge of power, at the territorial (and agentive) limits of the State.

³⁸ Ingar Øien, personal communication.

Double Binds

I began this telling with the story of some bird-men, poised on the edge of a marsh—taciturn, attentions turned entirely on the birds in their telescopes. Here, observation was a delicate craft, a careful operation that wove into itself a whole environment—enfolding sounds, colour, weather and wind, movements, shade and concealment, qualities of patience, the texture of the air, moisture or dryness, silence—in order to disappear, blending into its own background to vanish the observer from the point of view of the observed. This was a gaze that withdrew itself, in other words, concealing the act of observation from its object: non-reciprocal, asymmetrical, the gaze of the voyeur. To *know* the birds in this way, to establish conditions for knowing them, was to make oneself invisible and disappear: to be *un-noticed*. This was invisibility as a matter of aesthetics, of learned skill, of concern for the surroundings, perhaps also the tradition of a certain professional habitus, an ethos of birding. In part, however, it was also pragmatic, rooted in a concern for the survival of the quarry.

To any species as vulnerable to human predation as the Lessers, close human contact is dangerous. However benign, however well intentioned, all contact carries the risk of habituation—threatening that wary skittishness that protects the Lessers from their key predators, running the risk of entraining them for predation, turning them (potentially) into docile prey. The goslings of the Lessers imprint easily; adults too can become accustomed to the human presence. Birds that become trusting *here* may well be shot down *over there*, somewhere down the line, out of sight, where humans carry rifles rather than binoculars. Interventions must thus cultivate (and sustain) the distrust of their object, even as they conduct the required work: a certain amount of monitoring, occasional captures, the invasions of telemetry. This necessity established a space of asymmetrical transparency that seems familiar: figuratively speaking, the space of a human presence, joyfully contemplating its own absence—a trope familiar from centuries of romantic literature and ecological fantasy.³⁹ To think it merely in these terms, however, is to risk reducing the paramount concern for wildness, and the wild, to an apophatic derivation: an impoverished negative space, environment or organism “minus human.” Other more positive investments are also in play.

As a quality of living beings, of places and actions and stories and events, the wild can be a myriad things: romantic affect and nostalgic referent, heroic construct, misanthropic fantasy, dream of an “underived alterity.”⁴⁰ To the humans who engage with them—at least the ones I have described here, other factions involved with the species would disagree strongly—the wild of the Lessers appears as fragile and easily compromised, a thing of delicate boundaries. Can Lessers be bred in captivity? Can they be raised and released? Can they be taught new migration routes? When do they cease being Lessers, and become something new, or different, something that no longer warrants protection? Should a hybrid be suffered to live? What are the limits of wildness, where does it end, when does it become something else—domesticity, impurity, loss? A Lesser that permits a human observer to draw close, to feed it, to hold it, to entrain it along new migration paths ... Is it still itself? Is it still a Lesser? These are powerful problems, that gave rise to complex, intractable controversies.

The risk here is that misguided conservation might destroy the Lessers, in the very gesture that saved them: that the birds would cease to be “wild,” or rather *cease to be*

³⁹ Timothy Morton, *Ecology without Nature* (Cambridge: Harvard University Press, 2009).

⁴⁰ Gayatri Spivak, *Death of a Discipline* (New York: Columbia University Press, 2003).

themselves, in some vital and fundamental sense—that they might be taken from the wild, or have their wildness taken from them. This risk functions as a double bind, held in the pressured space between extinction (as a limit on numbers and time) and the fragile wild (as a limit on intervention). Fail to intervene, and the object is lost; intervene, and the object may also be lost, although in other ways. Within these limits, I suggest, the Lessers were brought into being, as objects of human concern and attention, through a *constitutive withdrawal*: not an abandonment but rather the opposite, a powerful and highly productive investment which, through its paradoxical absent-presence, offered a solution (of sorts) to the double bind. Engage with the birds, but in a manner that approximates absence.⁴¹ Defined through withdrawal, the wild here effectively marks a parameter or limit point of human power, a threshold against which it comes up, and halts; a point where life, a certain form of life is articulated as fragility, as too fragile to touch, too fragile to endure the presence of human bodies. As wild beings, thus, the Lessers draw out a human presence that conceals itself in the exercise of its power—preserving its elusive object, and the fragile elusiveness of that object. Here I have suggested that this asymmetrical intimacy roots the operation of biopower in a particular modality—as a power that holds back, acting through indirection, displacement and non-locality: withdrawing itself, in the very act of constituting its object *qua* object. A haptic ban and a double limit on presence, doubled again in the sphere of power. If sight is haptic, marking out the coordinates of a tactile capture, this is power in latex gloves: the touch of a ghost, leaving no fingerprints. Telescopic biopower, telekinetic even. As exemplified in the sacrifice of the foxes, this is a modality of power that operates discretely, through preference and dispositions, through indirect manipulation, flowing with the grain of practice and inherited traditions—a kind of *governmentality*, in other words, a nonhuman “conduct of conduct.”⁴²

At heart, I think, the story I have told here concerns a certain kind of love: a love vested in the impossibility of symmetry or of return, that denies reciprocation, cultivated in the full knowledge that it can neither be returned nor acknowledged—an enmeshment, in other words, that persists by denying itself the intimacy of its own entanglements, living down the length of a telescope. It is also the story of how this love, in turn, became (or can become) enmeshed in people and machineries, in wheels of governance, in funding decisions and zoning regulations, in the biopolitical engines that regulate, control and generate the nonhuman world as an object of human concern; of how a powerful but personal affect reproduces itself, at other scales—traversing the priorities and operations of states, agencies and intergovernmental powers, emplacing constraints. This is the wild as simultaneously productive and apophatic: a caesura, by which human powers conceptualise their own limits, and a receding attractor, seen only from the corner of an eye.

On the edge of the marshes, hovering over their telescopes, the bird-men embodied this stance—with the absence in their presence, the coming-to-meet in their asymmetrical withdrawal. Soon, perhaps, as the marshes around us fall silent, such self-erasure may be all we have left; perhaps, however, it may yet also be a grace—an opening to something else, a saving power.

⁴¹ From the perspective of the birds—obviously not for the foxes.

⁴² Michel Foucault, “The Subject and the Power,” in *Michel Foucault: Beyond Structuralism and Hermeneutics*, ed. H. Dreyfus and P. Rabinow (Chicago: Chicago University Press, 1983), 208-226.

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Bibliography

- Adey, Peter. *Aerial Life—Spaces, Mobilities, Affects*. London: Wiley-Blackwell, 2010.
- Andersson, Åke and Tor Larsson. "Reintroduction of Lesser White-fronted Goose *Anser erythropus* in Swedish Lapland." In *Waterbirds around the world*, edited by G. Boere, C. Galbraith and D. Stroud, 635-636. Edinburgh: The Stationery Office, 2006.
- Benson, Etienne. *Wired Wilderness: Technologies of Tracking and the Making of Modern Wildlife*. New York: Johns Hopkins University Press, 2010.
- Bergman, Charles. "Inventing a Beast with No Body: Radio-Telemetry, the Marginalization of Animals, and the Simulation of Ecology." *Worldviews* 9, no. 16 (2005): 255-270.
- BirdLife International. "Anser Erythropus." In *IUCN Red List of Threatened Species*, Version 2012.2. Accessed 16 October 2013. <http://www.iucnredlist.org/details/100600377/0>
2013. "Species Factsheet: *Anser Erythropus*." Accessed 16 October 2013. <http://www.birdlife.org/datazone/speciesfactsheet.php?id=377>
- Birkhead, Tim. *The Wisdom of Birds: An Illustrated History of Ornithology*. London: Bloomsbury, 2008.
- Brown, Mark and Dieter Oschadleus. "The Ongoing Role of Bird Ringing in Science—A Review." In *Proceedings of the 12th Pan-African Ornithological Congress 2008*, edited by D. Harebottle, A. Craig, M. Anderson, H. Rakotomanana and M. Muchai. Cape Town: Animal Demography Unit, 2009.
- Buckeridge, John. "Of Trees, Geese and Cirripedes: Man's Quest for Understanding." *Integrative Zoology* 6, no. 1 (2011): 3-12.
- Bull, Jacob, ed. *Animal Movements—Moving Animals*. Uppsala University Press: Uppsala, 2011.
- Candea, Matei. "'I Fell in Love with Carlos the Meerkat': Engagement and Detachment in Human-Animal Relations." *American Ethnologist* 37, no. 2 (2010): 241-258.
- Convention on Migratory Species, "Convention on Migratory Species", accessed 16 October 2013. <http://www.cms.int/documents/index.htm>
- Derrida, Jacques. *The Gift of Death*. Chicago: Chicago University Press, 1995.
- Foucault, Michel. "The Subject and the Power." In *Michel Foucault: Beyond Structuralism and Hermeneutics*, edited by H. Dreyfus and P. Rabinow, 208-226. Chicago: Chicago University Press, 1983.
- Gärdenfors, Ulf, ed. *Rödlistade arter i Sverige 2010*. Stockholm: Artdatabanken, 2010.
- Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3 (1988): 575-599.
- _____. *When Species Meet*. Minneapolis: University of Minnesota Press, 2008.
- Høyland, Tore, Morten Ekker and Petteri Tolvanen. *Lesser White-fronted Goose: Anser Erythropus*. Helsinki: WWF Finland, nd.

- Ingold, Tim. *Lines: A Brief History*. London: Routledge, 2007.
- Kålås, John, Åslaug Viken, Snorre Henriksen and Sigrun Skjelseth. *Norsk Røddliste for Arter 2010*. Trondheim: Artsdatabanken, 2010.
- Latour, Bruno. *The Politics of Nature*. London: Harvard University Press, 2004.
- Lorentsen, Svein-Håkon, Ingar Øien and Tomas Aarvak. "Migration of Fennoscandian Lesser White-fronted Goose Anser Erythropus Mapped by Satellite Telemetry." *Biological Conservation* 84 (1998): 47-52.
- Morton, Timothy. *Ecology without Nature*. Cambridge: Harvard University Press, 2009.
- Moss, Stephen. *A Bird in the Bush: A Social History of Birdwatching*. London: Aurum Press, 2004.
- Mulcahy, Daniel and Daniel Esler. "Surgical and Immediate Postrelease Mortality of Harlequin Ducks (*Histrionicus histrionicus*) Implanted with Abdominal Radio Transmitters with Percutaneous Antennae." *Journal of Zoo and Wildlife Medicine* 30, no. 3 (1999): 397-401.
- Preuss, Niels. "Hans Christian Cornelius Mortensen: Aspects of his Life and of the History of Bird Ringing." *Ardea* 89 special issue (2001): 1-6.
- Rassi, Pertti, Esko Hyvärinen, Aino Juslén and Ilpo Mannerkoski. *Suomen laijen uhanalaisuus 2010*. Helsinki: Ympäristöministeriö & Suomen ympäristökeskus, 2010.
- Reinert, Hugo. "Face of a Dead Bird: Notes on Grief, Spectrality and Wildlife Photography." *Rhizomes: Cultural Studies in Emerging Knowledge*, 23 (2012).
- _____. Forthcoming (2014), "Landscape as Ontological Rupture: Perspective and Extinction in a Norwegian Fjord." In *Ruptured Landscapes*, edited by H. Sooväli-Sepping, J. Miles-Watson and H. Reinert. London: Springer, 2014.
- Spivak, Gayatri. *Death of a Discipline*. New York: Columbia University Press, 2003.
- Toming, Maire. "New National Action Plan for the Lesser White-fronted Goose in Estonia." In *Conservation of Lesser White-fronted Goose on the European Migration Route*, edited by P. Tolvanen, I. Øiyen and K. Ruokolainen, 86-88. Helsinki: WWF, 2009.
- Tolvanen, Petteri, Ingar Øien and Kalle Ruokolainen, eds. *Conservation of Lesser White-fronted Goose on the European migration route—Final report of the EU LIFE-Nature project 2005-2009*. Helsinki: WWF, 2009.
- Tsing, Anna. "Unruly Edges: Mushrooms as Companion Species." *Environmental Humanities* 1 (2012): 141-154.
- Øien, Ingar and Tomas Aarvak. *Dverggås i Norge: Kunnskapsstatus og Forslag til Nasjonal Handlingsplan*. Trondheim: BirdLife Norway, 2008.
- Øien, Ingar, Tomas Aarvak and Morten Ekker. "Imre er død—Leve dverggåsa!" *Vår Fuglefauna* 30, no. 1 (2007): 26-28.
- Øien, Ingar, Tomas Aarvak, Morten Ekker and Petteri Tolvanen. "Mapping of Migration Routes of the Fennoscandian Lesser White-fronted Goose Breeding Population with Profound Implications for Conservation Priorities." In *Conservation of Lesser White-fronted Goose on the European Migration Route*, edited by P. Tolvanen, I. Øiyen and K. Ruokolainen, 12-18. Helsinki: WWF, 2009.