Conserving wolves by transforming them? The transformative effects of technologies of government in biodiversity conservation

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Abstract

This article investigates the construction of instruments and techniques employed in the management of Norwegian wolves since the early 1980s by construing the tools as technologies of government. The proliferation of such instruments and techniques, constructed to effect protection in practice, has transformed Norwegian wolves in significant ways. Unlike the historic population, which often went through large variations in number and was spread throughout large parts of the country, the current population of wolves is regulated to stay at a fixed number and within a relatively small wolf-zone. The current population is also highly amenable to detailed government; the number and location of the wolves, and even the genetic composition of the population over the longer term, can be reconfigured in detail. The article further argues that the general proliferation of governmental technologies in biodiversity conservation indicates similar transformations of a great number of endangered organisms.

Keywords: biodiversity, endangered species, technologies of government, wildlife management, wolves.

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Introduction

The current population of Scandinavian wolves, which comprises a few hundred animals in Norway and Sweden, is commonly described as "new" because wolf numbers remained at a minimum between the last decades of the nineteenth century and the 1990s. Molecular biologists have identified that the current population is genetically distinct from the historic one by establishing that all the founders of the current population were immigrants from a Finno-Russian population (Vila et al., 2003). The current population of wolves in Scandinavia is, therefore, new in a genetic sense, as well. It is, however, also distinct from the previous population in the way in which the wolves have been molded as objects of government.[i] This article examines the efforts of biologists, wildlife managers, bureaucrats, politicians, and others to effect the protection of wolves in practice. In particular, it examines the construction of a population goal, a wolf-zone, genetic techniques, and a monitoring system, by construing these conservational tools as technologies of government. By employing this approach, the article analyzes how protective management instruments and techniques can transform endangered organisms in significant ways.

The article proceeds by presenting the research approach. This includes an introduction to the concept 'technologies of government', considerations concerning both the historicity of biodiversity conservation and populations as analytical foci, and a methodological account. I then outline general developments in the use of technologies of government in international biodiversity conservation, as well as the historical background of Norwegian wolf management. I follow this with empirical accounts of the construction of technologies of intervention and technologies of knowledge production, respectively, in the Norwegian case. Finally, I discuss how these governmental technologies have transformed Norwegian wolves, before returning to discuss the transformative effects of technologies of protection in the conclusion.

Technologies of government

This study investigates how efforts to protect Norwegian wolves have transformed them over time, while attending in particular to the way in which these efforts and transformations have related to government of the wolves. To this end, it employs the concept "technologies of government" from the growing field of governmentality studies. Peter Miller and Nikolas Rose argued that studies of government should focus on the actual mechanisms, or

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"technologies," that enable government in practice, rather than restrict themselves to the "actions of a state … construed as a relatively coherent and calculating political subject" (Miller & Rose, 2008, p. 27). With inspiration from Michel Foucault, Bruno Latour and Michel Callon, they argued that modern government is not only constituted by grand political schema and negotiations between politicians, but, in practice, is dependent on "apparently humble and mundane mechanisms" such as techniques of notation, calculation, assessment, and intervention. It is often such techniques and instruments that make objects amenable to government, and therefore enable interventions of practical politics. Several researchers who employ Foucauldian perspectives in studies of government, as well as researchers within science and technology studies, have proposed similar arguments (e.g., Barry, 2001; Callon, 1986; Dean, 2010; Latour, 1987; Porter, 1995). Miller and Rose designated such techniques and instruments "technologies of government," of which health surveys, accounting practices, maps and compasses, psychological diagnoses, prison designs, and political documents are only a few examples. The list of governmental technologies is heterogeneous and, in principle, unlimited (Miller & Rose, 2008).

Although technologies of knowledge production and technologies of intervention are often interlinked in practical government, for analytical purposes it can be beneficial to separate the two types of technologies of government. While technologies of knowledge production make objects amenable to government (by producing information, calculations, and so forth), technologies of intervention employ this knowledge to intervene upon objects and effect politics in practice. For the practical purposes of this article, I will sometimes designate technologies of government (both intervention and knowledge production) that are specific to biodiversity conservation as "technologies of protection."

The purpose of studying technologies of government is to understand both how government is conducted in practice and how objects of government are created, shaped, or transformed by these technologies (Miller & Rose, 2008). Such studies of public government have often concentrated on the government of subjects and "social" objects of government, such as the market, populations, and mental illness, and hence on the production of knowledge and instruments by professionals such as psychologists, social workers, accountants, and factory managers.[ii] In this article, I argue that governmental technologies of knowledge production and intervention have also been decisive for the management of wolves in Norway, and that studies of biodiversity conservation, generally, could benefit from this approach.

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The historicity of biodiversity conservation

A growing body of literature has employed Foucauldian approaches in social scientific studies of biodiversity conservation (e.g., Biermann & Mansfield, 2014; Bravermann, 2015; Collard, 2012; Fredriksen, 2016; Friese, 2013; Hennessy, 2013; Lorimer, 2015; Reinert, 2013; Srinivasan, 2014; Youatt, 2015). These studies have begun the important—and extensive—task of investigating the biopolitical aspects of such conservation efforts. However, very few studies have conducted historical analyses of the conservation practices they have studied.[iii] This is somewhat surprising, considering the importance of historical analysis in Foucault's work. In particular, little attention has been paid to historical analysis of the way in which protective efforts have affected (or transformed) wild animals.

Additionally, Foucauldian approaches have rarely been used in historical research on biodiversity conservation. Much of the historical literature has focused on the protective status of endangered species, including if and how this status was achieved. For example, studies have focused on who was responsible for discovering and providing knowledge about endangered species (Barrow, 2009a, 2009b); ideas of conservation (Farnham, 2007; Takacs, 1996); and controversies over the protection of particular species or the establishment of particular regulations (Alagona, 2013; Cioc, 2009; Holdgate, 1999; Petersen, 2002). Similarly, the historical literature about wolves has typically focused on eradication measures (Coleman, 2004; Robinson, 2005; Walker, 2005) and subsequent transformations in attitudes towards wolves (Dunlap, 1988; Jones, 2010; Worster, 1994). Although much of this literature has investigated—at least indirectly—how endangered organisms have been governed, it has only examined the biopolitical aspects of this government to a very small degree.

There is, therefore, a lacuna in the body of social scientific literature on biodiversity conservation: Foucauldian analysis of the historical developments of particular conservation practices. This article aims to contribute some insights to begin to remedy this lacuna, by examining the case of Norwegian wolf protection.

Viewing a particular phenomenon (such as endangered species management) through a larger historical framework enhances our understanding of the phenomenon and produces knowledge that is otherwise difficult to gain. In particular, slow developments, even if profound and extensive, can be very difficult to notice unless the past is employed as a comparison. This take on employing a historical perspective and emphasizing discontinuity and contrast rather than continuity draws particularly on the work of Michel Foucault and the

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governmentality studies his work inspired (Dean, 2010; Miller & Rose, 2008). The main purpose of Foucault's historical studies of prisons, for example, was to understand how the practice of imprisonment "was capable of being accepted at a certain moment as a principal component of the penal system, thus coming to seem an altogether natural, self-evident and indispensable part of it" (Foucault et al., 1991, p. 75). In order to do this, he investigated the histories of discipline and prisons and attempted to identify how the transition from other forms of punishment had occurred. One can similarly investigate the historicity of current biodiversity conservation. By employing a larger historical framework as a contrast, researchers can identify and articulate what is particular about aspects of biodiversity conservation that otherwise seem natural, self-evident, and indispensable.[iv]

Transformations on the level of the population

A growing number of studies has argued that Foucauldian approaches can—and should—be employed in social scientific studies of animals. Specifically, many have argued that the concept of "biopower," which Foucault developed to denote "the calculated management of life" (Foucault, 1990, p. 139), is well fitted to study power–knowledge interventions and regulations in the government of not only humans, but also animals (Biermann & Mansfield, 2014; Collard, 2012; Holloway & Morris, 2012; Srinivasan, 2014; Youatt, 2015). However, as Srinivasan (2014), Whitney (2013) and Youatt (2015) argued, some of the mechanisms that underlie biopower do not satisfactorily account for the operation of biopower in human–animal relations. This observation particularly concerns the internalization of government through subjectification, or "self-governance" (Agrawal, 2005; Dean, 2010; Rose, 2007). Although some interventions aiming at self-governance within biodiversity conservation are thinkable—and have even been conducted (Rinfret, 2009)—most nonhumans are "constitutionally incapable of being self-regulating subjects who can internalize the conditions of subjection in biopower's own terms" (Youatt, 2015, p. 55). Further, the overall current efforts to conserve wild animals, including Norwegian wolves, do not include such interventions. This means that the most important divergence in the article's analysis from many Foucauldian analyses of humans is that it does not include mechanisms related to self-governance. However, the article does not depend on analyses based on such mechanisms, but rather utilizes Foucauldian methodology to arrive at analyses that are specific to biodiversity conservation.

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In focusing on the population of wolves in Norway, the article pays less attention to the effects of conservation efforts on individual wolves. Many studies on the biopolitics of wildlife conservation have focused on individual animals and criticized the higher value ascribed to species over individuals (Chrulew, 2011; Fredriksen, 2016; Lulka, 2004; van Dooren, 2014). As the case of Norwegian wolf conservation shows, however, conservation efforts also cause decisive biopolitical transformations on the level of populations that merit critical scrutiny. Therefore, this study focuses on the properties and transformations of the wolf population over time, rather than those of individual wolves.

Method

The findings and discussion of this article are based on an extensive study of political and scientific documents, as well as the historical archives of the Norwegian Environment Agency (NEA) and the Ministry of Climate and Environment (MCE). I reviewed a large majority of the several hundred major political and scientific documents that had been produced in relation to the management of wolves in Norway since the 1960s. This included white papers, national plans, regulatory documents, scientific reports, and articles. I examined in more detail the most central documents, as well as those concerning the construction of technologies of protection. I also traced the internal processes of governmental technology construction in more than 20,000 pages of archival material from the NEA and MCE. Not all of these documents concerned wolf management, only. A large part concerned the management of large carnivores, and some concerned general biodiversity conservation. However, most of the documents had a direct or indirect impact on the construction of technologies of protection in wolf management. Further, I interviewed six biologists and one wildlife manager who were central in efforts to effect the protection of wolves in practice.

The interviews and archival material are not cited or explicitly employed in this article, although I found them important sources for achieving both broad contextual understanding and specific knowledge of practical management challenges. Because the article concerns broad developments that span decades, there are few opportunities for detailed description. Also minding the critical or curious reader, I reference more accessible documents (scientific reports, white papers, law regulations, etc.) where possible.

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Proliferating technologies of government in biodiversity management

The 1960s and 1970s are often referred to as the height of "the age of ecology," and were characterized by broad public awareness and acts/regulations to protect nature (Barrow, Jr., 2009a; Worster, 1994). In the following period, "biodiversity" became a crucial concept in nature conservation and management. The term was coined in the 1980s (Farnham, 2007), made politically decisive through the Rio Convention on Biological Diversity established in 1992, and further institutionalized by the recently established Intergovernmental Platform on Biodiversity and Ecosystem Services. The concept of biodiversity is often described as a successful instrument in conservational efforts—even "the leading paradigm for nature conservation" (Farnham, 2007, p. 15) since the 1980s.[v] The strength of the concept is understood as its ability to encompass what were previously thought of as separate environmental movements in a common issue (Farnham, 2007), and its rhetorical effect on the way in which lay people, politicians, and others conceive of nature (Takacs, 1996). However, the biodiversity paradigm is also associated with a shift in conservation efforts that had extensive practical implications for the management of endangered organisms.

A distinctive trait of this period is the extent to which a host of political interventions, knowledge production, and detailed regulations was generated to effect protection in practice (sometimes out of frustration over a lack of actual effects from the general protective regulations established in the age of ecology). Jamie Lorimer argued that "[b]iodiversity conservation is informed by a desire for panoptic knowledge, comprehensive accounting, and efficient, instrumental management" (Lorimer, 2015, pp. 58–59), while Rafi Youatt established that the 1990s "saw a global mobilization of conservation efforts" (Youatt, 2015, p. 8). Bowker (2005), Turnhout, and Boonman-Berson (2011), as well as Turnhout and colleagues (2013), further noted a general increase after the early 1990s in efforts to collect data on biodiversity and archive it in databases (i.e., technologies of knowledge production, in the terminology of this article), through a wide variety of institutions and initiatives including the World Conservation Monitoring Centre, the Global Biodiversity Outlook, the European Biodiversity Observation Network, and the Global Biodiversity Information Facility.

The proliferation of technologies of government in biodiversity conservation is, however, most clearly evident in the document that was designed to improve such conservation, globally. The Convention on Biological Diversity elevated monitoring to the heart of conservation efforts by assigning it an entire article (United Nations, 1992). Nations that have ratified the convention are required to identify and monitor their biological diversity, assess

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which organisms are threatened, and create national plans or strategies to ensure protection. This implies the construction of a multitude of technologies of protection, such as extensive monitoring systems, detailed assessment criteria, numerous regulations, and other instruments of intervention.

Historical background

After varying highly in number since at least the sixteenth century—most historical accounts identify three periods of high numbers[vi] interrupted by periods of low numbers (e.g., Collett, 1912; Johnsen, 1928)—the population of wolves in Norway significantly decreased in the second half of the nineteenth century and into the twentieth century (Myrberget, 1969). The government's establishment of public bounties and other measures to eradicate wolves, beginning in the 1840s, were major reasons for the latest decrease in number. The wolf population kept decreasing into the twentieth century, and, by the 1960s, wildlife biologists assumed that the population was almost extinct (Myrberget, 1969). Efforts to eradicate wolves in Norway were part of an international trend of utilitarian conservation in game management, which prevailed in much of the Western world in the nineteenth century and into the twentieth century (Coleman, 2004; Jones, 2002; Lopez, 1978; Robinson, 2005; Walker, 2005). This rational approach, which had roots in eighteenth century scientific agriculture and forestry, prescribed that eradicating large predators would maximize game populations and reduce livestock losses (Dunlap, 1988; Scott, 1998; Worster, 1994).

In an effort to save the very few wolves remaining, the wolves were protected by law in 1971. Due to immigrant wolves from Finland and Russia, the numbers started to rise again—mostly after the 1980s (Wabakken et al., 2001). Presently, there are about 30 wolves in Norway, 320 in Sweden, and 50 that reside on both sides of the border (Wabakken et al., 2014). The Norwegian government considers the current number of wolves in Norway sufficient to cover Norway's responsibility for protecting a viable population of Scandinavian wolves. However, organizations in favor of wolf protection have contested this.

As in many other places where wolves have returned or been reintroduced, in Norway, wolf protection has led to controversy (Hayward & Somers, 2009; Mech & Boitani, 2003; Nie, 2003). With this in mind, the protection of wolves in Scandinavia has been successful, at least to some degree. The Scandinavian population has followed a recovery pattern similar to that

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found in many other European countries (Table 1). The reasons for the successful European recovery of large carnivores, a category that also encompasses brown bears, Eurasian lynxes and wolverines, range from coordinated legislation to the stable political climate since World War II, the rise of environmental movements in the 1970s, socio-economic changes such as the widespread exodus from rural areas and associated abandonment of agricultural land, and context-specific management practices and institutional arrangements (Chapron et al., 2014). However, the number of wolves in Norway is significantly lower than that in Sweden and several other countries, which, to similar degrees, encompass areas of potentially suitable wolf habitats.

The reasons why Norwegian wolf numbers are relatively low in a European context are not easily identifiable. However, large carnivore protection has been most challenging in countries where the species have previously been extirpated, and this has led to altered practices in husbandry or other activities. In such cases, the return of large carnivores has often led to intense social conflicts (Chapron et al., 2014). The Norwegian case fits this pattern. Owners of sheep, in addition to reindeer owners, hunters and land owners, have opposed wolf protection for economical reasons. However, controversy concerning wolf protection in Norway has encompassed a broader context than potential economic loss. The social conflicts concerning wolf protection have, to a large degree, been related to social transformation processes and cultural and economical power relations, such as urban–rural tensions (Figari & Skogen, 2011; Krange & Skogen, 2011; Skogen & Krange, 2003).

Technologies of intervention

The legal protection established in the early 1970s—often referred to as "total protection"—was challenged by controversy over human–wolf conflicts after a few wolves immigrated from Finland and Russia in the 1980s. Sheep killed by a wolf in the municipal Vegårdshei soon made national headlines, along with calls to cull the wolf, which the Norwegian parliament allowed by loosening regulations and moving away from total protection. The new regulations, which allowed for culling, stated that their purpose was to secure a viable population of wolves (Forskrifter om forvaltning av bjørn, jerv og ulv, 1983). The question wildlife managers faced was: How should one determine, in practice, whether culling a wolf is incompatible with the objective of protecting a viable population? In response, the managers initiated a process, involving biologists, of defining the lowest number of wolves a

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Population	Country	Recent wolf number estimate	Past wolf number estimate
Scandinavian	Norway	30	Extinct
	Sweden	230-300	Extinct
	Total	**260-330**	**Extinct**
Karelian	Finland	**150-165**	**Almost extinct**
Baltic	Estonia	200-260	-
	Latvia	200-400	Almost extinct
	Lithuania	300	34-56
	Poland	267-359	11
	Total	**870-1400**	**-**
Central European lowlands	Germany	43	Extinct
	Poland	100-110	Extinct
	Total	**150**	**Extinct**
Carpathian	Czech	1	Extinct
	Hungary	1-5	Extinct
	Poland	209-254	45
	Romania	2300-2700	1550
	Slovakia	200-400	100-150
	Total	**3000**	**1700**
Dinaric-Balkan	Albania	200-250	-
	Bosnia-Herzegovina	650	1000
	Bulgaria	700-800	100-150
	Croatia	168-219	50
	Greece	700	500
	FYR Macedonia	466	267
	Serbia	750-850	500-600
	Slovenia	32-43	10-15
	Total	**3900**	**-**
Italian peninsula	Italy	**600-800**	**100**
Alpine	Austria	2-8	Extinct
	France	13 packs + 7 border ones	Extinct
	Italy	12 packs + 7 border ones	Extinct
	Switzerland	8	Extinct
	Total	**160 (32 packs)**	**Extinct**
NW Iberian	Spain	2000	350-500
	Portugal	220-435	150-200
	Total	**2200-2500**	**500-700**
Sierra Morena	Spain	**6**	**60**
Total		**12000**	**-**

Table 1: Estimated numbers of current and past European wolf populations (Chapron et al. 2014). Recent estimates are for years 2010, 2011 or 2012, while past estimates refer to the lowest abundance during the 1950–1970s.

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protected population could constitute. Early on, this number was produced as a population goal, which was based on the concept of “viability” from conservation biology. However, the biologists found it difficult to establish an authoritative definition of viability, and the concept was debated and negotiated widely over the following decades. In this process, the authority to define how many wolves constitute a viable population was transferred first from biologists to wildlife managers, then to politicians (Stokland, 2016).

In the end, it was politicians who set a population goal of three new litters of cubs each year, and stated that this was sufficient to secure the viability of the population (Stokland, 2016). This was not a minimum goal, but an exact goal (Forskrift om forvaltning av rovvilt, 2005). If exceeded, it was to be enforced by culling. The three litters would need to be born by family groups residing exclusively on the Norwegian side of the border, which meant that litters born by family groups that had been observed in Sweden would not count.[vii] Further, if a family group were to reside partly outside of a wolf-zone (the construction of which is described in the next paragraph) on the Norwegian side of the border, at least 50 percent of the territory would have to be within that zone. This has been Norway’s population goal since 2004.[viii]

A recurring issue specific to the Norwegian wolf controversy has been the extensive number of sheep grazing largely unattended in remote areas—a tradition that originated in the twentieth century, after most large predators had been decimated. Livestock owners release about two million sheep to graze in the mountains and hills of Norway each summer, and, in addition, about 200,000 reindeer graze largely unattended in areas farther north (St. meld. nr. 15, 2003-2004). These practices have complicated the return and protection of wolves, and one technology of intervention has been constructed to specifically address the problem of livestock losses to wolves. In 2004, parliament established the current borders of a so-called wolf-zone in south-east Norway, along the border with Sweden (Figure 1) (Innst. S. nr. 174 [2003-2004]).[ix] The location was chosen for its absence of reindeer and its relatively low number of grazing sheep, as well as for its proximity to the larger part of the Scandinavian population of wolves in Sweden. The borders of the zone, which is formally referred to as “the management area for breeding wolves,” are not absolute. The area designates, rather, an area where wolves are prioritized over grazing livestock, while the opposite applies outside of the area. Thus, some wolves reside outside of the zone, and some livestock graze inside it. As specified by the population goal, however, established family groups that deliver cubs are only permitted inside the zone. Culling in order to uphold these regulations is effected by license hunting and culling in cases of serious damage or defense.

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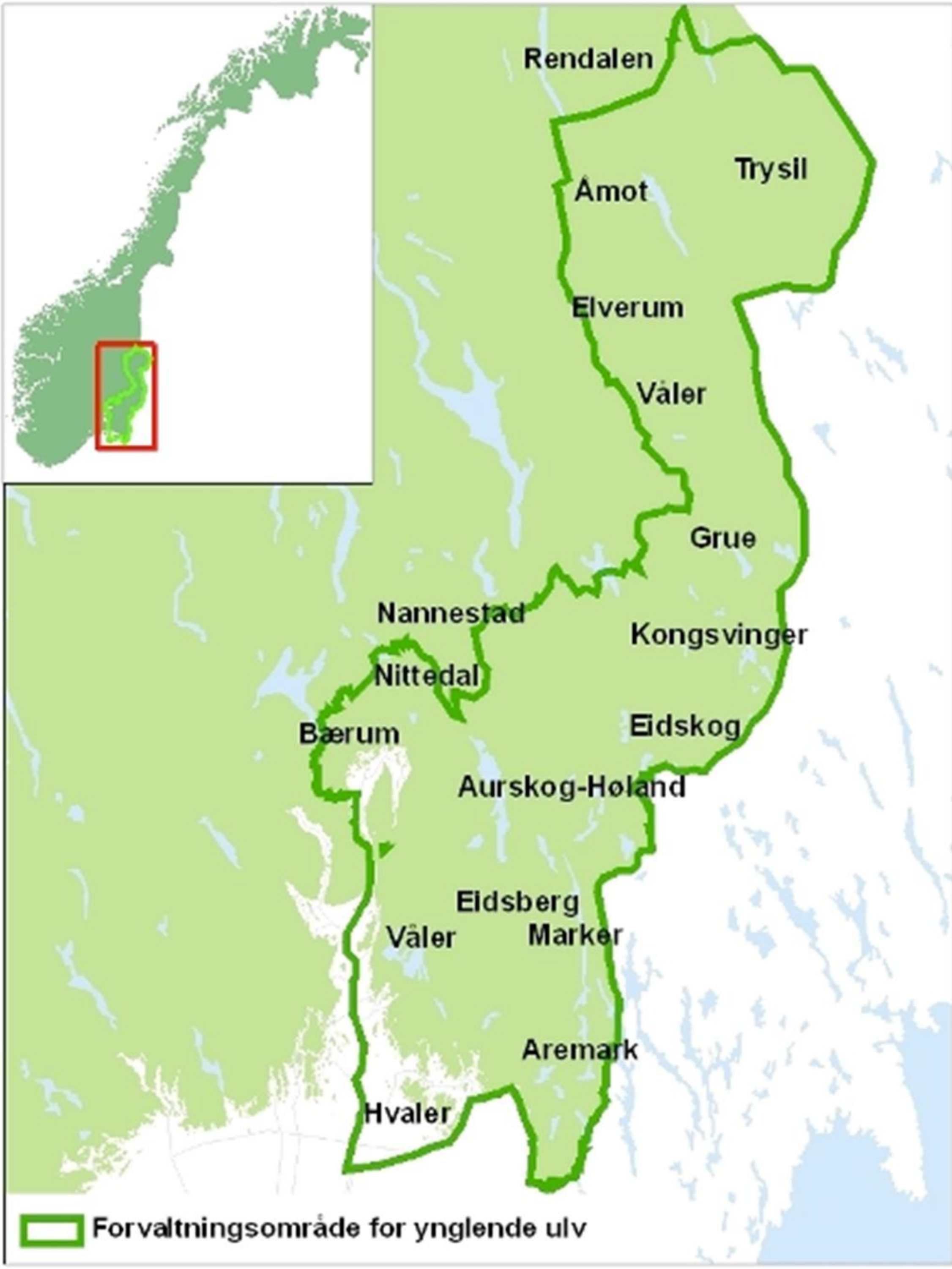

Figure 1: *The wolf-zone is situated in south-east Norway, along the border with Sweden. © Miljødirektoratet.*

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Technologies of knowledge production

The establishment of wolves as objects of protection in Norway in many ways resembles the process of "problematizing" described by Miller and Rose (Miller & Rose, 2008). Miller and Rose argued that a thing appears to require government only when it appears problematic to someone. One should, therefore, ask how this rendering of things problematic first occurs. Miller and Rose argued that such problems are never pre-given or self-evident, but are constructed and made visible by someone through a process they denote as "problematizing." The events that led to the legal protection of wolves in 1971 were parts of a complex process, and it is no coincidence that these events occurred at the height of "the age of ecology". However, a single document seems to have had a decisive impact on the abrupt shift in the government of wolves from a public bounty to a total protection model.

A report by wildlife biologists on the status of wolves in Norway and other Nordic countries, which produced very low estimates of their numbers, described the situation as disastrous and called for immediate protection (Myrberget, 1969). The subsequent treatment of this case within the political system invariably took the report as its base of knowledge and a guide for management regulations (Stokland, 2015). One reason for this is, of course, that the report drew attention to the endangered status of wolves. If we construe the process through the lens of problematizing, however, we become aware of how the biologists constructed endangered wolves as problematic objects requiring government. It then becomes clear that protected wolves as objects of government were constructed through number estimates from the very beginning. Miller and Rose argued that the activity of problematizing is intrinsically linked to the activity of devising technologies of intervention. Part of the process of problematization is therefore rendering the object amenable to intervention, because a problem that cannot be acted upon is never (or rarely) considered politically relevant (Miller & Rose, 2008). By proposing number estimates of the wolf population, therefore, the report not only attempted to show that the population was endangered; it also rendered the population governable as an object of protection, by illustrating that it was possible to produce knowledge about the number of wolves. Without this knowledge, it would have been very hard to imagine how legal protection could have been effected in practice, or even been known to have any actual effect on the population.

When wolves returned to Norway in the early 1980s and wildlife managers faced the task of effecting protection in practice, their efforts soon revolved around questions of wolf numbers. The previous section described how they strived to define the lowest number of wolves that

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could constitute a viable wolf population. However, establishing this was not sufficient for the managers to decide whether culling a wolf was incompatible with the objective of protecting a viable population. They also needed to know the number of wolves that resided in Norway and compare this number to the viability limit. As the population goal became more specific over the following decades (i.e., three litters per year), the detail of knowledge required to implement it increased dramatically.

Since wolves have returned to Norway, wildlife biologists have constructed an extensive infrastructure to count them and monitor their movements (Stokland, 2015).[x] The Directorate for Nature Management (later part of the Norwegian Environment Agency) initiated the first large-scale research project on large carnivores in the early 1980s. Later, this was followed up by increasingly intensive efforts to monitor the number, as well as the locations, migration, genetic health, and more, of the wolves. Today, the improved infrastructure enables monitoring throughout the whole of Norway. Extensive field studies of snow tracks by wildlife biologists—sometimes with the aid of lay people's reported observations, the Norwegian Nature Inspectorate, or GPS collars—is one component of this infrastructure. Since the 2000s, these studies have been complemented by genetic studies. The latter were initially conducted in an effort to study inbreeding in the population, as well as to establish whether the wolves had been illegally introduced, or if they were hybrids (Stokland, 2013). As the identification of specific wolves through collected scat proved very helpful for monitoring efforts, however, it was established as a central component of the activity. Since that time, genetic studies have constructed DNA profiles and a pedigree for almost every wolf that has resided in Scandinavia since the early 1980s (Åkesson, 2013). Figure 2 depicts the pedigree back to 1983 of two adult wolves that resided in Østmarka, near Oslo, in 2013.

The monitoring results are published in annual reports that identify the number and locations of wolves in Norway. Figure 3 shows wolf territories in Norway in the winter of 2012/2013, as identified in a preliminary report that also illustrates the monitoring accuracy required by current regulations (Wabakken et al., 2013). The biologists identified 13 wolf territories within the zone, of which cubs were born in eight. In five of these territories (6, 8, 9, 12, and 13), some of the wolves had spent time in Sweden, which meant that they did not count in the population goal (as described in the previous section). Two of the territories with cubs (2 and 3) were situated exclusively within the zone, but the nine wolves occupying the final territory (1) had partly resided outside the zone. In order to determine whether this group of wolves was compatible with official regulations, which stated that at least 50 percent of the territory

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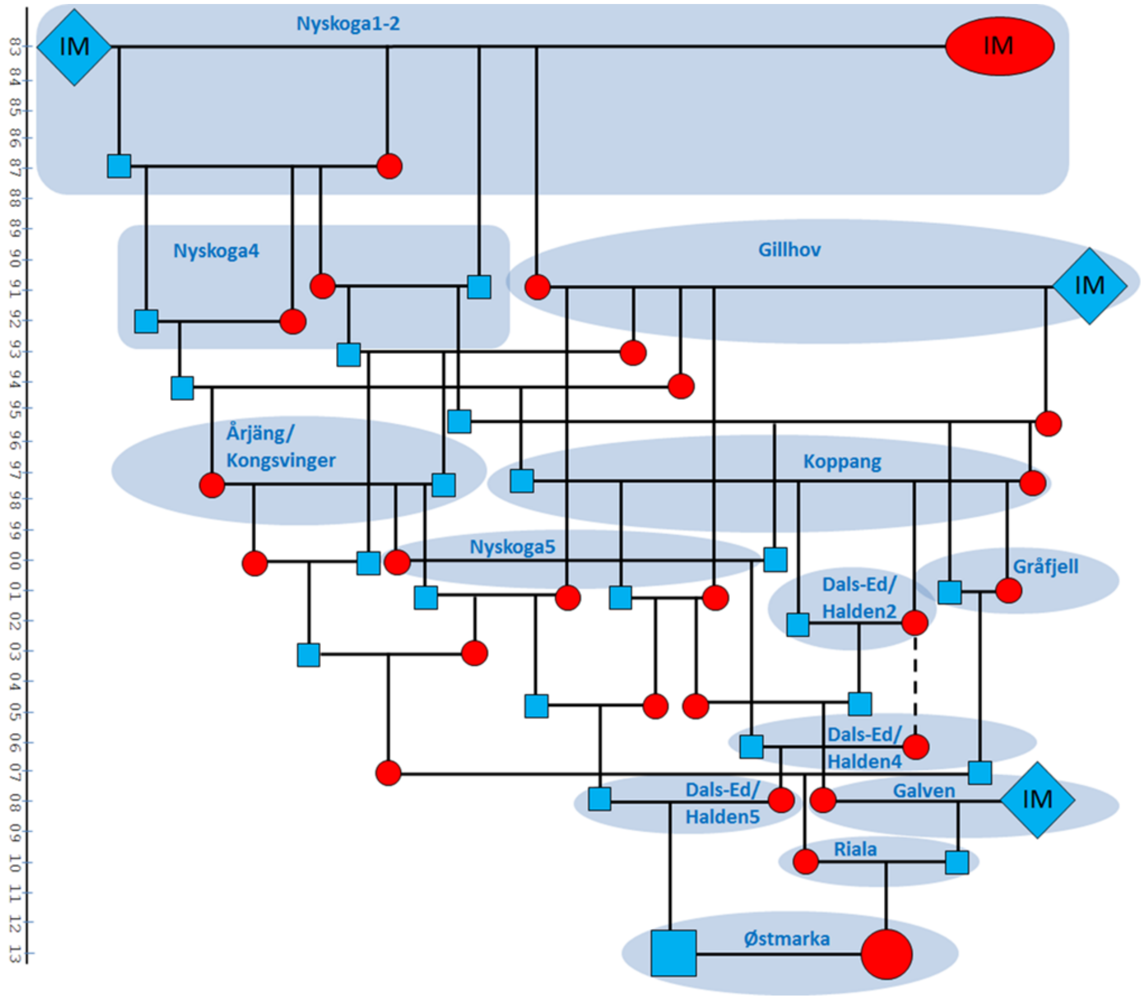

Figure 2*: Pedigree of two adult wolves that resided in Østmarka, near Oslo, in 2013. Blue squares represent male wolves, while red circles represent females. IM represent immigrant wolves from the Finno-Russian population. The light blue background designates the geographical areas in which cubs have been born, while the numbers to the left represent the years of birth. © Reproduced by permission of the Norwegian Institute for Nature Research.*

must be within the zone in such cases, the biologists had to determine exactly how much of the area the wolves had ever visited was situated within the border of the zone. In the preliminary report, the biologists estimated that 51 percent of the area occupied by the group of wolves was situated within the zone. This implied that the group was compatible with the population goal by a hair, and that they would receive protected status instead of being culled (Wabakken et al., 2013)

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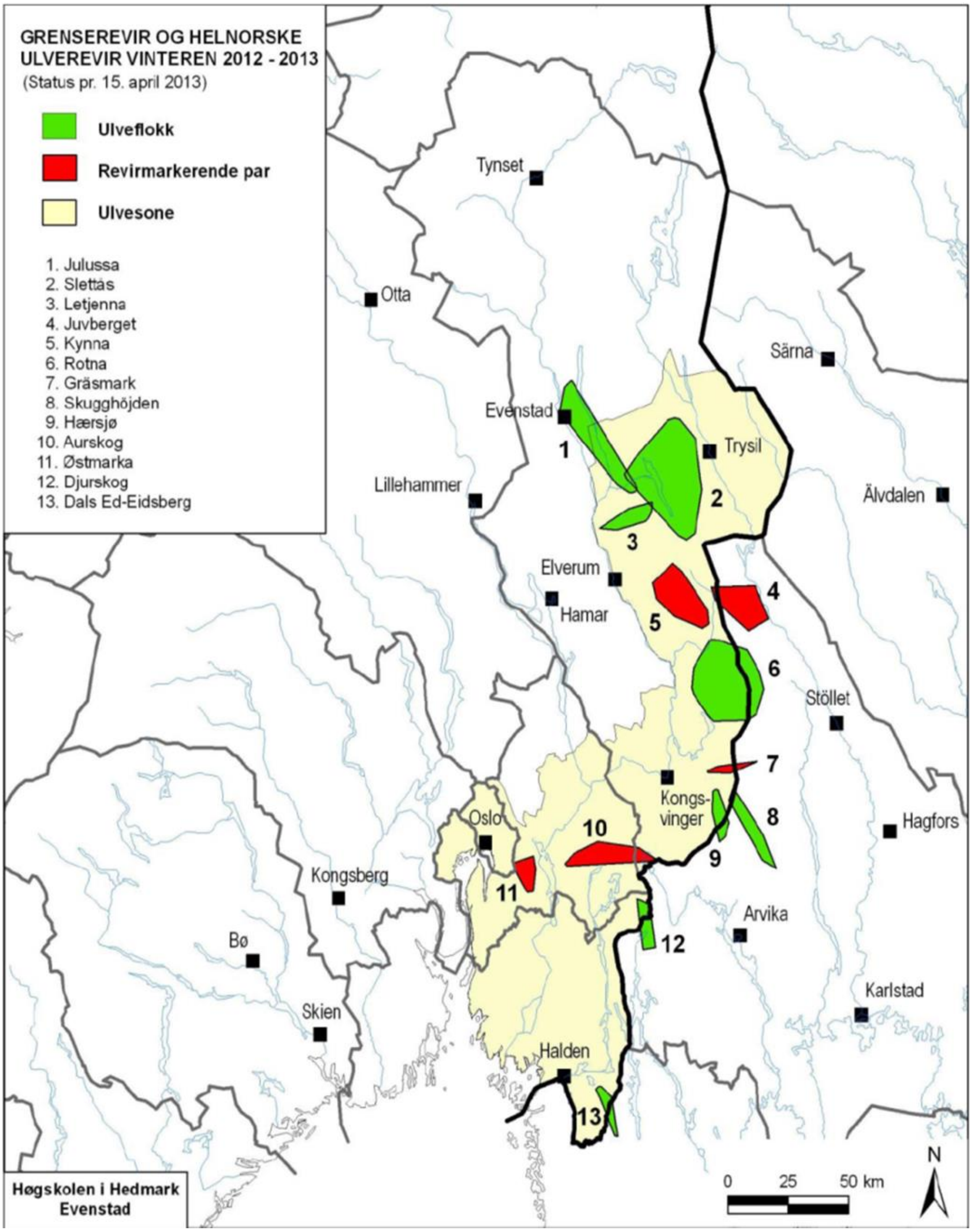

Figure 3: *Wolf territories in Norway in the winter of 2012/2013, according to a preliminary report. Green areas represent areas of residence for packs of wolves in which cubs were born in 2012, while red areas represent pairs of wolves marking territory. The yellow area indicates the current wolf-zone, while the thick black line indicates the border between Norway and Sweden. © Reproduced by permission of Hedmark University College.*

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Conserving by transforming

The wolves currently residing in Norway are, in many ways, similar to those of the historic population: they hunt moose, kill sheep, mate, and live in family groups. However, a governmentality approach that focuses on the way in which the wolves have been molded as objects of government, combined with a larger historical framework, illuminates that they have undergone significant transformations, relative to the historic population.

The population goal and wolf-zone are typical technologies of intervention: instruments that are constructed to intervene upon an object and effect politics in practice. Unlike the historic population of wolves, which often went through large variations in number, the current population is regulated to stay at a fixed number (of three new litters each year). This number further constitutes what parliament considers the lower viability limit of the population, which means that the purpose of the protection is to keep the wolf population in a fixed state at the brink of survival. This fixed state is further regulated to perpetuate new litters of cubs only within a relatively small area in south-east Norway. The historic population of wolves, in contrast, was spread throughout large parts of the country until it was decimated.

The monitoring techniques that produced detailed knowledge of wolf numbers and particular wolves' genes and geographical movements are typical technologies of knowledge production. Such knowledge enabled wildlife managers to effect technologies of intervention in practice, and thus enabled the protection of wolves in practice. In addition, the technologies of protection induced some more fundamental transformations of the Norwegian wolves. The extensive and detailed monitoring system, constructed to monitor the wolves permanently and in detail, transformed the wolves into objects that are highly amenable to detailed government. The wolves' number and locations, and even genetic composition over the longer term, can be reconfigured in detail, if deemed necessary. This aspect of the current population is highlighted when compared to the historic one. The only systematic knowledge production of the latter was in the form of statistics on the number of bounties the authorities paid for killed wolves. Besides this, the authorities knew little of the state of wolves in Norwegian forests and mountains. The historic population, therefore, was significantly less amenable to detailed government.

These transformations resulted from efforts to effect protection in practice. The reintegration of wolves into modern Norwegian society was possible only by technologies of protection such as a population goal to determine the number of wolves that should be protected and a

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wolf-zone to determine where they should be allowed to reside. It is certainly possible to imagine that the population goal or the borders of the wolf-zone could be set differently, but it is harder to imagine the protection, in practice, of such a controversial species without more general technologies to effect government of the wolves' number and locations. Similarly, it is possible to imagine that other technologies of knowledge production than those specific to the current monitoring system could have been employed to enable government of the wolves, but harder to imagine how protection, in practice, could have been achieved without the wolves being made amenable to government to a certain degree.

While this study was restricted to Norwegian wolves, proliferation of technologies of protection is a general trend in biodiversity conservation. This makes it likely that the transformation of endangered organisms through protective government is a more general phenomenon. In the previous paragraph, we saw that the historic population of wolves was significantly less amenable to detailed government than the current population. The effort to eradicate the historic population was, nevertheless, successful. This might indicate that the practice of protecting endangered organisms requires knowledge production on a much more intensive level than does eradication of large carnivores, and thus objects that are significantly more amenable to government. Technologies of intervention such as the detailed population goal and wolf-zone further indicate that protection is a much more complex management objective to effect than is eradication of large carnivores. The latter was mainly accomplished by the single governmental technology of public bounties, in addition to relatively modest efforts to disseminate techniques and equipment for killing wolves (Søilen, 1995).[xi] The proliferation of technologies of protection after wolves returned to Norway, which wildlife managers constructed to counter practical management problems, further indicates that protection might often be a much more complex management objective to effect in practice than to establish by law or general regulation. This might be part of the rationale behind the general proliferation of technologies of government in biodiversity conservation since the 1980s.

Conclusion

In the case of Norwegian wolf management, protection turned out to be a much more complex management objective to achieve than eradication, and overcoming the challenges that this complexity constituted involved several technologies of government. These governmental

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technologies, which were constructed to effect protection in practice, in many ways transformed the wolves into new objects that appear in a new way and with new properties. Thus, they had transformative effects. The proliferation of technologies of government in biodiversity conservation, generally, further indicates that similar transformations of endangered organisms might be a common phenomenon. This merits more attention from social scientists studying wild animals, as well as natural scientists and practitioners involved in biodiversity conservation.

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[i] The phrase “objects of government” does not imply that the wolves lack agency. Rather, it reflects that they became objectified by the logics of government when they were transformed into objects of government.

[ii] Kristin Asdal’s history of Norwegian environmental politics in the twentieth century (Asdal, 2011) and Arun Agrawal’s study of forest conservation in northern India (Agrawal, 2005) are two notable exceptions.

[iii] Braverman 2013 and Youatt 2015 are two notable exceptions.

[iv] Historical analysis is not the only method of identifying what is particular about seemingly self-evident aspects of current biodiversity conservation. In fact, most of the literature referenced at the beginning of the section has done this through other social scientific approaches. However, one would expect that historical analysis, by employing different contrasts, would yield other findings and thus potentially contribute other perspectives to enhance our understanding of biodiversity conservation.

[v] Since the book’s publication, however, various signs have indicated that ecosystem services might complement or challenge biodiversity as the leading paradigm for nature conservation (e.g., Turnhout et al., 2013).

[vi] It is difficult to estimate how many wolves resided in Norway in the periods with highest numbers. The government paid bounties for more than 200 wolves annually in the latest period, and this indicates that there might have been several hundred wolves in Norway at the time. However, the bounty hunting arrangement was susceptible to fraud. The number of paid bounties is, therefore, an unreliable source for estimating wolf numbers (Johnsen & Myrberget, 1969).

[vii] The reason for not including so-called “border wolves” in the population goal was pragmatic. Culling wolves that had spent time on both sides of the border would require

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negotiation with Swedish authorities. Leaving these wolves out meant that Norway would have full governmental authority over the animals regulated by the population goal.

[viii] The population goal is supposed to be revised soon.

[ix] Areas where established family groups of wolves have been allowed to reside, with varying sizes and locations, have been restricted since 1997.

[x] A growing body of literature has examined the development and use of monitoring technologies in biodiversity conservation (e.g., Benson, 2010; Reinert, 2013; Whitney, 2013).

[xi] The generally broader public consent to eradication than protection might account for some of the differences in management complexity.

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