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Looking for a common ground: useful knowledge and adaptation in wolf politics in southwestern Finland

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When Finland joined the European Union (EU) in 1995, the grey wolf *Canis lupus* became strictly protected. The wolf population grew gradually until 2007, at which point it exceeded 250 wolves. Since then, the population size has drastically fluctuated between 150 and 240 animals. Current wolf policy that coordinates wolf-related human actions has not succeeded in stabilizing the population size on the favorable conservation level. We argue that the understanding of epistemic contestations and social practices in local knowledge production is a key to the improved wolf management.

In this case study, we explore wolf hunters' (license applicant's) epistemic adaptations in their interplay with regional authorities as both parties' have attempted to find a common ground of wolf management by means of culling specific wolves. We collected data that cover a nine-year history of one wolf-territory in southwestern Finland.

Our results indicate that epistemic adaptations that began after appearance of wolves to the region related to 1) how wolf knowledge production was made useful for those participating in it; and 2) how local actors adapted to changing administrative epistemic requirements and processes related to the wolf management. In our case, hunters actively built networking to collect information, and learned to play a strategic game of providing specific descriptive knowledge on the habits of 'the problem wolf', and compulsive prescriptive knowledge concerning solutions to the problem. The case shows how the epistemic adaptation in the context of policy and management is associated with the purposes and reasons of local agents in knowledge production. Now that large carnivores have during recent decades been returning to modern human-dominated landscapes in Europe, an increasing challenge is, how to govern the process of adaptation and create opportunities for utilizing the potential of local knowledge capacity in collective problem solving beyond that of lethal management.

Since 1973, the grey wolf *Canis lupus* has had legal rights in Finland that have restricted the extent to which it can be hunted (culled). When Finland joined the European Union (EU) in 1995, the grey wolf was listed on Annex IV of the Habitat Directive (92/43/EEC) in southern Finland; it is therefore strictly protected. The size of the wolf population increased gradually from 1998 to 2006, at which point the population exceeded 250 animals (Kojola et al. 2011). The population then decreased to approximately half of its peak (RKTL 2013) and then increased again to its previous peak level in 2015 (LUKE 2015). The preparation of the new management plan for the wolf population in Finland was one of the drivers of the recent increase (MAF 2015). According to the latest Red List of Finnish species, Finland's wolf population is endangered and its main threat is legal and illegal hunting (Rassi et al. 2010).

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Wolf policy and management is a knowledge-intensive endeavor. Annual abundance estimates, compilations of large carnivore damages and descriptions of the behavior of individual animals have become necessary constituents of wildlife policy. Both wolf protection and the derogation from strict protection (i.e. granting licenses to remove animals) are discussed and justified in the context of the nationwide wolves' favorable conservation status (see Hunting Act 615/1993; Government Decree on Derogations Laid down in the Hunting Act 169/2011). This affects how wolf sightings are made locally, how and when researchers have interpreted collected data in producing population estimates, and how the Finnish Wildlife Agency (later wildlife agency) uses specific sightings and abundance estimates to support decision making.

In this paper, we explore and explicate wolf hunters' (license applicant's) epistemic adaptations in their administrative interaction with the regional wildlife agencies in their attempts to get licenses to kill wolves. Asking and giving of reasons and evidence is epistemic game within this administrative interaction. Our empirical case describes the local knowledge building and the interaction between

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regional decision makers and local applicants of derogations (killing licenses) in one wolf territory in 2005–2013 in southwestern Finland. Now that wolf populations are recovering in human-dominated landscapes in Europe (Chapron et al. 2014), our case aims at exploring the types of epistemic adaptations potentially emerging, particularly among hunters.

The adaptation of useful knowledge production

Recent empirical research on environmental governance has increasingly focused on ways to more effectively match the institutional arrangements to the ecosystems or their key processes (Ekstrom and Young 2009, Haller et al. 2013, Treml et al. 2015). Though the several typologies of institutional misfit exist (Galaz et al. 2008, Young 2008), for our purpose, a notion made by Galaz et al. (2008) is worth exploring. They discuss the evolution of knowledge production systems and emphasize the need for iterative learning process at fitting the knowledge production to legislative and administrative processes.

Mokyr (2002, chapter 5) has studied the evolutionary processes of creating useful knowledge. He makes a distinction between two types of useful knowledge: propositional 'what'-knowledge and prescriptive 'how'-knowledge. Propositional knowledge takes two forms. One is the observation, classification, measurement and cataloguing of natural phenomena, such as the monitoring of the number of wolves or the extent of their damages to sheep farmers. The other is the establishment of regularities, principles and 'natural laws' (e.g. predation, emigration of young animals from the territory, etc.) that govern these phenomena and allow us to make sense of and use them. This is the customary work of the fields of wildlife biology and wildlife management in their attempts to gradually decrease system state uncertainties (Williams et al. 2002).

Prescriptive 'how'-knowledge relates to efficient techniques for overcoming situational obstacles. Techniques are sets of executable instructions, codes, recipes and routines describing how to manipulate the surrounding environment efficiently for a particular purpose. For example, the wildlife administration and some civil society actors, such as hunters, are governed by their own customary codes of conduct and routines. The nature of prescriptive knowledge boils down to the question of workability – to what extent relevant system structures are recognized and to what extent a technique does its job successfully in certain circumstances. A good match between acquired prescriptive knowledge and a problem at hand also requires a good understanding of the situation and the variety of cause–effect relationships that can be used to manage the system (i.e. propositional knowledge).

What is considered as useful knowledge is often contested. The situational understanding of the usefulness of knowledge is gained by playing epistemic game. Following Brandom (1994), we define epistemic game as giving reasons and asking for reasons. The purpose of the epistemic game is to have an effect on who can, must, may or cannot do something. Reason giving is an attempt to make knowledge to serve the purpose, to make knowledge useful. It is a game because when useful, knowledge enables better fit of particular interest, the alleged problem and institutional purpose. Institutional fit is a basis for practice as collective action (Young 2008; see also Barnes 2001). In the context of our paper, such practices constituting the dynamic game of giving of and asking for reasons and supporting the arguments with empirical evidence are of our specific interests.

Material and methods

Study area

The study area covers one wolf territory in the south-western part of the Pyhäjärvi region, located in southwestern Finland (Fig. 1). The territory includes some natural protection areas, such as Kurjenrahka National Park and Vaskijärvi Strict Nature Reserve. The core area of the territory is surrounded and fragmented by roads in the east and west, water bodies

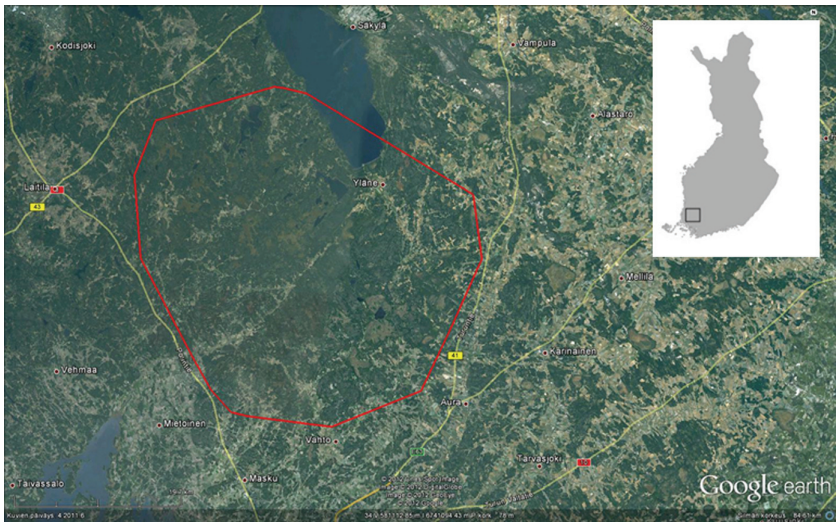


Figure 1. The grey wolf territory in 2011 (red boundaries) of the study area in southwestern Finland (territory data source: Luke; map source: Google Earth April 2011, accessed November 2011).

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(in the north) and densely populated villages surrounded by agricultural land, including fields and pastures. Relatively small portions of the human populations of the municipalities of Mynämäki (covering the western side of the wolf territory) and Pöytyä (covering the eastern side) live in urban areas (65% and 49%, respectively) compared to corresponding numbers for the rest of Finland (84%). More people in these areas make their living from agriculture (Mynämäki 17.4%; Pöytyä 17.8%) compared to the rest of Finland (3.7%) (Statistics of Finland 2015).

Material

We have collected multiple types of data from actors producing and sharing wolf-related information in the wolf territory. The data covers the time period from the first appearance of the wolf pack in 2005, to 2013, when the original territory separated into two parallel territories.

We collected and reviewed all applications (and corresponding decisions) for derogation (8 in total) made in 2007–2013 targeted at killing individuals living in the wolf territory. As supporting data we also collected all the wolf-related local newspaper articles from the study period and conducted 12 theme interviews among the key informants. We approached potential informants by using the principles of snowball sampling and all of them agreed to share their experiences anonymously. Each interview took between one and four hours. The informants sometimes had several roles. Four of them were local volunteer observers, five were representatives of NGOs, two were local applicants of derogates, and three were administrators at the regional level who processed or issued licenses to derogate from strict protection.

In addition, we exercised participatory observation by acting as observer-as-participant in two wolf-related meetings held within the territory, one in the municipality of Nousiainen in November 2011 and another in the municipality of Pöytyä in October 2012 (on method: Punch 2005, p. 183).

Methods

We applied case-study methodology and relied on its strategy: various types of detailed information were collected to explore and identify the themes related to forms of epistemic adaptation (local practices) within, and guided by, the LC policy in one specific case (see Flyvbjerg 2011 for strategy). Various types and sources of data enabled us to perform triangulation and to cross-validate our observations. We used directed content analysis (Hsieh and Shannon 2005) to identify specifically the new or changing patterns of hunters' and LCVs' adaptations that emerged in the study area in 2005–2013. We combined the information from multiple data sources into narrative summary, i.e. a chronological sequence of the events that are connected to each other's and meaningful for the purposes of our paper. The resulting narrative allowed us to maintain the anonymity of informants, but describes the key dynamics, actions and interactions of local agents during nine years in southwestern Finland, and exemplifies typical local practices of collecting LC sightings and using them to guide administrative decision making. The main epistemic adaptations and their subcategories that we recognized were named as numbered titles and subtitles in the 'Making the wolf explicit'-section.

Our case in southwestern Finland can be regarded as an atypical Finnish example in the sense that the Yläne wolf territory is located in surroundings not typical for Finnish grey wolf territories (Kaartinen at al. unpubl.). The historical context of the study area is atypical for Finland also because wolves are assumed to have killed more than 20 children in the 1800s in the current territory and nearby (Linnell et al. 2003; episode 5 'Åbo'). We assume that the historical events, associated anecdotes and the dense human population in the territory area may motivate local wolf-related agents to remove wolves more actively than in other parts of the Finland. However, we believe that the knowledge-related adaptations we have identified have similarities to those used elsewhere in Finland and many other member countries of the EU with recovering wolf populations, and this motivate our theoretical generalizations.

Making the wolf explicit

Local wolf sightings and the wolf knowledge

The Finnish monitoring scheme for large carnivore (LC) populations provides the national context for local dynamics in knowledge production. The monitoring scheme has, since 1978, been mainly based on collaboration among citizens, large carnivore monitoring volunteers (LCVs), researchers and wildlife administrators. Wolf sightings have been mainly made by the LCVs, who also validate, when necessary, the sightings made and shared with them by untrained citizens. Researchers have analyzed the data and annually reported both the total and regional estimates of animal abundance, population trends, and the sustainable harvest rate to the Ministry of Agriculture and Forestry. The latter has prepared the Decree regulating the maximum license quota for the Finnish Wildlife Agency (later wildlife agency). The wildlife agency can, when legal conditions are met, and at its discretion, authorize derogations of strict protection and grant individual licenses.

Our narrative starts from the establishment of the wolf pack (Yläne wolf pack) in 2005, which rapidly increased the number of wolf sightings within the territory area. The sightings included animals or tracks that were observed as well as some wolf-related damages that took place. According to two informants, the active LCVs soon found the nationwide data collection practices used at that time to be somewhat infeasible to make this data proper propositional what-knowledge. For decades, the LCVs throughout Finland had documented their sightings (mainly made during the winter) on paper forms and sent them by regular mail three times per year to the Finnish Game and Fisheries Research Institute (since the beginning of 2015 this has been the Natural Resources Institute Finland (Luke))

Networking between the LCVs to collect information

According to three informants, a few LCVs in the territory first called together a collaborative group of 10–15 local LCVs to exchange information throughout the territory of the Yläne pack. Previously, they had only kept personal lists

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of sightings, but they now began to distribute information within their local network in informal meetings arranged twice a year. In 2006 they started building their own internet-based GIS-database called PETONETTI (large carnivore internet portal) to make better sense of the situation in the different part of the territory; this also made it easier to transmit their sightings to the researchers (TS 4.1.2008). The system enabled the local LCVs to record the wolf sightings that they made or validated in the region. The database expanded to include a map interface in 2007 and enabled public access to recent sightings for anyone interested. It appeared that shared practices that developed locally around the networking, searching for sightings, recording, and publishing increased the fit by serving the information needs of local citizens (Bisi and Kurki 2008) and highlighted also in the guidelines of the national wolf management plan (2005).

Networking between the LCVs and citizens

To improve the process of collecting sightings, the LCVs did not only built network between the LCVs, but also started to publicly appeal to citizens to collaborate with them and share their sightings. For example, one of the LCVs in the territory appealed in the local newspaper in July 2008 (TS 27.7.2008) for people to inform the LCVs as quickly as possible about any sightings of animals behaving abnormally because large amounts of this type of information helps in getting licenses to derogate from wolf protection. PETONETTI and practices constituting the functioning of it became a technique, a vehicle of prescriptive knowledge.

The game of giving and asking for reasons

Finnish hunters may apply for licenses to remove specific wolves causing significant damage or threat of damages. Applications and the supporting evidence reflect applicants' understanding experiences and desires (see Sjölander-Lindqvist 2015 for analysis of Swedish applications). However, it is important to note that it is applicants' responsibility to provide the evidence that the legal criteria for granting licenses have been met. The networking between the hunters, LCVs, assisting citizens, and the internet-based GIS-database helped to collect and maintain the evidence, but necessary requirements to be adapted included also learning when and how to interact with regional authorities.

Applying killing order from the local police

The first time the LCVs' wolf sightings were used to support applications for removing a wolf from the Yläne wolf pack took place in January 2007. According to one informant and a newspaper article (TS 30.1.2007), a boy had been waiting for a school bus when a wolf appeared on the road and paced toward him for a while. The local LCV verified the sighting made by the boy based on the wolf tracks in the snow. Based on this evidence, police used their authorization (animal protection, Police Act 493/1995, 25 §) and ordered the local hunters to kill the wolf to ensure human safety. The hunters did not succeed in the hunt that followed, but the district organization of The Finnish Association for Nature Conservation complained to the Chancellor of Justice about the decisions made by the police in granting the orders in this case.

Applying license from the wildlife agency

A few months later in March 2007, volunteer sightings were used for a second time during the same winter as an argument for killing wolves in the same territory. Now, according to application documents, a group of hunters applied for a license to derogate from the Ministry of Agriculture and Forestry and kill two wolves. According to the applicants, there were at least 10 wolves in the territory. They also reported 29 separate wolf sightings made by the LCVs near their places of residence (2004–2007) and 15 sheep killed (2004–2006) as their evidence of the wolves' problematic behavior. The wolves, according to the applicants, caused fear among local citizens (see Table 1 for the types of arguments given). The application was declined, with the supporting argument given by the wildlife agency in the decision document that the wolves did not frequently go near the residences, located in urban areas, according to the sightings recorded. The confirmed sheep damages (11 sheep killed) that took place in 2006 were regarded as a relevant form of evidence, but the damage was not regarded as severe, given that the owners were compensated. The timing of the application was also regarded as too late in the spring because there was no snow left on the ground to enable the removal of specific young animals.

This interplay between applicants and wildlife agency opened up a game of asking and giving reasons, to continue in the years that followed. The collection of sightings continued after the decline of the application, as did the fine-tuning of applications, based on the lessons learned from the rejection decision and with communications with the personnel of the regional office of the wildlife agency during and after the application process.

In 2008, a list of volunteers' wolf sightings was used twice as evidence supporting applications for the killing of wolves. According to two informants, at the beginning of February it was observed that one wolf seemed to be wounded, based on the fact that it was bleeding. The police ordered the hunters to extirpate the individual wolf, based on the National Animal Protection Act 247/1995 14 §. Hunters succeeded in killing the wolf. The autopsy documents later revealed that the wolf's wounds were caused by other wolves.

Appealing to the politicians

A few days later, some members of the same group of hunters approached the Ministry of Agriculture and Forestry. One of the hunters told us in the interview that they requested and received a meeting with the minister and left an application for killing four wolves. This was the first time that hunters of the Yläne territory tried to support the approval of an application indirectly, by making a personal appeal to the politicians. The lesson learned from the application process of the previous year was, based on how the next application was written, that it is important to be able to provide hard evidence that wolves have recently and frequently appeared near urban areas. Now, according to the evidence attached to the application (a total of 340 wolf sightings made in the period 01-05-2007–11-02-2008), the wolves frequently visited villages and behaved fearlessly. Applicants estimated that there were 8 wolves in the pack and 12–13 other wolves in the

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Table 1. Supporting arguments given and supported evidence provided by the applicants of the derogations (2007–2013) within Yläne wolf territory, to fulfill the granting criteria set by Finnish Hunting Act 41a (2-3). [i] The argument types 1–5 detected refer to 'what'-knowledge, and argument 6 to 'how'-knowledge.

Argument type:	2007	2008	2009		2010	2011	2012	2013	
1. Number of wolves is too high There are too many wolves in the region (given the circumstances)	x	x	x	x	x	x	x	x	x
2. Wolf behavior is abnormal									
- are fearless, bold	x	x	x	x	x		x	x	x
-visit frequently near houses	x	x	x	x			x	x	x
-Alpha pair teach abnormal behavior trait to pups.				x			x		
3. There are wolf attacks with unwanted consequence (during the last 12 months) in the territory	x 6 sheep	x 1 dog	x 1 dog	–	x At least 26 sheep killed, >10 sheep wounded, sheep farmer blamed	x At least 26 sheep killed, >10 sheep wounded	x 1 dog and 5 sheep killed, 1 dog and 5 sheep wounded	x 3 young cows	
4. Wolves raise fear or worry									
- Generally among local population	x	x	x	x			x	x	
- Decrease the number of clients for nature tourism entrepreneurs	x		x				x		
- Decrease the immigration of families to the area	x		x						
5. Authorities will not help (but they should) It is difficult to receive help from police, MAF or FWA							x	x	
6. There are costs related to the preventing of damages									
- School transportation costs	x	x	x				x	x	
- Restrict hunting with dogs / performance tests	x	x	x	x			x	x	
- Restrict recreational use of nature	x	x	x	x			x		
- Not all damages can be prevented (by chasing wolves away, fencing, educating citizens, dog owners)	x	x	x		x x		x		x
-Building of LC-fence takes time									
Applications (n)	1	1	1		2	1	1	2	
Decision (Granted, Rejected)	R	G	R	R	G	R	G	R	R

[i]Section 41 a – Provided that there is no other satisfactory solution and the decision is not detrimental to the maintenance of the species at a favourable conservation status in its natural range, the FWA can grant a derogate to e.g. prevent particularly significant damage to crops, livestock, forestry, fisheries, reindeer husbandry, water or other property (2), or in the interest of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment (3).

area. The license was granted (Table 1), confirming that certain types of evidence, together with face-to-face lobbying, may lead to the desired outcome. The license allowed the hunters to kill one wolf in the area defined in the application, during the period from 25 March to 9 April 2008. The purpose was to extirpate one individual that continuously obtruded the village boundaries and to maintain the wolves' predisposition to avoid humans, by means of hunting. No wolves were killed in the hunt that followed, but the District organization of The Finnish Association for Nature Conservation complained to the Council of States about the MAF's decision to grant the killing license without clear evidence of realized damage. The complaint was declined in 2010.

Repeating the mode of operation built in the previous years

In 2009, volunteer sightings were used twice as evidence of fearless wolves, who, according to the Hunting Act (615/1993, section 41a), can be removed if there are no other satisfactory means to solve the problem in order to ensure the safety of humans and to prevent damages. The first event of that year concerned an encounter between a wolf and a logger who had been felling trees. The police ordered hunters to remove the individual wolf after one of the local LCVs evaluated that the same animal had also visited house yards and wounded two dogs, (TS 4.1.2009). The hunters killed the animal on 3 January 2009, very soon after the initial encounter. The applicants also applied for a license from the wildlife agency on 7 February to kill three wolves within the area, which covers nearly 127 000 hectares. The timing for applying for derogation was now earlier than in 2007, thus allowing hunters to collect wintertime sighting data. In the event that the hunting license was granted, it was now possible to perform the hunt before the disappearance of snow cover. The applicants claimed in the application documents that the number of wolves in the area was now 22 individuals and several packs (according to the hunters' own censuses on 9 January 2009). According to the applicants, the number of wolves was so high that encounters risking human safety and livelihoods (animal husbandry) could not be avoided in the near future (Table 1). The application was declined by the wildlife agency. It argued in its decision that none of the specific conditions to derogate were met and that the national maximum quota set by the MAF no longer allowed killing more wolves in the region during the winter season of 2008–2009. At that time, according to the decision documents, two wolves had already been killed in a traffic accident in the area, and one wolf had been killed as a result of a removal ordered by the police. Exceeding the quota would jeopardize the favorable conservation status of the wolf. According to another argument, 'the behavior of wolves was largely normal' because, according to calculations made by the regional wildlife agency, only 9.5% of wolf sightings made by the LCVs included some type of human encounter or animal tracks located within 100 meters of house yards. According to one LCV that we interviewed, the rejection decision decreased the motivation of some LCVs to continue recording sightings because recording was now felt to be a waste of time and effort.

Building new arguments on wolf risk

The number of wolves in the Yläne territory was 8–10 animals in the winter of 2009–2010 (RKTL 2010). This general context, together with the rejection of the above-mentioned hunters' application in 2009, led applicants to partially refocus their next application, filed on 16 February 2010. The lessons from the recent rejection decision seemed to be that the previous application included too low a percentage of wolf–human encounters or animal tracks near house yards. The rejection may have also shown hunters that not even high population size estimates ensure the approval of an application. No damages had taken place during the recent year. This was probably the reason why the application now focused on describing the high potential for wolf damage risks due to susceptible landscape characteristics and the worry that the presence of wolves caused among the local people. For example, in 2008 more than 2000 local citizens had added their signatures to a petition that demanded the removal of wolves. The appendices of the application, which contained the relevant animal information, now focused only on records of the number of wolf–human encounters or animal tracks near house yards during the recent year. At 17%, the percentage of such sightings mentioned in the application, based on calculations made in the wildlife agency, was now clearly higher than in the previous year. The application was again rejected by the wildlife agency. According to the decision, the behavior of wolves was still regarded as normal. In addition, the maximum quota for the 2009–2010 season, ensuring the wolves' favorable conservation status in Finland, was running out (allowing only one more wolf to be killed in western Finland), and there was a need to reserve this permission for more serious and urgent needs, i.e. to remove a hybrid wolf that might exist in a neighboring region (Satakunta) or for a wolf living in another part of the same region who is known to be wounded to some extent. The lesson learned from this application process was that – to gain high priority in the granting of derogations – evidence should be provided that points to abnormal behavior or to animals that are actually wolf–dog hybrids.

In the summer of 2010, grey wolves caused the most notable damages since the establishment of the territory in 2005. At the end of July, the wolves attacked two neighboring sheep farms, killing 27 sheep and injuring some 20 animals in the northeastern part of the territory. The tracks of three wolves were verified by LCVs. The sheep farmer applied for a license from the wildlife agency for local hunters and used the damages as evidence. The application was granted with strict spatial restrictions on the hunting due to fact that it was summertime, which makes it very difficult by other means to recognize the animals that are causing problems. The restriction, given to ensure the removal of specific animals, was not greeted by applicants. No wolves were killed in the hunt that followed for a period of four weeks in the same fields of the farms where the damages took place.

In 2011, the number of wolves remained at 6–7 in the territory. It was now the seventh year in a row that breeding had taken place since the establishment of the territory. The same group of hunters as in previous winters applied for a derogation to remove one wolf – first applying to the Minister of the Ministry of the Agriculture and Forestry and not to the wildlife agency, which formally grant derogates.

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The appeal to the Minister as part of the application process had been successful in 2008, but now it was not.

Networking between hunters, parents of the small children and municipalities

On 13 August 2011 the wolves killed one sheep that was the pet of a young girl, then a dog two weeks later on 1 September. They also killed three sheep and injured two more animals on 5 September. A white-tailed deer killed by wolves near the villages raised public concern and fear among parents of school children and raised demands to remove wolves (Vanhempainyhdistykset 2011). The hunters, together with the parents of the school children, arranged a meeting on 21 November that allowed us the participation as observer. Together they appealed the Finnish Parliament members of the region and municipality administrators to support the granting of derogations for wolves in the territory. After the meeting, four municipalities formed a coalition around the issue, and the mayor of the Nousiainen municipality was the applicant for the derogation on behalf of the hunters. The wildlife agency granted later the license to derogate in January 2012, enabling the killing of one wolf by local hunters. Unlike in the previous decisions focusing the baseline reason for granting the application was now according to decision document the threat and fear that was experienced by local people, supplemented by some realized (and expected) damages. The lesson learned, according to our interview with the one of the hunters preparing the application, was the need for building broader and stronger coalitions, not only among hunters and the LCVs but also among other civic society members and even municipalities.

Leaving several applications

The shared practice of local actors applying for licenses to kill wolves from both the wildlife agency and the police in the territory continued and became more frequent later in 2012 and in the winter of 2013. From the initiative of hunters, the police ordered them to remove an animal that, according to one LCV, visited a farm a few times in July – no animals were killed and no confirmed wolf sightings were made in the two-week hunt that followed. A few months later, in September 2012, the police rejected local demands that they order removal after wolves killed three young cows at a farm located in the core area of the wolf territory (TS 11.9.2012): The main reason that the police did not give this order was that there were no imminent threats to humans (wolves had not returned to the site again during the next three days), the farmer's losses were compensated and there was no snow on the ground to enable the removal of specific animals.

However, the police gave an order after asking consultation from the wildlife agency in January 2013 after wolf or canine-like tracks were observed by one LCV three times near the Mynämäki municipality center. No wolves or their tracks were observed in the area during the next three weeks. The above-mentioned cases indicate that in attempting to adapt to the situation police tried to coordinate the removals with other authorities. They also took even a few sightings made by just one LCV as sufficient evidence when granting a killing order for the restricted urban area probably not leading to removal of any animals.

Taking advantage of the opportunity space

At the beginning of February 2013 the number of wolves in the territory and surrounding areas was between five and seven wolves (RKTL 2013). No damages in the territory took place during the winter of 2012–2013. However, several applications to derogate from the strict protection in the territory were made again, as quick reactions to fact that the Ministry of Agriculture and Forestry was unexpectedly increased the maximum culling quota at the middle of the season after facing strong criticism nationwide from citizens and NGOs critical to prevailing wolf hunting policy (for details see Hiedanpää and Pellikka 2015). The first of the applications requested a license to remove two wolves. The main supporting argument was that the presence of wolves represented a damage risk and that the mitigating methods would costs too much. In our interview the person who handled the application in the wildlife agency characterized the application as "shake of arguments", referring to the fact that variety of fragmentary arguments was used without any supporting evidence. In the case that strong evidence had clearly existed, he added, the agency would have helped the applicant to fine-tune the arguments, but this was not now the case. The second application, filed in March and renewed in April, demanded the removal of 10 fearless wolves visiting the villages "to make the life of the local citizens easier" (translation by authors). According to the rejection decision made by the wildlife agency, the applicant argued that the number of wolves in the region was 10–11 and that they all visited residential areas and should be removed. The arguments were not strong compared to that of earlier applications, but the increasing of the nationwide culling quota opened an opportunity space that applicants tried to quickly take advantage – assuming that the game of asking and giving reasons had changed, but it was not.

Discussion

Epistemic adaptations

Our case demonstrates how the establishment of wolf territory and various institutional arrangements, particularly those that set the preconditions for derogation of the strict protection of the wolf, have gradually led to two main types of interconnected epistemic adaptations. The institutional adjustments have created new requirements concerning the 'what'-knowledge.

The first type of epistemic adaptations of hunters and the LCVs are manifested in the new practices of collecting wolf sightings via networking, maintaining, managing and providing useful propositional 'what'-knowledge, to be fueled by the management processes. The useful knowledge collected included the (high) number of wolf sightings, the recorded or estimated number of animals, certain spatial patterns of sightings (emphasizing the wolves' tendency to appear near the villages), or detailed case descriptions of the 'abnormal' behavior of the animal encountered. The evidence was collected to evaluate and to support the interpretation that the number of animals and their behavior represent risks. These pieces of information were flexibly provided to the wildlife administrators and the police to frame the situation at hand

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in a way that legally fulfilled the criteria for enabling the derogation of the strict protection.

The second type of epistemic adaptations regarding the application process related to the type and variety number of supportive arguments given, the relative emphasis on certain arguments, the timing of filing an application, the way of lobbying for granting the decision through politicians, and the forming of broad applicant coalitions beyond local hunter networks. In our case area, the variety of adaptations in knowledge production and delivery has taken shape in a relatively short period of time, over the course of nine years.

The process of acquiring local propositional knowledge has become sensitive and reactive – quickly detecting signs indicating problematic behavioral patterns of wolves.

According to one of the key principles of good governance, administration is obliged to help the citizens to use the services offered to them. Wildlife administration must help hunting applicants to write better applications but also protect the wolf. Similarly the police is increasingly obliged to evaluate the relevance of the canine tracks found near schools and livestock pastures when allocating resources. Over time, the derogation from the strict protection of the wolf has become an evolving game of asking for and giving of reasons. An increased demand of the wildlife administration to explain the reasons for granting or rejecting applications led to the establishment of an internet service in 2012 that enables open access for the public to all decisions. The role of reasons is important, demonstrated by the fact that the decision document is currently 11–13 pages long.

From the point of view of civil society, institutional adjustments have increased the demands of making strong applications – with empirical propositional and prescriptive evidence attached. Institutional adjustment leads to epistemic adjustment. The set of supportive reasons given by hunters in the applications has been largely the same in successive years, but the set of reasons tended to broaden from application to application. In our data this was particularly true if the applicants were the same from year to year and if there were no notable wolf damages or high public pressures to remove wolves prior the filing of the application. It seems that the epistemic adaptation is case- and context-specific and takes many forms. This preliminary finding should be carefully tested with large and representative data to enable firm conclusions.

Our case shows how hunters have attempted to adapt to partially different formal rules and instructions given to the different local authorities. This had led hunters in our study area both to apply for derogates from the regional wildlife administrators and to request killing orders from the police annually. While this is not clearly present in our case focusing on the territory level the process has fostered co-adaptation in the institutional setup, administrative practices and useful knowledge (see also Hiedanpää and Pellikka 2012, Hiedanpää et al. 2016). The co-adaptation of authorities has been to increase collaboration, exchange information, and inform each other about the decisions they make regarding wolves. In addition, more detailed national-level instructions and codes of conduct for local-level police regarding large carnivore issues were given in 2012, leaving less administrative discretion to local police. The same is true of wildlife administration, which was under major revision in 2011. According to the decision making process guided by the recent Wildlife and Game Administration Act (158/2011) that came into effect in March 2011, the personnel of regional level wildlife agency currently only prepare the derogations and introduce them to the Director for Public Administration Tasks, who makes the final decisions nationwide.

Ethics of adaptations

It is uncertain whether the recognized co-adaptations will help to fulfill broader societal purposes and to mitigate the problems that currently fuel the adaptive attempts. The knowledge is largely collected in response to specific local needs, and it may not be useful for every interest group. Indeed, the adaptation that we have described in the article may take a path that maintains and even makes deeper the gap between agents who are suspicious of each other and the knowledge they produce, thus formalizing counter-narratives that provide their own explanations for the nature and origin of wolves and their numbers (see also Theodorakea and von Essen 2016). People may also get tired of repeatedly engaging in exchanges of knowledge and arguments that do not seem to lead to desired ends (von Essen and Hansen 2015). Consequently, the political debate ceases and illegal hunting increases (von Essen et al. 2015). The true epistemic challenge of the current situation is how to build knowledge that support legal local action, and how to redirect the co-adaption process from the current epistemic 'arms race' in new directions, where capacity building is directed more at exploring more broadly ways of mitigating damages and increasing wellbeing for both wolves and people with various backgrounds and values.

We conclude that striving for creative solutions both to the problems of co-existence between humans and wolves calls for a perspective that opens up new avenues for producing knowledge. It calls for the ethical aspects of propositional and prescriptive knowledge. The reasons asked and given are situated in a particular social practice and organizational routine. Moral commitments and concerns are embedded in those practices and routines and understanding about them help to solve associated problems wisely and fairly (Flyvbjerg 2004, 2011, Flyvbjerg et al. 2012). As our case clearly shows the epistemic adaptation in production of 'what'- and 'how'-knowledge cannot be properly understood in the context of policy and management without paying close attention to the 'why'-question, i.e. the purposes and reasons of local agents in knowledge production. The why-question is an ethical question about the situational social purpose and the function of knowledge for the sake of fulfilling that purpose.

Conclusions

Taking steps forward in Finnish wolf management have during this decade included the introduction of new tools and more dynamic processes to foster the co-production

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of knowledge, especially on the level of old and new wolf territory. Existing examples in this development path include, for example, the recent large carnivore censuses made among hunters (LCVs), members of nature conservation NGOs, game researchers and game administrators in Finland (Rannikko et al. 2011).

The knowledge-intensity of wolf management does not show signs of decreasing, the opposite is the case. One may expect that the adaptation process, including game of asking for and giving of reasons when applying for the licenses to derogate from the strict protection of the wolf, will go on and intensify particularly when new territories and novel territory-level institutional adjustments are introduced. This is probably the case not only in Finland, but similarly in many member countries of the EU that has increasing wolf population, new territories and local pressure for lethal management. However, one may also expect that step by step administrative knowledge requirements and increasing territory level capability to provide such useful knowledge will make these two knowledge practices to converge closer to each other. More practice- and culture-oriented wolf management will find such knowledge useful, which is also meaningful for the variety of stakeholders in wolf territories.

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