

Science, law and politics in the case of the Norwegian wolves

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Abstract

For the benefit of conservation practitioners that may try to use the law as a conservation tool for endangered species, we recount the arguments and elements of the court case brought by environmental NGOs against the Government of Norway for allowing the killing of a significant portion of the critically endangered Norwegian wolf population in 2005. In the process we comment on the key elements of Norwegian wolf “management,” such as it is, in light of what it ought to be. Perhaps the clearest lesson emerging from this effort is to not underestimate the difficulty of getting lawyers and judges to comprehend the nature of stochastic processes and the intricacies and importance of biological/numerical processes at the population level. In the case of Norway, it is clear that the law is not an effective tool for large carnivore conservation and that the conditions for scientifically based conservation are not present. We also provide an update and discuss more recent developments in the Scandinavian wolf population.

Introduction and background

Norway is internationally renowned—at least in Norway!—as an advocate for the environment. From Gro Harlem Brundtland and *Our Common Future* (written by Lloyd Timberlake) through their pledge of USD 3 billion for tropical forest conservation (REDD+). The reason people have a positive impression of Norway on the international scene, is that no one knows anything about Norway. It is a small back woods country, an appendix jutting out in the North Sea, which few outside Norway know much about, if they think of it at all. Those who follow Norway’s role in fish farming, whaling, in large carnivore “management”, in protecting their own biodiversity or forests, or as a major oil and gas exporter, have a more nuanced picture.

The Norwegians among us known to be working on issues to do with the "management" of large carnivores in general, and wolves (*Canis lupus*, *L*) in particular, are sometimes called upon to answer queries from incredulous observers, notably those with an understanding of conservation biology, population dynamics or population genetics, of the kind "*What (in the World) is going on in Norway!?!*". These people may have heard of Norwegian authorities killing up to a third of its until recently extinct wolf population; a population that still has not exceeded 30 individuals.

The winter of 2001, [government rangers/hunters](#) killed ten wolves out of a population that had been estimated during the previous winter at 28 individuals. Or rather, they only succeeded in killing nine of the ten that the Directorate for Nature Management and the Ministry of Environment had ordered them to kill—after they abandoned hunting on the ground and took to the air in helicopters.

In January 2005 it happened again, only this time five wolves were targeted out of a population of between 18 and 21, and the killing was turned over to licensed hunters—the general public was invited to apply for licenses to kill wolves, and a total of over 400 hunters

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responded. At that time, there were four established wolf pairs in Norway. No population viability analysis was attempted prior to permitting the killing of the wolves. Not even a rudimentary analysis was conducted to get ballpark estimates of the increased threat to the population before stating in their decision that the cull “did not threaten the viability of the population.” This was stated without justification.

At the time, the latest census estimate (official wolf populations estimates published in the fall are derived from tracks in the snow the preceding winter and does not include pups born the preceding summer) indicated that we had 18-21 wolves resident in Norway, and a total Scandinavian population of 120-140 wolves. The entire population is descended from just three individuals: a pair established in 1983, and one male, the last successful immigrant from the Finno-Russian population in 1991. Following the cull we had 13-16 wolves resident in Norway, and only one intact pair.

The Norwegian Carnivore and Raptor Foundation (FVR), hereafter “Plaintiff”, took the Government (hereafter “defendant”), represented by the Ministry for the Environment and its wildlife management branch the Directorate for Nature Management, to court, in order to keep a similar scenario from happening again. This essay recounts the key elements of that court case. We also feel that this case has gained international relevance in light of recent developments in Sweden with regard to culling of wolves and in the Rocky Mountain region of the United States with regard to the attempted delisting of the wolf population in states there and periodic wolf hunts depending on the most recent pronouncements of authorities and the courts.

Norwegian authorities, in their “wisdom”, still regularly give permission to kill wolves in various places in Norway where there is a danger they might prey on livestock, notably sheep that are let out into the outback without supervision throughout the summer. As necessitated by law (otherwise they could not legally give such permits), they claim that killing these wolves does not jeopardize the viability of the population. As luck would have it, the population of wolves on the Norwegian side of the border appears finally to have increased somewhat following the cull in early 2005: in [the last official status report](#) (for the winter of 2008-2009) to 25-26 wolves. That year also saw the first successful immigrants since 1991, as two immigrants from the Finno-Russian population fathered litters—one in Sweden and one in Norway.

Sadly, this year the Swedish Government for the first time also allowed a cull of 28 wolves on the part of the Scandinavian wolf population that is found on the Swedish side of the border (between 182 and 217 animals). That cull has been brought before the European Commission by Swedish NGOs, and the Commission has since demanded answers from the Swedish government. The European Commission in a recent letter to the Swedish government states that “it appears probable” that the cull exacerbates the problems due to inbreeding depression. The commission believes that the status “was not favourable when the hunting license was effective and that the hunt made the conservation status less favourable”. They questioned the scientific basis for the hunt, and requests an explanation why Sweden set a limit of 210 wolves for the entire country and an elaboration of the scientific reasons behind this.

Norway’s official policy on wolves is that wolves are to be limited to a narrow “[wolf management zone](#)” (east of the river Glomma and south of the municipalities Rendalen and Engerdal with Oslo and some westerly parts of Akershus and Østfold districts thrown in), with a target population of three annual litters within this zone. But in practice, it seems

they will not allow the population above that target, and authorities issue frequent permissions to kill wolves even before this “goal” has been attained.

Science

It is often stated that the southern Scandinavian wolf population died out in the 60s and 70s and was only reestablished after a pair formed in Northern Sweden in 1977. This pair was destroyed and scattered and one does not know what happened to it. Some 6 years later a new pair was discovered in the border areas down south. Yet some say that it is possible wolves were somewhere in Norway or Sweden all through the 60s and 70s, with occasional immigrants.

The idea that it was extinct in Scandinavia at some point was stated by someone at the Färna Symposium on the effect of culling in the Scandinavian wolf population, and accepted without discussion, and it made it into the [symposium report](#).

In court, we heard that the government did not consider the situation for the wolf acute, even though [the population is severely inbred](#); that there was time to wait for an immigrant from Finno-Russia. This despite the fact that there had been no successful immigrant to the population since 1991, and before that none since early 1980s/late 1970s. Furthermore, the wolves that try end up dead. There was an immigrant back in 1984, which was shot in southern Norway with permission from the Government even though at the time it was the only wolf in the country. Another known immigrant was shot in far northern Norway later in 2005, after the culling this case is about. Another was shot legally in Sweden after it started hanging around town, apparently looking for the only available partners: dogs that were chained outside. Reindeer herders up North are adamant that wolves make their operations difficult, and no one has been willing to take that argument with the reindeer herders. Rumor has it that reindeer herders also shoot any wolves that come near, whether they have permission to or not.

[Professor Nils Ryman](#) stated on behalf of plaintiff that he *did* consider the situation acute, due to the severe inbreeding in the population, the continuing loss of rare alleles, and the need to grow out of the present bottle-neck as quickly as possible. He showed that an MVP for wolves is approximately 5000 individuals.

The [report from the Färna Symposium](#) on the effect of culling in the Scandinavian wolf population (commissioned by Defendant) played an important role in court, as this is the closest thing Defendant had to a PVA—albeit subjective and not emanating from a quantitative analysis. It stated, without debate, that the ratio N/N_e was 3-4 for the Scandinavian wolf population. This ratio had great impact every time a conversion from N_e to N was needed, as in the statement “ N_e of 50 needed to avoid inbreeding depression in the near term, would require 150-200 wolves”. Of course in a management situation one should be conservative (in line with the precautionary principle) and use the upper value rather than the lower. Yet, this ratio came simply from a simulation carried out quickly in [VORTEX](#) by Henrik Andrén. One of the factors the simulation left out was that wolves form lasting pair-bonds. Instead the simulation put individuals back in the pool and drew pairs at random from the entire population for each mating (Nils Ryman, *pers. comm.*). Furthermore, the simulation was based on data from the population at the time. It seems clear, that at $N_e=50$ or $N_e=500$, the data will dictate a higher ratio. For instance, in a larger population, packs

are likely to be larger than they were in 1983-2002. Larger packs would involve more non-breeders to each alpha pair.

Ryman testified that the N/N_e ratio was likely much higher, and he preferred to use $N/N_e=10$.

[Dr. Olof Liberg](#) (witness for the defense; Coordinator of the [Scandinavian Wolf Project](#)) has claimed that illegal hunting is the greatest immediate threat to the population, not its precarious genetic situation (Vargsymposiet 2002). Well, of course there is a connection between killing by humans and the precarious genetic situation. And presumably if illegal killing is a problem, then so is *legal* killing. The more speculative suggestion is that unless there is legal killing, illegal killing will increase. We know of no data that suggests such a connection. Furthermore, it seems unfortunate to suggest, in a court of law, that Defendant must allow certain activities that are detrimental, because otherwise people will commit crimes.

Liberg also brought up that Dave Mech had talked of the Île Royal example at Färna, and that there a small population of wolves had persisted for 50 years without going extinct. It was *not* emphasized that Mech was one of the participants in the panel most in favor of rigorous PVAs. A single example is treated as anecdotal in science, unless it is a clear counter-example or a clear example of an important mechanism, but this may not be evident in court where the audience does not necessarily have scientific training.

Liberg acknowledged that it was “unlucky” that individuals among the cull of 2001 had turned out later to be genetically very valuable individuals. He himself had testified in court at that time that the cull would not jeopardize the viability of the population. Plaintiff claimed that the authorities cannot rely on luck as to whether or not the cull will jeopardize the population. The authorities’ job is to take every precaution to ensure that that is not the case, and back it with the best available science if necessary.

Plaintiff claimed that the government lacked scientific backing for the claim that the cull would not jeopardize the viability of the population. They claimed that the authorities did not have the technical expertise to make such an assessment, that they had not taken the trouble to ask someone who did, or ask someone to conduct such an assessment for them. They also stated that the granting authorities did not have a good grasp of what it entailed to make a statement such as they did: that the cull does not jeopardize the viability of the population. They had not found it necessary to define what they meant by such a statement, nor did they seem to appreciate the kind of analysis and data necessary to come to the conclusion that they did. No explanation was given for why they thought as they did, despite such justification being mandated by law.

The conclusion from the Färna panel regarding culling is oddly different in the English edition and in the Norwegian edition:

...a cull of 1-2 wolves per year will not jeopardize the populations survival, unless these animals are of special genetic interest. If possible this genetic value ought therefore to be determined prior to initiating the cull. Exact viability analyses should be conducted before initiation of larger control programs where more wolves than this is taken out.

Where the Norwegian report says “1-2”, the English version says “five”. Olof Liberg translated the report into English, and pressed the panel (months after the symposium itself)

about how high they could go in setting an upper limit (Phil Hedrick, *pers. comm.*). The English version was not written until 2005—*after* the cull.

At Färna it was claimed off-hand, and accepted without discussion, that Scandinavia was too small to support a viable population of wolves. This was reiterated twice by the Government Attorney, and by Liberg under oath.

Plaintiff presented [Lande et al. \(2003\)](#). The authors use GIS techniques to break down Scandinavia into categories with regard to habitat quality and suitability for wolves. They then use the area of these suitability classes and the potential density of wolves in each, to estimate the number of wolf packs Norway, Sweden, Lapland, and Scandinavia as a whole can support. From these numbers—288, 408, 97, and 793 *packs*, respectively—they conclude that: “the availability of suitable habitat will not be a limitation on the preservation of viable populations.”

[Professor Nils Chr. Stenseth](#) explained the nature of stochastic processes, the importance of population size in stochastic population dynamic models, the nature of source-sink dynamics, and emphasized that management must be science based.

[Dr. Øystein Flagstad](#) showed the results of his genetic analysis of the Scandinavian wolf population vis à vis the Finnish population, and specifically the genetic analysis of the dead wolves, some of which were found to be genetically valuable. He confirmed that the wolves killed in 2001 were *particularly* valuable individuals, that constituted a significant portion of the genetic variability in the overall population, and that the alpha female in that family group was a daughter of the 1991 immigrant male (Fig. 1). Flagstad confirmed that scat samples for genetic analysis were on file *prior* to the the granting of the 2005 permission, and could have been quickly analyzed but were not.

Liberg produced what he presented as a “viability analysis”. Some minimal comments were offered as to what the model does. Liberg claimed the model showed a low extinction probability for the population. The material he presented is reproduced, *in extenso*, in the [Appendix](#) to this paper.

Upon examination the following quickly becomes clear:

1. Defendant was referring to the extinction probability for the entire Scandinavian population, not the Norwegian population.
2. They use a short time scale for their assessment of “viability”.
3. The initial population size was set to the most recent estimate, three full years *after* the decision to cull.
4. The model (1) seems to indicate a *high* extinction risk. The discrepancy appears to be a rescue effect: a high extinction rate is offset by a high immigration rate. Hence a population might go extinct several times within the first 50 years, yet still be counted as extant due to recolonization just prior to the end of the run.
5. High harvesting rates appear to be driving the populations extinct.

- Atnadal female (2001)
- ▲ Atnadal pups (2001)
- Males killed 2005
- Females killed 2005
- Finish wolf population
- Scandinavian wolf population

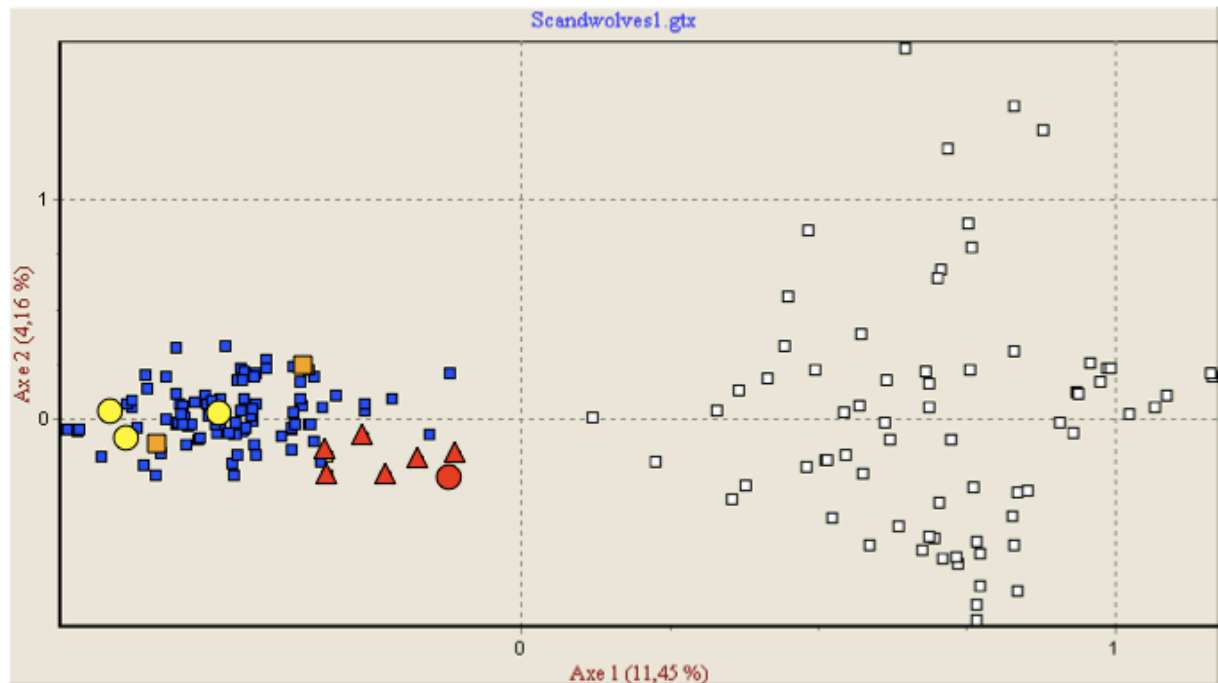


Figure 1. Slide presented by Dr. Øystein Flagstad showing genetic variation of analyzed Scandinavian and Finnish wolf population as it sorts out along the two principle component axes. Some of the wolves killed in the 2001 cull, the Atnadal female and her pups, in red; wolves killed in the 2005 cull in yellow and orange. Note that particularly wolves from the 2001 cull are outliers in the Scandinavian wolf population and represent a significant proportion of the total genetic diversity as well. [Click to see the figure in greater detail.](#)

It was evident (to those present that have experience with population viability modeling) that the model did not contain many of the mechanisms required for a responsible statement about viability, and that the model was insufficiently described.

Following a subsequent query to Olof Liberg (after the verdict had been handed down), we received an answer from Pär Forslund, who reportedly conducted the modeling. It appears the analysis was based on a stage-structured matrix iterated in Matlab with fecundity and survival schedules derived from the Scandinavian wolf population. Even with the opportunity to elaborate at leisure in a written response to concrete questions it remains unclear what the model does and what factors are included and how they are implemented. It does seem that some inbreeding depression was included by modifying litter sizes with respect to inbreeding coefficients as observed in data from years passed, but it is not clear how individuals were paired in the iterations or how one would incorporate future effects. Demographic stochasticity was also incorporated by varying vital rates in accordance with variations observed in the data from the Scandinavian wolf population. It is clear however, that this is not the model a competent investigator would chose if one were to state with any degree of confidence that a cull such as the one permitted by GoN *does not* signifi-

cantly exacerbate the tenuous predicament of the wolf population (in terms of increasing its likelihood of extinction within a carefully chosen time frame). If the above cited factors are *all* that is built into the model, it clearly does not yield conservative and precautionary estimates of actual extinction risks.

Politics

Defendant argued that there is a multitude of political dimensions that they had to consider.

Plaintiff argued, on the contrary, when the viability of the population is threatened, the law dictates that consideration of the endangered species is *paramount* and that there should be no room for politics when a management decision may threaten the population's continued existence.

Specifically, [Dr. Tormod V. Burkey](#) in his opening statement, argued that what DN ought to do was to conduct a thorough viability analysis and then use the law to defray such political pressures, on the grounds that they would further jeopardize the viability of an already critically endangered population².

The statement, that Norway/Scandinavia is insufficiently large for a viable wolf population can only make sense in light of two assumptions, a) that Scandinavia is completely cut off from immigration from the Finno-Russian population, and b) *taking political constraints into account*. Plaintiff argued that defendant must mean that it is not *politically* feasible to have a viable population of wolves in Norway. In the end, it is the very crux of this court case, whether or not the authorities are *allowed* to take political considerations and public concerns into account, in a situation where the population in question is so precarious as to be in real danger of extinction.

It was stated in court numerous times, by both parties and their expert witnesses, that according to law and policy the viability of the population is *paramount*. It is the opinion of the Plaintiff, therefore, that when the viability of the population is in question, politics should not be allowed to enter into the equation.

Defendant argued that it was doing what was best for the viability of the population, because they needed to win the people's *acceptance* of wolves. Ostensibly the argument is that it takes time to win popular acceptance of the "new" wolf population, and that they were winning such acceptance by culling wolves and allowing the population to grow only very gradually. The argument seems to be that if the Government does not cull wolves or permit such killing, then people will take the law into their own hands and kill wolves illegally!

However, they did nothing to demonstrate that State-sanctioned killing of wolves does anything to build popular acceptance of the wolf population, or to reduce poaching. Opponents of capital punishment argue that public executions have the opposite effect: namely to undermine people's respect for life and hence make them *more* likely to commit killings of their own, not less.

² according to the official [Norwegian Red Data List](#)

The only study we have seen on this topic, concludes that, in the case of Scandinavian lynx, there does not seem to be any simple relationship between legal “harvest” and poaching ([Andrén et al. 2006](#)).

Defendant argued that they were acting in accordance with the will of Parliament, whose carnivore management plan defines the wolf management zone and allows for culling when the population target of three annual litters within this zone has been attained. Plaintiff argued that even this modest target had not been attained, as one of the three litters in the year in question was on the *outside* of the zone. Plaintiff further argued that Parliament had not been made aware that such a plan seems in itself to doom the Norwegian wolf population to extinction, and might itself not be in accordance with Norwegian law (and that the Directorate’s failure to make this known to decision makers and the public is a breach of the [Århus Convention](#)).

Defendant argued that there was no time frame for attaining the goals set by Parliament, and that they were free to take their time about it.

The Government Attorney stated in her closing argument that if the court agreed with Plaintiff, this would entail discarding the entire Norwegian carnivore policy. We do not disagree with this. At the very least it would entail conducting comprehensive quantitative viability analyses and genetic analyses of the individuals in question prior to permitting any culling, as well as a quantitative analysis of the extinction risk assumed with current policies and with the current wolf management zone in particular. Anyone with some experience of quantitative simulations of population viability measures would conclude that killing so many individuals in a population as critically endangered as the Norwegian wolf population, or even the Scandinavian wolf population, would significantly increase its risk of extinction.

Law

The trial started with disaster for the Plaintiff as their lawyer made an excruciatingly long-winded, faltering, and unpolished introductory lecture which completely blew the time schedule. The Government Attorney took full advantage of this weakness and insisted on exceeding her allotted time by an equivalent amount, so that by the end of her lecture we were three hours behind an already excruciatingly tight schedule.

Plaintiff argued that Defendant’s interpretation of “population” as the southern Scandinavian population (shared with Sweden) is a violation of international law. Although, *biologically*, the wolves of southern Scandinavia form a single intermixed population, *legally* Norway must deal in terms of the part that they have jurisdiction over: the *Norwegian* wolf population. Even if one defined “population” as the Scandinavian wolf population, the cull would by necessity make things worse for the population, which was already endangered and needs to grow out of the genetic bottle-neck as quickly as possible.

With a population that moves between Norway and Sweden we could argue that Norway’s culling of wolves on their side of the border is analogous with air-pollution drifting from one nation to another—the responsibility for which is regulated by international law. Not only does wolf killing on the Norwegian side remove degrees of freedom from Sweden’s efforts to manage *their* population, but in the logical extreme Norway may impose on Sweden’s

sovereign right to have a healthy and intact ecosystem, including a viable wolf population, on its own territory.

All parties acknowledged that the precautionary principle is inscribed in Norwegian law.

Although at the time that the authorities granted permission for the cull, no viability analysis and no genetic analysis had been conducted to back their claim that the cull would not jeopardize the viability of the population, Norwegian law holds that *if it turns out after the fact* that such analysis *would not have made a difference to the decision*, then they get off scot free. Plaintiff therefore had to convince the court that such an analysis could have made a difference had it been carried out at the time.

When Liberg's model was presented it became clear that Plaintiff's lawyer still did not grasp the core issues of the case, despite numerous briefings, and early warnings that Defendant could produce an inadequate PVA to "support" their case. Hence, he did not manage to shoot down Liberg during cross-examination.

Subsequently, Ryman was prepped to shoot down the model. To Plaintiff's shock and dismay, however, Ryman was cut off by the judge, probably because he was already pissed off that Plaintiff's lawyer had been wasting the court's time. When the first line of questioning was cut off, Plaintiff's lawyer did not manage to redirect and get back to the planned line of questioning, which in our opinion would have been the end of Defendant's case.

Defendant argued that everything plaintiff had brought up in court was well known to them. Plaintiff's argument was that while authorities were in possession of a reasonably extensive set of facts about the wolf population, they lacked the scientific understanding and an adequate understanding of philosophy of science, to interpret the facts and data they had to determine whether or not the cull jeopardized the viability of the population. They were able to rattle off data on individual wolves, but did not seem to comprehend that this was not the critical issue, but that rather the emergent properties at population level—population viability estimates that encompass both demographics and genetics—*were*. Their lack of understanding also explains why they did not see the need to justify their claim that the cull would not jeopardize the viability of the population.

Norwegian law gives management great leeway to exercise their "free judgement". Plaintiff found that the model presented by Liberg was completely inadequate for the task of justifying Defendant's claim, and that his presentation was inadequate to communicate the model's uses and limitations. Plaintiff argued, that Defendant's choice to let Liberg present this model in court demonstrated clearly that Defendant did not understand the core issues of the case, namely the stochastic nature of population dynamics and genetics which can lead to extinction in small populations. Nor do they understand what it would entail to justify the claim made in the permission for the cull. Plaintiff argued that since the Defendant clearly did not understand these core matters, their "free judgement" was legally inadequate.

The court did not apparently buy this argument which unfortunately was hastily made at the very end of closing arguments, and concluded that Defendant was within their rights.

In the [verdict](#), the judges state flat out, without justification, that if a PVA *had* been carried out it probably would have been turned over to the folks at the Scandianavian Wolf Project (Liberg and others), or Directorate for Nature Management people, and therefore that the result would have been the same!

Recent developments

So far, the authorities have been extraordinarily lucky in that two wolves have successfully wandered in from the Finno-Russian population and produced litters in Sweden after the ruling in this case. Before that, a successful immigration event had not occurred for nearly 20 years. Descendants of these wolves have since made it across into Norway, though through no effort on the part of the defendants in this case. Managers of endangered species should not rely on luck; instead they ought to take every precaution and action to improve the odds of a successful outcome, in accordance with the precautionary principle and a solid grasp of stochastic processes.

Although the establishment of two Finno-Russian male immigrants in Sweden was very glad tidings indeed, sadly many of their descendants since then have already been killed. No complete inventory of their surviving offspring have been conducted.

The saddest development is that the Swedes, which have hitherto been much more scientific in their approach to wolf management, have decided to halt the population increase in Sweden at 210 wolves and introduced an annual wolf cull of their own. 28 wolves were killed in Sweden during this event last year, and started up again January 15 this year despite strong criticism from the European Commission (which Sweden is answerable to but not Norway). A small consolation is that the authorities appear committed to avoiding culls in packs with descendants from the two immigrant males. The EU Commission has now instigated [legal action against Sweden](#), since it considers this year's killing a breach of EU environmental law. Sweden argues that the cull is necessary to improve the health of this critically inbred population (!) and to build acceptance for the current wolf population—the same unsubstantiated claim that we met in court in Norway. It seems unlikely that Norwegian authorities will take EC criticism of the Swedish cull (which takes a much smaller proportion of a much larger population than they do in Norway) to heart.

Ironically, during the first round in court we had used the Swedish Directorate for the Protection of Nature as an example of a more professional agency, more science-based, and more independent of political pressures, than the corresponding Norwegian agency.

Swedish authorities now say that they want to introduce wolves from Finland regularly so that an annual cull can be conducted while improving the genetic diversity in the population as a whole. However, due to concerns about the introduction of diseases, rumor has it that they want to introduce individuals from captive stocks, which seems a rather strange result indeed considering the inability of these wolves to manage in the wild, that they will be used to humans from their time in captivity and therefore may present a risk to humans, and the strange mix of genetics that may be represented in the captive stock.

This winter (2010-2011), for the first time, the target of three annual litters born inside the Norwegian wolf management zone seems to have been attained. As long as this population target for is treated as a maximum target rather than a minimum target one could say that it is not individual culls itself that threatens the population, but this policy target. Predictably, the response to the attainment of this goal has been for local “carnivore panels” to approve (January 12) the licensed cull of three wolves in the Norwegian population just outside of the wolf management zone this winter. Environmental NGOs have once again challenged the ruling and the conflicts over carnivore “management” show no sign of abating.

The Norwegian Minister for the Environment, Mr. Erik Solheim, has recently invited the parties in the Norwegian Parliament to deliberations on the process for obtaining a new agreement on population targets and carnivore management policy. In a letter to concerned NGOs he emphasizes his desire for a broad exploration of existing knowledge prior to deliberations on new population targets for wolves and bears. One can only hope that this broader consultation will include hearing from some competent population ecologists and population geneticists, and that these will be able to explain things in a way that politicians and bureaucrats can comprehend.

Oddly enough, and unlike in the American Congress and many other nations' legislative bodies, there are very few legal professionals in the Norwegian Parliament. This may or may not have contributed to the paucity of effective environmental laws and enforcement.

Conclusion

If the Government intends to limit the Norwegian wolf population to three breeding pairs, as its white paper on large carnivores, and current practice, suggests, then this becomes the *de facto* carrying capacity for the population. Prolonged limitation to fluctuations around this level means that the population leads a very tenuous existence indeed. In our judgement, the Norwegian wolf policy is a *de facto* extinction policy, and as such is not in accordance with Norwegian law or the [Bern Convention](#).

Either Norwegian environmental law is too weak to be of much use in compelling authorities to ensure the viability of (critically) endangered species, or the difficulties of getting lawyers and judges to understand population genetics and dynamics (particularly given the stochastic nature of these in small populations) proved insurmountable in this case—aided by the limited understanding (or ill will) of key witnesses for the defense and key management personnel.

One could argue that the court's support for the defendant's scientifically unsupported view that the cull did not jeopardize the population was based on a definition of "viability" (a probability measure) by a more lax standard than any conservation scientist would dream of using. However, no statement was made either by Defendant or the court as to what standard might have been used in reaching their conclusion.

Apparently it is legal in Norway to drive a species to extinction, at least after this case was lost and a precedence was set. It is not clear that [the new law](#), passed after this ruling was handed down (and which retains most of the old text with regard to large carnivores), provides any stricter protections for large carnivores.

For now at least, it appears that politics trumps both science and law in Norwegian large carnivore management.

[Annex](#)