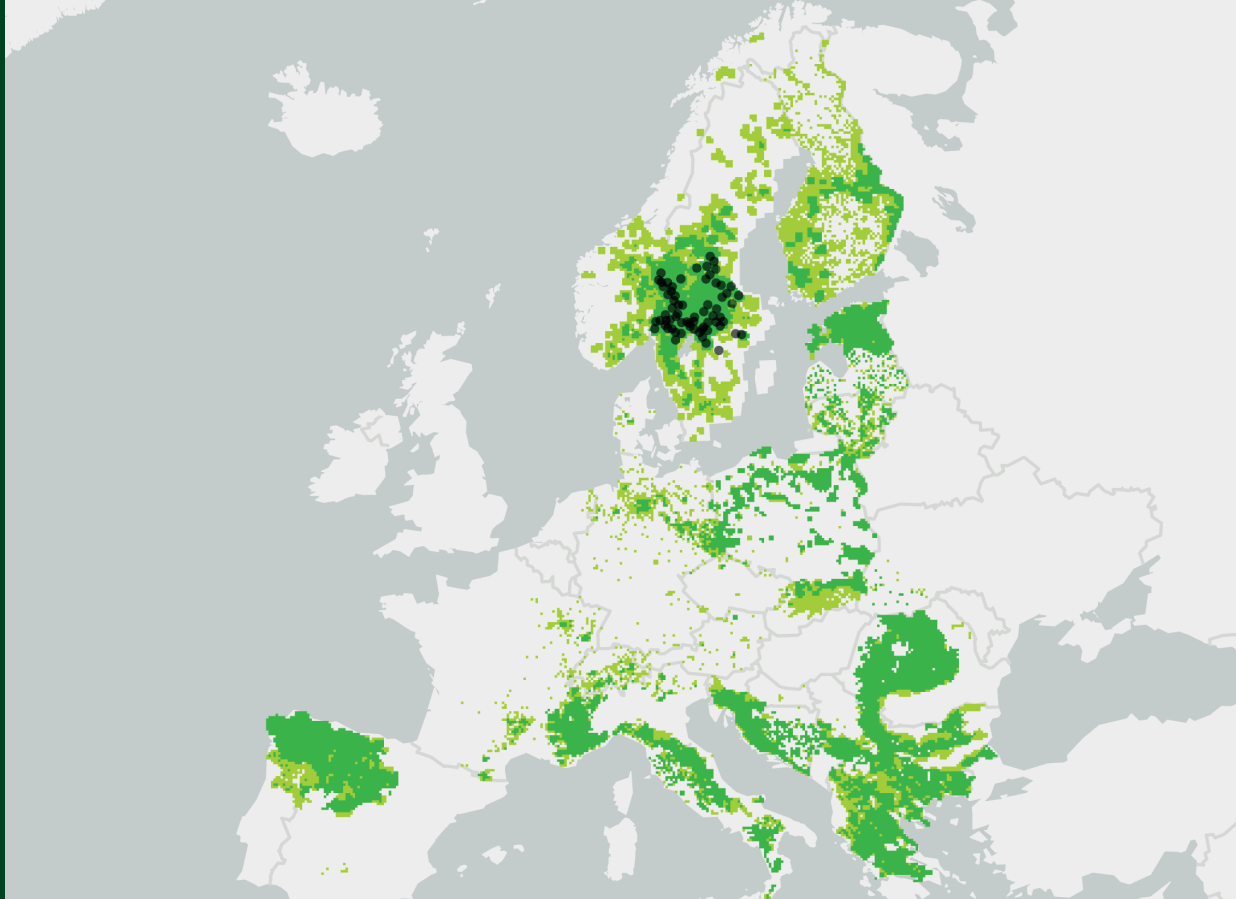




Høgskolen
i Innlandet



Eriksen A, Willebrand MH, Zimmermann B, Wikenros C, Åkesson M, Backer IL, Boitani L, Fauchald OK, Fernández-Galiano E, Fleurke F, Linnell JDC, Mech LD, Mills LS, Sand H, Stronen AV, Wabakken P.

Assessment of the Norwegian part of the Scandinavian wolf population, phase 1

WORKSHOP SUMMARY

Skriftserien 19 - 2020



Cover illustration:

Scandinavian wolf territories 2018-2019 (black dots) and wolf distribution in Europe 2012-2016 (dark green = "Resident" and light green = "Passage" or "Seasonal" according to the IUCN Red List presence criteria). Data from Russia, Belarus, most of Ukraine, Moldova, and Hungary were not available.

Sources:

Linnell JDC, Kaczensky P et al. 2020. Status of large carnivores in Europe 2012-2016. Distribution, numbers, and red list assessments. NINA Report 1708.

Svensson L, Wabakken P et al. 2019. Bestandsovervåking av ulv vinteren 2018-2019. Bestandsstatus for store rovdyr i Skandinavia 1-2019.

Forsideillustrasjon:

Skandinaviske ulverevir 2018-2019 (sorte prikker) og utbredelse av ulv i Europa 2012-2016 (mørk grønn = "Resident" og lys grønn = "Passage" eller "Seasonal" i følge IUCNs kriterier). Data fra Russland, Hviterussland, det meste av Ukraina, Moldova og Ungarn var ikke tilgjengelig.

Kilder:

Linnell JDC, Kaczensky P m. fl. 2020. Status of large carnivores in Europe 2012-2016. Distribution, numbers, and red list assessments. NINA Rapport 1708.

Svensson L, Wabakken P m. fl. 2019. Bestandsovervåking av ulv vinteren 2018-2019. Bestandsstatus for store rovdyr i Skandinavia 1-2019

Eriksen A, Willebrand MH, Zimmermann B, Wikenros C,
Åkesson M, Backer IL, Boitani L, Fauchald OK, Fernández-
Galiano E, Fleurke F, Linnell JDC, Mech LD, Mills LS, Sand H,
Stronen AV, Wabakken P.

Assessment of the Norwegian part of the Scandinavian wolf population, phase 1

WORKSHOP SUMMARY

Skriftserien nr. 19 2020

Trykk: Flisa Trykkeri A/S

Utgivelsessted: Elverum

© Forfatteren/Høgskolen i Innlandet, 2020

Det må ikke kopieres fra publikasjonen i strid med Åndsverkloven eller i strid med avtaler om kopiering inngått med Kopinor.

Forfatteren er selv ansvarlig for sine konklusjoner. Innholdet gir derfor ikke nødvendigvis uttrykk for høgskolens syn.

I Høgskolen i Innlandets skriftserie publiseres både internt og eksternt finansierte FoU-arbeider.

Skriftserien nr. 19 2020

ISBN trykt utgave: 978-82-8380-236-8

ISBN digital utgave: 978-82-8380-237-5

ISSN: 2535-5678

Sammendrag

I innstilling 257 L (2016-2017) ba Stortinget den norske regjeringen om å foreta en faglig gjennomgang av den norske delbestanden av ulv, med den begrunnelse at en selvstendig utredning av hva som kan defineres som en levedyktig bestand av ulv i Norge aldri tidligere har vært gjennomført. Klima- og miljødepartementet ga Miljødirektoratet (MD) i oppdrag å følge opp dette arbeidet, med følgende spesifikasjoner: Gjennomgangen må omfatte en levedyktighetsanalyse for ulvebestanden i Norge, utredningen må ta hensyn til at bestanden deles med Sverige, og dermed må vurderingen omfatte både den norske delbestanden og den samlede sør-skandinaviske bestanden. Klima- og miljødepartementet anbefalte å dele arbeidet inn i to faser, der den første skulle gjennomgå tidligere arbeider, samt ulike begreper og faguttrykk som forekommer i forskrifter og lovverk, og dermed legge grunnlaget for en levedyktighetsanalyse i andre fase. Departementet påpekte at arbeidet med dette oppdraget må ha et strengt faglig perspektiv, og ikke være bundet til hensyn av premissene som ligger i dagens politikk.

Som første fase av utredningen ga MD Høgskolen i Innlandet oppgaven med å koordinere en workshop med et ekspertpanel, inkludert juridisk ekspertise og ekspertise i levedyktighetsanalyser, for å diskutere parametere som er relevante for gjennomføringen av fase to. Workshopen ble gjennomført 5. til 6. mars 2020, og denne rapporten oppsummerer diskusjonene og konklusjonene fra workshopen.

Hovedkonklusjoner:

Fra et biologisk perspektiv kan ulvebestanden i Skandinavia ikke deles i delpopulasjoner definert av administrative grenser. Den felles skandinaviske ulvebestanden deles mellom Norge og Sverige, og er knyttet til den større nord-/sentraleuropeiske metapopulasjonen gjennom innvandring. Derfor vil en egen bestandsanalyse for Norge ikke være biologisk meningsfylt. Levedyktighetsanalyser av den skandinaviske ulvebestanden er allerede gjennomført.

Fra et juridisk perspektiv, under nasjonal og internasjonal lov, er Norge forpliktet til å opprettholde arter og deres genetiske mangfold på lang sikt og å sikre at arter forekommer i levedyktige bestander i deres naturlige utbredelsesområder. Imidlertid fremstår Norges tolkning av deres forpliktelser overfor Bernkonvensjonen noe uklar, her illustrert med to ytterpunkter som ble diskutert under workshopen:

- Hvis Norge kun forplikter seg til å bidra til en felles bestand bør en enkelt yngling kunne være nok, gitt at Sverige opprettholder en levedyktig bestand.
- Hvis Norge tar det fulle ansvaret trenger Norge en levedyktig bestand alene, samt å sikre forbindelsen til den større metapopulasjonen.

Juridisk sett er det klart at hvert land som er part i konvensjonen har eneansvaret for å utvikle og gjennomføre de tiltak som det har akseptert i henhold til konvensjonen, på nasjonalt territorium.

Denne uoverensstemmelsen mellom den biologiske virkeligheten (grenseoverskridende bestander) og den juridiske virkeligheten (de enkeltes lands juridiske forpliktelser) er en utfordring. Hvorvidt en fremtidig grenseoverskridende forvaltningsplan er vellykket, og biologisk og juridisk levedyktig, er imidlertid avhengig av at begge aspekter tas på alvor.

Et trinn i retning av en mer koordinert forvaltning vil være å øke samarbeidet og legge grunnlaget for en gjensidig avtale mellom Sverige og Norge om et felles bestandsmål og en fordeling mellom de to landene. Dette vil potensielt også gi større fleksibilitet for å oppfylle forpliktelsene under

Bernkonvensjonen, samt økt forutsigbarhet og robusthet i skandinavisk ulveforvaltning. De juridiske vilkårene for en slik grenseoverskridende tilnærming må utforskes nærmere.

For koordinert, kunnskapsbasert forvaltning av den felles skandinaviske ulvebestanden, vil en god forståelse av effektene av faktorer som lovlig og ulovlig jakt, og forbindelsen til den større metapopulasjonen, være av stor betydning. Spørsmålet om tilføring av nytt genetisk materiale bør prioriteres høyt, ettersom innvandring fra Russland sannsynligvis vil påvirke den genetiske variasjonen i Finland og Skandinavia. For å utforske hvordan ulike scenarier kan forventes å påvirke bestanden over tid, vil det være nyttig å utvikle en felles bestandsmodell for den skandinaviske ulvebestanden, som kan oppdateres fortløpende med nye data. For et større fennoskandisk perspektiv anbefales også informasjonsdeling med Finland og Russland.

Emneord: Grenseoverskridende bestander, levedyktighet, miljørett, rovviltforvaltning, Skandinavia, ulv, viltforvaltning

Oppdragsgiver: Miljødirektoratet

Abstract

In Recommendation 257 L (2016-2017), the Norwegian parliament asked the government to undertake an assessment of the Norwegian subpopulation of wolves on the grounds that an independent assessment of what can be defined as a viable population of wolves in Norway has never previously been conducted. The Ministry of Climate and Environment gave the Norwegian Environment Agency (NEA) the assignment to follow up this work, with the following specification: The assessment is to include a viability analysis for the wolf population in Norway, the report must take into consideration that the wolf population is shared with Sweden, and thus, the assessment must include both the Norwegian subpopulation and the joint Scandinavian population. The Ministry of Climate and Environment recommended dividing the work into two phases, the first of which would review previous assessments as well as various terms that appear in regulations and legislation, thus laying the groundwork for a viability analysis in the second phase. The Ministry pointed out that the work within this assignment must have a strictly academic/technical perspective, and not be bound by the premises of the current Norwegian policies.

As phase one of the assessment, the NEA gave Inland Norway University of Applied Sciences the task of coordinating a workshop with a panel of experts, including legal expertise and expertise in population viability analyses, to discuss documentation parameters that are relevant for the implementation of phase two. The workshop was carried out on 5-6 March 2020, and this report summarises the discussions and conclusions from the workshop.

Main conclusions:

From a biological perspective, the wolf population in Scandinavia cannot be divided into subpopulations defined by administrative borders. The Scandinavian wolf population is shared between Norway and Sweden, and is connected to the larger north-central European metapopulation through immigration. Hence, a separate population viability analysis for Norway will not be biologically meaningful. Population viability analyses of the Scandinavian wolf population have already been conducted.

From a legal perspective, under national and international law, Norway is legally bound to maintain species and their genetic diversity for the long term and to ensure that species occur in viable populations in their natural ranges. However, Norway's interpretation of their obligations to the Bern Convention seems unclear, here illustrated with two extreme positions, as discussed by the workshop participants:

- If Norway only commits to contributing to a joint population, a single reproductive unit should be enough, given that Sweden maintains a viable population.
- If Norway takes full responsibility, Norway needs a viable population on its own, as well as ensuring connectivity with the larger metapopulation.

Legally speaking, it is clear that each country that is party to the Convention has sole responsibility for developing and implementing the measures on national territory that it has accepted under the Convention.

This discrepancy between the biological reality (transborder populations) and the legal reality (legal obligations of individual countries) presents a difficult conundrum. However, the potential success and biological and legal viability of a future transboundary management plan depend on taking both aspects seriously.

A step towards a more coordinated management would be to increase collaboration and lay the groundwork for a mutual agreement between Sweden and Norway on a joint population goal and distribution between the two countries. This would also potentially give more flexibility for meeting the obligations under the Bern Convention, as well as increased predictability and robustness in Scandinavian wolf management. The legal conditions for such a transboundary approach need to be explored further.

For coordinated, knowledge-based management of the joint Scandinavian wolf population, a good understanding of the effects of factors such as legal and illegal harvest, and connectivity with the larger metapopulation, will be of great importance. The topic of influx of new genetic material should be given high priority as immigration from Russia is likely to affect the genetic diversity in Finland and Scandinavia. To explore how different scenarios can be expected to affect the population over time, it would be useful to develop a Scandinavian wolf population model that can be continuously updated with new data. For a larger Fennoscandian perspective, information sharing with Finland and Russia would also be recommended.

Keywords: Carnivore management, cross-border populations, environmental law, population viability, Scandinavia, wildlife management, wolves

Financed by: The Norwegian Environment Agency

Content

Sammendrag	3
Abstract	5
Content.....	7
1. Background	8
2. Definition of common terms	11
2.1 Metapopulation.....	11
2.2 Source-sink dynamics	11
2.3 Viable population	11
2.4 Minimum viable population	11
2.5 Genetic diversity.....	12
2.6 Genetic drift.....	12
2.7 Inbreeding	12
2.8 Ecosystem functioning	12
3. Questions from the Norwegian Environment Agency.....	13
Q1: What parameters are relevant for a viability analysis of the Norwegian/Scandinavian wolf population, from a biological perspective?.....	13
Q2: Previous Swedish assessments since 2010.....	14
A: To what degree have these previous assessments been bound or influenced by the premises of the current Norwegian policies?.....	14
B: To what degree are the previous assessments transferable to the Norwegian/Scandinavian population?	14
Q3: Norwegian legislation	15
A: What directions does §5 of the Nature Diversity Act (NDA) impose for viability analyses of the species?.....	15
B: What parameters for viability follow from the legislation (including white papers and other relevant assessments)?.....	16
Q4: How do terms and definitions associated with viability in NDA relate to the terms and definitions used in Swedish and EU legislations?.....	16
4. Conclusions and recommendations.....	17
5. Literature provided to the participants prior to the workshop.....	18
5.1 Legislation.....	18
5.2 Assessments in Sweden since 2010.....	18
5.3 Selected scientific publications	19

1. Background

In Recommendation 257 L (2016-2017), the Norwegian parliament asked the government to undertake an assessment of the Norwegian subpopulation of wolves on the grounds that an independent assessment of what can be defined as a viable population of wolves in Norway has never previously been conducted. In the letter of allocation for 2018 and 2019, the Ministry of Climate and Environment gave the Norwegian Environment Agency (NEA) the assignment to follow up this work, with the following specification in an additional letter dated 10 August 2018:

- The assessment is to include a viability analysis for the wolf population in Norway.
- The report must take into consideration that the wolf population is shared with Sweden.
- Thus, the assessment must include both the Norwegian subpopulation and the joint Scandinavian population¹.

The Ministry of Climate and Environment recommended dividing the work into two phases, the first of which would review previous assessments conducted in Sweden as well as various terms that appear in regulations and legislation, thus laying the groundwork for a viability analysis in the second phase. The Ministry of Climate and Environment pointed out that the work within this assignment must have a strictly academic/technical perspective, and not be bound by the premises of the current Norwegian policies. Four assessments regarding viability and reference values for favourable conservation status FCS were conducted in Sweden during 2012 to 2015.

1. In 2012, Chapron et al. evaluated the demographic viability of the Scandinavian wolf population under the IUCN Red List Criteria E (extinction risk < 10% on 100 years) but without accounting for genetics. They showed that wolf populations with 100 individuals have > 90% probability to escape stochastic extinctions, even with catastrophic events where a significant part of the population died.
2. Liberg and Sand (2012) concluded in a literature review that a population of 200-400 wolves and an immigration rate of 2-3 wolves per generation (0.4-0.6 per year) would retain 90-95% of the heterozygosity, and would reduce inbreeding coefficient levels below 0.15. However, they stressed that contact with other populations through migration is much more important than population size per se.
3. Bruford (2015) estimated the effects of immigration into the Scandinavian wolf population using data on demography and genetics, and concluded that population size is not as important for reduction of inbreeding or retention of genetic diversity compared to the rate of effective immigration.
4. In 2015, eight scientists evaluated science-based criteria for favourable reference population FRP² of the Scandinavian wolf population (Swedish Environmental Protection Agency 2015), but consensus was not achieved. Seven of the scientists proposed that an FRP of 340 wolves for the Scandinavian population (300 in Sweden and 40 in Norway) would have a high probability of persistence, conditional on being part of a functioning

¹ The Scandinavian wolf population is defined as the joint Norwegian and Swedish population on the southcentral part of the Scandinavian peninsula, excluding Denmark.

² Population in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the species. Favourable reference value must be at least the size of the population when the Habitats Directive came into force.

metapopulation. In addition, a preliminary estimate of 600 wolves in Sweden was suggested by three of the eight scientists in order to achieve “ecological viability”, and 1200-1700 wolves was proposed by one of the eight scientists if Sweden cannot include wolves from outside its national territory to fulfil its obligations under the Habitats Directive.

As phase one of the assessment, the NEA gave Inland Norway University of Applied Sciences (INN University) the task of coordinating a workshop with a panel of experts to discuss documentation parameters that are relevant for the implementation of phase two. The NEA specified that the expert panel should include legal expertise (Norwegian, Swedish and EU legislation) and expertise in population viability analyses (demographic and genetic, both general as well as specific for wolves). The assignment to INN University specified a number of questions that were to be addressed:

1. What parameters are relevant for a viability analysis of the Norwegian/Scandinavian wolf population, from a biological perspective?
2. Since 2010, a number of assessments of the Swedish/Scandinavian wolf population have been conducted, with respect to viability (demographic and genetic), and reference values for favourable conservation status FCS.
 - a. To what degree are these assessments transferable to the Norwegian and to the entire Scandinavian wolf population?
 - b. To what degree have previous assessments been bound or influenced by the premises of the current Norwegian policies?
3. Norwegian legislation:
 - a. What directions does §5 of the Nature Diversity Act (NDA) impose for viability analyses of the species?
 - b. What parameters for viability follow from the legislation, including preparations and other relevant assessments?
4. How do terms and definitions associated with viability in NDA relate to the terms and definitions used in Swedish and EU legislations?

On 5-6 March 2020, a secretariat consisting of Maria Hörnell Willebrand, Barbara Zimmermann and Ane Eriksen (INN University), and Camilla Wikenros (moderator, Swedish University of Agricultural Sciences (SLU)), gathered an expert panel at Hoel Gård, Nes in Hedmark, Norway. The panel consisted of:

- Inge Lorange Backer (University of Oslo, retired)
- Luigi Boitani (University of Rome)
- Ole Kristian Fauchald (University of Oslo)
- Eladio Fernández-Galiano (Council of Europe, retired)
- Floor Fleurke (Tilburg University)
- John D. C. Linnell (Norwegian Institute of Nature Research NINA)
- L. David Mech (IUCN Canid Specialist Group, USGS, University of Minnesota)
- L. Scott Mills (University of Montana)
- Håkan Sand (SLU)
- Astrid Vik Stronen (University of Ljubljana)
- Petter Wabakken (INN University)
- Mikael Åkesson (SLU)

Observers present at the workshop were Terje Bø (NEA), Kjell Vidar Seljevoll (NEA), Sami Niemi (Finnish Ministry of Agriculture and Forestry) and Andreas Ahlén (Swedish Environmental Protection Agency (SEPA)).

This report summarises the conclusions from the workshop.

2. Definition of common terms

We limit the definitions to language that is relevant to large carnivores, and wolves in particular.

2.1 Metapopulation

Set of populations where among-population processes such as connectivity, and within-population processes such as birth and death rates, are both important in driving population dynamics.

Note: Both regions of dispersal and unoccupied areas between the subpopulations should be considered important for the overall persistence of the metapopulation.

2.2 Source-sink dynamics

A source population contributes more individuals to the overall metapopulation than it loses to mortality.

A sink population loses more animals to mortality than it contributes to the overall metapopulation.

Note: Both source and sink populations have a value. Even though the persistence of a sink population is contingent on immigration, a sink population can still export valuable individuals to other subpopulations.

2.3 Viable population

An interacting group of individuals of a given species with a specified high probability of persisting above a specified numeric threshold for a specified time into the future.

For example, the IUCN red-listing criteria classify species as being not threatened if their probability of persistence is > 90% for 100 years.

2.4 Minimum viable population

The smallest population expected to have a specified high probability of persisting above a specified numeric threshold for a specified time.

Note: The MVP concept is problematic, e.g. because it implies a degree of precision (i.e. a specific number of individual animals) that is rarely scientifically defensible due to the complexity of factors affecting population dynamics and the challenges of estimating population processes.

2.5 Genetic diversity

The variation in the genetic information within and among individuals of a population, a species, or a community. High genetic diversity can be manifested as a high number of alleles in a population or a high number of heterozygous loci in an individual.

2.6 Genetic drift

Random changes in genetic diversity (allele frequencies) over time. Small populations are prone to loss of genetic diversity due to drift.

2.7 Inbreeding

The loss of genetic diversity (heterozygosity) arising from breeding between related individuals. By chance, small populations have a higher probability of breeding with relatives.

2.8 Ecosystem functioning

The collective life activities of the species in an ecosystem, and the effects these activities have on other species in the environment.

3. Questions from the Norwegian Environment Agency

Q1: What parameters are relevant for a viability analysis of the Norwegian/Scandinavian wolf population, from a biological perspective?

We object to the use of “Norwegian wolf population”. From a biological perspective, there is only one shared population of wolves in Norway and Sweden. This Scandinavian wolf population is part of the larger north-central European metapopulation through immigration from (and emigration to) Finland and Russia. The distinction of “Norwegian” and “Swedish” wolves is administratively and legally relevant, but the national border is biologically irrelevant.

We consider that there is little to gain from a new Norwegian or Scandinavian population viability analysis (PVA). From a biological perspective, wolves in Norway are not a separate (sub)population, and hence a PVA of the Norwegian part of the Scandinavian wolf population would be meaningless. Demographic and genetic PVAs of the Scandinavian wolf population have already been conducted (see list of assessments at the end of this document).

However, it would be useful to develop a Scandinavian wolf population model that can be continuously updated with new data. The purpose of such a model would not be to calculate MVP, but rather to explore likely outcomes of different scenarios for e.g. legal culling and immigration, including cumulative effects over several years and considering different levels of illegal harvest. Such a model could be used by both Norwegian and Swedish managers for more coordinated management of the species. For such a model for the Scandinavian wolf population, we recommend the following:

- Include the standard demographic parameters for population modelling (i.e. reproduction, mortality, migration).
- Both demography and genetics must be included.
- Model the Scandinavian wolf population as a part of the Fennoscandian/north-central European metapopulation.
- Consider the connectivity with the rest of the metapopulation (particularly immigration from Russia).
- Consider the frequency of (mildly and strongly) deleterious mutations.
- Allow for different mortality scenarios due to legal and illegal harvest, and the effects of removing individuals belonging to different demographic groups (e.g. reproducing adults, dependent young, or single vagrant or territorial wolves), taking into account the precautionary principle.
- Allow for cumulative effects over several years.

- A Bayesian modelling approach would be recommended to build in the uncertainty of the different vital rates.
- The VORTEX population viability analysis model is not recommended for wolves, as it is not suitable for social species and is less flexible than desired for these purposes.

Q2: Previous Swedish assessments since 2010

A: To what degree have these previous assessments been bound or influenced by the premises of the current Norwegian policies?

Previous assessments have been heavily influenced by Norwegian government policies for two main reasons:

- 1) Population size: Previous assessments by two independent research groups, Liberg et al. as well as Mills and Feltner (Swedish Environmental Protection Agency 2015) concluded that Sweden needs a minimum of 300 wolves. This number was based on the assumption that Norway would have 40 wolves, thus reaching the minimum of 340 wolves in Scandinavia to obtain favourable reference population (FRP) status. Hence, the Norwegian population goal of 4-6 reproductive units (i.e. approximately 40-60 wolves assuming a conversion factor of 10) has directly influenced the Swedish population goal through SEPA's viability assessments. This emphasises the need for cooperation between Sweden and Norway for a common population goal. The conditions under which such a transboundary population-level management could become operational and legally sound should be further explored.
- 2) Connectivity: Previous assessments of the Scandinavian wolf population (Bruford 2015, Liberg and Sand 2012) concluded that the rate of effective immigration is more important for population viability than population size per se. Norwegian areas are important for the potential for immigration, and Norwegian policies and management actions along the area for connectivity greatly affect this potential. E.g. out of 26 wolves documented by DNA as having immigrated into Norway and/or Sweden from 1982 to early 2020, seven were only recorded in Norway and four were recorded in both Norway and Sweden. That is, at least 11 out of 26 immigrants used Norwegian areas for their dispersal towards the Scandinavian wolf population, and the likelihood of them contributing new genetic material to the Scandinavian population could be directly affected by Norwegian policies and management actions.

B: To what degree are the previous assessments transferable to the Norwegian/Scandinavian population?

The wolves in Sweden and Norway belong to one, joint Scandinavian population, and the assessment by SEPA in 2015 was done for the population as a whole. The methods and the parameters used in previous assessments are therefore applicable to Norway as the underlying conditions and parameters are the same. However, because the wolves in Norway are not a unique

biological entity, it would be biologically meaningless to conduct an assessment specifically for the Norwegian part of the Scandinavian wolf population.

Q3: Norwegian legislation

A: What directions does §5 of the Nature Diversity Act (NDA) impose for viability analyses of the species?

NDA §5: The objective is to maintain species and their genetic diversity for the long term and to ensure that species occur in viable populations in their natural ranges. To the extent necessary to achieve this objective, areas with specific ecological functions for different species and other ecological conditions on which they are dependent are also to be maintained.

§ 5 lays down a legally binding overall objective, but not a stringent rule with a concrete policy and a given end result determining the outcome in any individual case. The wording makes it clear that the goal includes both demographic and genetic viability. The term natural ranges is not defined, and it could be interpreted as all of their former range which still contains suitable habitat, i.e. all of Norway where the species would be likely to occur. The individual wolf has a legally protected status under § 15 no matter where it is, subject to certain exceptions including § 18 in keeping with the Bern Convention. NDA has a lack of clarity regarding populations that are shared with other countries. E.g. if Norway represents the edge of the species range, to what extent do Norway's responsibilities depend on the status of the species outside Norway? Without a fully-fledged mutual agreement between the countries to assure the long-time survival of the species within the natural ranges covered by the jurisdiction of the respective countries, each country has an independent responsibility for the species in question, as a country can only be held accountable for its own legal commitments. This obviously includes national law but also Norway's commitments under the Bern Convention, consistent with State sovereignty. Hence, the viability of such a transboundary approach depends on the agreement of formal safeguards at transnational level to ensure the achievement of the legal objectives.

A relevant factor to consider is that Sweden as a party to such an agreement has to comply with standards of the Habitats Directive including its interpretation by the European Court of Justice (CJEU). Importantly, the CJEU has recently opened the door for such a transboundary management approach (Case C-674/17, para 58). The Court did expressly state that this does not apply to population segments in third countries which are not bound by an obligation of strict protection of species of interest for the European Union. It could be argued that it does apply to Norway, as it is a party to the Bern Convention and a system of strict protection has been adopted in the NDA. Notwithstanding this potential, it is still unclear to what degree, and under what conditions precisely, states may take into account population segments in neighboring states, and this needs to be explored in more detail as the Scandinavian population approach would include EU and non-EU member state(s).

B: What parameters for viability follow from the legislation (including white papers and other relevant assessments)?

It follows from NDA that demography, connectivity and genetics must all be considered. The need for specific ecological functions by wolves is less clear and has not been studied in Scandinavia. However, wolves have successfully recolonized areas of central and southern Europe with very high anthropogenic impact, and the single most important resource requirement for wolves is likely to be prey availability. There have been studies on the effects of wolves on ecological functions (prey populations, potential cascading effects on plant communities, provision of carcasses to the scavenging community, impact on other large carnivores) in Scandinavia. Even though these studies have found limited effects of wolves relative to hunter harvest and forest management, significant wolf effects on ecosystems cannot be ruled out and further studies are needed. This is the case especially if considering long-term effects of wolves on ecosystem functioning. If wolf densities were allowed to increase, it is likely that their ecological impact would be greater relative to what has been found with the present population status, which is subject to major anthropogenic influence.

Q4: How do terms and definitions associated with viability in NDA relate to the terms and definitions used in Swedish and EU legislations?

- Swedish legislation reflects EU legislation.
- Norwegian legislation (NDA) reflects the Bern Convention (BC), but is more specific.
- NDA is the only legislation to include the term 'viability'.
- The term 'favourable conservation status' (FCS) is used in EU legislation (Habitats Directive), but is not found in BC which was written earlier (signed in 1979, ratified by Norway in 1986). The level required by Article 2 of the BC has however been described as a 'favourable conservation status' by the Standing Committee of the BC. The term FCS was therefore not included in NDA, but the concept is reflected to some extent in NDA §5.
- Derogation is critical in the BC and NDA, and defining the conditions for derogation is essential.

4. Conclusions and recommendations

From a biological perspective, the wolf population in Scandinavia cannot be divided into sub-populations defined by administrative borders. The Scandinavian wolf population is shared between Norway and Sweden, and is connected to the larger north-central European metapopulation through immigration, and Norwegian areas are important for the potential for immigration.

Wolves in Norway are part of the Scandinavian wolf population, and a separate population viability analysis for Norway will not be biologically meaningful. Population viability analyses of the Scandinavian wolf population have already been conducted.

From a legal perspective, under national and international law, Norway is legally bound to maintain species and their genetic diversity for the long term and to ensure that species occur in viable populations in their natural ranges.

Norway's interpretation of their obligations to the BC seems unclear, here illustrated with two extreme positions, as discussed by the workshop participants:

- If Norway only commits to contributing to a joint population, a single reproductive unit should be enough, given that Sweden maintains a viable population (340 wolves according to Liberg et al. and Mills and Feltner, Swedish Environmental Protection Agency 2015).
- If Norway takes full responsibility, Norway needs a viable population (340 wolves) on its own, as well as ensuring connectivity with the larger metapopulation.

Legally speaking though it is clear, and consistent with State sovereignty, that each country that is party to the Convention has sole responsibility for developing and implementing the measures on national territory that it has accepted under the Convention.

This discrepancy between the biological reality (the transboundary nature of shared populations) and the legal reality (the legal obligations of individual countries) presents a difficult conundrum. However, the potential success and biological and legal viability of a future transboundary management plan depend on taking both aspects seriously.

A step towards a more coordinated management of the Scandinavian wolf population would be to increase collaboration and lay the groundwork for a mutual agreement between Sweden and Norway on a joint population goal and distribution between the two countries. This would also potentially give more flexibility for meeting the obligations under the BC, as well as increased predictability and robustness in Scandinavian wolf management. Even though the standards will not be lowered by the existence of a transboundary management plan, it is clear that a more robust joint Scandinavian population, and better cooperation and coordination of wolf management, would make it easier to satisfy the conditions for derogation under the NDA and the BC. The legal conditions for such a transboundary approach need to be explored further.

For coordinated, knowledge-based management of the joint Scandinavian wolf population, a good understanding of the effects of factors such as legal and illegal harvest, and connectivity with the larger metapopulation, will be of great importance. It is unclear to what degree it is legally and practically feasible to rely on Russia for the influx of new genetic material, but this topic should be given high priority as immigration from Russia is likely to affect the genetic diversity in Finland and Scandinavia. To explore how different scenarios for e.g. connectivity and legal and illegal harvest can be expected to affect the population over time, it would be useful to develop a Scandinavian wolf population model that can be continuously updated with new Swedish/Norwegian and Finnish/Russian data and include cumulative effects over several years. For a larger Fennoscandian perspective, information sharing with Finland and possibly Russia would also be recommended.

5. Literature provided to the participants prior to the workshop

5.1 Legislation

[The constitution of the kingdom of Norway §112](#)

[Nature Diversity Act NDA](#)

[Rovviltforskriften](#) (regulations for the management of carnivores) – in Norwegian only

[The Habitats Directive](#), which states that the habitats and species listed in its Annexes shall have "favorable conservation status" (Article Ie and Ii), has EU Law & Directive Status, and the wolf is listed in Annexes 2 and 4.

[Reporting under Article 17 of the Habitats Directive](#), explanatory notes and guidelines for the period 2013-2018, final draft version – April 2017

[Bern convention](#) – Convention of the conservation of European wildlife and natural habitats

[Verdict LB-2018-128035 from the Borgarting Court of Appeal](#) – in Norwegian only

5.2 Assessments in Sweden since 2010

Chapron, G., Andrén, H., Sand, H., & Liberg, O. 2012. [Demographic viability of the Scandinavian wolf population](#). Report from SKANDULV to the Swedish Environmental Protection Agency

Liberg, O. & Sand, H. 2012. [Genetic aspects on the viability of the Scandinavian wolf population](#). A report from SKANDULV to the Swedish Environmental Protection Agency

Bruford, M. W. 2015. [Additional population viability analysis of the Scandinavian wolf population](#). Report 6639, Swedish Environmental Protection Agency

Swedish Environmental Protection Agency 2015. [Report on the Government Commission to Investigate Favourable Conservation Status for Wolf \(M2015/1573/Nm\)](#); English translation from Swedish was provided

[Attachments:](#)

3-4: Assessments by Liberg et al. and Mills & Feltner

2: Joint statement from the authors of the assessments

5: Promemoria: Legal support concerning the Habitats Directive, Stockholm 2015-09-21 (English translation from Swedish was provided)

5.3 Selected scientific publications

- Ebenhard, T. 2000. Population viability analyses in endangered species management: the wolf, otter and peregrine falcon in Sweden. *Ecological Bulletins* 48: 143-163.
- Nilsson, T. 2004. Integrating effects of hunting policy, catastrophic events, and inbreeding depression, in PVA simulation: the Scandinavian wolf population as an example. *Biological Conservation* 115(2): 227-239.
- Mills, L. S. 2013. *Conservation of Wildlife Populations: Demography, Genetics, and Management*. Wiley / Blackwell Press (2nd edition).
- Stronen, A.V., Jedrzejska, B., Pertoldi, C., et al. 2013. North-south differentiation and a region of high diversity in European wolves. (*Canis lupus*). *Plos One* 8(10):e76454.
- Laikre, L., Olsson, F., Jansson, E., Hössjer, O., & Ryman, N. 2016. Metapopulation effective size and conservation genetic goals for the Fennoscandian wolf (*Canis lupus*) population. *Heredity* 117, 279–289.
- Epstein, Y. 2016. Favourable conservation status for species: examining the Habitats directive's key concept through a case study of the Swedish wolf. *Journal of Environmental Law*, 28(2), 221-244.
- Epstein, Y., López-Bao, J. V., & Chapron, G. 2016. A legal-ecological understanding of favorable conservation status for species in Europe. *Conservation Letters*, 9(2), 81- 88.
- Trouwborst, A., Fleurke, F. M., & Linnell, J. D. 2017. Norway's wolf policy and the Bern Convention on European Wildlife: avoiding the “manifestly absurd”. *Journal of International Wildlife Law & Policy*, 20(2), 155-167.
- Trouwborst, A., & Fleurke, F. M. 2019. Killing wolves legally: exploring the scope for lethal wolf management under European nature conservation law. *Journal of International Wildlife Law & Policy*, 22(3), 231-2

In Recommendation 257 L (2016-2017), the Norwegian parliament asked the government to undertake an assessment of the Norwegian subpopulation of wolves on the grounds that an independent assessment of what can be defined as a viable population of wolves in Norway has never been conducted. The Ministry of Climate and Environment gave the Norwegian Environment Agency (NEA) the assignment to follow up this work, with the following specification: The assessment is to include a viability analysis for the wolf population in Norway, it must take into consideration that the wolf population is shared with Sweden, and thus, it must include both the Norwegian subpopulation and the joint Scandinavian population. The Ministry recommended dividing the work into two phases, the first of which would review previous assessments as well as terms that appear in regulations and legislation, thus laying the groundwork for a viability analysis in phase two. The Ministry pointed out that the work within this assignment must have a strictly academic/technical perspective, and should not be bound by the premises of the current Norwegian policies.

As phase one of the assessment, the NEA gave Inland Norway University of Applied Sciences the task of coordinating a workshop with a panel of experts, including legal expertise and expertise in population viability analyses, to discuss parameters that are relevant for the implementation of phase two. The workshop was carried out on 5-6 March 2020, and this report summarises the discussions and conclusions from the workshop.