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Department of Ecology and Natural Resources Management/Institutt for Naturforvaltning

What Does the Landowner Think?
- A landowner survey about red deer management along the west coast of Norway

Hva mener grunneieren?
- En grunneierundersøkelse om hjorteforvaltning langs vestkysten av Norge

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Management of Natural Resources/Naturforvaltning

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Ås, 13th May 2016.

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Abstract

To know the degree of stakeholders' agreement, or opposition to policies, can be of great importance for successful management. Simultaneously, there is a need for knowledge that combine wildlife and social interactions. In the management of ungulates in Norway, the landowner is a main stakeholder because of their hunting rights to their property. They are often actively involved in the practical aspects of hunting and define the aims of perennial management plans. Their thoughts, interests and commitment can therefore be key elements to functioning wildlife management. There are few studies addressing ungulate management based on social aspects in Scandinavia. We designed a web-based questionnaire for landowners in five counties along the west coast of Norway. Through this thesis, we wanted to explore landowner's different opinions and attitudes surrounding the present management of red deer (*Cervus elaphus*). An important focus was to examine the state of satisfaction and cooperation within various management units. Further, we were especially interested to investigate which improvements the landowner think are necessary in order to achieve a better deer management and how any of these changes are considered appropriate.

This thesis shows a general overview of landowners' attitudes towards red deer management. Our main findings indicate that landowners, in general, are satisfied with current practices. The degree of satisfaction with organizations and cooperation of red deer management were highest in local management units and decreased with the spatial scale. Landowners disagree that increased size of local management unit (vald) is a solution to improve current management. Despite this, we did find a correlation between proportions satisfied and size of local management units, where landowners involved in large valds were most satisfied. Cooperation is something that landowners perceive as preferable to achieve management objectives, and these views are not only limited to self-centred interests, but also considered in a larger perspective. They tolerate a certain browsing damage on pastures up to a threshold value, simultaneously an increased quota would affect the degree of satisfaction. Although larger areas are appropriate in a management perspective considering migratory red deer, landowners' ability to interact over equivalent areas can be a challenge.

Sammendrag (Norwegian abstract)

Innsikt i interessegruppers grad av enighet, eller motsatt, er viktig for å oppnå en vellykket forvaltning. Samtidig er det behov for kunnskap som kombinerer viltforvaltning og sosiale interaksjoner. På bakgrunn av grunneierens ansvar for organisering av jakt, sammenstilling av forvaltningsplaner og jaktrettigheter på deres eiendom, er grunneieren ansett som en viktig interessegruppe i norsk hjorteforvaltning. Grunneierens tanker, interesser og engasjement kan derfor være nøkkelfaktorer for fungerende forvaltning. Det finnes få studier som adresserer hjorteviltforvaltning basert på sosiale aspekter i Skandinavia. Vi gjennomførte en internettbasert spørreundersøkelse til grunneiere i fem fylker langs vestkysten av Norge. Gjennom denne oppgaven ville vi med kvantitativ metode undersøke grunneierens meninger og oppfatninger rundt forvaltning av hjort (*Cervus elaphus*) ut ifra dagens praksis. I tillegg ville vi undersøke graden av fornøydhet og samarbeid i ulike forvaltningsenheter. Videre var vi spesielt interessert i å undersøke hvilke forbedringer grunneier mener er nødvendig for å oppnå en bedre hjorteforvaltning og om disse endringene er gjennomførbare.

Denne oppgaven viser en generell oversikt over grunneierens meninger om dagens forvaltning. Hovedfunnene våre indikerer at grunneieren er fornøyd med dagens praksis og at samarbeidet fungerer bra i lokale forvaltningsenheter, men at den synker i takt med hierarkiske inndeling av forvaltningsenhetene (jaktfelt/vald – kommune). De er uenige i at økt størrelse på vald er en løsning for å forbedre dagens forvaltning, til tross for at vi fant en korrelasjon med valdstørrelse og andelen fornøyde grunneiere, der store vald hadde flest fornøyde grunneiere. Videre uttrykker de at de ser nødvendigheten av grunneiersamarbeid tilknyttet hjorteforvaltning og at det er større fordeler enn ulemper med samarbeid. Grunneiere tolerer ett visst beitetrykk på innmark opp til et terskelnivå, samtidig vil økt kvote påvirke fornøydhetsgraden. Våre resultater tyder på at selv om større areal er passende i et forvaltningsperspektiv med tanke på migrerende hjort, så kan grunneiernes evne til å samhandle over tilsvarende areal være en utfordring.

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1 Introduction

Stakeholder engagement is considered as an important aspect in wildlife management (Decker et al. 2015), and has been promoted as a result of reforming traditional top-down decision-making processes to achieve more sustainable, equitable and enduring governance of the environment and resources (e.g. Berkes 2010). For successful management, the attitudes and perception of relevant stakeholders must be well understood and considered (Sandström 2012). While wildlife management of ungulates has primarily been the territory of natural science, stakeholders' attitudes are recognised as important implements for management decisions (Gordon et al. 2004). An area with high stakeholder engagement is the management of large carnivores, both in Norway (Figari & Skogen 2011; Skogen 2003), Europe (Dressel et al. 2015) and America (Lute & Gore 2014). In particular to human-wildlife conflicts, the decentralisation of power – central government formally ceding power to actors or institutions at lower political or administrative levels – is crucial (Sandström et al. 2009).

Populations of ungulates have increased both in Europe and North America to high-density levels in the last several decades (Apollonio et al. 2010; Côté et al. 2004; Milner et al. 2006) and constitutes large economic, sociocultural and ecological impact on landscapes (Apollonio et al. 2010). Many factors are considered to explain this population increase, including the socio-ecological aspect, e.g. hunting culture, which incorporate a mixture of beliefs and facts that will influence the composition of harvest rates, and affect management decisions (Milner et al. 2006). To regulate most of the large wildlife species, harvesting through recreational sport hunting is the most widely applied method (Brown et al. 2000). Those who pull the trigger are, in practice, the actor issuing management through population control. Regardless of what some actors may argue, strong interest groups (e.g., hunters' perceptions), must be taken into account. However, management systems- and hunting practice vary to great extent between European countries with regard to which objectives are pursued (see Apollonio et al. 2010).

Because of ungulates migratory behaviour (Fryxell et al. 1988), conservationist and scientists regard their extensive annual space use as a challenge (Harris et al. 2009). Managing seasonally migrating ungulates is considered particularly challenging because ungulates can both cause harm and create hunting value that are unevenly distributed between and across administrative borders (Skonhoft & Olaussen 2005). Management units are often too small to

cover even single migratory individuals (Jarnemo 2008), which leads to a mismatch between the hunting units and the biological range size of the target species (Meisingset 2015). Improved organization with a high level of cooperation between local units is therefore required (Apollonio et al. 2010). However, lack of stakeholder engagement is one of the most obvious reasons for unsuccessful implemented adaptive management (Sandström 2012).

In line with the focus of efficient and sustainable population management, the collaborative management including social networks with a broad group of different stakeholders have recently received more attention in natural resource governance (Bodin & Crona 2009). This has been explored, i.e. integrated wild deer management in United Kingdom, by social scientists (Irvine et al. 2010). In this work, divergent goals between different stakeholder groups are addressed to be barriers to encouraged collaboration of such ecological resources; with private landowners' attitudes being the most central. To achieve successful management, the dialog within- and between stakeholders, such as landowners, in addition to wildlife managers and researchers is considered to both be a challenging, but a necessary task (McCleery et al. 2006). Still, few studies concerns landowners' opinions with respect to the management of ungulates in Scandinavia.

Previous studies considering landowners' attitudes towards management of ungulates are of economic concern. A typically issue is that increasing population density towards browsing damage on forest stands (Horne & Petäjistö 2003). Here, Finnish landowners preferred a lower population level of moose (*Alces alces*), even when the benefit from hunting exceeded the cost of browsing damage. In Norway, surveys have targeted the deer hunter (Andersen et al. 2014), in addition to the potential and willingness for the landowners to increased hunting as a commercial activity (Olaussen & Mysterud 2012). The main findings of Olaussen and Mysterud (2012) indicates that the average landowner does have higher costs than income caused by the red deer population. In addition, increased density of deer did not automatically lead to more income or potential income. Otherwise, red deer hunting is an activity for the landowner themselves, with family, friends and local hunters. Concerning commercialisation, the most important issue with the sale of hunting permits was that local hunters are been shut out. By excluding local hunters, the authors consider this issue as an alternative cost than a benefit. In this study, they state that the landowners are satisfied with how things are. Exceptions from other parts of the world are where deer density affect agricultural producers' perceptions regarding their desire of future population management (West & Parkhurst 2002).

The Norwegian red deer (*Cervus elaphus*) moves rapidly between high elevation summer ranges and lowland winter ranges (Mysterud et al. 2011b). The timing of fall migration overlaps with the hunting season (Rivrud et al. 2016), and may result an uneven distribution of hunting benefits on the one hand, and browsing and grazing damages among different landowners on the other hand (Olaussen & Mysterud 2012). Central authorities recently extended and advanced the hunting period. The main reason for this extension was the desire to facilitate a better redistribution of deer during the hunt (Solberg et al. 2015). As a result of this extension, Loe et al. (2016) found a better redistribution of red deer harvested and the harvest increased within management units in inland summer ranges. However, several studies demonstrate the need to include the spatial aspects of large animal behaviour when designing management plans (Kropil et al. 2015; Singh & Milner-Gulland 2011; Skonhoft et al. 2002; Zimmermann et al. 2014). Hence, social and cultural aspects of management need to be accounted for (Milner et al. 2006).

Given that harvest statistics reflect the population trend, the Norwegian red deer population has increased both in density and distribution in the last couple of decades, with a peak of 39.070 red deer harvested in 2010 (Statistic Norway 2016a). Norwegian management of ungulates should include clear goals for the desired population trend in accordance with other values such as forestry, agriculture, biodiversity and societal (Miljødirektoratet 2016). Deer management is organized within three main levels; i) Central authorities (Miljødirektoratet) are responsible for follow up of general laws and regulation, and produces guidelines for management and hunting, including the regulation of hunting period. ii) Municipalities are local authorities that implement the guidelines and regulations from the central authorities. Lastly, iii) landowners are responsible for the preparation of population plans and have responsibilities for organising the practical hunt. A-long-side these responsibilities, landowners are also involved in coordination with different bordering management units (Miljødirektoratet 2016). Although a landowner holds hunting rights, they must follow the specific quotas given by the management plan (Olaussen & Mysterud 2012). The landowners are free to keep the quota for themselves or rent it out to other hunters (Andersen et al. 2010). Considering two-thirds of the total land area are private property (Andersen et al. 2010), legal access to hunting areas are frequently distributed through landowners. Because of the increasing emphasis in which local management population plans of red deer are developed by the landowners based on local knowledge (Andersen et al. 2010), it requires a great

responsibility which makes the landowner a very important part of the management system (Andersen et al. 2009; Olaussen & Mysterud 2012).

In this thesis, we want to explore landowner's different aspects and attitudes regarding the management of red deer, both how they perceives the current situation, what improvements they think are necessary and how any of these changes can become appropriate. Are the benefits of larger cooperation more important than the drawbacks? Further, how are these opinions affected by the interests of the landowner themselves? Another main goal is to discuss these findings up against management of migratory deer.

1.1 Hypothesis and predictions

H = *Hypothesis*

P = *Predictions*

H1: Landowners act primarily as hunters and practical, social and meat are the most important aspects from red deer hunting

P1: Income from deer hunting are generally not regarded as important, except for landowners that already have some income from hunting arrangements.

H2: The balance between revenue and damage affects degree of satisfaction

P1: Browsing damage decrease satisfaction

P2: Larger quotas increase satisfaction

H3: Local anchoring and simplicity of decision-making affects the satisfaction with deer management

P1: Satisfaction decrease with management level

P2: Local satisfaction decrease with number of landowners

H4: Local anchoring affects the cooperation with deer management

P1: Cooperation decrease with management level

P2: Local cooperation decrease with number of landowners

H5: Benefits of larger cooperation are mainly self-centred

H6: Landowners see increased vald size as an important tool to improve management

P1: Landowners are aware that they have migratory deer

P2: Migratory animal's results in more agreement to increase vald size

P3: They see recent changes in hunting period as positive

2 Methods

2.1 The choice of method

Any scientific research project requires a plan that involves several decisions on how you will answer your research questions. The choice of research design is based upon whom and what is going to be the study object. Different from natural science where the study objects are not able to speak, social research – where people are the objects – requires a plan how to approach a social reality (Babbie 2013). According to Creswell (2009) there are three types of designs: qualitative, quantitative, or combining these into mixed methods. The main approaches, qualitative and quantitative research are not opposites, but represents different ends of a continuum. While qualitative research aims to explaining issues by using words, quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell 2009). For our thesis, we used a quantitative research approach. This give us the opportunity to examine a large population, providing numeric description of trends, attitudes or opinions by using a deductive approach (Creswell 2009). Our aim was to reach a population consisting of Norwegian landowners, who hold red deer on their properties. In Norway, the increase of red deer and issue around red deer management have been localised in the southwestern part of the country (Figure 1). The knowledge of this fact delimits the objects of our study. For data collection we developed questions for a self-administered web survey distributed via emails by using LimeSurvey software (LimeSurvey 2015). Web-based surveys have become a powerful tool in research design both in economic term and rapid turnaround in data collection (Sills & Song 2002). The survey is cross-sectional, where the data is collected at one point in time (Creswell 2009). The hunting period for red deer in Norway lasts from 1th September until 23th December (Solberg et al. 2015), therefore, the survey was send out to landowners via email in January 2016 to ensure that the entire hunting season of 2015 was complete. The reason was that we wanted to ensure an accurate account of the current situation, and with this timing the landowners would have the last hunting season fresh in mind.

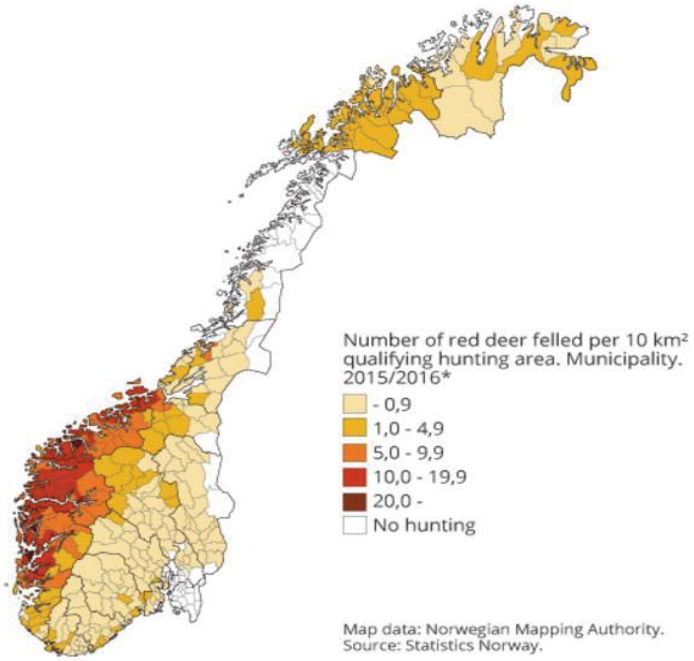

Figure 1: Number of red deer felled per 10 km^2 qualified hunting area in the municipality during hunting season 2015 (Statistic Norway 2016a).

2.2 Study area and research population

To reach the desired population of landowners we sent out the questionnaire in cooperation with Norwegian Forest Owner Associations (NFOA) and Norwegian Farmer`s Union (NFU). Both organizations cover the whole country.

Through membership lists in the organizations, it was possible to send the survey link to landowners who had registered email addresses in NFOA and NFU. Although, we were told that there was some lack of member information in the organizations` database, at least 5795 invitations were send to Norwegian speaking landowners to participate in the survey. This procedure represents a non-random sampling of participants (Creswell 2009). As stated before the increasing focus on deer management have been localised in the southwestern part of the country. Therefore, the counties included in the study were Rogaland, Hordaland, Sogn og Fjordane, Møre og Romsdal and Sør-Trøndelag. In these five counties, the number of red deer harvest were 30.628 in the hunting season 2015, which is a decline of 1.525 from the previous year (Statistics Norway 2016). This represents over 90% of all red deer harvested in Norway during the hunting season and means that these counties hold the highest red deer populations in the country (Figure 2).

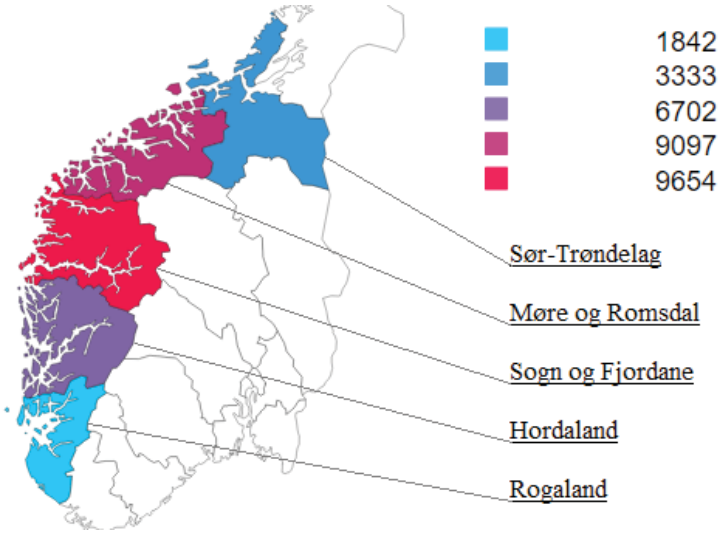

Figure 2. Number of red deer harvested in each county within the study area (Statistic Norway 2016a).

The organizations sent out e-mails independently, in three pools. While NFU directly sent at least 2441 email to their available e-mail addresses distributed on these five counties, NFOA have sub organizations, grouped into several forest owner associations. Vestskog covers Rogaland, Hordaland and Sogn og Fjordane counties, while Allskog includes Møre og Romsdal and Sør-Trøndelag within the study area. Vestkog sent out approximately 1000 e-mails and Allskog sent at least 2354. Data collection took place from 15.01.2016-17.02.2016. Since there is a probability for the landowner to be member in both organizations, we told them to ignore one of the inquires. Because of the possibility of being sent two requests, it is not possible to know the exact number of landowners that have been invited to participate or estimate a correct response rate for our survey.

2.3 The questionnaire

The survey consisted of multiple questions designed to elicit landowners´ opinions about the current red deer management in Norway. A group of nature environment researchers developed a draft questionnaire in Norwegian based in insights from previous studies (Andersen et al. 2014; Olaussen & Mysterud 2012). The questionnaire was translated into English and passed through several iterations of adjustments, following input from a board consisting of hunters, representatives of landowners, professors in natural sciences and a social scientist. The questionnaire was pilot tested by two representatives of landowners. The final version of the questionnaire was sent out in Norwegian (Appendix 2).

The welcome page of the survey explained the aim of the study. We used NFOA and NFU as sponsors as a strategy since we believed this would increase the likelihood of responses due to the trust of members in their organizations (Fan & Yan 2010). One reminder was send to the participants. However, due to a technical difficulty, one of the organizations did not send out a reminder.

The questionnaire consisted of 88 questions distributed over 10 groups. The first question confirms if their property is used for deer hunting. If the respondent ticks “yes”, they move next to question 2. If the respondent ticks “no”, they directly move to question 16 containing size of vald- hunting field- and property (Appendix 1). Due to this split in the questionnaire structure, those respondents whose property is not used for deer hunting, would not answer the full set of questions.

In general, researchers are interested in determining the extent to which respondents hold a particular perspective or attitude. Therefore, you can present a given statement as a choice-experiment, and ask respondents whether they agree or disagree, or grade of importance by using Likert scale (Likert 1932). We used both questions and statements, which we believe gave the questionnaire more flexibility in the design of items and could make the questionnaire more interesting for the respondents. Most questions were closed-ended-questions, with some open-ended questions used to elicit additional views or experiences not covered by statements as a last option in some selected groups. This was to ensure that the respondents could submit additional answer too not exclude alternative options (Creswell 2009). None of our questions was compulsory, meaning the respondents did not have to answer all questions to move further in the questionnaire. Consider question 2, 3.1 and 3.2 we ask about how many deer were harvested in the hunting field, how many of each sex and age classes and in which period they were harvested. Here the respondents had to provide numbers. Multiple responses were allowed for some questions.

2.4 Definitions

With wildlife management in mind, there are several management units to consider. From the municipality to the landowner's property, many administrative borders are defined in hunting legislation and management programs in how quotas are determined. Understanding these terms is important in order to get an overview of landowners' attitudes. In addition, the survey included questions about the different management units (Textbox 1). Some Norwegian terms are retained because there is no English equivalent.

A management unit *is a social entity where decisions are made with considerations to the unit distribution in time, act and values. The hierarchical subdivision is controlled by the acreage;*

1. *Landowners property*
2. *Hunting field*
3. *Vald*
4. *Population plan area*
5. *Municipality*

Vald: *A vald is the smallest geographical and legal entity that can be allocated a hunting permit from the municipality. A vald may contain other land types than counting acreage, but it is just the qualified area who get allocation of hunting permits.*

Hunting field: *An area identical to- or smaller than a vald where the respective landowner has the right to hunt within a restricted area. Several landowners may pose a hunting field to achieve a qualified area within a vald. At the other hand, the landowners' property can be large enough to pose its own hunting field, or even a vald. A vald board distributes the hunting permits within the hunting fields.*

Population management plan: *An approved perennial (maximum five-year) public plan containing goals for the management with a description of population trends and the annual harvest of cervids.*

Population plan area: *An area representing two or more valds in a committed cooperation, where they have common population plan with the same management objectives.*

Textbox 1. Definitions of local management units (Miljødirektoratet 2016).

2.5 Data treatment

After the closure of the questionnaire (17.02.2016), we collected the raw data from Lime survey for cleaning in Microsoft Excel. Together, 852 individuals of the landowner entered our survey within the designated period. Because of the memberships list may overlap in county distribution, participants from outside the study area who participated were removed from the data set (n=7). This was most likely due to sending error from one of the organisations. In addition, participants who entered our survey without adding answers were removed (n=48). This made 811 individual landowners responded one or more questions. Because of dropouts during the participation, the response rate was decreasing throughout the survey with a full response of 548 in the end. Since the questionnaire was not compulsory, we chose to keep all responses, either if they just had completed group 1 or 10, to keep as many answers as possible. Sub questions were combined into single groups to show how many landowners answered each specific question. A percentage distribution was made from the total number of responses (n). Some questions (9 to 14) that asked of degree of importance- or agree/disagree, were merged from five to three categories. Cross tabulation with the pivot function in excel was used to gather information about relationship between questions as they were or further used in statistical analyses.

2.5.1 Statistical analysis

We used version 3.1.2 R commander (R Core Team 2013) in statistical analyses.
Pearson chi-squared test (Pearson 1900) was used to test for pairwise differences in distribution of answers across groups of respondents. Generalized linear models (GLM) with a logit link were used for relationship between a response variable and two or more predictor variables. The response variables in the GLM were in all cases a dichotomized version of multilevel answers. As an example, the degree of satisfaction with local deer management (5 options ranging from very satisfied to very dissatisfied) were dichotomized by assigning "very satisfied" and "satisfied" value 1 and all other answers value zero. We tested correlation between candidate predictor variables included in the same models. If $r>0.6$, only one of the variables where included. Hetcor function in R was used to check for correlation coefficients between multiple variables and quantifies correlation between all combinations of numerical and factorial variables.

In order to run statistics for many of the questions/variables it were required to merge into fewer categories to achieve a sufficient sample size within each category. Open-ended questions are interpreted as text and are not analysed statistically. In all statistical analyses, P values less or equal to 0.05, treated as significant.

3 Results

3.1 Description of survey respondents

Landowners who answered the survey were unevenly distributed within the study area. Sør-Trøndelag had the highest fraction (30%), while Sogn & Fjordane the lowest (12%). Sixty-one percent were older than 50 years (Figure 3). The majority of respondents were male (92%). Of all respondents, 93% had properties with deer hunting activity. The majority also live on the property all year (92%), while 5% live there part of the year and remaining 3% do not live there at all.

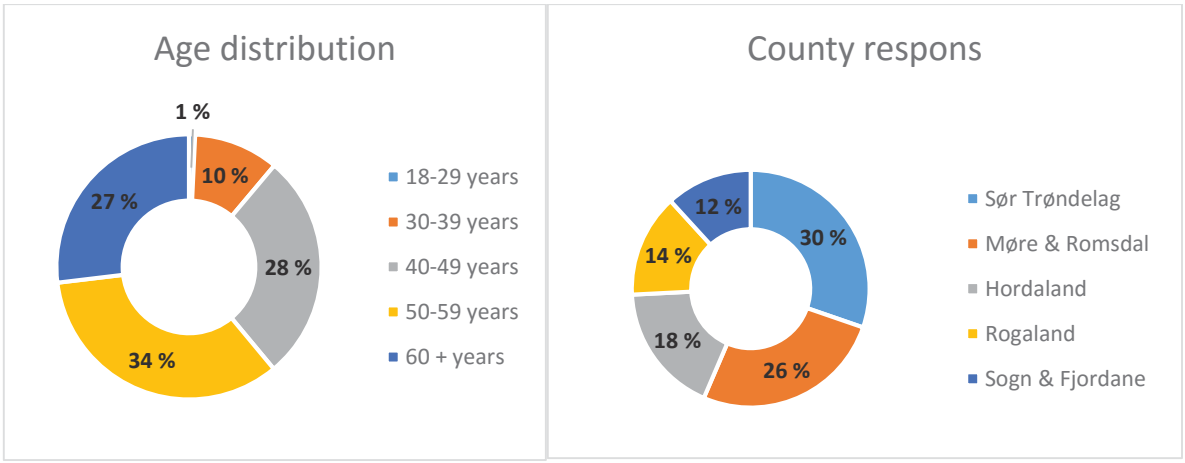

Figure 3: Age distribution and county response

Twenty percent have properties smaller or equal to 499 acres, 72% between 500 – 4.999 acres and 8% have properties larger than 5.000 acres. Both vald and hunting field differed in size amongst landowners (Table 1). The average vald size is somewhere between 5.000 and 49.999 acres and average hunting field size between 2.000 and 19.000 acres. Seventy-seven percent are stating that they have a perennial management plan for their vald area, 15% do not have, and 8% do not know.

Table 1: Vald and hunting field size (acres)

Vald size	**%**	**Hunting field size**	**%**
< 2000	**12%**	< 500	**4%**
2.000 – 4.999	**11%**	500 – 1.999	**15%**
5.000 – 19.999	**25%**	2.000 – 4.999	**27%**
20.000 – 49.999	**20%**	5.000 – 19.999	**38%**
> 50.000	**22%**	> 20.000	**9%**
I don't know	**10%**	I don't know	**7%**

Number of landowners in vald and hunting field diverges to some extent, but for vald it is most common that more than ten landowners are involved (64%) (Table 2).

Table 2: Number of landowners in hunting field and vald

Landowners in hunting field	n/%	Landowners in vald	n/%
Separate	**76/11%**	One vald	**30/4%**
2-5 landowners	**210/30%**	2-5 landowners	**113/16%**
6-10 landowners	**203/29%**	6-10 landowners	**97/14%**
>10 landowners	**202/29%**	>10 landowners	**451/64%**
I don't know	**16/2%**	I don't know	**12/2%**

Income from agricultural production (including livestock) vary between landowners, but average income is somewhere between 50.000 and 249.000 NOK. Main agricultural production at landowners' properties is composed of mainly grass (85%). While arable crops (7%), fruit/berries (4%) and other (3%) are less common. To get an opinion regarding browsing damages at the property, landowners were asked to state the severity of such damages on pastures and forest, where in total 27% stated that they had some or serious damage on forest and 43% had some or serious damage on pasture (Table 3).

Table 3: Extent of browsing damage by deer on forest and pastures owned by the landowner in 2015

Type of damage	Serious damage	Some damage	Little damage	No damage	I dont know
Browsing damage on forest	8%	19%	37%	34%	2%
Browsing damage on pastures	20%	23%	29%	27%	1%

Today's income from red deer hunting (including any accommodation, guiding, meat sales etc.) are low amongst landowners. Fifty-five percent (n=294) have no income at all, and 90% have less than 10.000 kr.

When it comes to red deer arrangements, the typical participants involved in the hunt on the landowner's property are the landowners him/herself with family, friends or local hunters (77%). Of all landowners in the survey, 15% lease all deer hunting at their property, while 11% of the respondent combine these by leasing in some periods. When landowners where asked to state how involved they were in management of deer, 61% said they participated in the practical hunting (i.e., to take part in the act of hunting). Forty-eight percent participate in annual meetings with members of hunting field, vald or management plan area. While landowners are less involved as contact person for hunting field to the vald (34%) or function as board member in management plan areas (9%). Further, 83% are stating that they in some way are involved in deer management.

3.2 Red deer population size and migration behaviour at landowners property

Majority of landowners think the deer population at their property is appropriate (51%), 30% thinks it is to large, 16% thinks is to low and remaining 3% do not know.

Landowners tend to know the migration pattern for red deer within their area, and the majority reply that the most common migratory movement is that red deer enter the hunting field throughout the hunting season (57%). A smaller percentage say red deer disappears from the area (27%), while the perception of only having stationary animals seems to be the least common (11%). Only five percent are stating that they do not know (Figure 4).

When landowners where asked of their opinion with respect to the recent changes in hunting season, the majority of landowners states that the situation is better now. Both when the hunting period was advanced from 10^{th} to 1^{th} September (55%) and extended to 23^{th} December (64%) (Table 4). Further, landowners who states that some or many deer disappear throughout the hunting season were more satisfied (69%) with the earlier start (advanced from 10^{th} - 1^{th} Sept.) than landowners who states that some or many deer enter throughout the hunting season (51%); $\chi^2 = 12.3$, df = 2, P= 0.002). Landowners with some or many deer entering throughout the hunting season are more satisfied (75%) with the longer hunting season (15^{th} Nov to 23^{th} Dec) than landowners with some or many deer disappear throughout

the hunting season (52%) (χ^2 = 24.5, df = 2, P= <0.001).

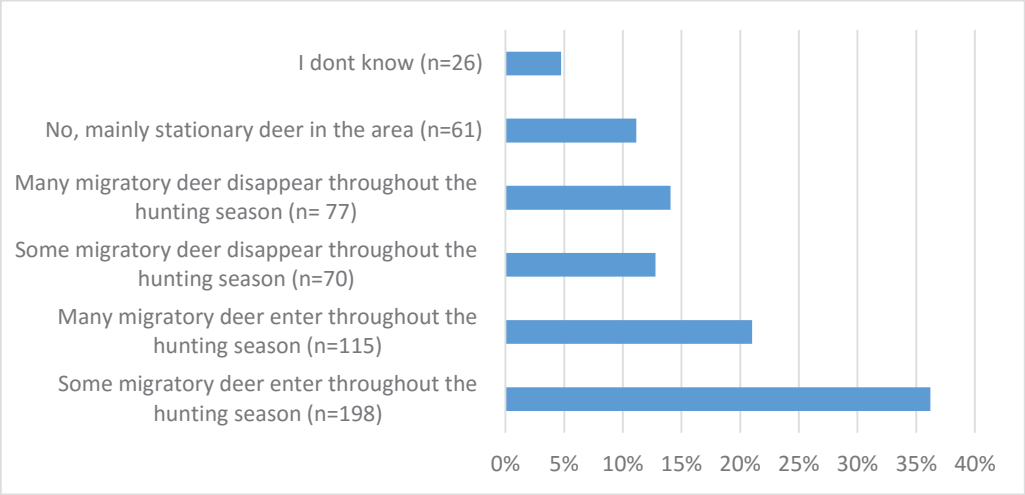

Figure 4: Do you have migratory deer in your huntning fiald? Mark the most appropriate

Table 4: Management authorities recently extended the legal hunting period. What is your opinion on this change?

	Better now	It does not matter	Better before	I don't know
Season start moved forward from 10 September to 1 September	55%	24%	16%	4%
Season end moved back from 15 November to 23 December	64%	18%	14%	5%

3.3 What does "good deer management" means to landowners

All questions that were presented under this topic had more consensus then disagreement (Figure 5). The most important aspect for landowners is that deer population must be validated against biodiversity and other landscape and conservation goals (75%). That red deer management is conducted in line with a joint management plan also seems to be important (62%).

Questions regarding other considerations within the management, working to reduce deer population to lower the cost of pasture damages (61%) seems to be the main driver for landowners. Reducing deer population because of browsing damages on forest (53%) and risk of road accidents (40%) have less agreement.

When asked about sex and age classes in harvested animals, more landowners agree to harvest yearlings (55%) than calves (35%). Further, agreement to retain a high proportion of adult hinds (50%) and adult stags (48%) do not differ to this extent. That income is evenly shared between landowners is also something that is important (57%).

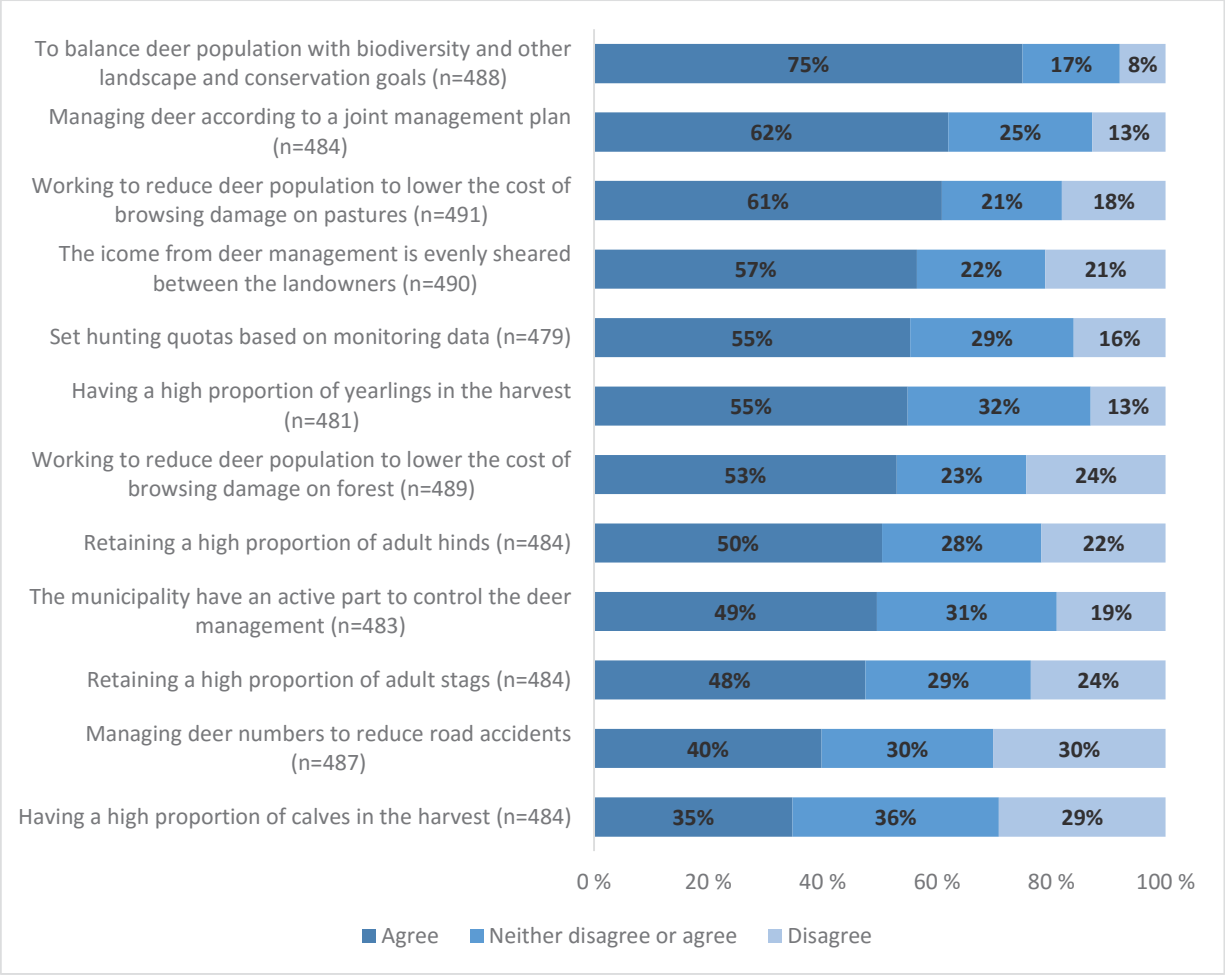

Figure 5: What does god deer management means to you?

3.4 Importance of deer hunting aspects

Practical (53%), social (45%) and meat (43%) from deer hunting seems to be the most important aspects for landowners (Figure 6). Income (12%) and trophies (5%) are of least

concern. However, the aspect of income from red deer hunting becomes more important for landowners if they already have some income through renting out hunting (χ^2 = 100, df = 1= P <0.001) (67.4% versus 18.4%). Further, the aspect income are more important for landowners who do not participate in the practical aspects of hunting (χ^2 = 15.2, df = 2= P <0.001) (55.5% versus 37%).

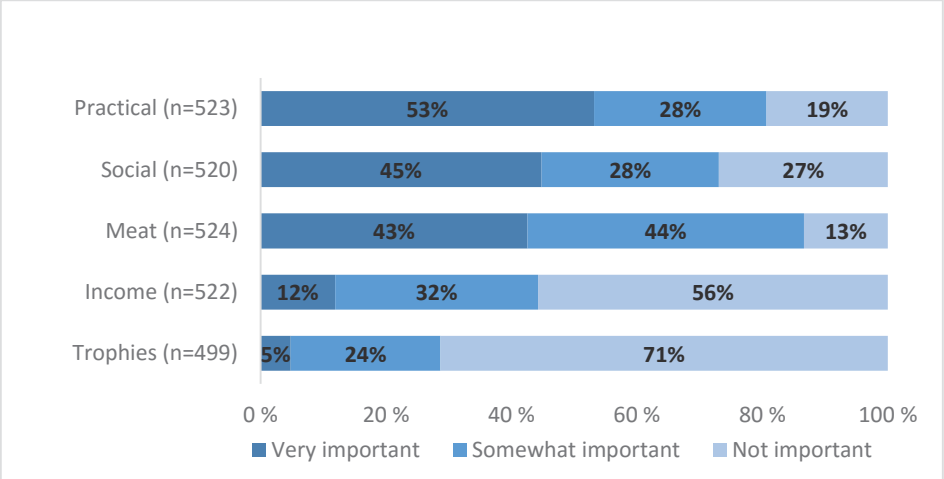

Figure 6: How important are the following aspects of deer hunting to you?

3.5 Satisfaction in red deer management among landowners

In general, the landowners seem to be quite satisfied in how current management is organised at all management levels. However, the proportion of satisfied landowner decreases from hunting field to municipality (Figure 7). Landowners that were dissatisfied with management at the municipality level also thought that municipality should be more involved in deer management (χ^2 = 37.2, df = 4 P = < 0.001; (Figure 14).

The correlation in degree of satisfaction also decreases with the hierarchical difference in management level. The highest correlation is found between hunting field and vald (Table 5).

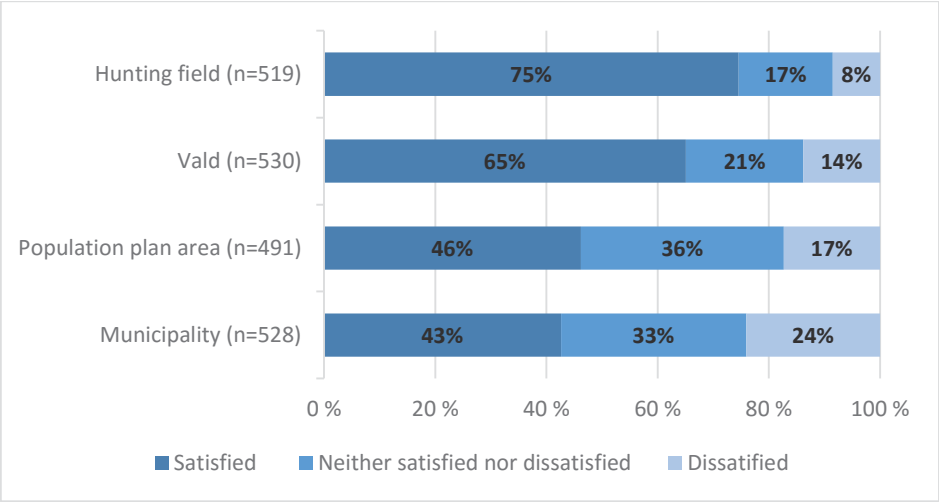

Figure 7: Are you satisfied with how deer management is currently organised?

Table 5: Correlation between management units in responses to the question "are you satisfied with how deer management is currently organised"

Variables	1	2	3	4
1. Hunting field	1	*	*	*
2. Vald	0.64	1	*	*
3. Management plan area	0.44	0.62	1	*
4. Municipality	0.32	0.34	0.55	1

The size of vald influence the degree of satisfaction in how red deer management is organised (χ^2 = 9.85, df =4 P = 0.04). Landowners with vald size smaller than 5.000 acres were less satisfied than landowners with larger vald size (Figure 8). Number of landowners in a vald did not affect the degree of satisfaction (χ^2 = 0.75, df = P = 0.68). Neither are there any relationship between number of landowners in a hunting field and satisfaction (χ^2 = 4.56, df = 2, P = 0.102).

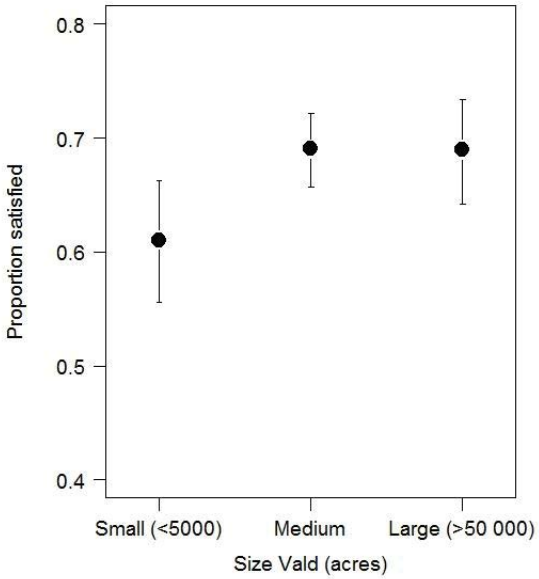

Figure 8: Proportion satisfied landowners in the question "are you satisfied with how deer management is currently organized" as a function of vald size. Small (<2.000 up to 4.999) Medium (5.000-19.9000 – 20.000-49.999) Large (50.000 or more).

The degree of satisfaction with deer management at vald level increased with quota, but decreased with the level of damage on agricultural pasture (Table 6; Figure 9). There was no correlation between browsing damages on forest and degree of satisfaction at vald level (χ^2 = 6.85, df = 6, P = 0.33).

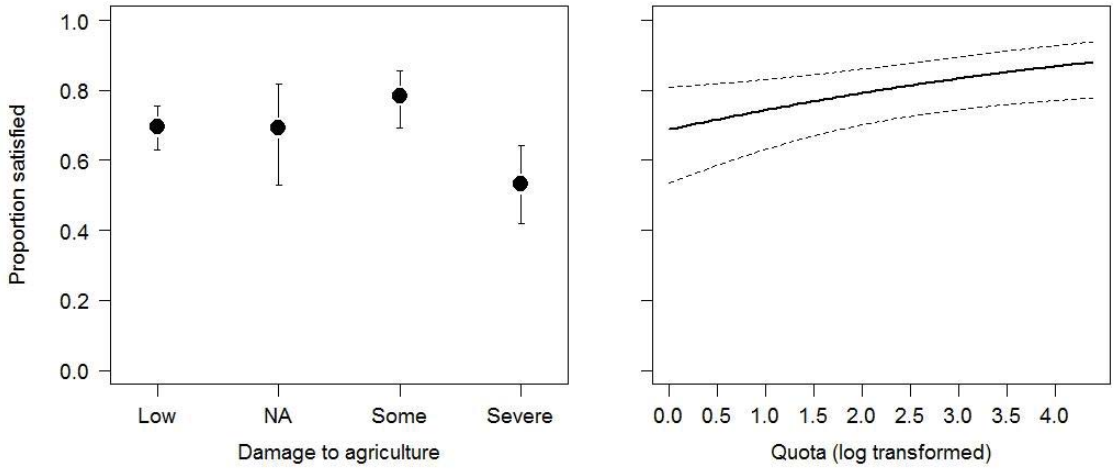

Figure 9: Proportion satisfied landowners in the question "are you satisfied with how deer management is currently organized" as a function of total quota and browsing damages on pastures (NA= Not provided or I don't know).

Table 6: Generalized linear model. Dependent variable: Satisfaction vald level

	Estimate	SE	Z value	P value
Intercept	0.3220	0.2310	1.39	0.1633
Not provided	-0.0149	0.3762	-0.04	0.9683
Some damage	0.4691	0.2904	1.61	0.1062
Serious damage	-0.6962	0.2851	-2.44	0.0146
Quota	0.2725	0.1148	2.37	0.0176

3.6 Current experience of cooperation

In line with current organisation of deer management, it seems like landowners perceive cooperation as good (Figure 10). For example, does 65% percent state that cooperation is good among landowners within the hunting field. For cooperation between hunting field in the same vald, most landowners also say that cooperation is good (51%) (Figure 10). The degree of satisfaction is declining with acreage and if there is cooperation between such units. However, there is only the question about cooperation between municipalities, landowners experience as poor (Figure 10).

We also predicted that the degree of positive view on cooperation would decrease with the number of landowners in hunting field, however there is no significant difference between number of landowners in a hunting field and degree of cooperation ($\chi^2 = 0.85$, df = 2 P = 0.65). Those who believe that landowners have other goals (see Figure 12) are less likely to state that cooperation is good between landowners. However, there was no such significant correlation among landowners within hunting fields (Table 7).
Likewise, with degree of satisfaction, the similarity in response decreases with the different management categories (Table 8).

Table 7: Generalized linear model. Dependent variable: Goals of other landowner are very different from my own.

Variable	Estimate	SE	Z value	P value
Intercept	-2.6570	2.7480	-0.001	0.999
Among landowners within hunting field	1.3820	3.8520	0.001	1.000
Intercept	0.5764	0.1627	3.5430	0.001
Between hunting field in the same vald	-0.9331	0.2253	-4.14	0.001
Intercept	-0.1027	0.1603	-0.64	0.522
Within the management plan area	-1.4161	0.2676	-5.49	0.001
Intercept	0.1691	0.1558	1.08	0.277
Between vald/management plan area and municipality	-1.3807	0.2399	-5.75	0.001
Intercept	-1.1907	0.1852	-6.42	0.001
Between municipalities	-1.3806	0.3522	-3.92	0.001

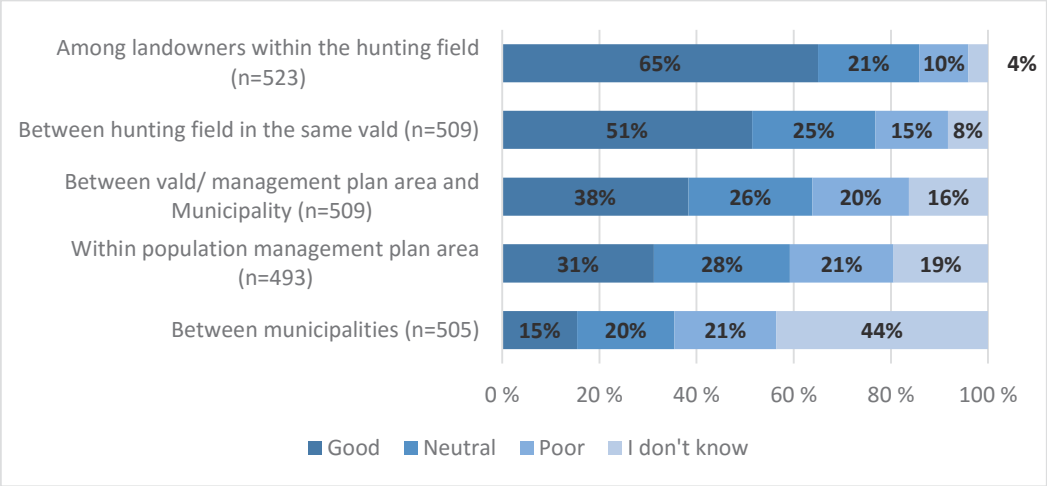

Figure 10: How would you describe the cooperation in relation to deer management as you currently experience it?

Table 8: Correlation in response between management units in the questions "How would you describe the cooperation in relation to deer hunting and management as you currently experience it"

Variables	1	2	3	4	5
1. Among landowners in same vald	1	*	*	*	*
2. Between hunting fields in same vald	0.50	1	*	*	*
3. Between vald/management plan area	0.25	0.51	1	*	*
4. Within population management plan area	0.17	0.39	0.73	1	*
5. Between municipalities	0.08	0.28	0.61	0.74	1

3.7 Benefits and drawbacks with cooperation

Landowners seems to agree more in questions regarding benefits (Figure 11) than drawbacks (Figure 12) with cooperation.

One of our hypotheses was that benefits of larger cooperation was mainly self-centred (income, less administrative duties and access to more licenses and larger area is important factors). The least agreed question under this topic, however, is that greater cooperation results in more income (21%). Nor does the larger proportion of landowners agree that less reporting/administrative duties (30%) and paperwork/meetings (19%) are important in this matter. On the other hand, landowners do agree that access to larger areas and more licenses are important benefits of greater cooperation (55%). Benefits of larger cooperation are rather seen in context with management issues. For example, that you can ensure harvest of same sex and age classes (70%), ensure appropriate number of deer shot over a larger area (63%) and improve management of migratory animals (60%). Another important aspect is that most landowners also agree that cooperation facilitates the practical aspects of hunting (61%).

Divergent goals and conflicts between landowners are the main challenges of greater cooperation. From the asked questions of drawbacks, statements that involve interference between landowners are amongst the most agreed. For example, goals of other landowners are very different from my own (35%), I must relate to people I find difficult (31%) and other landowners do not want to cooperate (26%) (Figure 12). However, that red deer population differs too much between hunting fields (39%) seems to be the most important drawback with larger cooperation. Further, landowners with more damage on pastures are more likely to state that other landowner goals are very different from my own (Table 9).

Table 9: Generalized linear model. Dependent variable: Goals of other landowners are very different from my own.

Variable	Estimate	SE	Z value	P value
Intercept	-0.9135	0.1385	-6.59	0.001
Serious damage	1.2775	0.2460	5.19	0.001
Some damage	-0.0980	0.2486	-0.39	0.693

We were also interested to see if some benefits with cooperation changed if landowners participated in the practical hunt. Landowners who take part in in this act tend to agree more that cooperation facilitates the practical aspect of hunting ($\chi^2 = 7.26$, df = 2, P = 0.02), results in less reporting and administrative duties ($\chi^2 = 6.40$, df = 2, P = 0.04) and to meet

neighbours/ other hunters socially (χ^2= 12.5, df = 2, P = < 0.001). None of the remaining questions under this topic were significantly different between landowners who hunt and not.

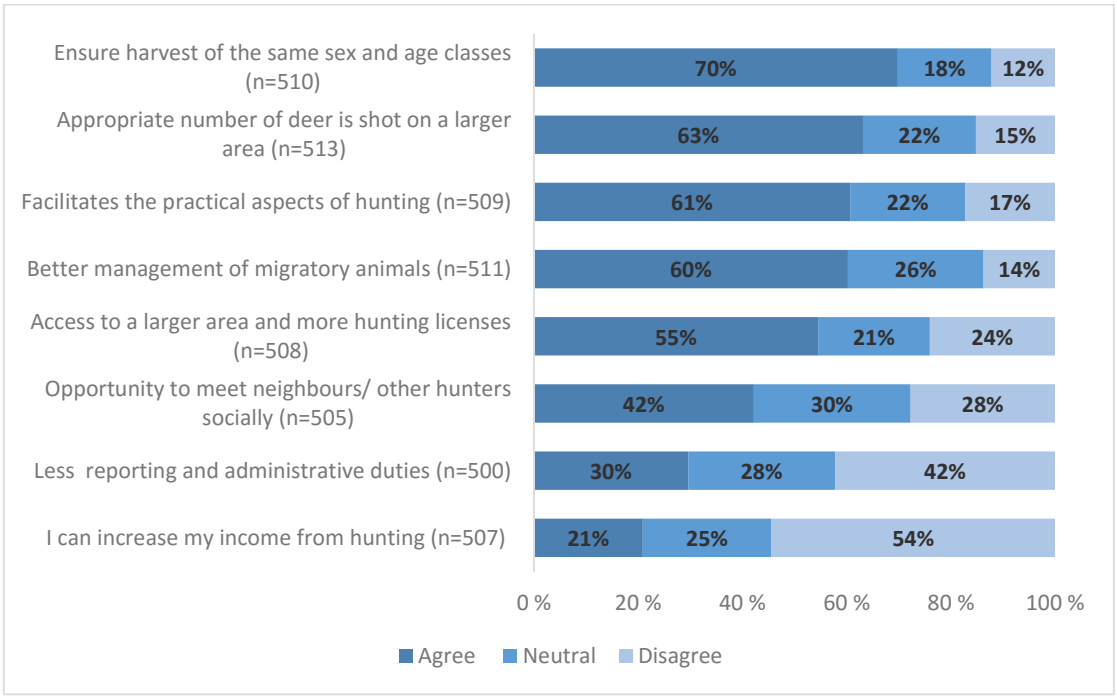

Figure 11: What is your view on the benefits of cooperation with other landowners?

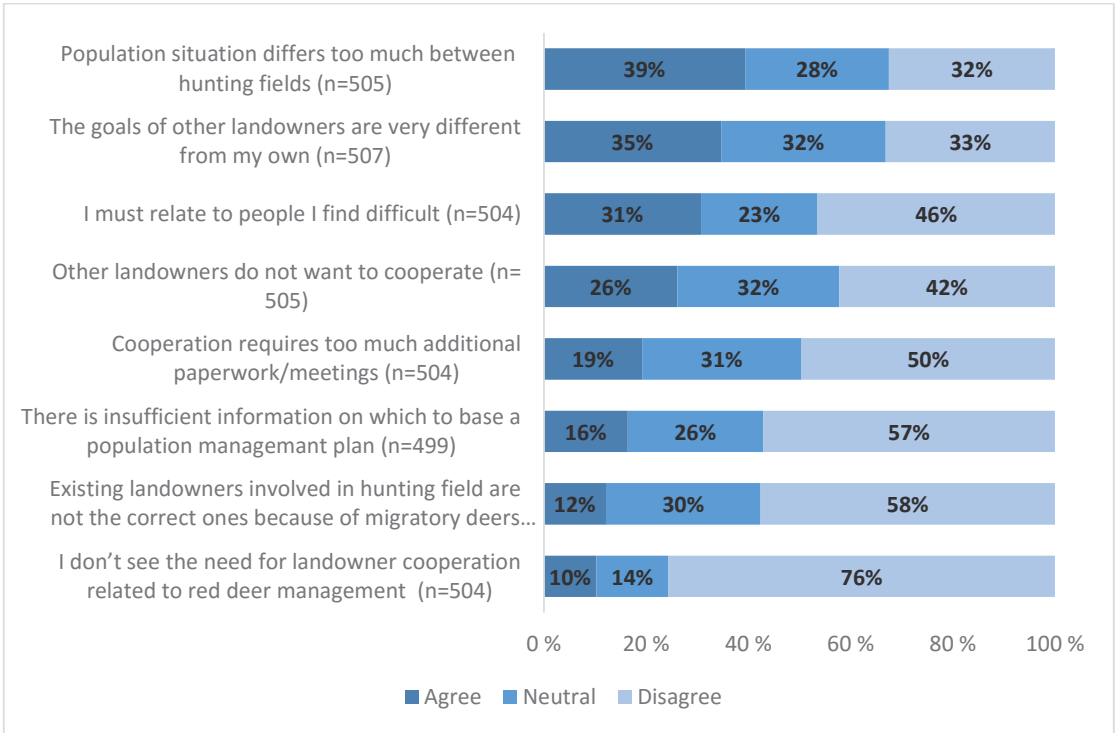

Figure 12: what is your opinion on potential drawbacks and challenges of cooperation with other landowners related to red deer management?

To get a more thorough understanding about benefits and drawbacks, respondents were able to make up an opinion in open questions. Although few of the respondents used this opportunity, some patterns emerged.
The most prominent challenge of greater cooperation in open questions is what is considered appropriate populations size (n= 21). The majority of written benefits are connected to improved management (n=17), this because they think harvest over a larger area is more efficient and an easier way to reduce the population size (n=6), but also because they believe you can distribute quotas to areas it seems more preferable (i.e., areas with browsing damages) (n=5). Some sees greater cooperation as a positive effect for social and practical aspects (n=8), for example to recruit hunters and simplify hunting (i.e., enables more hunting forms).

Many of the written answers are due to a conflict of interest between landowners that experience browsing damages who feel they are a minority in relation to landowners who don't see this as an issue (n=21). As an example, one landowner is stating "Serious damage problems on pastures, and few active farmers who becomes a minority on annual meetings. The majority is composed of landowners who have no interest in crops, but with a desire to have a large population of deer". Other interactions between landowners is also something that has some support (n=14). For example, enhanced discussion because of divergent values (n=6) and shearing of dividend from hunting (n=3)

3.8 Which improvements does landowners see as necessary in order to achieve better deer management

The majority of landowners think that improvements are necessary (figure 14). Seventy six percent of the respondents do also see the need for landowner cooperation in relation to red deer management. Only ten percent do not see this as any advantage at all (see figure 13). Further, a larger proportion thinks that such cooperation is a necessity to achieve better deer management (53%).

The most agreed question under this topic is to improve common agreements on management aims within the municipality and across municipality borders (64%). Hence, a larger proportion of landowners also think that there is a need for better monitoring to identify/understand changes in the deer population (54%).

Landowners believe that it is more important to harvest migratory- (39%) than stationary deer (30%). Moreover, respondents who states that red deer are migrating (enter or disappear) from their hunting field are more likely to agree that to harvest more migratory animals is necessary to achieve better deer management (figure 13). Further, if compering landowners who agree and disagree to improve cooperation between landowners, respondents who states that many or some migratory deer disappear from the area are more likely to see improved cooperation as an advantage (χ^2=3.82, df= 1, P= 0.005). Red deer migration behaviour also influence what the individual landowner thinks about deer population at his/hers property (χ^2=16.4, df= 4, P= 0.002), where those with stationary animals seems to believe that red deer population is largest (table 10).

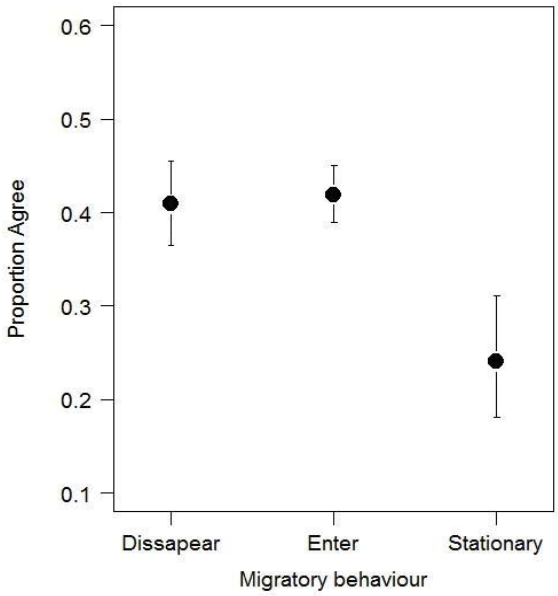

Figure 13: Proportion agree in the question "More of the migratory animals need to be harvested" as a function of migratory behaviour (figure 4)

Table 10: What the landowner thinks about red deer population size at his/hers property in relation to migratory behaviour (figure 4).

	Too large	Appropriate	Too low	I don't know
Disappear	21,1 %	47,4 %	24,1 %	7,5 %
Stationary	44,4 %	46,3 %	9,3 %	0,0 %
Enter	32,3 %	53,1 %	13,5 %	1,0 %
I don't know	15,0 %	60,0 %	15,0 %	10,0 %

A small proportion of landowners agree that increased size of vald will achieve better deer management (19%). This opinion do not change if red deer disappear, enter or are stationary within the hunting field area (χ^2= 6.3, df= 4, P= 0.17). However, landowners who think that cooperation leads to better management of migratory animals are more willing to increase their vald size (χ^2=15.2, df= 4, P= <0.001) (30,2% versus 10,3%).

There is more support for that management plan over large number of vald are a solution for better management (39%). That neighbouring valds harvest same sex and age classes is also something that is of importance (47%).

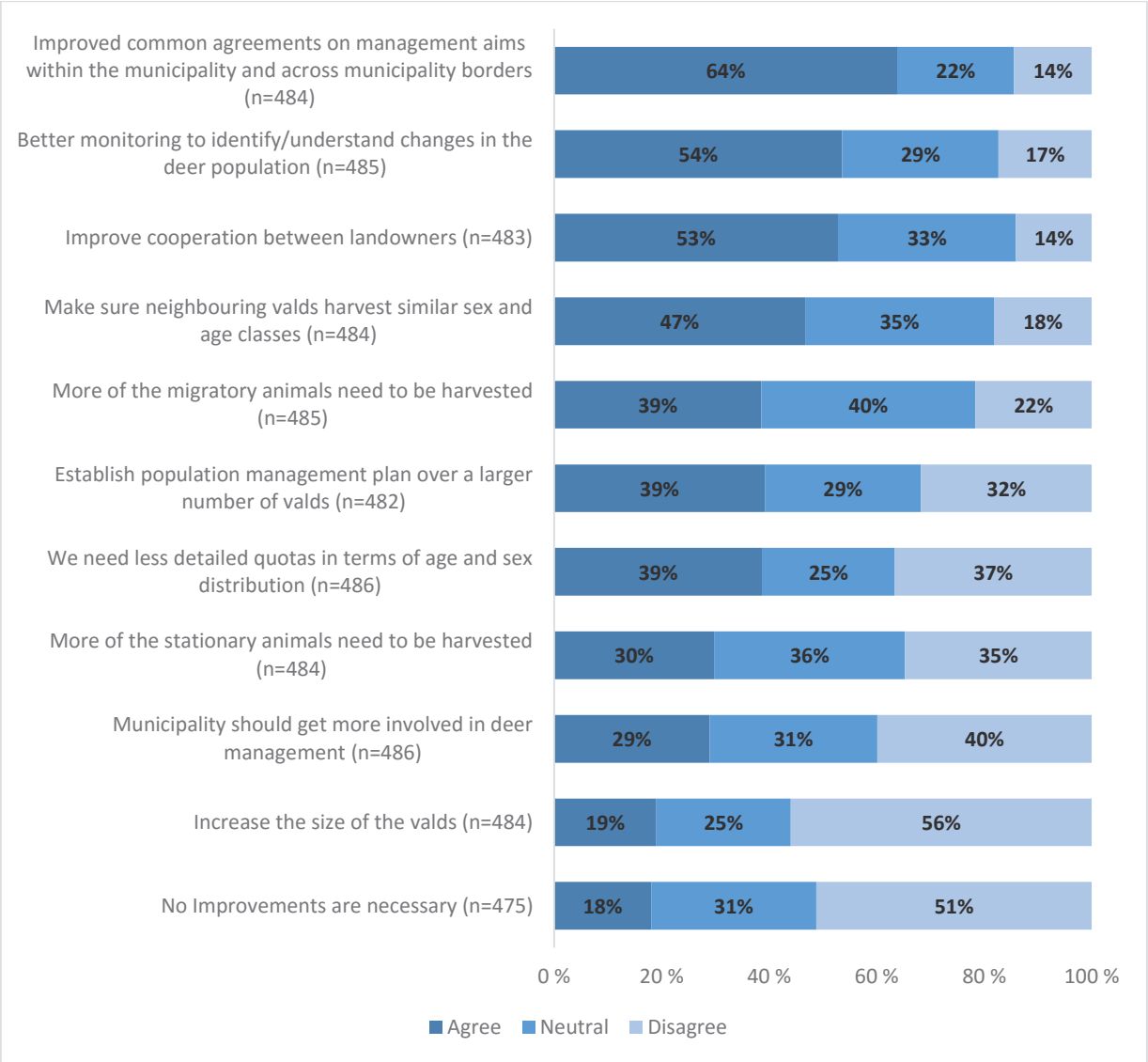

Figure 14: What improvements do you think are necessary in order to achieve better deer management?

4 Discussion

In this thesis we have explored Norwegian landowners' perception and opinions regarding the management of red deer. Our survey reveals that landowners are pleased with present management, but that these perceptions are influenced by several factors. Although in general satisfied, the majority also identify management issues with potential for improvement. Cooperation is something that landowners regard as important to achieve management objectives, and these views are not only limited to self-centred interests, but are also considered in a larger perspective. However, it appears that some management objectives, such as forming larger management units, are perceived as challenging. Contrary to our predictions, we could not distinguish any relationship between the number of landowners in vald or hunting fields and degree of satisfaction with cooperation and organisation. Further, agreement to increase the vald size was low amongst landowners, and did not change drastically in relation to migratory behaviour.

Similar to red deer, the pink-footed geese (*Anser brachyrhynchus*) has increased in population in the last decades (Madsen et al. 2014). During their long-distance migration, pink-footed geese frequently use areas in Norway as stopover sites. Because of large populations, browsing damages on pastures have become confrontational within agriculture (Bjerke et al. 2014; Tombre et al. 2013). Collaboration and insight into landowners' opinion and motivations are thereby important for management success (Søreng et al. 2015). Management of goose stopover sites suggest that larger and more coherent management units are key management action. Expanding the collaboration and spatial scale of management are thus identified as main management challenges also within other taxa and for species that cross several municipality borders as well as country borders. However, similarities from our study are most likely to occur within other fields where a resource, such as deer, is unevenly distributed and where the degree of influence differs between stakeholders (Austin et al. 2011).

4.1 Hunting aspects and arrangements

In agreement with the study of Olaussen and Mysterud (2012) from Sogn og Fjordane it appears that also within our study area it is most common that red deer hunting is conducted by the landowner themselves with family, friends and locals, which demonstrates that this is a widespread phenomenon in Norwegian red deer hunting. Landowners also participate in annual meetings and state that they are involved in management, indicating that many landowners have a keen interest in both red deer and their management. Our survey confirms that traditional values, such as meat and recreation, are the most important aspects for landowners in regard of deer management (*Supporting H1*). This is something that has been stated in earlier studies (Milner et al. 2006) and are common in the Norwegian context because of long hunting traditions. In general, income from red deer hunting was low amongst landowners, but was more important for landowners that already had some income from such arrangements, which also supports our prediction (*H1, P1*).

The typical Norwegian management unit involves many landowners (64% have more than 10 landowners in a vald), i.e., many small properties together constitute a management unit. We have demonstrated that deer hunting is an activity based on recreational purposes. It is therefore interesting to compare the differences in structure to other countries. In Scotland, the individual land holding or estates owned by private landowners are large in spatial extent, ranging in size from 10.000 to over 100.000 acres (MacMillan & Leitch 2008), and unlike Norwegian conditions, the private Scottish landowner depends on red deer as a natural resource that makes a significant contribution to the rural economy. These private landowners are more likely to manage deer populations to maintain high-density levels to optimize economic profit (Austin et al. 2011). Further, according to TNS (2004), 3.500 people participated in deer stalking in Scotland, and represent less than 0.001% of the population. The privileged who saw landownership for sport to gain social status, have mainly persisted through the social structure surrounding sporting estates where white men, typically 50 years or older with a higher social status are the people taking part in the Scottish red deer stalking (MacMillan & Leitch 2008). In contrast, 45.400 participated in the red deer hunt in Norway in 2014 constituting 0,9% of the population (Statistic Norway 2016a; Statistic Norway 2016b). Additionally, Norwegian red deer hunters represent a diversity of typologies (Andersen et al. 2014). While Scottish hunting is defined by an upper class participation, Norwegian hunting is a community-based activity. This comparison is interesting because it demonstrates

differences in hunting structure and that landowners from different countries have vast divergent opinions regarding the management of a single species, which clearly highlights the need for detailed information to successfully improve management.

4.2 Current perception of red deer management

Despite landowners identifying management issues, they seem to be quite satisfied with both organisation and cooperation within red deer management. However, our findings show that satisfaction seem to decrease with the hierarchical level of the management units (*Supporting H3, P1 and H4, P1*). In addition, another remark is that landowners tend to not know the state of cooperation and organisation with increased acreage (e.g., between municipalities), which also could imply that landowners are more familiar with smaller areas or not included or engaged in broader cooperation. Ferranto et al. (2013) surveyed forest owners' willingness to engage in cooperation with others. Their findings shows that support for collaboration decreased from local to state and federal level. They discussed these findings in the light of Bergmann and Bliss (2004), and suggest that distrust and uncertainty to reveal their own goals may be causes for limited engagement in cooperation with state and federal level. Trust between parties can be a determining factor for shared goals and successful management (Berkes 2009), and may be equally important in our study system.

West and Parkhurst (2002) examined two stakeholder groups: agricultural producers and homeowners in Virginia, to determine whether the white-tailed deer (*Odocoileus virginianus*) density influence them. By using a mail questionnaire, they wanted to understand the interactions between deer-density and attitudes that are necessary to effectively manage the deer population. Their main findings show that those who experience severe damage were more likely to consider the deer population as a nuisance, and supported dramatic reduction in the deer herd. In direct and open-ended questions from our survey it seems like browsing damages on pastures is an important factor influencing satisfaction. Landowners who report some agricultural damage are the most satisfied, while landowners with severe damage the least (*Supporting H2, P1*). It therefore seems like landowners are accepting some degree of browsing damage up to a threshold value, most likely because they also have the possibility to harvest the deer causing the damage. That landowners were willing to hold a certain deer

density at the cost of economic loss was also shown in the study of Olaussen and Mysterud (2012). On the other hand, higher quotas increase satisfaction (*Supporting H2, P2*). This may be because quotas could provide the opportunity to harvest more animals, where it is desirable, but also because it provides a means to reduce damage. Hence, we believe that possibilities to affect a certain amount of deer through population control is important in this context (Brown et al. 2000).

We expected that the degree of satisfaction and cooperation would decrease with number of landowners due to higher probability of conflicting interests. However, we did not find any evidence for this at vald or hunting field level (*Rejecting H3, P2 and H4, P2*). Nonetheless, that cooperation and satisfaction decrease throughout the management units' points to an important trade off in scale where larger areas are more suitable for management reasons, but the nature of human interactions makes management at these scales more difficult. In addition, this is supported when a large proportion of landowners are stating that common agreements on management aims within the municipality and across municipality borders need to be improved. This is something that has been shown for other taxa (Treves & Karanth 2003), and may be transferable to our case. Different goals between landowners affected the landowners' likelihood to state that cooperation was good. However, this was not the case for landowners within a hunting field, which further highlights that agreement between landowners could be more difficult to achieve with increased spatial scale.

4.3 Benefits and drawbacks with enhanced cooperation

We hypothesized that the perceived benefits of cooperation were mainly self-centred. Despite that access to larger area and more licenses are important and can promote the individual landowner, benefits are seen in a greater context (*Rejecting H5*), reflecting that landowners are aware and acknowledge management perspectives. In addition, landowners do believe that cooperation improves and facilitates red deer management. Agreement in such aspects are something that can greatly contribute to further and enhanced collaboration.

Irvine et al. (2010) addressed diverse goals between stakeholders as barriers for collaborative deer management. From our respondents it also seems like divergent goals among landowners can contribute to such an effect. Through closed and open questions about what relates to conflicts, some possible issues emerges. Open questions have a small total (n) and must

therefore be treated with caution, but it seems like landowners have two different perspectives; those who find the current red deer population size appropriate and those who think it is too large. The latter group often provides browsing damage on pastures as a reason. However, this is something that has been reckoned as an issue in red deer and ungulate management in Norway for a long time (Andersen et al. 2009). The benefit of cooperation is said to be greatest when extent of browsing damages and migratory behaviour increases (Mysterud et al. 2011a). However, conflicting interests can complicate broader cooperation (Apollonio et al. 2010), and will require well defined guidelines to attain management objectives. Knowledge about divergent and contrary opinions provides insight into potential conflicts and are important to understand in order to improve cooperation between participants, which eventually can promote red deer management through specific measures (Côté et al. 2004).

4.4 A need for larger management units?

Landowners seem to know that they have migratory deer (*Supporting H6, P1*) and they perceive the deer as mainly entering or leaving their hunting field during the hunting season. Migratory behaviour proved to affect landowners' vision of cooperation and their view on how many migratory deer that should be harvested, hence this should emphasise the need to address such behaviour in relation to red deer management.

Mismatches between red deer habitat use and management units are frequent (Apollonio et al. 2010; Jarnemo 2008; Zimmermann et al. 2014). Increased size of management units or vald are thereby said to be preferable (Kropil et al. 2015; Meisingset 2015). With knowledge about red deer habitat and spatial use during the year in Sogn og Fjordane, Meisingset (2015) suggested that a vald area of 300 km^2 could contain 80% of the population. The majority of landowners in our study have vald areas less than 50.000 acres (202 km^2). The spatial use of red deer is influenced by several factors (Mysterud et al. 2011a), but there is a high probability that the vald units within our study area are too small to cover larger parts of a given red deer population. Interestingly, what these studies say about the need of broader cooperation and larger management units, the highest rated improvement alternative to achieve better deer management in our study is that agreements on management objectives within the municipality and across municipality borders need to be improved. Additionally,

the greatest drawback with cooperation from a landowner's view is that red deer populations differs too much between hunting fields, which makes this an even more important issue.

Despite the fact that landowners who believe that cooperation leads to better management of migratory animals show more interest to increase the vald size, the majority want to keep the current vald composition (*Rejecting H6*). We also predicted that landowners with migratory deer saw increased vald size as an important tool to improve management, but we could not distinguish any clear difference between migratory behaviour and the respondent's willingness to increase their present vald size (*Rejecting H6, P2*). Although, an interesting finding shows that landowners included in larger valds tend to be more satisfied with the current organisation. However, the majority of landowners are satisfied at vald level, which can point to the same direction of what Olaussen and Mysterud (2012) discussed, that landowners are satisfied with how things are, which may be an explanation for reluctance to increase vald size. Additionally, increased vald size could mean more involvement from additional landowners and further extensions of administrative borders. Another solution to expand the area of management units, and which could function as a substitute for increased vald size, is to establish management plans over larger numbers of valds. Landowners obviously see this as a more workable solution to improve deer management. However, it should be noted that a large proportion also disagree with this statement.

4.5 Landowners response to central authority regulations

Follow-up studies can be useful for evaluating attitudes towards management changes (McCleery et al. 2006). To compensate for the population growth and emerging conflicts, management authorities both extended and gave the opportunity to start the hunting season earlier. This allows for the harvest of red deer to be better distributed between and over a larger area (Solberg et al. 2015). Landowners in our survey tend to believe that this change has improved the situation (*Supporting H6, P3*), which indicates that management authority goals also are suitable for landowners. In addition, landowners who stated that animals disappeared from the hunting field were more satisfied with the advanced hunting period compared to those who had deer entering their hunting field. Loe et al. (2016), found that harvest increased in inland management units by 17%, and we documented that this was well

received by landowners with typical deer summer ranges, if assumed the migration pattern follows vertical movements (Mysterud et al. 2011b).

Landowners prefer decision making at the local level, and thus do not prefer more municipal involvement. However, if landowners are dissatisfied with the current situation, they believe that the municipality should involve themselves more. About half agree that municipalities should have an active part in controlling the red deer management, meaning that some involvement is appreciated and seen as necessary from a landowner's point of view. These findings provide insight into how management changes are received, and are relevant in an adaptive perspective (Allen et al. 2011).

4.6 Method and sampling procedure

When using a self-administered web survey, several factors will influence the completion of the questionnaire. These are important to consider in relevance to our survey (Babbie 2013).

The content in the questionnaire may have been too comprehensive, in both expected duration and in relative against too detailed requirements from the participants. An example is where the total (n) decreased dramatically between question two and four (n=184). These questions required the respondents to fill in the numbers of each: sex- and age specific information about harvest and quota (Appendix 1). In hindsight, those questions were of little importance with a quantitative approach. We should have just kept questions that sought for total quota.

The web survey completion, which concerned the process where participants received the accommodation, the log in- completing and submitting their answers, can affect response rates (Fan & Yan 2010). The organizations sent out the invitations independently to their membership lists. When members from one of the organizations received accessed to the survey link, the lime survey software went through an unannounced update, causing an error message. The survey link was non-functional for approximately 12 hours. We believe we lost potential responses, in addition to drop off from the web survey process caused by this direct technical flaw (Fan & Yan 2010). Because of this incident, a subsequent reminder was not sent to those members.

The topic will also influence the response rates (Fan & Yan 2010). Landowners who are more dedicated to management and red deer hunting, or have a keen interest are more likely to

participate. Hence, we also believe that given answers are controlled by deer density and which county they represent. Our thesis shows an overall view of the red deer management and we must be aware that these findings can differ between counties (Figure 2). Internet access- or use is negatively correlated with age (Couper et al. 2007). However, we got a good representation of the oldest age segment (Figure 3), which can indicate a low degree of bias.

By using two independent organisations with large overlap in membership, it was not possible to calculate an overall response rate. We had no opportunity to look through the membership lists, and are unfamiliar with how many participants may overlap in organization membership. A response rate should be achieved in a survey (Babbie 2013), and is a guide of the representativeness to the sample. If there were no overlap in membership, the response rate would be 14% (n=811), however, we believe our response rate is much higher.

5 Conclusion

There has been a demand for knowledge that combines wildlife and social interactions (Gamborg & Jensen 2016; Johansson et al. 2016; McCleery et al. 2006; Sandström 2012). In conjunction, there is a need for studies that target landowners' challenges related to an increased and expanding deer population (Olaussen & Mysterud 2012). Our survey highlights some possible challenges between landowners and management of red deer. Despite the fact that landowners perceive a need for improvement, landowners are quite satisfied with the present situation. We may conclude that the majority of Norwegian landowners at the west coast see the necessity of measures that can help to improve red deer management, and that they see more benefits than drawbacks with cooperation between landowners to achieve these goals. However, different interests and perceptions of the present situation can complicate this relation and the success of obtaining certain objectives. One example can be different goals amongst participants, and thus communication between parties is therefore essential to promote common objectives and to avoid conflicts. We may also conclude that goals from management authorities, such as larger vald, are not necessary perceived as desirable from a landowner's perspective.

Our survey can be useful in terms of improving the link between practical management and landowners, and provides an insight into the current situation. This study also provide a guideline for further discussion between managers and landowners considering management of red deer. Nonetheless, further research is needed to address different stakeholders' attitudes regarding red deer as a mobile resource (Austin et al. 2011).

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7 Appendix 1. Landowner survey about red deer management

Norwegian Forest Owner Associations (NFOA) and Norwegian Farmer`s Union (NFU) participates in a larger research project where the aim is to identify some key topics relating to deer hunting and deer management. An important focus is to investigate the extent to which the landowner's regard changes in todays practice to be necessary. It is important that as many landowners as possible participate in the survey and complete the questions fully. The survey will take approximately 20-30 minutes. Data will be treated confidentially. Results will be reported only in an aggregated format, securing the anonymity of each individual landowner.

Main findings from the survey will be presented in the magazine "Hjorteviltet" and provide basis for a workshop with landowners and managers. If you have any questions regarding the survey, feel free to contact **Vidar Holthe** (vidar.holthe@skog.no) in NFOA or **Finn Erlend Ødegård** (finn.erlend.odegard@bondelaget.no) in NFU.

This survey are sent to members of the Norwegian Farmer`s Union and- or Norwegian Forest Owner association. If you are member in both organizations and have received two requests to participate in the survey, please ignore one of these inquiries.

Group 1: Deer hunting structures

1. Deer hunting structure around your property– Please tick the appropriate box in each block.

1a	Yes	No	If you tick "no", you will directly go to questions 16.
My property is used for deer hunting			

1b *Hunting field*

A) My property constitutes a separate hunting field	
B) Our hunting field consist of 2-5 landowners	
C) Our hunting field consist of 6-10 landowners	
D) Our hunting field consist of >10 landowners	
E) I don't know	

1c *Vald*

A) Our hunting field represents its own vald	
B) Our vald consists of 2-5 hunting fields	
C) Our vald consists of 6-10 hunting fields	
D) Our vald consists of >10 hunting fields	
E) I don't know	

1d	Yes	No	I don't know
Our vald has a perennial population management plan			

Group 2: Deer Harvested

2. In 2015; How many red deer were harvested in the hunting field where your property is included? *Enter 0 if the specified type of deer were not harvested. Please leave blank if you do not know.*

	Fawn	Hind (1,5)	Stag (1,5)	Hind (2,5 year or older)	Stag (2,5 year or older)	Total
Number of deer shot						

3.1 When and how many deer were harvested in your hunting field during 2015? *Enter 0 if no deer were harvested in the specified period. Please leave blank if you do not know.*

	1.-9. September	10.-30. September	October	November	December	None	I don't know
Number of felled deer							

3.2 What was the total quota for your hunting field in 2015?

4. Management authorities recently extended the legal hunting period (2012). What is your opinion on this change?

	It is better now	It does not matter	It was better before	I don't know
A) Season start moved forward from 10 September to 1 September				
B) Season end moved back from 15 November to 23 December				

5. Do you have migratory deer in your hunting field? Mark the most appropriate

A) No, mainly stationary deer in the area	
B) Yes, SOME migratory deer enter throughout the hunting season	
C) Yes, MANY migratory deer enter throughout the hunting season	
D) Yes, SOME migratory deer disappear from the area throughout the hunting season	
E) Yes, MANY migratory deer disappear from the area throughout the hunting season	
F) I don't know	

Group 3: Hunting arrangements in general

6. Who is involved in the actual red deer hunting on your property?

A) Myself/family/friends/locals hunt ourselves	
B) Rent out some periods	
C) All the deer hunting at my property is for rent	
E) Other:	

7. How important are the following aspects of deer hunting to you?

	Not important	Somewhat important	Very important
A) The practical part of deer hunting			
B) Meat from deer hunting			
C) Trophies from deer hunting			
D) The social part of deer hunting			
E) Income from deer hunting			

Group 4: Deer management

8. What is the nature of your current involvement in the management of deer? (Several choices possible):

A) I participate in the hunt	
B) I am the contact person of hunting field towards vald or I report the number of seen deer and/or shot deer ("jaktleder" or serve secretary function)	
C) I am involved in administration in the *vald* (e.g. responsible for vald towards the municipality, or involved in drawing up the management plan at the *vald*, ensuring that management plan objectives are adhered to)	
D) I am board member of *population plan area* (collaboration of several *vald*)	
E) I participate in annual meetings with members of *hunting field*, *vald* or *population plan area*	
F) I am not involved in deer management	
G) Other:	

9. Are you satisfied with how deer management is currently organised?

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
A) In the *hunting field* area					
B) In the *vald* area					
C) In the *population plan area*					
D) In the municipality					

Group 5: Benefits and challenges of cooperation

10. How would you describe the cooperation in relation to deer hunting and management as you currently experience it?

1 = Cooperation is very poor- 5 = Cooperation is very good.

	1	2	3	4	5	I don't know
A) Among landowners within the *hunting field*						
B) Between *hunting fields* in the same *vald*						
C) Within the *population plan area*						
D) Between *vald/ population plan area* and Municipality						
E) Between municipalities						

11.1. What is your view on the benefits of cooperation with other landowners?

1= Disagree strongly – 5 = Agree strongly

	1	2	3	4	5
A) Through cooperation I have access to a larger area and more hunting licenses					
B) Through cooperation we can ensure to harvest the same sex and age classes					
C) By cooperating we can ensure that an appropriate number of deer is shot on a larger area					
D) Cooperation leads to a better management of migratory animals					
E) Cooperation facilitates the practical aspects of hunting					
F) I can increase my income from hunting if I cooperate with others					
G) I have less reporting and administrative duties if I cooperate					
H) Cooperation provides an opportunity to meet neighbours/ other hunters socially					

11.2. Are there any other benefits of cooperation that come to mind? Please specify:

12.1. What is your opinion on potential drawbacks and challenges of cooperation with other landowners related to red deer management?

1= Disagree strongly – 5= Agree strongly

	1	2	3	4	5
A) Cooperation requires too much additional paperwork/meetings					
B) I don't see the need for landowner cooperation related to red deer management					
C) There is insufficient information on which to base a *population management plan*					
D) Population situation differs too much between *hunting fields*					
E) The goals of other landowners are very different from my own					
F) Other landowners do not want to cooperate					
G) I must relate to people I find difficult					
H) Existing landowners involved in *hunting fields* are not the correct ones because of migratory deers					

12.2. Are there any other challenges or drawbacks of cooperation that come to mind? Please specify:

Group 6: Improvements and god deer management

13. What improvements do you think are necessary in order to achieve better deer management?

1= Disagree strongly – 5= Agree strongly

	1	2	3	4	5
A) Increase the size of the valds					
B) Make sure neighbouring valds harvest similar sex and age classes					
C) Establish *population management plan* over a larger number of *valds*					
D) Better monitoring to identify/understand changes in the deer population					
E) Improved common agreements on management aims within the municipality and across municipality borders					
F) We need less detailed quotas in terms of age and sex distribution					
G) More of the stationary animals need to be harvested					
H) More of the migratory animals need to be harvested					
I) Improve cooperation between landowners					
J) Municipality should get more involved in deer management					
K) No improvements are necessary					

14. What does “good deer management” mean to you?

1= Disagree strongly – 5= Agree strongl1y

	1	2	3	4	5
A) The income from deer management is evenly sheared between landowners					
B) Set hunting quotas based on monitoring data					
C) Retaining a high proportion of adult hinds					
D) Retaining a high proportion of adult stags in the population					
E) Having a high proportion of calves in the harvest					
F) Having a high proportion of yearlings in the harvest					
G) Working to reduce deer population to lower the cost of browsing damage on pastures					
H) Working to reduce deer population to lower the cost of browsing damage on forests					
I) Managing deer numbers to reduce road accidents.					
J) Managing deer according to a joint management plan					
K) The municipality take an active role in overseeing deer management					
L) To balance deer population with biodiversity and other landscape and conservation goals					

Group 7: Size of vald, hunting field and property

15. Deer population: (Single cross)

	Too large	Appropriate	Too low	I don't know
The deer population on my property is				

16. In 2015, the extent of browsing damage by deer on forest and pastures I own:

	Serious damage	Some damage	Little damage	No damage	I don't know
A) Browsing damage on forest					
B) Browsing damage on pastures					

17. The size of your *vald* (acres)

< 2.000	2.000-4.999	5.000-19.999	20.000-49.999	50.000 or more	I don't know

18. The size of your hunting field (acres)

< 500	500-1.999	2.000-4.999	5.000-19.999	20.000 or more

19. Size of your property (acres):

< 50	50-249	250-499	500-999	1.0001.999	2.0004.999	5.00019.999	20.000 or more

Group 8: Agricultural Production

20. The size of the infield/agricultural area on my property is (acres):

0-49	50-99	100-199	200-299	300-499	500 or more

21. The main production on my agricultural area in 2015 consisted of:

Grass	Arable crops	Vegetables	Fruit/Berries	Other

Group 9: Income

22. Gross income (*before tax*) from red deer hunting (including any accommodation, guiding, meat sales etc.) in 2015 was

0	1-4.999 kr	5.000-9.999 kr	10.000-14.999 kr	15.000-24.999 kr	25.000-49.999 kr	50.000-99.999 kr	100.000 kr or more

23. Please provide an estimate of your total income and any income from your property that apply to you.

	0	1-24.999 kr	25.000-49.999 kr	50.000 - 99.000 kr	100.000 - 249.999 kr	250.000 - 399.000 kr	400.000 - 599.999 kr	600.000 kr or more	Prefer not to say
A) Total Gross income(*before tax*) from any source in 2015 was:									
B) Gross income from forestry in 2015 was:									
C) Gross income from forestry in normal years is:									
D) Gross income from agriculture (including livestock) in 2015 was:									

Group 10: Personal data

In the end, would you please provide some personal data.

24. Gender:

Female	Male

25. Age

18 - 29	30-39	40-49	50-59	60+

26. Location of your property

A) County	
B) Municipality	
C) Zip code for your property	

27. Do you live on the property this questionnaire refers too?

D) Yes, all year	
E) Yes, part of the year	
F) No	

8 Appendix 2. Grunneierundersøkelse om hjorteforvaltning

Norges Skogeierforbund og **Norges Bondelag** deltar i et større forskningsprosjekt med formål om å kartlegge noen sentrale tema vedrørende hjortejakt og hjorteforvaltning. Et viktig fokus er å undersøke i hvilken grad grunneiere ser nødvendigheten av endringer i dagens praksis eller ikke. Vi håper så mange som mulig ser seg tid til å besvare spørsmålene. Det er veldig viktig at så mange som mulig svarer, og at svarene er så korrekte som mulig. Undersøkelsen vil ta ca. 20- 30 minutter. Svarene vil bli behandlet anonymt, og det vil kun bli rapportert gjennomsnittsverdier fra undersøkelsen slik at det ikke er mulig å identifisere hva den enkelte grunneier har svart.

Hovedfunn fra spørreundersøkelsen vil bli presentert i tidsskriftet "Hjorteviltet" og vil gi grunnlag for møtevirksomhet med grunneiere og forvaltere. Ved spørsmål angående undersøkelsen kontakt **Vidar Holthe** (vidar.holthe@skog.no) i Norges Skogeierforbund eller **Finn Erlend Ødegård** (finn.erlend.odegard@bondelaget.no) i Norges Bondelag.

Denne spørreundersøkelsen sendes til medlemmer av Norges Bondelag og Norges Skogeierforbund. Dersom du er medlem begge steder og dermed har mottatt to forespørsler om å delta i spørreundersøkelsen, ber vi deg se bort fra den ene av disse henvendelsene.

Gruppe 1: Strukturering av hjortejakt

1. Hjortejakt på din eiendom – ett kryss per delspørsmål (a, b, c og d).

1a	Ja	Nei	Hvis egen eiendom ikke utnyttes til hjortejakt, vil du gå dirkete til spørsmål 16.
Min eiendom utnyttes til hjortejakt			

1b. *jaktfelt*

A) Min eiendom danner eget jaktfelt	
B) Vårt jaktfelt består av 2-5 grunneiere	
C) Vårt jaktfelt består av 6-10 grunneiere	
D) Vårt jaktfelt består av >10 grunneiere	
E) Vet ikke	

1c. *Vald*

A) Vårt jaktfelt danner et eget vald	
B) Valdet vårt består av 2-5 jaktfelt	
C) Valdet vårt består av 6-10 jaktfelt	
D) Valdet vårt består av >10 jaktfelt	
E) Vet ikke	

1.d

	Ja	Nei	Vet ikke
Valdet vårt har en flerårig bestandsplan			

Gruppe 2 - Felte hjort

2a. Hvor mange hjort ble felt i jaktfeltet hvor din eiendom inngår i 2015? Skriv 0 om den aktuelle alders- eller kjønnskategorien ikke ble skutt. La det stå åpent om du ikke husker antallet.

	Kalv	Ungkolle (1,5 år)	Spissbukk (1,5 år)	Hind/Kolle (2,5 år og eldre)	Bukk (2,5 år og eldre)	Sum
Antall dyr felt						

3.1 Når ble det felt hjort i ditt jaktfelt i 2015? Skriv 0 hvis ingen hjort ble felt i perioden. La det stå åpent om du ikke husker antallet.

	1.-9. september	10.-30. september	Oktober	November	Desember
Antall dyr felt					

3.2 Hva var den totale kvoten på ditt jaktfelt i 2015?

4. Hva synes du om utvidelsen av jakttida for hjort som ble innført i 2012?

	Det er bedre nå	Spiller ingen rolle	Det var bedre før	Vet ikke
A) Framskynde fra 10. september til 1. september				
B) Utvide fra 15. november til 23. desember				

5. Har du/dere trekkende hjort på jaktfeltet?

A) Nei, hjorten i området er hovedsakelig stasjonær	
B) Ja, det kommer NOEN trekkende hjort utover i sesongen	
C) Ja, det kommer MYE trekkende hjort utover i sesongen	
D) Ja, NOEN trekkende hjort forsvinner fra terrenget utover i sesongen	
E) Ja, MANGE trekkende hjort forsvinner fra terrenget utover i sesongen	
F) Vet ikke	

Gruppe 3 - Hjortejakt

6. Hvem utøver hjortejakta på din eiendom/i deres jaktfelt?

A) Meg selv/familie/venner/lokale jegere	
B) Leier ut i perioder	
C) All hjortejakt på min eiendom er til leie	
E) Annet:	

7. Hvor viktig er følgende aspekter av hjortejakta for deg?

	Ikke viktig	Noe interesse	Veldig viktig
A) Den utøvende delen av hjortejakt			
B) Kjøtt fra hjortejakt			
C) Trofe fra hjortejakt			
D) Den sosiale delen av hjortejakt			
E) Inntekt fra hjortejakt			

Gruppe 4 – Forvaltning av hjort

8. Egen involvering i forvaltningen av hjort.

A) Jeg deltar i jakta	
B) Jeg fungerer som kontaktperson for jaktfeltet, eller rapporterer sette eller felt dyr (jaktleder eller sekretærfunksjoner)	
C) Jeg sitter i styret i valdet	
D) Jeg er styremedlem for bestandsplanområde (samarbeid for flere vald)	
E) Jeg deltar på årsmøter med medlemmer fra jaktfelt, vald eller bestandsplanområde	
F) Jeg er ikke involvert i hjorteforvaltning	

G) Annet:

9. Er du fornøyd med hvordan nåværende forvaltningen er organisert?

1 = Veldig misfornøyd – 5 = Veldig fornøyd

	Veldig misfornøyd	Misfornøyd	Verken eller	Fornøyd	Veldig fornøyd
A) I jaktfeltet					
B) I valdet					
C) I bestandsplanområdet					
D) I kommunen					

Gruppe 5 – Samarbeid - Fordeler og ulemper

10. Hvordan vil du beskrive samarbeidet i tilknytning hjortejakt og hjorteforvaltning slik du opplever det i dag?

1 = Svært dårlig samarbeid – 5 = Svært godt samarbeid

	1	2	3	4	5	Vet ikke
A) Blant grunneiere i jaktfeltet						
B) Mellom jaktfelt i valdet						
C) Mellom vald i bestandsplanområdet						
D) Mellom vald/bestandsplanområdet og kommunen						
E) Mellom kommunene						

11.1. Hvilke synspunkt har du om fordeler ved å samarbeide med andre grunneiere?

1 = Helt uenig – 5 = Helt enig

	1	2	3	4	5
A) Jeg får tilgang på større område og flere fellingstillatelser					
B) Man sikrer et riktigere uttak fordelt etter kjønn og alder					
C) Bidrar til å sikre at det totale jaktuttaket blir stort nok					
D) Samarbeid fører til bedre forvaltning av trekkende dyr					
E) Samarbeid forenkler den praktiske jakta					
F) Jeg kan øke inntektene fra jakt					
G) Det blir færre administrative oppgaver på meg					
H) Samarbeid om hjorteforvaltningen representerer en sosial møteplass					

11.2. Er det andre fordeler med samarbeid du tenker på? Beskriv:

12.1. Hva mener du om mulige ulemper og utfordringer med å samarbeide med andre grunneiere i tilknytning til hjorteforvaltning?

1 = Helt uenig – 5 = Helt enig

	1	2	3	4	5
A) Samarbeid krever for mye papirarbeid/møter					
B) Ser ikke meningen med grunneiersamarbeid i tilknytning til hjorteforvaltning					
C) Det er ikke tilstrekkelig informasjon til å lage en bestandsplan					
D) Bestandstettheten er for ulik mellom jaktfelt					
E) Målene til andre grunneiere er veldig forskjellige fra mine					
F) Andre grunneiere vil ikke samarbeide					
G) Må forholde meg til mennesker jeg opplever som vanskelige					
H) Involverte eiendommer i jaktfeltet er ikke de riktige på grunn av trekkende hjort					

12.2. Er det andre ulemper og utfordringer med samarbeid du tenker på? Beskriv:

Gruppe 6 – Forbedringer og god hjorteforvaltning

13. På hvilke områder mener du at det er viktig å endre hjorteforvaltningen for at den skal bli bedre i framtida?

1 = Sterkt uenig – 5 = Sterkt enig

	1	2	3	4	5
A) Øke størrelsen på valdene					
B) Sørge for at tilgrensende vald høster samme kjønns- og aldersklasser					
C) Etablere bestandsplan over enda flere vald/større bestandsplanområder					
D) Bedre overvåkning for å forstå endringer i hjortebestanden					
E) Forbedre felles forståelse av forvaltningsmål innen kommunen, og på tvers av kommunegrensene					
F) Vi trenger en mindre detaljert kvote med hensyn til alder og kjønnsfordeling					
G) En større andel stasjonære dyr bør beskattes					
H) En større andel trekkende hjort bør beskattes					
I) Forbedre samarbeidet mellom grunneiere					
J) Kommunen bør involvere seg mer i hjorteforvaltningen					
K) Ingen forbedringer er nødvendig					

14. Hva betyr god hjorteforvaltning for deg?

1 = Helt uenig – 5 = Helt enig

	1	2	3	4	5
A) Inntektene fra hjortejakta er rettferdig fordelt mellom grunneiere					
B) Sette jaktkvoter basert på overvåkningsdata					
C) Beholde en høy andel av voksne koller/hinder					
D) Beholde en høy andel av voksne bukker					
E) Felle en høy andel kalver					
F) Felle en høy andel ungdyr (1,5-åringer)					
G) Begrense hjortebestanden for å redusere beiteskader på innmark					
H) Begrense hjortebestanden for å redusere beiteskader på skog					
I) Begrense hjortebestanden for å redusere trafikkulykker					
J) Forvalte hjort som en felles ressurs gjennom en felles forvaltningsplan					

K) Kommunen har en aktiv rolle til å kontrollere hjorteforvaltningen					
L) Balansere hjortebestanden i forhold til biologisk mangfold og naturens bæreevne					

Gruppe 7 – Størrelse på vald, jaktfelt og eiendom

15. Hjortebestanden på min eiendom er:

	For stor	Passe	For lav	Vet ikke
Hjortebestanden på eiendommen min er				

16. Omfanget av beiteskader av hjort på skog og innmark (2015):

	Store skader	Endel skader	Litt skade	Ingen skade	Vet ikke
A) Beiteskader på skog					
B) Beiteskader på innmark					

17. Størrelse på vald (dekar)

	< 2.000	2.000-4.999	5.000-19.999	20.000-49.999	50.000 Eller mer	Vet ikke
Total						

18. Størrelse på ditt jaktfelt (dekar)

	< 500	500-1.999	2.000-4.999	5.000-19.999	20.000 eller mer	Vet ikke
Total						

19. Størrelse på din eiendom (dekar)

	< 50	50-249	250-499	500-999	1.000-1.999	2.000-4.999	5.000-19.999	20.000 eller mer
Total								

Gruppe 8 – Landbruksproduksjon

20. Størrelse på innmark/jordbruksareal på eiendom (dekar)

	0-49	50-99	100-199	200-299	300-499	500 eller mer
Innmark/jordbruksareal						

21. Hovedproduksjonen på mitt innmarksareal i 2015 var (Ett kryss)

	Gras	Korn	Grønnsaker	Frukt/bær	Annet
Hovedproduksjon					

Gruppe 9 - Inntekt

22. Min bruttoinntekt (*før skatt*) i forbindelse med salg av hjortejakt (inkludert eventuell overnatting, guiding, kjøttsalg osv.) i 2015 var

0	0-4999 kr	5.000-9.999 kr	10.000-14.999 kr	15.000-24.999 kr	25.000-49.999 kr	50.000-99.999 kr	100.000 kr eller mer

23. Økonomi - Vennligst gi et anslag over den samlede inntekten og eventuelle inntekter fra din eiendom.

	0	1-24.999 kr	25.000 - 49.999 kr	50.000 - 99.000 kr	100.000 - 249.999 kr	250.000 - 399.000 kr	400.000 - 599.999 kr	600.000 kr eller mer	Ønsker ikke å oppgi
A) Min totale bruttoinntekt (*før skatt*) i 2015 var:									
B) Min bruttoinntekt fra skogsdrift i 2015 var									
C) Min bruttoinntekt fra skogsdrift et normalt år er									
D) Min bruttoinntekt fra jordbruk (inkludert husdyrhold) i 2015 var									

10 – Personopplysninger

24. Kjønn:

Kvinne	Mann

25. Alder

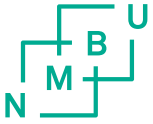
18 - 29	30-39	40-49	50-59	60+

26. Hvor er du bosatt?

A) Fylke	
B) Kommune	
C) Postnummer på eiendom	

27. Bor du på eiendommen som dette svarskjemaet refererer til?

A) Ja, hele året	
B) Ja, deler av året	
C) Nei	



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