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Lyhördhet i den svenska älgförvaltningen

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Abstract

The moose population in Sweden has historically fluctuated considerably. It has changed from a situation of near extinction to a state of overabundance. With the intent to solve some of the ecological and social problems present in the moose management, the Swedish government introduced a new moose management system in 2012. It is now supposed to be carried out in an adaptive, ecosystem- and locally based way, were the knowledge and experiences of hunters and landowners are used to manage the species. A new level of responsibility has been installed called moose management areas (MMA). The areas are governed by a moose management group (MMG) consisting of three hunters´ and three landowners´ representatives, who are supposed to represent the interests of their respective organisations. The aim of my study was to investigate the representation in the newly instated MMA´s and the component, in the concept of representation, which I mainly focused on was responsiveness. In order to investigate responsiveness, I used data from three questionnaires, which had been sent out to landowners, hunters and MMG representatives. I primarily defined responsiveness as the overlap in views, regarding the number of moose in an MMA, expressed by the local landowners´, hunters´ and their respective MMG representatives in the different questionnaires. Furthermore, I also collected several moose management plans (MMP), from the various MMAs, to be able to examine if the views of the local landowners and hunters could be observed in the plans. Moreover, to investigate if certain aspects could have an effect on responsiveness, I tested it against a number of independent variables, which I named *occupation, identity, attendance at wildlife management consultation and network.* Moreover, I also tested if there was significant difference in responsiveness between the landowners, hunters and the MMG representatives seen between the three regions Götaland, Svealand and Norrland of Sweden. The general conclusion that can be made from my study is that the overlap between the views of the local hunters and their MMG representatives appears to be slightly greater compared to the overlap between the views of the landowners and their MMG representatives. However, the overlap between the views of the landowners' representatives and the development goals in the MMPs, appears to be stronger than that of the hunters´ representatives. Furthermore, the results also revealed that two independent variables presented a significant difference in responsiveness for the landowners, namely *occupation* and *network*, indicating that responsiveness may be effected if a landowner has a job in either the forestry, agriculture or wildlife management as well as if a landowner is part of a landowner organisation. Results also revealed that responsiveness, for the hunters, may be affected if a hunter is part of a hunting team. Furthermore, I detected a significant difference in the mean level of responsiveness for hunters, amongst the three regions, but could not detect any such significant difference in responsiveness for the landowners.

Sammanfattning

Älgpopulationen har historiskt sett varierat kraftigt i Sverige. Den har utvecklats från att vara nära utrotning till ett tillstånd av överflöd. Med avsikt att lösa några av de ekologiska och sociala problem som finns inom älgförvaltningen, så har den svenska regeringen sedan år 2012 introducerat ett nytt älgförvaltningssystem. Det är nu menat att den ska utföras på ett adaptivt, ekosystem- och lokalbaserat sätt, där man använder sig av de kunskaper och erfarenheter som jägare och markägare har för att förvalta arten. En ny ansvarsnivå har införts av den svenska staten som kallas för älgförvaltningsområden (ÄFO). Dessa områden styrs av en älgförvaltningsgrupp som består av tre jägar- och tre markägarrepresentanter. Representanterna förväntas representera de intressen deras respektive organisationer har. Syftet med min studie var att undersöka representation i de nyligen införda älgförvaltningsområdena. Den komponent, inom konceptet representation, som jag fokuserade till störst del på genom hela studien var lyhördhet. För att kunna undersöka lyhördhet så använde jag mig av data från tre olika frågeformulär, som tidigare skickats ut till markägare, jägare och ÄFO representanter. Jag definierade lyhördhet som den överlappande uppfattningen, beträffande hur mycket älg det finns i ett visst ÄFO, vilket uttryckts av lokala markägare, jägare och deras respektive ÄFO representanter i de olika frågeformulären. Dessutom så samlade jag in ett flertal älgförvaltningsplaner från de olika älgförvaltningsområdena, för att kunna se om det som de lokala markägarna och jägarna uttryckt kunde återfinnas i planerna. För att dessutom kunna undersöka om vissa aspekter kunde ha en påverkan på lyhördhet, så testade jag det mot ett antal oberoende variabler, vilka jag valde att benämna som *yrke, identitet, deltagande i samrådsmöte om viltförvaltning* och *nätverk.* Jag testade även om det fanns någon signifikant skillnad i lyhördheten mellan lokala markägare, jägare och deras ÄFO representanter, sett mellan de tre svenska regionerna Götaland, Svealand och Norrland. Den generella slutsatsen som kan dras från min studie är att uppfattningen hos de lokala jägarna och deras representanter sammanfaller till större del i jämförelse med uppfattningen hos de lokala markägarna och deras representanter. Dock så sammanfaller markägarrepresentanternas uppfattning till större del med älgförvaltningsplanerna än jägarrepresentanternas uppfattning. Ytterligare, så visade resultaten från min studie på att två av de oberoende variabler gav en signifikant skillnad i lyhördhet för markägarna, nämligen *yrke* och *nätverk,* vilket indikerar att lyhördhet kan påverkas om en markägare jobbar inom skogssektorn, jordbruket eller med viltvård, likaväl kan den påverkas om en markägare är medlem i en markägarorganisation. För jägarnas data så visade resultaten att lyhördheten kan komma att påverkas om en jägare är med i ett jaktlag. Därtill, upptäckte jag att det fanns en signifikant skillnad i lyhördhet mellan de lokal jägarna och deras representanter, sett mellan de tre regionerna. Jag kunde dock inte hitta någon signifikant skillnad i lyhördhet mellan de lokala markägarna och deras representanter, sett mellan de tre regionerna.

Abbreviations

- Swedish EPA (Swedish Environmental Protection Agency, Naturvårdsverket)
- CAB (County Administrative Board, Länsstyrelsen)
- SFA (Swedish Forest Agency, Skogsstyrelsen)
- MMA (moose management area, älgförvaltningsområde)
- MMU (moose management units, älgskötselområde)
- MMG(moose management group, älgförvaltningsgrupp)
- MMP (moose management plan, älgförvaltningsplan)

Introduction

The concept of representation

In 2012 a new multi-level moose management system was established in Sweden and the management is now intended to be carried out in an ecosystem based, local and adaptive way (Näringsdepartementet, 2010; Swedish EPA , 2015). The new system was formed with the intention to resolve some of the ecological and social problems such as a fluctuating moose population, browsing damages and conflicts between landowners and hunters. Moreover, the aim of the new management is to create a high-quality moose population that is in balance with the current food-resources (Näringsdepartementet, 2010).

According to the Swedish government, the previous moose management system was lacking a sufficiently comprehensive view and government, which in turn limited the abilities to control a moose population (Naturvårdsverket, 2014). Therefore, a new level of responsibility was introduced to the system and is referred to as a moose management area (MMA) (Figure 3). Each MMA is supposed to contain a single moose population, thus facilitating a better ecological adapted management (Näringsdepartementet, 2010). The MMAs are governed by a moose management group (MMG) consisting of three landowners´- and three hunters´ representatives. The MMG representatives are supposed to have knowledge regarding aspects such as forestry and hunting and are intended to represent the views of their respective interest groups (Näringsdepartementet, 2010). Included in the MMAs are smaller areas, which are referred to as moose management units (MMU), license areas and unregistered grounds (Figure 3). Moose management plans (MMP) are produced on both an MMU level as well as on an MMA level and one of the MMGs main tasks is to harmonise these different plans at the ecosystem level (Näringsdepartementet, 2010). Since the MMG representatives are supposed to represent the views of their interest groups and use knowledge from the local landowners and hunters to create durable MMPs, it is imperative to have a well-functioning representation embedded in the system (Sandström, Wennberg DiGasper, & Öhman, 2013; Bjärstig, Sandström, Lindqvist, & Kvastegård, 2014; Lindqvist, Sandström, Bjärstig, & Kvastegård, 2014; Wallgren, 2016).

Included in the concept of representation are accountability and responsiveness (Ribot, 2005). Accountability implies that the represented population has ways of sanctioning the representatives with the help of various accountability mechanisms. In the moose management accountability would imply that the local landowners and hunters are provided with ways of sanctioning their MMG representatives if they feel like they are being misrepresented. Responsiveness entails that the representatives are given certain powers enabling them to respond to the wishes of the represented population (Ribot, 2005). Responsiveness in the new moose management system therefore entails that the MMG representatives are able to convey the views of the local landowners and hunters into the construction of the MMPs.

The aim of my study is to explore the responsiveness between the different actors involved in the construction of the MMPs on an MMA level. More specifically I will explore:

- to what extent the views of the local landowners and hunters overlap with the views of the MMG representatives.
- to what extent the views of the representatives overlap with the development goals present in the MMPs.
- Whether responsiveness is affected by certain aspects such as for example how far a landowner or hunter live from their respective MMAs, if they are part of a landowners´ or hunters' organisations etc.
- If there is a significant difference in responsiveness between the landowners, hunters and the MMG representatives seen between the three regions Götaland, Svealand and Norrland of Sweden

The history of moose management in Sweden

The moose population in Sweden has historically suffered from large fluctuations. The management of the species has changed throughout the years from resembling what Hardin (1968), referred to as a tragedy of the commons, with open access hunting and an over-exploitation of the moose population, into a state of complete overabundance of moose (Hardin, 1968; Ekman, 1993; Sandström, Wennberg DiGasper, & Öhman, 2013)

The history of moose hunting and management in Sweden goes back for centuries. During the middle ages the monarchs had monopolised hunting on all cervid game in the country and the monopoly was held for a long period of time. Despite the regulations, illegal hunting was common, especially in the northern parts of Sweden and it, partly, kept the moose population down on a low level (Ekman, 1993; Liberg, Bergström, Kindberg, & Von Essen, 2010).

In 1789, legislation regarding the right to hunt moose was changed and thereafter it was linked to ownership of land, regardless of the owner's ancestry and social status (Ekman, 1993; Liberg, Bergström, Kindberg, & Von Essen, 2010). At this point in time, most of the land in Sweden was owned by farmers and peasants and enormous hunting on cervid species commenced. Thus, the moose population was reduced radically (Ekman, 1993; Liberg, Bergström, Kindberg, & Von Essen, 2010). The extensive hunting was put to a stop by the enforcement of a 10-year ban, however when the ban ended the hunting was resumed to its former extent (Ekman, 1993).

In 1938, the Hunting Act was introduced and this encouraged small farm owners to unite with others and create larger game management areas (Liberg, Bergström, Kindberg, & Von Essen, 2010). The areas had a license system with bag limits equivalent to the abundance of moose (Liberg, Bergström, Kindberg, & Von Essen, 2010). The introduction of the hunting act was one of the first steps towards a moose management with collective action (Ekman, 1993; Liberg, Bergström, Kindberg, & Von Essen, 2010). Moreover, in the 1950-60´s, clear cutting became prominent in the Swedish forestry (Ekelund & Hamilton, 2001) which helped create an abundance of food for the moose population (Ekman, 1993). The abundance of food and a change in regulations, which had once prohibited the killing of calves instead of the cow, led to an explosion of the moose population (Ekman, 1993).

Owing to an inconsistent management and hunting (Figure 1), the moose population in Sweden has suffered from large fluctuations over time. However, two of the most significant historically factors that have influenced the development of the moose population and its management are firstly the institutional change requiring landowners and hunters to engage in collective action and secondly the industrialization of forest management in Sweden (Wennberg DiGasper, 2008; Liberg, Bergström, Kindberg, & Von Essen, 2010).

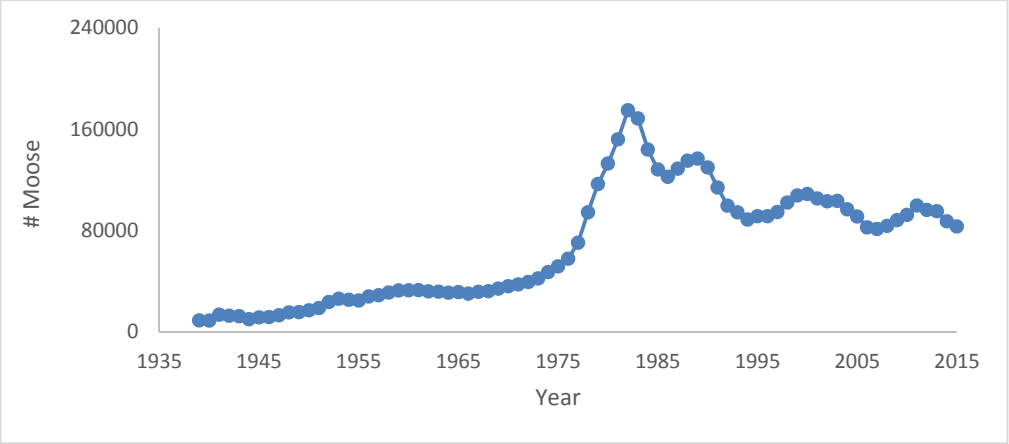

Figure 1 Historically reported moose harvest in Sweden from 1939-2015. Source Viltdata

As mentioned initially the Swedish Parliament approved a new moose management system in 2010 which was fully implemented in 2012 and the management is now carried out in an ecosystem based, local and adaptive way. The management aims to create a high-quality moose population that is in balance with the current food resources (Swedish EPA , 2015). Moreover, important aspects that need to be considered whilst constructing the management goals are general interests such as predators, damages to forests caused by moose, moose related traffic accidents and biodiversity (Swedish EPA , 2015). The management is also meant to reduce costs by creating a self-financed inventory system. As the management is adaptive, it should constantly be altered and revised in order to account for new or changing circumstances (Swedish EPA , 2015). In the next sections the current state of the art regarding these aspects will be briefly presented.

Effects on the ecosystem and economic aspects

At present the summer moose population in Sweden is estimated to be around 300 to 400 thousand individuals (Olsson M. , 2015) which implies that Sweden has the world's densest moose population in relation to the current forest area (Wallgren, 2016). The status of the moose population is not only of concern for humans, but the species also plays an important role in the ecosystem. The moose consumes around 10 kg dry weight (30-40 kg fresh weight) each day in the summer and 3-5 in winter (Ekman, 1993; Persson, Danell, & Bergström, 2000). Studies, regarding moose browsing preferences, have shown that moose favour deciduous trees, such as rowan (*Sorbus aucuparia*), willow (*Salix* ssp.) and aspen (*Populus tremula*) over conifers. Moreover, moose rarely browse on Norway spruce (*Picea abies*), however during winter times it can consume large amounts of Scots pine (*Pinus sylvestris*) (Ball & Dahlgren, 2002; Månsson, Kalèn, Kjellander, Andrèn, & Smith, 2007). As a result, pine can suffer from directed browsing (Hörnberg, 2001; Bergqvist, Bergström, & Edenius, 2001; Ball & Dahlgren, 2002), which may lead to local pine stands being severely damaged (Hörnberg, 2001). Because of how the forestry is applied, the Swedish forests are mainly dominated by pine and spruce (Barklund, 2001) and therefore, moose browsing may have a great effect on the biodiversity (Ericsson, Edenius, & Sundström, 2001; Edenius, Bergman, Ericsson, & Danell, 2002).

For instance, it has been reported that moose can have an impact on the distribution of aspen in the forest landscape as younger stands containing aspen are more likely to be exposed to browsing damages than old stands (Ericsson, Edenius, & Sundström, 2001).

Moreover, the general browsing preferences of moose can cause an increase in spatial heterogeneity through the formation of gaps in the Swedish forest stands (Edenius, Bergman, Ericsson, & Danell, 2002). In addition, browsing by moose may have a positive effect on biodiversity on a tree level as it can create substrate forms such as dying or dead wood which would occur less frequently if there were no moose (Edenius, Bergman, Ericsson, & Danell, 2002).

The impact of moose browsing on the Swedish forests are substantial and according to the Swedish National Forest Inventory's data from the year 2009-2013, approximately 42% of the scots pine in Sweden suffers from moose browsing damages (Skogsstyrelsen, 2016). Moreover, calculations made in 2004 showed that the browsing pressure of pine forests by moose, was expected to cause a 30-80 million SEK loss of income for forest owners in Sweden each year (Glöde, Bergström, & Pettersson, 2004). Calculations also showed that the browsing pressure would in 30-50 years, result in additional losses in quality of approximately 500 million up to 1,3 billion SEK (Glöde, Bergström, & Pettersson, 2004). Due to the potential consequences, a browsing moose population can have seen from a biological and economical point of view, the management of the species becomes evidently important. Moreover, moose are not only the largest herbivores in Sweden (Olsson M. , 2015), they are also important prey species for one of the largest predators in Sweden, wolves (Miljö- och energidepartementet, 2007; Liberg, Bergström, Kindberg, & Von Essen, 2010).

Wolves (*Canis lupus*), have recently re-colonized Sweden (Wabakken, Sand, Liberg, & Bjärvall, 2001) and the population is supposed to achieve and attain a favorable status in accordance with the habitats directive (Naturvårdsverket, 2014). Moose (*Alces alces*) are regarded as one of their main prey (Miljö- och energidepartementet, 2007; Liberg, Bergström, Kindberg, & Von Essen, 2010). Studies have shown that well over 90% of all the meat consumed by wolves, originates from moose (Miljö- och energidepartementet, 2007; Sand, Andrèn, Swenson, & Kindberg, 2011) and a majority of all moose killed by wolves are calves or one-year-olds (Sand, Andrèn, Swenson, & Kindberg, 2011). According to the Swedish Environmental Protection Agency webpage the counties with the highest proportion of wolves in Sweden are, Dalarna, Gävleborg, Örebro, Värmland, Västmanland and parts of Västra Götaland (Allander, 2016). As a result, one of the major difficulties that moose managers, especially in wolf populated areas, are faced with today, is to balance the increasing consumption of moose by an expanding wolf population along with the moose hunters´ wish to keep a high harvest (Liberg, Bergström, Kindberg, & Von Essen, 2010). Moreover, another aspect which is required to be accounted for in the moose management, is the risk for moose related traffic accidents.

Moose is Sweden's largest animal (Jägareförbundet, jagareforbundet.se, 2016), and can whey around 200-550 kg (Stålfelt, 1993; Jägareförbundet, jagareforbundet.se, 2016). Consequently, moose can cause serious or even fatal damages when involved in traffic collisions. Between 2010 and 2016 the number of moose related collision in Sweden varied from 7227 to 5874 (Figure 2). According to the proposition (Prop. 2009/10:239) the moose management should be carried out in a way were the interest of decreasing the number of moose related accidents is accounted for.

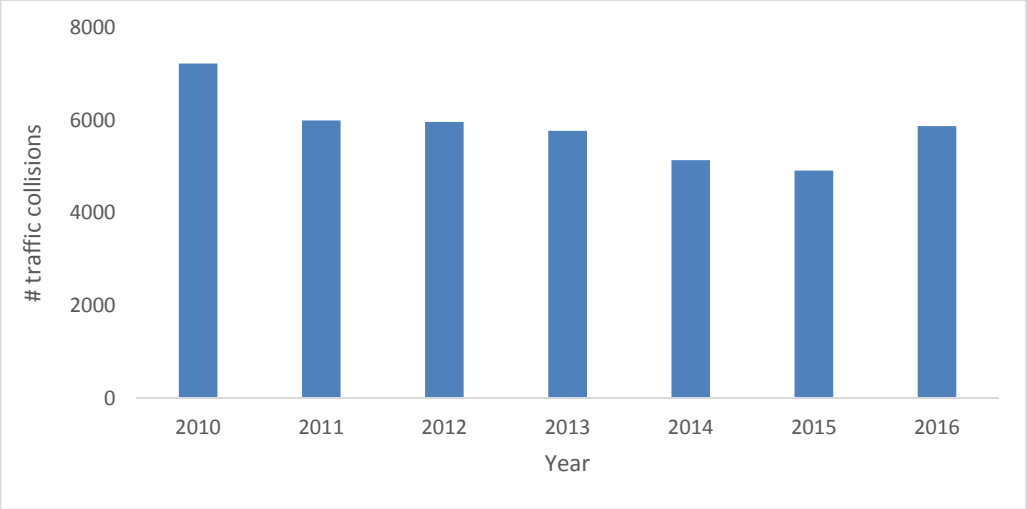

Figure 2. Total number of moose related traffic collisions in Sweden between the years 2010-2016. Source viltolycka.se

Recreational value

The moose hunt in Sweden has a great economical and recreational value (Mattsson, Boman, & Ericsson, 2008). Each year approximately 290,000 hunters cash in the state hunting permit (Jägarregistret, 2016). A majority of all hunters participate in the moose hunt and the moose is considered to have the highest hunting value out of all the game species in Sweden (Mattsson, Boman, & Ericsson, 2008). Moreover, studies have shown that the average Swedish moose hunter will spend a gross value of approximately 11,200 SEK on hunting aspects, such as ammunition, tenancy, travels etc., also included are recreational values (Mattsson, Boman, & Ericsson, 2008). This is partly the reason why moose management in Sweden receives a great deal of attention.

In sum, all of these aspects are to be dealt with in the new multi-level management of moose. The primary tool to take these aspects into consideration is by regulating the number of moose. Since the regulation of the moose population is done at multiple levels it is important that there are a certain degree of responsiveness between the actors at different levels.

The Swedish moose management

In Sweden, the Swedish Environmental Protection Agency (Swedish EPA) has the main responsibility of the wildlife management, whilst the County Administrative Board (CAB) has the more practical responsibility of bringing the interests of society together with the wildlife management (Swedish EPA , 2015). The CAB coordinates and are responsible for making most decisions regarding the moose management in Sweden (Swedish EPA , 2015). Included in each CAB is a wildlife management delegation, that help facilitate the organization of wildlife management issues and bring multiple stakeholders, other than hunters and landowners, into the decision-making process.

The Swedish EPA and CAB receive relevant information from the Swedish Forest Agency (SFA), regarding forest conditions and this information is later used as guidelines to create a wildlife management that is well adapted to the forestry in Sweden (Swedish EPA , 2015). The current general governing structure can be seen in Figure 3.

Swedish Environmental Protection Agency

Has the main responsibility for the wildlife management in Sweden

The County Administrative Board (#21)

Each CAB divides their respective county, into *moose management areas.*

All CAB´s have a wildlife management delegation, working with aspects regarding wildlife management in the county.

Appoints which of the suggested hunters and landowners that will act as representatives for the *moose management areas*.

Registers *moose management units* and *license areas*

Establishes plans, goals and hunting seasons

Determines area limits for the *license areas*

Swedish Forest Agency

Provides the Environmental Protection Agency and the County Administrative Board with information regarding the state of the forest, such as i.e. forest damages caused by ungulates, the amount of food available for moose and how the forestry can be wildlife adapted.

Moose management areas (#149)

(*are governed by a moose management group with three representatives of hunters and landowners each*)

Constructs moose management plans

Suggests, collects, compiles and analyses moose inventories

Considers the current amount of food available for moose and the level of damage moose cause on the forest

Are in charge of monitoring and coordination

Have consultations with the *moose management units*

Gives their opinion on the moose management plans

Suggest area limits for the license areas

Moose management units

(*Consists of a board and multiple hunting teams*)

Produces moose management plans

Consultations between local landowners and hunters

License areas

One or multiple hunting teams or individual hunters

Unregistered land

One hunting team or individual hunters

Figure 3. The current governing structure of moose management in Sweden and the tasks appointed to each level. Source Naturvardsverket.se

One of the key changes that has been made in the new moose management system, in comparison to the previous one, is the introduction of a new level of responsibility called moose management areas (MMA). Each MMA is generally intended to include one distinct moose population and be ≥50 000 hectare in size (NFS., 2011; Swedish EPA , 2015). The CAB is responsible for dividing their respective county into an appropriate number of MMA ´s (Näringsdepartementet, 2010) and as each area is supposed to be confined by natural barriers the range of an MMA can extend beyond county borders (Näringsdepartementet, 2010). The MMA´s are expected to have an advisory role in the system, facilitating the connection between the local hunters, landowners and the CAB (Näringsdepartementet, 2010; Sandström, Wennberg DiGasper, & Öhman, 2013).

For those who were part of an MMU prior to the installation of the new system, the introduction of MMA´s meant a partial centralization with more restricted decision-making power. However, when considering the harvest quota for licence areas, the new system meant a decentralization, as the planning is performed on a more local level than on a county level (Swedish EPA , 2015). The MMA is governed by a moose management group (MMG). The MMGs most commonly consists of three hunters' representatives and three landowners' representatives, with the exception being that in some parts of northern Sweden one of the hunters' representatives is replaced by a Sami representative (Näringsdepartementet, 2010; Swedish EPA , 2015). The representatives are nominated by the hunters´ and landowners´ organisations and are then elected by the CAB (Swedish EPA , 2015).

According to the proposition (2009/10:239), the MMG representatives are supposed to have, among other things, knowledge regarding forestry and hunting (Näringsdepartementet, 2010). They are supposed to represent the interests of all local hunters and landowners and are expected to formulate goals for aspects such as the winter population of moose, the amount of damages on forests and crops which are acceptable, harvest levels etc. (Skogsbrukets nationella viltgrupp, 2014).

Moreover, the MMG are responsible for having consultations with the MMUs and developing a moose management plan (MMP) for the MMA which can be harmonised with the MMPs produced on an MMU level (Swedish EPA , 2015). Thus, responsiveness is an important part of the multileveled system. In order to acquire continuity in their work, the MMG representatives are supposed to remain at their positions for three years (Näringsdepartementet, 2010).

Furthermore, the Swedish government believe that, since the landowners are responsible for the care of the forests, they are to be given a stronger position in the MMG´s. Therefore, one of the landowner´s representatives is appointed chairman and obtains a casting vote (Näringsdepartementet, 2010). Consequently, should the voting end in a tie, the landowner's chairman can use the casting vote and determine which decision should be made. However, a moose management plan must be approved by the CAB before it is finalised and available for use. Subsequently, the chairman does not have full authority to determine how the MMP is designed (Sandström, Wennberg DiGasper, & Öhman, 2013).

Theoretical framework

Responsiveness and decentralization

Intended to create more equity and efficiency in recourse management, decentralization is becoming more common around the world (Ribot, 2005). For example, in the forestry sector certain forest management powers are being given to different institutions such as local government authorities, traditional authorities, NGOs etc. as decentralizing reforms (Ribot, 2005). Decentralization in wildlife management is also becoming increasingly evident (Virtanen, 2003; Von Essen, 2012; Swedish EPA , 2015; Boonman-Berson, Turnhout, & Carolan, 2016). Having a decentralized wildlife management can provide individuals on a more local level, the opportunity to influence their surroundings in a way which would not have been possible otherwise (Swedish EPA , 2015; Von Essen, 2012). Moreover, decentralization is meant to increase equity, efficiency and democracy (Larson, 2005). Although efficiency most often is of greatest concern to central governments, equity and democratic benefits such as control over livelihoods and receiving a greater share of other natural resources benefits, may likely be more important to the local people (Edmunds & Wollenberg, 2003).

Political decentralization can be described as groups at different levels of government, such as central, sub-national and local, which are granted power to make decisions connected to what affects them (Blaser, Küchli, Pierce Colfer, & Capistrano, 2005). When discussing the term decentralization Ribot (2005), argues that the main condition for effective decentralization is a well-functioning representation. Moreover, when exploring representation, it may also be useful to further divide the concept into two components, the first component being *accountability* and the second *responsiveness* (Brinkerhoff, 2001; Olowu, 2003; Blair, 2000). In order to have accountability in a system, the represented population must be able to sanction the representatives by means of various accountability mechanisms (Ribot, 2005). Furthermore, responsiveness entails that the representatives are allowed power, which they can use to respond to the needs of the represented (Ribot, 2005).

Responsiveness in the newly instated MMAs may be described as how well the MMG representatives are able to convey the views of the local landowners and hunters into the construction of the MMPs. An example situation could be if local hunters were to express a concern regarding that moose-observations are indicating a decline of the moose population, it is then the hunters' representatives responsibility to voice that view and to attempt to change the future harvest in the MMPs. In order to make such a change possible, the hunters´ representatives have to be given decision-making power and in this case that power is the right to vote on how the MMPs are constructed. If the hunters' representatives are able and willing to represent their organisation in an adequate way, the result would most likely be a decline in the future harvest ratio in the MMP. Although, since the MMGs only have an advisory role and not a direct decision-making role in the new moose management system (Näringsdepartementet, 2010), it is also required that the CAB approves the proposed harvest changes. Moreover, to analyse the responsiveness in the MMAs I will measure the overlap between the views of local landowners, hunters, how the MMA representatives perceive those views and how the future development goals in the MMPs have been formulated (Figure 4). By examining the overlaps, it may become evident if the views of the local landowners and hunters transpire into the MMPs. Consequently, the overlap may be perceived as an alternative measure of responsiveness.

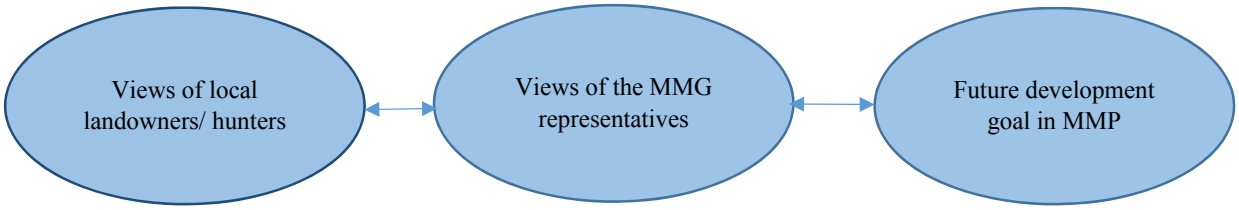

Figure 4. The different components in the new moose management system that will be examined and compared with each other in my study

Operationalisation

The new moose management system requires that the MMG representatives represent the local hunters and landowners. Therefore, it is imperative to study the concept of representation and what it entails for the moose management. The aim of my study is to investigate one of the components in the concept of representation, namely responsiveness and if there is sufficient responsiveness embedded in the newly instated MMAs.

In my study responsiveness in the MMA´s will be examined in an indirect way by exploring the overlap in views between the local landowners, hunters and their MMG representatives and further on by comparing the views of the representatives with the future development goals set in the MMPs. Additionally, it may be of importance to examine whether or not responsiveness is affected by certain aspects. Therefore, I will test the concept against several selected independent variables such as *occupation, identity, attendance at wildlife management consultations, distance* and *network*. The exact meaning of the independent variables is explained in the text below.

Occupation

Individuals who are employed in a certain field may be prone to involve themselves in questions and aspects relating to that same field (Overdevest, 2000; Swedish EPA, 2016). A study regarding public involvement on a national forest district in North Carolina, revealed that certain interest groups outcompeted the public in participation. Overdevest (2000) reported that a greater percentage of the participants had occupations related to natural resources compared to the public.

Therefore, I assume that those who are employed in the forestry sector, agriculture or wildlife management, may more often involve themselves in moose management issues and thus might more often be able to get their views across. They may have a better insight regarding how the moose population is effecting the surrounding environment and consequently they may be able to produce solid arguments as to why the population should be managed in a certain way.

Identity

If the overlap in views for an individual who identify themselves as both hunter and landowner is greater than that of an individual who simply recognise themselves as a hunter is unknown. I expect that if an individual regards themselves as part of both interest groups, it may increase the desire for that person to involve themselves in moose management aspects and thus increasing the opportunities for that person to get their opinion across.

Attendance at wildlife management consultations

Previous studies have shown that having consultations may have a positive effect on representation (Gospel & William, 2003; Dundon, Curran, Ryan, & Maloney, 2006). I expect that individual landowners or hunters, who more frequently attend consultations might more often be able to influence how the MMPs are constructed compared to those who do not attend and therefore a greater overlap in views may be achieved.

Distance

Spontaneous meeting in the everyday life can work as a channel between a representative and the represented (Wohlgemuth, 2006). The two parties can during these meetings exchange information and opinions can be compared. As a result, this may lead to an increased responsiveness (Wohlgemuth, 2006). The likeliness of two people randomly meeting will most likely increase if the two parties live close to each other. Therefore, how well an individual is represented might be related to the distance between the represented and the representative. In my study I will test if there is any difference in the overlap in views between local landowners, hunters and their MMG representatives, given that they either live far away or close to the moose management area that they are included in. As the MMG representatives have to attend consultation meetings with the MMUs included in the MMA (Värmland), they are expected to live close to the MMA which they are representing. In general, the MMAs are larger and fewer in numbers in the north (Jägareförbundet, jagareforbundet.se, 2013). Consequently, the distance between local landowners, hunters and their representatives may be greater in the north and I expect that this may have a negative effect on the overlap in views.

Network

To use organisations as channels to influence political spheres and to represent various interest groups, is commonly done throughout the world (Halpin, 2004; Johansson & Lee, 2014). A study by Weldon (2002) regarding the representation of women in policy making, showed that organisations may provide effective avenues for the expression of its members which may thus lead to a greater responsiveness (Weldon, 2002).

According to the proposition (Prop. 2009/10:239) the MMG representatives are supposed to be appointed from the landowners´ and hunters´ organisations (Näringsdepartementet, 2010; Swedish EPA, 2015). The MMG representatives are partly suggested from organisations such as The Swedish Association for Hunting and Wildlife Management and Jägarnas Riksförbund (CAB Gävleborg, 2012). The Swedish Association for Hunting and Wildlife Management also has the specific responsibility of educating those who are active in the moose management. They are supposed to assist the MMGs with interpreting the yearly inventory results. Moreover, some of the larger forest companies have employees working actively in the moose management as MMG representatives (Södra, 2016; Norra, 2017). Some hunters and landowners, are members of these organisations but whether this leads to greater overlap in views is currently unknown. I assume that the overlap in views will be greater between a landowner or hunter and the MMG representatives, if they are part of such an organisation.

Moreover, since it is becoming more common that hunters have less time to spend on hunting moose, partly because more hunters live further away from their hunting grounds (Swedish EPA , 2015), I assume that it may be of importance to be part of a hunting team to improve responsiveness. The hunting teams could perhaps work as channels for the individual hunters, passing on their views to the next level in the moose management system, the MMUs. Thereafter the MMUs can communicate the views to the MMG, perhaps during consultation meetings.

Overlap to the MMPs

To further analyse responsiveness in the MMAs, I will measure the overlap between the answers given by the MMA representatives and how the future development goals in the MMPs have been formulated (Figure 4). By examining this overlap, it may become evident

if the views of the local landowners and hunters transpire into the MMPs. Consequently, the overlap can be perceived as an alternative measure of responsiveness.

In short, the main objective of my study is to investigate the responsiveness in the MMAs. I will do this by observing the overlap in views between the local landowners, hunters and their MMG representatives in the newly instated MMAs and furthermore by comparing the views of the representatives to the development goals set in the MMPs. The hypotheses for my study is that, given previous knowledge, responsiveness between local landowners, hunters and their MMA representatives may be effected by independent variables such as *occupation*, *identity*, *wildlife consultation participation*, *distance* and *network*. Each null hypothesis is formulated in (Table 1). Moreover, some additional hypothesis that I will test is whether responsiveness is affected by an individual being a landowner or a hunter and furthermore if there is a significant difference in responsiveness between the landowners, hunters and their representatives in the three different regions of Sweden namely, Götaland, Svealand and Norrland.

Table 1. Null hypotheses for each independent variable tested

Independent variable	Null hypotheses	
	Landowners	Hunters
Occupation	"There is no significant difference in responsiveness between the landowners with an occupation in the forest industry, the agricultural sector or wildlife management compared to those who do not have such an occupation."	-
Identity	-	"There is no significant difference in responsiveness between the hunters who consider themselves to be only hunters compared to those who consider themselves as both hunters and landowners."
Attendance at moose management consultations	"There is no significant difference in responsiveness between the landowners who have attended moose management consultations sometime in the last 12 months, compared to those who have not."	-
Distance	"There is no significant difference in responsiveness between the landowners who live close to their respective MMA compared to those who live further away."	"There is no significant difference in responsiveness between the hunters who live close to their respective MMA compared to those who live further away."

Network	"There is no significant difference in responsiveness between the landowners who are part of an agriculture association and/or a forestry association compared to those who are not."	1. "There is no significant difference in responsiveness between the hunters who are part of a hunting association compared to those who are not." 2."There is no significant difference in responsiveness between the hunters who are part of a hunting team compared to those who are not"

Method

Study area

I collected data from 20 out of the 21 Swedish counties. Gotland was excluded from the study because there is currently no moose population inhabiting the county. When examining potential regional differences in regards to responsiveness, I divided the country into the three Swedish regions, Götaland, Svealand and Norrland.

Data collection

In order to investigate responsiveness in the MMA´s, I used data from three separate questionnaires, along with the development goals found in the moose management plans.

The first questionnaire, "EN UNDERSÖKNING OM VILT, JAKT OCH SKYTTE", was sent out in 2016, to a total of 6300 hunters across Sweden and 3592 (57%) responded. Three hundred individual hunters from each county were randomly selected to participate in the study. The addresses of all hunters were retrieved from the Hunter Registry (Jägarregistret). The recipients were contacted 4 times at the most. The original aim of the questionnaire was to obtain better knowledge regarding the views of Swedish hunters in some general and some specific questions concerning hunting. I thoroughly examined the questionnaire and only the questions relevant for examining responsiveness were selected and used. In total, I collected data from 3592 respondents and compiled it into an excel file.

The second questionnaire, "EN UNDERSÖKNING OM SKOGSBRUK OCH VILT", was sent out in 2014, to a total of 1200 landowners in Sweden and 658 (54%) responded. The selection of participants was made from 4 separate sub-groups being referred to as "Götaland", "Svealand and Gävleborg", "Jämtland and Västernorrland" and "Norrbotten and Västerbotten". In total 300 landowners from each sub-group were randomly selected each fulfilling the requirement that they own at least 10 hectare forest land. All addresses were obtained from the SCB-registries. SCB, also referred to as *Statistics Sweden*, is an authority responsible for developing, producing and spreading, official statistics and other types of governmental statistics to their customers (Statistics Sweden, 2013). The landowners were contacted 4 times at the most. The original aim of the questionnaire was to examine the outlook landowners have on forestry, damages caused by wildlife and wildlife management. The same procedure, as for the hunters' questionnaire, was performed for the land owner questionnaire and I compiled data from 658 respondents into excel.

The third questionnaire used in my study, "EN UNDERSÖKNING OM ÄLGFÖRVALTNING", was sent out to all hunters´ and landowners´ representatives in the moose management groups in all counties, except for one group in Skåne for which no addresses could be found. 81.4% responded to the questionnaire and the response rate varied from 73-94% between the different counties. The representatives were contacted 4 times at the most. In total, I used the answers from 622 representatives in my study and compiled them into an excel.

Moreover, for the purpose of the study, in total 142 MMP´s were collected. I selected all relevant objectives, such as the future development goals for the moose population, from the plans and transferred them into excel.

In common for all three questionnaires was the question: “do you think that there are too few, just enough or too many moose in your moose management area?”, which was included in each survey. However, the exact wording in the question varied slightly in each questionnaire. The hunters´ were asked to answer the question in regards to their main hunting grounds, the area were they mostly hunt. Moreover, the landowners were asked to answer the question in regards to their forest estate and the MMG representatives were asked to answers the question in regards to their MMA. The MMG representatives were asked to answer the question with the view of their respective organisation (landowners or hunters) in mind. Therefore, the answers given by the MMG representatives was not interpreted as their personal view, but as the view of the interest they represent in the MMGs. To be able to investigate if responsiveness may be effected by certain independent variables I used the response data from several different questions included in the questionnaires. The formulation of the questions and how I treated the data is described below.

Distance variable

All landowners´ were asked to answer the question regarding how far away they live in relation to their forest estate and the question was asked in the following manner; “How far is it from your home to your forest estate?”. They were given seven response alternatives namely; “I live on my estate”, “1-25 km”, “26-50 km”, “51-100 km”, “101-150 km”, “151-200 km” and “more than 200 km”, where *km* stands for kilometres. I pooled the variables into just three different distance categories the first category included all individuals who had answered “I live on my estate”, the second included all individuals who had answered either “1-25 km” or “26-50 km” and the third distance category included all individuals who had answered either of the four remaining alternatives.

Furthermore, the hunters were asked to write down how many kilometres they had between their home and their main hunting grounds and the question was asked in the following way; “How many kilometres do you have between your home and your main hunting grounds?”. The hunters were then asked to write down the approximative number of kilometres by hand. I used the same distance limits as I did for the landowners and divided the hunters´ data into three separate groups. I treated all hunters who had answered that they had 0 kilometres between their home and their main hunting grounds the same way as the landowners who had answered “I live on my estate” and therefore those hunters formed the first group.

Network variable

Both the landowners and the hunters were asked to answer the question; “which of the following organisations are you part of?” and were then given a number of different organisations to choose from. The landowners were given 13 response alternatives, however I pooled all the individuals who had answered that they were either part of a “landowner organisation (e.g. Södra, Mellanskog, Norrskog, Norra skogsägarna)” or “LRF-The Federation of Swedish Farmers” or part of both organisations into one “Yes”-alternative. I used the data from the remaining landowners to create a “No”-alternative. Furthermore, the hunters were given 12 response alternatives, however I also pooled the hunters´ data and created a “Yes”-alternative, which included all hunters who were part of one or both of the following organisations; “Swedish Association for Hunting and Wildlife Management” and “Jägarnas Riksförbund”. The data from the following individuals were used to create the “No”-alternative.

The hunters were asked to answer whether they were part of a hunting team or not in the following way; “Are you part of a hunting team that hunts on your main hunting grounds”. They were given two response alternatives; “No” and “Yes, we are……. members”. I only used the “No” and “Yes” alternatives and excluded all information regarding how many members the hunting team had, as that was of no importance for my study.

Occupation

The question regarding *occupation,* which I used as an independent variable, was asked all landowners´ in the following way; “Do you primarily work in agriculture, forestry or wildlife management?”. The landowners were given five response alternatives; “No”, “Yes, in agriculture”, “Yes, in forestry”, “Yes, in both forestry and in agriculture”, “Yes, with wildlife management”. I pooled the options into just two different groups, the first included all individuals who had answered “No” and the second group included all the following alternatives.

Attendance at wildlife management consultations

The question regarding *attendance at wildlife management consultations,* was asked all landowners in the following way; “Have you during the past 12 months attended wildlife management consultations in the area where your estate is included?”. The landowners were given three response alternatives; “No”, “Yes”, “I don’t know”. To be able to use a chi square test when studying the variable, I excluded all individuals who had answered “I don’t know” and only used the data from the other two response alternatives.

Data analysis

In order to examine responsiveness in the MMA´s, I used chi-square tests. All data analyses were performed in the statistical programme JMP (Copyright © SAS Institute Inc).

Chi-square test

I used a chi-square test to investigate if there was a significant difference in responsiveness between local landowners, hunters and their respective MMG representatives, depending on a number of independent variables. Responsiveness was explained as the absolute difference, or overlap, between the answers to the main question ("do you think that there are too few, just enough or too many moose in your moose management area?"), given by the hunters, landowners and the mean value of the answers given to the same question by their respective MMG representatives. To be able to receive this difference I coded the response alternative "*too few*", "*just enough*" and "*too many*" as 1, 2 and 3. Considering that the MMG representatives, should answer in the interest of the organisation which they represent, the difference between their answers and the answers given by the local landowners and hunters should be as small as possible and an exact overlap in views would result in zero. When performing the chi- square tests I divided the difference-values into three separate difference groups, the first being between 0-0.5, which represented the group of local landowners or hunters who had very similar views as their MMG representatives, the second being >0.5 and <1.5, which represented the group who had somewhat different views and the final group being ≥0.5, which represented landowners and hunters who had very different views compared to their MMG representatives. The reason why the middle group had a bigger range than the other two difference groups, was because I wanted it to be less likely for an individual to end up in one of the "extreme" groups. In all chi-square tests the absolute differences was used as the dependent variable, which was tested against several independent variables.

In addition to all independent variables mentioned earlier in the text, I performed a chi-square test using the role of an individual, landowner or hunter, as an independent variable. The test was performed to examine if there was a significant difference in the overlap between the view of the landowners' and their MMG representatives compared to the overlap between the view of the hunters´ and their MMG representatives. The null hypotheses was formulated as follows; "there is no significant difference in responsiveness between landowners and hunters". Furthermore, I also used an ANOVA to examine if there was a significant difference in the responsiveness level between all hunters and all landowners in the three different regions of Sweden, Svealand, Götaland and Norrland.

Results

General overview

As mentioned initially the aim of my study is to explore the responsiveness between the different actors involved in the construction of the MMPs on an MMA level. In order to explore to what extent the views of the local landowners and hunters overlap with the views of the MMG representatives I will give a general overview of the central question regarding the moose population i.e. whether hunters and landowners think that there are too few, just enough or too many moose.

When examining the responses given by all landowners and hunters throughout the 20 different counties, I found that in total, most of the landowners (around 60%) had responded that there were "*just enough"* moose in their MMAs (Table 2). Moreover, most of the hunters had answered that there were either *"too few"* or "*just enough"* moose in their MMAs, whilst only a small portion (around 5%) had answered that there were *too many* (Table 2).

Table 2. The number of individual responses given by the local landowners and hunters in the 20 counties studied. Total number of replies given for each responses category can be seen at the bottom of the table

	Too few		**Just enough**		**Too many**	
County	**Landowners**	**Hunters**	**Landowners**	**Hunters**	**Landowners**	**Hunters**
Blekinge	3	59	4	44	0	5
Dalarna	4	92	8	89	6	4
Gävleborg	1	69	6	69	3	6
Halland	1	43	8	65	0	7
Jämtland	14	98	70	146	22	13
Jönköping	1	42	8	79	10	5
Kalmar	3	101	11	83	5	12
Kronoberg	1	45	6	107	2	17
Norrbotten	15	62	38	90	23	8
Skåne	2	60	4	33	0	2
Stockholm	2	14	4	25	0	2
Södermanland	1	71	0	60	0	5
Uppsala	4	63	3	55	1	4
Värmland	7	143	14	18	3	4
Västerbotten	8	68	52	96	20	13
Västernorrland	5	40	26	31	13	7
Västmanland	0	72	5	41	0	6
Västra Götaland	5	42	20	66	6	12

Örebro	3	105	5	45	2	5
Östergötland	0	88	7	51	2	5
Total no of responses	80	1377	299	1293	118	142

Moreover, when observing the responses given by the MMG representatives, I found that in general most of the landowners´ representatives had responded that there were "*too many*" moose in their MMAs (Table 3). Furthermore, most of the hunters´ representatives had replied that there were either "*too few*" or "*just enough*" moose in their MMAs.

Table 3. The number of individual responses given by the landowners´ and hunters´ representatives in the 20 counties studied. Total number of replies given for each responses category can be seen at the bottom of the table

	Too few		**Just enough**		**Too many**	
County	**Landowners´ reprst.**	**Hunters´ reprst.**	**Landowners´ reprst.**	**Hunters´ reprst.**	**Landowners´ reprst.**	**Hunters´ reprst.**
Blekinge	0	3	1	2	4	0
Dalarna	0	8	11	23	13	2
Gävleborg	0	12	7	9	15	5
Halland	0	1	2	3	2	1
Jämtland	0	0	2	11	13	5
Jönköping	0	2	1	10	13	3
Kalmar	1	10	10	10	9	3
Kronoberg	0	2	3	12	12	5
Norrbotten	0	0	0	6	11	7
Skåne	0	0	2	6	3	0
Stockholm	8	10	6	7	2	0
Södermanland	0	7	8	10	8	1
Uppsala	0	4	5	9	5	3
Värmland	9	24	6	1	1	0
Västerbotten	0	5	1	5	11	3
Västernorrland	0	4	0	2	4	0
Västmanland	1	3	5	5	1	0
Västra Götaland	1	3	7	7	11	7
Örebro	1	15	5	3	8	0
Östergötland	1	11	3	6	9	0
Total number of responses	22	124	85	147	155	45

To be able to explore to what extent the views of the representatives overlap with the development goals present in the MMPs I examined most of the MMPs throughout all 20 counties. When doing so I found that in about 51% of the times the goal for the future moose population was set to decrease (Table 4).

Table 4. Development goals set in the numerous MMPs in each county

County	Increase	Stay unchanged	Decrease
Blekinge		2	
Dalarna		6	9
Gävleborg	2	2	9
Halland			1
Halland		1	
Jämtland		1	5
Jönköping		2	4
Kalmar	1	4	5
Kronoberg		3	4
Norrbotten		1	5
Skåne	1	3	
Stockholm	3	4	
Södermanland	1	3	3
Uppsala		2	4
Värmland		9	1
Västerbotten			5
Västernorrlands	1		1
Västmanland		4	
Västra Götaland	1	1	6
Örebro	1	3	4
Östergötland	1	4	3
Total number of development goals set	12	55	69

Furthermore, in my study I aimed to explore if there is a significant difference in responsiveness between the local landowners, hunters and their representatives seen between the three regions, Götaland, Svealand and Norrland, in Sweden. In order to analyse the regional data, I used an ANOVA test, which revealed that the mean level of responsiveness for hunters is significantly different ($p < .001$) amongst the three regions (Table 5). Indicating that the difference in the mean level of responsiveness between the regions is not merely due to chance, but is influenced by where in Sweden the hunters live. In Svealand, where the mean difference was calculated to be the lowest, the view of around 62% hunters and 50% of the MMA representatives, was that there were "*too few*" moose. However, no significant difference ($p = 0.15$) could be detected in the mean responsiveness for landowners amongst the three different regions (Table 5).

The mean difference did not exceed 1 for either of the interest groups, in any of the three regions. I calculated that in approximately 28% of the times the difference between the answers given by the local hunters and the mean value of the answers given by their MMA representatives was 0. Moreover, in about 25% of the times the difference between the answers given by the landowners and the mean value of the answers given by their MMA representatives was calculated as 0.

Table 5. Number of sampled individuals in each region (N). Mean difference 0-2 (responsiveness), standard deviation (Std. Deviation), standard error (Std. Error) and p-value (Prob >F), calculated by a means oneway ANOVA, performed on the landowners´, hunters´ and representatives´ data. A low mean difference indicates a high responsiveness

Region	N	Mean Difference (Responsiveness)	Std. Deviation	Std. Error	Prob > F (p-value)
Landowner´ data					0.15
Götaland	109	0.76	0.59	0.058	
Svealand	72	0.72	0.66	0.034	
Norrland	316	0.85	0.61	0.072	
Total	497				
Hunters´ data					<0.001*
Götaland	1003	0.62	0.50	0.016	
Svealand	892	0.41	0.47	0.016	
Norrland	816	0.75	0.55	0.019	
Total	2711				

* Statistical significance at level $p < 0.05$

In short, when examining the data in general, I found that most of the local landowners' and hunters´ had answered that there were either "*too few"* or "*just enough"* moose in their MMAs. Most of the landowners´ representatives had answered that there were "*too many"* moose in their MMAs, whilst most of the hunters´ representatives had answered that there were either "*too few"* or "*just enough"*. Moreover, in about half of all the MMPs examined in my study, I found that the future development goals for the moose population was set to decrease. I also found that there is a difference between the views of the local landowners´ and hunters´ and how their respective MMG representatives perceive those views. I detected a significant difference in the mean level of responsiveness for hunters, amongst the three regions, but could not detect any significant difference in responsiveness for the landowners. The regional data indicates that the lowest mean difference for the hunters´ can be found in Svealand.

Results from chi-square tests performed on landowners´ and hunters´ data

I used chi-square tests to be able to analyse whether responsiveness is affected by certain aspects such as for example how far a landowner or hunter live from their respective MMAs, if they are part of a landowners´ or hunters' organisations etc.

Amongst the chi square tests I performed on the landowners´ data, two resulted in a significant difference. The two independent variables, which brought about a significant difference in responsiveness, were *occupation* and *network* (Table 6). I calculated the mean difference for all landowners with an occupation in the forest industry, agriculture or wildlife management to be 0.76 whilst the mean difference for those who were not to be 0.83. Moreover, I calculated the mean difference for all landowners who are part of a landowner and/or agriculture association to be 0.73 whereas the mean difference for those who were not was 0.93.

Only one of the chi-squared tests, performed on the hunters´ data, resulted in a significant difference, namely the *network* variable regarding whether a hunter is part of a hunting team or not (Table 6). The mean difference for all hunters' part of a hunting team was calculated to be 0.58, whilst the mean difference for the hunters who were not was 0.63.

Table 6. Results from the chi-squared tests, performed on each independent variable for all landowners and hunters separately.

Independent variables	df	N	Pearson chi-square value	p-value	Null hypotheses
Landowners´ data					
Distance (3 categories)	4	492	1.3	0.86	Accepted
Network (forestry and/or agriculture association)	2	497	13.4	< .001*	Rejected
Occupation	2	497	16.2	< .001*	Rejected
Attendance at wildlife management consultations	2	489	2.3	0.32	Accepted
Hunters´ data					
Distance (3 categories)	4	2711	4.4	0.4	Accepted
Network (part of a hunting team on your own hunting grounds)	2	2676	6.2	0.045*	Rejected
Network (part of one or two hunting associations)	2	2575	4.6	0.1	Accepted
Identity	2	2678	1.4	0.5	Accepted

*Statistical significance at level p<0.05

Furthermore, to test for a significant difference in responsiveness between the two interests, I performed a chi-square test using the *role* (landowner/hunter) as independent variables. Results revealed a p-value of < .001, indicating that the null hypotheses can be rejected and that there is a significant difference in responsiveness between the two interest groups. The mean difference between all landowners and their MMA representatives was calculated to be 0.81 whilst the mean difference between all hunters and their MMA representatives was 0.59.

Moreover, when using the difference between the answers given by the MMG representatives' and the development goals set in the MMPs as a dependent variable, I discovered that there is a significant difference between the landowners´ representatives and the hunters´ representatives (Table 7). The mean difference between the answers from the landowners´ representatives and the development goals in the MMPs was calculated to around 0,4, whilst the difference between the hunters´ representatives and the MMPs was calculated to around 0,8. Which on an individual translated into that around 67% of the answers given by the landowners´ representatives and the MMPs were an exact match and 35% of the answers given by the hunters´ representatives and the MMPs were an exact match.

Table 2 Results from chi-square test performed on the representatives and MMP data. The role (landowners´ or hunters´ representative) was used as the independent variable.

Independent variables	DF	N	Pearson chi-square value	p-value	Null hypotheses
Role	2	263	35.6	< .001*	Rejected

In short, I found that the two variables *occupation* and *network* gave a significant difference in responsiveness for the landowners. One of the *network* variables gave a significant difference in responsiveness for the hunters. Furthermore, I found that there is a significant difference in responsiveness depending on if an individual is a landowner or a hunter. Moreover, when using the difference between the answers given by the MMG representatives' and the development goals in the MMPs as a dependent variable, I discovered that there is a significant difference between the landowners´ representatives and the hunters´ representatives.

Discussion

This study is the first of its kind, as there have been no previous studies performed on representation in the newly instated moose management areas. According to the proposition 2009/10:239, the hunters´ and landowners´ representatives are supposed to represent their respective interests (Näringsdepartementet, 2010). The general conclusion that can be made from my study is that the overlap between the views of the local hunters and their MMG representatives appears to be slightly greater compared to the overlap between the landowners and their MMG representatives. However, the overlap between the views of the landowners' representatives and the development goals set in the MMPs, appears to be greater than that of the hunters´ representatives (Figure 4).

Responsiveness in the MMAs implies that the MMG representatives can convey the views of the local landowners´ and hunters´ into the construction of the MMPs, as that is their task (Näringsdepartementet, 2010; Swedish EPA , 2015). The fact that the overlap between the views of the local landowners and their MMG representatives is slightly weaker than the overlap between the hunters and their MMG representatives and that the views of the landowners´ representatives more often are visible in the development goals, does not necessarily mean that the responsiveness in the system is poor. Since the MMGs only have an advisory role in the process of establishing the MMPs and the actual decision-making power lies with the CAB (Näringsdepartementet, 2010), it may be that the CAB more often makes decisions which are in agreement with what the view of the landowners´ representatives are.

Moreover, exactly what effects the overlaps, found in my study, have on the moose management system in Sweden cannot be seen simply by examining my results. However, since my results indicate that the development goals may more often be a reflection of the landowners' representatives' views, rather than the views of the local landowners, it may have an effect on how the moose population is managed. I expect that since some of the landowners´ representatives are employees at big forest organisations (Södra, 2016; Norra, 2017), it may be that the development goals are set in a way that benefits the large-scale forestry. Furthermore, why the plans more often are a reflection of the landowners´

representatives, may be because one of the landowners´ representatives obtains a casting vote and can, in a tie, use the vote to decide in which way the MMP will be constructed.

Results from the chi-square tests performed revealed that in total two independent variables presented a significant difference in responsiveness for the landowners, namely *occupation* and *network*. The exact reasons why the two variables resulted in a significant difference cannot be foretold simply by observing the results from my study. However, the reason why the difference was lower for the landowners who had a job in a related field compared to those who did not, could be that the landowners who have an occupation in a related field may have more insight in how the moose population is affecting its surrounding environment such as the forest. Therefore, their view may be more in agreement with the view of MMA representatives, who are according to the proposition also supposed to have knowledge regarding aspects such as forestry and hunting (Näringsdepartementet, 2010). It may also be that the landowners´ who work in a related field are prone to involve themselves in moose management issues (Overdevest, 2000) and as a result make an effort to pass on their views to the MMGs representatives. Moreover, because the MMG representatives are, amongst others, appointed from different forest organisations such as for example *Norra Skogsägarna* or *Södra* (Södra, 2016; Norra, 2017), it may be that the landowners, who perhaps work for the same organisations, are able to meet and convers with the MMG representatives during their working hours. Since, day to day meetings may have a positive effect on responsiveness (Wohlgemuth, 2006), this could be a reason why the responsiveness is greater for the landowners working in a related field. Furthermore, as mentioned earlier the MMG representatives are appointed from the organisations used as the *network* variable (Swedish EPA, 2015), and therefore it may be that the landowners who are part of one or more of these organisations also have more similar views as the MMA representatives compared to the landowners who are not. The chi square tests performed on the hunters´ data revealed a significant difference in responsiveness for the *network* variable concerning whether a hunter was part of a hunting team or not. Moreover, the mean difference for the hunters who were part of a hunting team was lower compared to that of the hunters who were not part of a hunting team. This indicates that responsiveness may be positively influenced if a hunter is part of a hunting team. The reason for this might be that the hunting teams could work as a channel for the individual hunters who are more commonly living further away from their hunting grounds and therefore have less time to involve themselves in the moose hunting (Swedish EPA , 2015). They may be able to get their view conveyed to the next level of responsibility, the MMUs, through the hunting teams which in turn might enable the views to reach further into the system.

The reason why the *network* variable, regarding whether a local landowner or hunter is part of an organisation or not, resulted in a significant difference for the landowners´ but not for the hunters´ is difficult to say. Perhaps the views of the hunters´ and their MMG representatives are more diverse in comparison to the landowners´ and their representatives.

Furthermore, a significant difference in responsiveness could be found between the hunters´ in the three different regions. The lowest difference between hunters´ and their representatives could be seen in Svealand indicating that the overlap in that region is greater. In common for both the hunters and MMA representatives in Svealand, was that around 50% or more had answered that there was too little moose. The exact reason for this view is difficult to distinguish, however one possible explanation could be that Svealand is home of some of most heavily wolf populated areas. Since wolves mainly consume moose (Miljö- och energidepartementet, 2007; Liberg, Bergström, Kindberg, & Von Essen, 2010), the hunters in Svealand must compete for the harvest of moose in a way that the hunters in

Norrland and Götaland do not. This competition may generally result in more similar views, amongst the hunters´ and their MMG representatives regarding the number of moose in an area.

However, the results from my study assumes that responsiveness can be explained as the difference between the answers to the main question "do you think that there are too few, just enough or too many moose in your moose management area?", given by the local landowners, hunters and the mean value of the answers given to the same question by the respective MMA representatives. This may not be the only or the foremost way of measuring responsiveness in the newly instated MMA levels. However, since the representatives were asked to answers the question as they perceive the views of their organisation to be, I assumed this to be a relevant way of measuring responsiveness in the moose management.

Since the two separate questionnaires sent to landowners and hunters were not originally intended for answering questions on an MMA level, the data from these questionnaires were only available on a municipality level. This made the comparison between landowners, hunters and their MMA representatives somewhat difficult to perform. In order to receive a slight majority, I matched the municipalities to the MMA`s, by which they had an area of 50% or more in common with and the municipalities which did not belong to any specific MMA by more than 50% were excluded from the study. Moreover, originally all questionnaires had five different response options for the main question. However, to be able to make adequate tests with a rather small data set, the response options were pooled into only three options, thus some of the variety of the data was lost.

Moreover, some MMA´s are governed by the same group and therefore one shortcoming is that some MMA representatives answered the main question with two or more MMA´s in mind.

Future research

In the proposition (Prop. 2009/10:239), no possible ways of sanctioning the MMG representatives are mentioned, should they not do their job properly. As the newly instated moose management system can partially be considered as a decentralization, which intends to make the management more locally based (Swedish EPA , 2015), it is important to have a well-functioning representation (Ribot, 2005). In the concept of representation both responsiveness and accountability are important components and in order to have efficient accountability the represented population must be given ways of sanctioning their representatives. Therefore, in the future it may be of importance to explore this particular part of the moose management system.

Moreover, the proposition declares that the MMG representatives are supposed to be appointed from the landowners´ and hunters´ organisations (Näringsdepartementet, 2010), however it does not state how the representatives are supposed to be chosen. Is it through democratic elections or in other ways? Exactly how and by who the MMG representatives are appointed, may be of importance to study when contemplating representation in the moose management system, as the representatives are supposed to represented the interests of the local landowners and hunters (Näringsdepartementet, 2010).

Another factor that might be important in regards to the representation of the different interests in the system, is the fact that some landowners´ representative may not only be landowners but also hunters. Results from a study performed by the Swedish EPA (2015),

revealed that some landowners´ representatives find it difficult to argue in the interest of their organisation as they feel lot of social pressure from the hunting society which they sometimes are a part of themselves (Swedish EPA , 2015). Therefore, it may be interesting to examine this aspect in the moose management further.

Conclusion

In short, my main results show that the overlap or responsiveness, between the local hunters and their MMG representatives seems to be slightly greater than that of the landowners and their MMG representatives. However, the overlap between the answer given by the landowners´ representatives and the development goals in the MMPs, was greater compared to the answers given by the hunters´ representatives. This indicates that the views of the landowners´ representatives are more often visible in the development goals set in the MMPs. Moreover, according to my results aspects such as *occupation* and *network* may be of importance for the responsiveness in the MMAs.

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