

Hunter Opinions on the Management of Migratory Geese:
A Case of Stakeholder Involvement in Adaptive Harvest Management

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Abstract

Knowledge of hunter attitudes toward goose management is essential for the involvement of hunters in adaptive harvest management. Our study provides insight into processes of stakeholder involvement in adaptive harvest management, as demonstrated by the case of implementing the International Species Management Plan for the Svalbard-breeding pink-footed goose (*Anser brachyrhynchus*). We conducted an online survey among goose hunters in Norway in the main autumn staging area of this species, Nord-Trøndelag, which is also the area in which most geese are harvested nationally. Our results demonstrated that a majority of these hunters see themselves as active participants in management. These hunters expressed a willingness to support management objectives through the delivery of daily harvest reports and by complying with regulations, as defined by national wildlife authorities and the international management plan.

Introduction

The number of temperate-wintering geese in Europe has increased significantly over the last few decades due to a combination of protection measures and improved feeding opportunities on agricultural lands (Fox et al., 2010). Warmer climate in the Arctic also contributes to improved breeding success (Madsen et al., 2017a). Large migrating goose populations, however, can cause conflicts with agricultural interests by reducing harvests and damaging crops (Eythórsson, 2004; Olsen, Bjerke, & Tombre, 2017; and see Fox, Elmberg, Tombre, & Hessel, 2017 for a review). The growth of goose populations is also causing degradation of vulnerable tundra vegetation in Arctic regions (Pedersen, Speed, & Tombre, 2013).

The population of the Svalbard-breeding pink-footed goose (*Anser brachyrhynchus*) has increased from approximately 10,000 individuals in the early 1960s to an estimated 88,000 individuals in 2017 (Madsen et al., 2017b). This increase has caused an escalation of conflict with agricultural interests regarding the species' spring staging areas and led to a call to reduce the population (Tombre, Eythorsson, & Madsen, 2013a; Williams & Madsen, 2013). In 2012, the pink-footed goose was selected for the establishment of an International Species Management Plan (ISMP) under the auspices of the African-Eurasian Waterbird Agreement, the first management plan of its kind in Europe. An international working group, including statutory agencies, non-governmental organization (NGO) representatives, and experts from the four range states (Norway, Denmark, Belgium, the Netherlands), has agreed on objectives and actions to maintain a sustainable population while taking economic and recreational interests into consideration. This includes setting a species population target of 60,000 individuals (Williams & Madsen, 2013).

Traditional autumn hunting is the only available tool to regulate the population of this species and efforts have been undertaken to increase harvest through liberalizations of hunting

regulations and improved hunting practices in Denmark and Norway, the countries with an open recreational hunting season for the pink-footed goose (Johnson & Madsen, 2016; Madsen, Clausen, Christensen, & Johnson, 2016). As the population of this species continues to grow, an increased hunting bag limit in both countries is thought to be needed. In Denmark, actions taken to increase harvest include extending the hunting season (Clausen, Christensen, Gundersen, & Madsen, 2017; Madsen et al., 2017a). In Norway, these measures are not an option, as the geese stay in the area temporarily before continuing their southward migration. Hence, to increase the hunting bag limit in Norway, hunting should be arranged optimally to increase its effectiveness. When the number of pink-footed geese has been reduced to the target population size of 60,000 individuals, a shared harvest quota will be implemented in Denmark and Norway to prevent further decline (Madsen & Williams, 2012).

Hunters also play an essential role in management by providing harvest data. The Norwegian Environment Agency, the national authority responsible for goose management in Norway, has developed an online tool enabling hunters to report their harvest daily (Brattland, 2017). The tool will be tested in the 2017 hunting season. Daily reporting will be necessary for Norway when the population target is reached, as this will provide a running overview of the quota fraction reached. Hence, active hunter participation is necessary and hunters must accept daily reporting and approve of the available tools for this to be successful.

Adaptive harvest management is a new approach in Europe, and the ISMP is the first plan of its kind with a defined population target and reliance on traditional autumn hunting as a management tool (Madsen et al., 2017a). Adaptive management has a longer history in North America (Johnson, 2011) where hunter surveys have provided important information about hunter attitudes, motivations, and values associated with the management of migratory birds (e.g., hunter typologies, behavior, satisfaction, attitudes toward hunting regulations; Brunke & Hunt, 2008; Dinges, Webb, Vrtiska, Nikon, & Stanis, 2014; Haugen, Powell,

Vrtiska, & Pope, 2015; Schroeder, Fulton, Lawrence, & Cordts, 2014). In Norway, Andersen, Kaltenborn, Vittersø, and Willebrand (2014) argued that management regulations aimed at optimizing ecological, social, and economic outcomes must be accepted by hunters to be effective. The opinions of goose hunters regarding adaptive management, hunting regulations, and their willingness to contribute to management processes have, however, not been studied in detail. At the current stage of implementing the ISMP for the pink-footed goose, more knowledge about the opinions, preferences, and motivations of goose hunters is needed for successful local, national, and international implementation.

Our study was designed to address this knowledge gap by explicitly targeting the opinions of goose hunters in the most important hunting area for the pink-footed goose in Norway. Our overall objective was to assess hunter opinions on goose management and their willingness and motivations to contribute to implementing the ISMP. To achieve this, we examined the following three research questions: (a) do hunters accept the population target for pink-footed goose and what are their preferences and opinions on hunting regulations to reduce harvest, (b) what are their attitudes toward daily bag reporting and what motivates them to report their harvest, and (c) what are their perspectives on being included as active partners in managing the pink-footed goose? By answering these questions, our goal is to gain a better understanding of hunter perspectives on crucial issues related to goose management and thereby contribute to successful implementation of adaptive harvest management of the pink-footed goose.

Methods

Our data were obtained from an online questionnaire distributed to goose hunters who hunt in Nord-Trøndelag County, which is the main autumn staging area of the pink-footed goose in Norway. Most of the pink-footed geese harvested nationally are harvested in this area (87% in 2016-2017 hunting season, Statistics Norway). According to Statistics Norway,

166 hunters harvested pink-footed goose in our study area in 2015. However, as contact information is not available from Statistics Norway, we relied on volunteered email addresses available from our extensive network of hunters and landowners from previous studies in the area. We thus compiled a sample of hunters by including all contact information for goose hunters from 2007 to 2016 (see Jensen, Madsen, & Tombre, 2016; Madsen et al., 2017a; Tombre, Jensen, Madsen, Eythórsson, & Gundersen, 2011, Tombre et al., 2013a; Tombre, Eythórsson, & Madsen, 2013b for details). In addition, local hunting coordinators and landowner associations contributed email addresses. In this sense, our sampling strategy resembles snowball sampling with several key hunters (e.g., hunting coordinators) contributing additional contact information for other hunters. Our aim was to include as many hunters in the area as possible, and the sample included all hunters who are known to us to have hunted pink-footed geese in the area during the timeframe of our research.

The hunters targeted in our survey play an important role in the efforts to reach the target population size of this species, as their experience, hunting practices, and activities are significant for the total hunting bag limit for Norway. They will also be the hunters affected by regulations when the population target has been reached. Our study aims to gain insight into the attitudes and opinions of a targeted group of hunters who play an important role in implementing the ISMP, rather than a representative account of all hunters nationally.

Our questionnaire targeted hunter attitudes, motivations, and preferences associated with the management of the pink-footed goose, as well as demographic and background data on hunting experiences and practices. The questionnaire included multiple choice and open-ended questions (Schuman & Presser, 1979), giving respondents the opportunity to elaborate on their views. The final question consisted of an open space for hunters to state other opinions on goose hunting and related management.

Questionnaires were distributed to 142 email addresses of which 133 were valid.

Distribution started in February 2016 and ended three weeks later. The email invitation and first page of the online questionnaire described the objective of the study, stated principles of confidentiality and anonymity, and ensured informed consent. The full results of this survey have been published in a Norwegian report (Holmgaard, Eythórsson, & Tombre, 2016) which was distributed to respondents for comments before publication. No respondents chose to comment on the report nor had any objections to its publication. Our study and questionnaire were approved by the Norwegian Data Protection Official for Research prior to inception.

Results

We received 95 completed questionnaires, yielding a 71% response rate. Most respondents (94%) were men, which is consistent with the distribution of registered small game hunters nationally (94.4% male hunters, Statistics Norway). More than half of respondents (53%) had hunted geese for more than five years, 32.5 % had 2-5 years of hunting experience, and the remaining 14.5% had hunted for less than two years. Most respondents hunted both small and big game in addition to geese (65%), whereas 31% hunted geese and other small game, and 4% hunted geese and big game. No respondents exclusively hunted geese.

None of the respondents disagreed with setting a population target for the pink-footed goose; 57% agreed with the population target of 60,000 individuals, 16% thought this target was too high, 2% thought it was too low, and the remaining 25% were undecided. We also asked these hunters to state their attitudes toward hunting regulations to reduce the annual harvest bag limit and 62% expressed a willingness to follow the prevailing management policies and regulations, including reducing the number of harvested geese if the population target is reached. Eleven percent of respondents stated that they will reduce harvest under certain circumstances, most commonly that regulations should be based on sound research, be

fair, and take local conditions into consideration. Fourteen percent of the hunters stated that they did not want any changes in hunting regulations and another 14% were undecided. The most preferred regulation tool for reducing the total annual harvest was bag limits (66%). Closing down hunting in selected areas was preferred by 20% of these hunters, and shortening the hunting season was preferred by 18%. Ten percent of respondents stated that hunting should be stopped once a national quota had been reached. As several measures might be combined, the regulation alternatives were not presented as mutually exclusive options.

The use of a mobile application (i.e., app) was the most preferred tool for providing daily reports on harvested geese (60%). Thirty-three percent of respondents preferred to report via text message to either a hunting coordinator (23%) or individual landowners and landowner organizations (10%). Only 8% of respondents did not wish to report daily. We also asked the hunters to state what would motivate them to report daily. A clear majority of respondents (91%) stated that if the reporting system was made simple and easily accessible, it would increase their motivation to report daily. More information about why daily reporting was needed and how the data will be used was another motivating factor (37%).

Only 4% of respondents stated that they did not want to take part in goose management. Most respondents (63%) stated that hunters ought to play an important role in managing the pink-footed goose. The remaining 33% of respondents stated that hunters can play some role in goose management. In the open-ended section of the online questionnaire (34 hunters responded in this section), the issues most commonly addressed ($n = 16$) were related to payment for hunting access and open versus exclusive access to hunting areas. Respondents expressed a concern that it had become increasingly difficult to gain access to the best hunting areas. These respondents also expressed a strong fundamental view that goose hunting ought to be available to everyone. They voiced a concern that landowners in

some areas would sell access to hunting teams willing to pay large sums, so goose hunting would become more expensive and access more restricted.

Discussion

The growing literature on adaptive management and co-management emphasizes the importance of communication, information sharing, transparency, trust building, and reaching common understanding to achieve management goals with active participation of stakeholders (Johnson, Boomer, Williams, Nichols, & Case 2015, Rist et al., 2016). In developing the ISMP for the pink-footed goose, stakeholder involvement has been an important priority in management and research. According to Williams and Madsen (2013), actively engaging with stakeholders from governmental agencies, farmer unions, and conservation and hunting organizations has been crucial in reaching shared understanding, building trust, and sharing knowledge in the development of the ISMP and in gaining acceptance for setting a population target for the pink-footed goose (Madsen et al., 2017a). At a regional and local levels of goose management, Tombre and colleagues (2013a, 2013b) demonstrated how the involvement of stakeholders and researchers in management processes has been essential in creating mutual trust and shared understanding among different stakeholders and between different levels of management. Our study here demonstrated an overall willingness of pink-footed goose hunters to contribute to management objectives, including reducing their harvest through more restrictive regulations when the population target is reached. Most respondents also accepted the species population target in the ISMP.

Respondents also expressed a willingness to provide daily reports on geese they harvested. Daily reports will reveal the current number of harvested geese in Norway, which is important for informing a quota system that has been implemented. Harvest data will also contribute valuable information to the development of predictive models in the ISMP, where future harvest quotas are predicted based on previous harvest rates and other population and

environmental variables (Johnson & Madsen, 2016). Ultimately, this enables sound decision-making based on updated information in accordance with the intentions of the adaptive harvest management principles of the ISMP. The results of our study also point to the need to place great emphasis on keeping stakeholders informed, a key issue in adaptive management frameworks (Johnson et al., 2015; Williams, 2011). Hunters in our study expressed that being informed about how data are used would increase motivation to undertake daily reporting.

Our results also show that the majority of pink-footed goose hunters surveyed in the targeted area want to play an active role in managing this species. Representatives from hunter organizations have been involved in setting the population target through hearings, workshops, and discussions across different scales (see Madsen et al., 2017a and also notes and minutes from the African-Eurasian Migratory Waterbird Agreement webpage: <http://pinkfootedgoose.aewa.info/meetings>). The involvement of stakeholders, where key representatives from different groups spread information and updates locally, is likely to have contributed to the generally positive attitudes of hunters in our survey to follow regulations, provide daily harvest reports, and participate in the adaptive management processes.

The open-ended part of our questionnaire revealed hunter concerns about local hunting regulations by landowners, particularly a potential development toward more limited access and expensive hunting. An earlier survey on hunter views, specifically organized hunting arrangements in Nord-Trøndelag, has also shown that an ideal of goose hunting as free and available to all has a strong standing with goose hunters (Søreng, Eythórsson, Tombre, Jensen, & Madsen, 2013). Studies on landowner attitudes toward goose management in Nord-Trøndelag indicate that economic gain is not a primary motivation for landowners and landowner associations when they allow goose hunting on their properties. However, income potential is a motivation to form landowner associations to organize the hunting and facilitate hunting areas (Eythórsson, Søreng, Holmgaard, & Tombre 2017; Søreng, Eythórsson, &

Tombre, 2015). Results from the open-ended section of our questionnaire indicate that increased costs for hunting access might challenge the positive attitudes among goose hunters toward contributing to management goals and following regulations. Hunters who see themselves as doing important work for farmers and management by reducing the pink-footed goose population might be less willing to pay for hunting access than those who hunt purely for recreational purposes or for meat. More knowledge is needed on how the identity of hunters as active participants in management might influence their willingness to pay for hunting access and accept regulations by landowner organizations. The active participation of both hunters and landowners is essential for successful implementation of the ISMP and sustainable management of the pink-footed goose.

Insights from our study can inform management agencies on how to include and motivate hunters to adhere to regulations and contribute valuable harvest data as part of implementing the ISMP for the pink-footed goose. Information from an ongoing harvest may also be valuable to Danish management and hunters, as it has been agreed in the ISMP that an “un-used quota” can be transferred to Denmark. Moreover, results from our study demonstrate how the realisms of implementing management actions locally can be evaluated, which might also inspire and advise adaptive management processes beyond this setting. In European waterfowl management, the ISMP for the pink-footed goose has become a model for managing other migratory goose populations, including the taiga bean goose (*Anser fabalis fabalis*), barnacle goose (*Branta leucopsis*), and greylag goose (*Anser anser*; African-Eurasian Migratory Waterbird Agreement, 2017). Lessons learned from implementing the ISMP for the pink-footed goose, including the insight into the opinions, motivations, and preferences of pink-footed goose hunters provided in this study, constitute valuable knowledge and experience when implementing these plans, especially in the context of the active involvement of stakeholders.

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