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Abstract

The population of Grey Partridge is decreasing worldwide as a result of anthropogenic activities. Increased agricultural production, requiring homogenous farming landscapes and increased use of pesticides are believed to be the main factor causing population declines in the Grey Partridge. Actions to enhance Grey Partridge populations are available; however, those actions are vain if the acceptance to conduct them is low. To gather information about acceptance among farmers, hunters and the County Administrative Board towards 18 available actions enhancing the Grey Partridge population, nine face-to face interviews were conducted as an exploratory case study. The results showed that willingness to conduct enhancing actions differ between and within the groups of stakeholders. Actions receiving highest acceptance are strongly connected with actions beneficial for the Grey Partridge during autumn and winter. Farmers reported a slightly negative attitude to actions requiring refraining of arable land without getting financial compensation. Results from this study can be used as guidance for creating a management plan to enhance the population of Grey Partridge on Gotland.

Sammanfattning

Populationen av raphöns minskar världen över som ett resultat av ett intensifierat jordbruk som kräver större åkerareal och ökad användning av bekämpningsmedel. Åtgärder för gynna raphönsen finns tillgängliga, men acceptansen för dessa åtgärder bland jordbrukare, jägare och myndigheter är oklar. För att införskaffa information om acceptansen till 18 åtgärder gynnsamma för populationen av raphöns utfördes en explorativ fallstudie baserad på intervjuer. Resultatet påvisar att villigheten att utföra åtgärder varierade mellan och inom grupperna av respondenter. Lantbrukare fram för allt yttrade en negativ attityd till åtgärder som innebar avsättande av mark arealer om de inte fick rimlig ekonomisk ersättning för marken de avsätter. Man kunde även urskilja en viss korrelation mellan villighet att utföra en åtgärd och årstider. Tre åtgärder som gynnar raphöns under vinterhalvåret rankades med hög acceptans och villighet att utföra. Resultatet av denna studie kan användas som verktyg i planerandet av en förvaltningsplan för populationen av raphöns på Gotland.

Introduction

Anthropogenic activities have for long had significant impact on landscape composition and still have. One of the fastest and most evident changes in historic time is the vastly increased agricultural production, (Bengtsson 2001), requiring a homogenous farming landscape and increased use of pesticides. As a result of these agricultural changes many species depending on heterogeneous landscapes fluctuate or decrease in population size. Such a species is the Grey Partridge (*Perdix perdix*).

The Grey Partridge belongs to the taxonomic family phasianidae (BirdLife International 2012). They originate from temperate grasslands. Nowadays the species is spread over most of central Europe, eastern Russia and North America (Game and Wildlife Conservation Trust. 2015). IUCN (Red List of Threatened Species) classifies the Grey Partridge as a viable species, but is decreasing worldwide due to anthropogenic factors. In the United Kingdom (UK) Grey Partridge has declined since 1945 (Rands 1985). Researchers have established that juvenile survival and insect abundance is positively correlated, and that the key factor causing population changes are juvenile mortality caused by e.g. starvation (Potts. 1986). In the modern agriculture, pesticides (insecticides, herbicides and fungicides) are sprayed on cereal crops to reduce loss at reaping. However, these pesticides also have an adverse effect on Grey Partridge, both direct and indirect by reducing weed and insect abundance on which partridges feed upon (Rands 1985). A significant decrease of the phasianidae species, (Common Pheasant *Phasianus colchicus* and Grey Partridge) were recorded during mid 1900s in Sweden. The decreasing phasianidae numbers was attributed to increased use of the pesticides introduced 1940s such as methyl-mercury, DDT and phenoxyacetic acids (Carlsson 2009).

At the moment is no designated management carried out to enhance national populations of Grey Partridge in Sweden. Management plans beneficial for field living game species are often structured to enhance species merge into groupings (Jordbruksverket. 2013). Initiators to enhance local populations of partridge are often stakeholders resident to the area. Stakeholders are often represented by hunters, farmers or authorities. Existing collaboration beneficial for the Grey Partridge between Swedish Hunting Association, Birdlife – Sweden and the Swedish Board of Agriculture (Jordbruksverket. 2013), are often operating at local level. Local management plans are enhancing local populations of Grey Partridge, but to enhance the population of the species in Sweden a national management plan is needed. Such a management plan would require actions to be applied in the modern agriculture. Such actions are costly and require a certain extent of readjustment, willingness to readjust or refrain from land, but also support, compensation and understanding from the society.

To increase the partridge population scientists, authorities and stakeholders must take into account those who use the land. Which actions are they willing to conduct or even more important less willing, and why? In Sweden there are few if any studies about stakeholders' willingness to conduct beneficial actions to enhance the phasianidae species, especially with regards to the Grey Partridge. This study was conducted based on knowledge about partridge needs, what can be done and have been done to increase the population size. Interest to conduct an explorative case study at four parishes at Gotland municipality arose after a conversation with a resident in one of the parishes about the fluctuating trend of Grey Partridge at Gotland.

Overarching objectives of this study were to investigate,

- How did the different stakeholders' e.g. hunters, farmers or authorities view the decrease in numbers of the Grey Partridge and its needs in relation to its species requirements? Do disagreements arise in these matters between the stakeholders?
- How did the stakeholders view the possible actions to enhance the Grey Partridge population on Gotland? Did they have different opinions about the actions which they were asked to rank? Which contributing factors could explain the potential differences?
- Based on opinions from foregoing questions what action/actions did they consider most/least beneficial for the Grey Partridge population? Which are they most/least likely to conduct and under which circumstances, e.g. financial compensation.

Habitat requirements

The Grey Partridge is a non-migratory species and therefore requires diverse types of habitats during all seasons of the year (Mykrä et al. 2010). Adult partridges feed mainly on a vegetable diet but females intermittently feed on insects to compensate for the variety of proteins they lose during nesting and incubation. Juvenile partridges feed exclusively on insects (Mykrä et al. 2010 & Potts 1986). Preferable nesting habitats in spring consist of a good availability of both food and cover e.g. a ley where seeds from previous year are left in the stubble, or a fallow where dry grass and weed stems are still standing. Ideally, those habitats occur as long linear strips or small patches along fields, ditches, stonewalls or other landscape features. Nests are vulnerable to flooding and heavy rain and the female prefer a dry and well-drained area as nesting location. In studies at Sussex, UK, hedges are by far the commonest nesting choice by female partridge (Potts 1986). Results from a recent study at this area indicate that with a higher abundance of nesting cover and hedges the efficiency of recruitment of nesting pairs increase linearly (Sotherton et al. 2014).

Grey Partridge brood and search for insects and seeds in summer along the edges of cereal fields where insect and weed abundance are most abundant (Green 1984). The juveniles feed independently from their parents but require brooding by the adults to keep warm. Juvenile partridges can only produce 1/3 of their body heat and lack the ability to regulate body temperature (Jönsson. 2009). In order to grow and feather up quickly the juveniles need to feed on a diversity of insects that are small enough for them to eat, slow enough for them to catch and are ground living (Jönsson. 2009). In proportion to the juvenile growth rate and amount of food available, the juveniles change their food preferences by time and transitioning to mainly a vegetarian diet as adults (Aebischer 1997).

In autumn and winter both sexes are seen living together in flocks, and several flocks are often living close together and may be perceived as one large flock. The flock uses fallow- or stubble fields, parcels and grasslands with fairly high vegetation as home range. The size of flocks' home range can vary from a few hectares to hundreds of hectares depending on the habitat quality (Mykrä et al. 2010). It has been seen that areas where parcels are small and diverse cultivated and where ditches and marginal zones are retained the number of flocks is significantly higher compared to areas with a homogenous landscape (Mykrä et al. 2010). In autumn after the cereal harvest the partridge feed on waste grain left on stubbles and seed of weed, especially those of knotgrass (*Polygonum sp.*), black bindweed (*Fallopia convolvulus*), and hemp nettle (*Galeopsis tetrahit*). Where grain and seeds are not available they resort to graze pasture foods such as grass, clover, weeds or green shoots of autumn-sown cereals e.g. wheat and rye if available (Potts 1986). During early winter when the

snow cover is negligible they use stubble fields and newly seeded grasslands for shelter and feeding.

Causes of population Decline of Grey Partridge

The Grey Partridge species evolved on the temperate steppe grassland of Europe and Asia. It later adapted to the anthropogenic arable landscape and vastly expanded its range as the agricultural development spread westward through Europe over the last eight millennia. Today are they present throughout Europe from the UK to Kazakhstan, extending north to Scandinavia and a patchy distribution in southern Europe as a result from translocations of birds. Through introductions at the 20th century are they now established populations in the northern half of the United States and in south-west of Canada (Aebischer 1997) see figure 1.

The Grey Partridge has declined significantly since 1950 as a result of a modernized and rationalized agriculture (Sotherton et al. 2014). According to the IUCN, the world population of Grey Partridge is classified as a species of least concern (LC) but yet is the population trend decreasing worldwide (BirdLife International, IUCN 2012). The Swedish equivalent for IUCN, the Swedish Species Information Center, ArtDatabanken, classified the Swedish population to Near Threatened (NT) (ArtDatabanken 2010). UKs equivalent RSPB, The Royal Society for the Protection of Birds classified the partridges as a species with a Red Status (RSPB 2014).



Figure 1. Map of distribution for Grey Partridge. Yellow = extant (resident). Purple = introduced (Photo: The IUCN Red List of Threatened Species, Accessed: 2015-01-03)

In studies from the UK, three crucial periods for the Grey Partridge population decline can be identified: stable populations before 1950, sharply decreasing numbers in 1950-1970, and a continued decline after 1970. During the first period of data, 1903 – 1950, hunting bags of several dozen and some peaks with more than hundred Grey Partridges shoot per square kilometer per year were recorded. The probably most influential factors on yearly fluctuations in Grey Partridge numbers during this period were harsh weather conditions e.g. rain or low temperatures (Kuijper et al. 2009).

The second period, 1950 – 1970, is characterized by a strong decline in the partridge population. Bag statistics were recorded to only a few individuals at the end of 1970s. As in rest of the world the main factor causing the sudden drop in population size this period was the modernization of agriculture that took place after the Second World War (Aebischer 1997). In UK and other parts of Europe, the modernization began during the 1950s with

increased use of insecticide, herbicides and fungicides. Foremost the juveniles are most adversely affected by the increased use of pesticides since the availability of food preferable by juvenile partridge, such as caterpillars, plant bugs and several species of beetles considerably decrease on sprayed areas (De Leo et al. 2004). Effects on the adults of using herbicides are mainly noticeable in the adult survival rate since use of herbicide leads to disappearing of weed species functioning as preferred food and nesting plants. The same pattern can be seen not only during the 1950s but also in modern time and can be applied to other phasianidae species such as the common pheasant (*Phasianus colchicus*) (Kuijper et al. 2009). Other causes working in parallel to the population declines have been identified such as reduction of suitable nesting sites. The situation for many farmland species aggravated significantly with the removal of suitable nesting cover (Potts 1986). Modernization, greater mechanization and the need of enlarged farmland all contributed to smaller amount of weedy field borders, spray free margins, removal of hedges, cairns, stonewalls and ditches.

The third period, from 1970 and onwards, still shows a decline of hunting bags, however the decreasing rate are slower than 1970 and earlier. A reasonable cause of continued decline is the number of game keepers and estates decreased in UK and worldwide after 1970 (Kuijper et al. 2009). Not only the hunting bags decreased, so did also the intensity of predator control. Models from UK show that restoring the population to the same observation level as before 1950 could only be accomplished by intense and continuous predator control (Kuijper et al. 2009). The partridge nests are often disposed alongside edges of fields and ditches. Many ground living predators such as red fox (*Vulpes vulpes*), badger (*Meles meles*) and domestic cat (*Felis silvestris catus*) have their hunting paths along those edges and wherein predation at the nest is high and many eggs are eaten before hatched (Mykrä et al. 2010). Foxes prey upon both eggs and adults during incubation and in western Poland during 1990 it was found that the red fox was the most frequent predator causing mortality to nesting hens and nest losses, cats mainly prey upon adult individuals and juveniles (Panek 2013).

Badgers, stoats (*Mustela erminea*), rats (*Rattus. spp*), weasels (*Mustela nivalis*) and other small ground predators seldom prey upon adult partridge usually they rather loot the nest (Tapper et al. 1996). With the reduction of gamekeepers increased not only the populations of terrestrial predators but also the avian predators. All corvid species prey upon eggs and many of the species actively search for nesting partridge during spring (Tapper et al. 1996). In addition the corvid species, inter alia western jackdaw (*Corvus monedula*), hooded crow (*Corvus cornix*), rook (*Corvus frugilegus*), common magpie (*Pica Pica*) and common raven (*Corvus corax*) (Faragó. et al. 2012), constitutes goshawk (*Accipiter gentilis*), common buzzard (*Buteo buteo*), golden eagle (*Aquila chrysaetos*) and other birds of prey a great threat towards particular nesting partridge species. The reduction of game management in combination with modernized agriculture is also a contributing cause of declining Grey Partridge populations in modern time.

The declining trend in UK can be distinguished also in several other European countries, also in Sweden. During 1940 was a new substance for seed treatment containing methyl-mercury introduced (Carlsson 2009). Besides methyl-mercury substances was DDT (dichlorodiphenyltrichloroethane) and phenoxyacetic acids used frequently as pesticides in Sweden during mid-1900s. A reduction in both pheasant- and partridge populations as well

raptor species was noticeable in whole Sweden during 1960s-1970s as a consequence of increased use of agricultural toxins (Carlsson 2009).

Current Situation and action available

Even though methyl-mercury, DDT and phenoxyacetic acids are prohibited in Sweden today, the taxonomic family Phasianidae is still declining. Numerous actions to enhance the partridge populations are available and practicable in a modern agriculture (table 1). Several organizations are engaged in management to enhance the partridge population. The Game and Wildlife Conservation Trust in UK (www.gwct.org.uk) and the Irish Grey Partridge Conservation Trust in Ireland (www.greypartridge.ie) are two examples. Both organizations have conducted several studies to investigate the possibilities to enhance the population size and which actions are most efficient. However, developing a management plan to increase the number of partridge in Sweden is depending on stakeholders' willingness to participate in planning and conducting management plans. If no or few possess willingness to conduct beneficial actions developing a management plan based on actions with no acceptance would be vain.

Actions feasible (table 1) can roughly be grouped into categories depending on the purpose of the action. Some actions support and enhance the Grey Partridge population directly, while others indirectly such as hunting predators. Regardless of how suitable the habitat is for the species, the population size will not increase promptly if the predation risk is all too high (Rands 1998).

From the Grey Partridge view, just as it is important to control the number of predators is it significant to understand which actions are of most importance during which season of the year. There are several actions available to benefit the species. Firstly, improve habitat quality. Ground living birds are most vulnerable during the breeding season (Irish Grey Partridge Conservation Trust 2015). Partridges target particular nesting areas where the habitat provides shelter from poor weather conditions and cover from predators (Irish Grey Partridge Conservation Trust 2015). Food availability has also been found important in the choice of nesting site. Secondly, increase the availability of food for both juveniles and adults. Beetle banks provide considerable quantities of nesting cover for adults and juveniles (Thomas et al 2001) as well increase the number of insects preying on cereal aphids (MacLoed et al. 2004). Thirdly, when food supplies are short will both reared and wild partridges stray to find it. To prevent or reduce straying partridges it is essential to provide them with supplemental food throughout the winter (Irish Grey Partridge Conservation Trust 2015). This straying can be avoided by supplementary feeding and/or by plowing the crop fields in spring rather than in autumn, to keep stubble fields over winter for the Grey Partridge to search for food and take shelter in (Aebischer. & Ewald 2004. & Meriggi et al. 1991).

Methods and Material

In conjunction with a hunter in Gotland municipality, interest for this study arose after discussing the causes to the decreasing population and actions necessary to enforce to increase the population of Grey Partridge. Studies about stakeholders' acceptance towards actions available to enhance the Grey Partridge population are few. To determine the causation and attain as much knowledge as possible within this issue an exploratory approach were used. Exploratory research studies are investigations into a problem which

provides insights to the researcher. The research method provides details where a small amount of information exists. It may use e.g. group discussions, experiments, or as in this study interviews to gain information (Business Dictionary 2015). As research design a case study was conducted to gain further understanding and knowledge about the participants' thoughts and beliefs. A case study is a documented study of a specific real-life situation used to modulate, deepen and develop concepts and theories (Brante, T. 2015).

Area description

The explorative case study is based on nine interviews, including four hunters, four farmers and one represent from the County Administration Board, Gotland. Gotland is located 100 km from the Swedish east coast and measure 3 134 km² (Nationalencyklopedin. 2014). The interviews were conducted in four parishes (figure 2), from southernmost to northernmost, Hemse (2500 hectares), Linde (2300 hectares), Lojsta (2200 hectares), Hörsne (3600 hectares) and the city of Visby. All parishes have elements of woodland but are otherwise open landscape with open landscapes with crop fields, pastures and grasslands, ley and fallows. The southernmost and the northern parishes have a more open landscape than Linde and Lojsta. All respondents asked to participate were resident on Gotland all year around and utilized land in all parishes except Visby. All respondents except one hunter resident to Hörsne parish and the represent from the County Board were living in the three southernmost parishes. Hemse, Linde, Lojsta, Hörsne and Visby parishes were chosen as study areas after a conversation with a hunter resident on Gotland, likewise were the respondents chosen after conversations with the hunter. Another contributing factor why predominantly Hemse, Linde and Lojsta would be suitable to conduct actions to enhance the partridge is their interconnection, where participating stakeholders' much easier could achieve synergetic effects from collaboration within the area. Both individually and together possesses those parishes a diverse cultivation landscape and beneficial areas where actions to enhance the Grey Partridge population would be achievable.



Figure. 2. Parishes were all interviews were conducted. From the southernmost to northernmost, Hemse, Linde, Lojsta, Hørsne marked with red, and the city of Visby marked with dark green (Photo: <http://commons.wikimedia.org/wiki/File%3AGotlandold.png>. Accessed: 2015-02-06)

Respondents

To gain understanding why disagreements might occur and contributing factors causing them (see section 3.2 & 3.3), information about the respondents are needed, how many hectares do they own, their interest towards the Grey Partridge for example.

Three (2nd, 3rd, and 4th) of the hunters reside and utilized land in the southernmost parishes. The 1st hunter is resident and utilizes land in the northern parish. The age of the hunters varied between 35 to 83 years old. All four hunters had been dedicated to hunting since childhood and have been hunting ever since. They all reported they have a great interest in the recovering of the Grey Partridge population, both as a hunt-able species and for emotional reasons. All of them have dogs trained to flush birds and the majority is breeding dogs for that very purpose. Three of them have reared and released partridge and the fourth

are supporting the action but are not at the moment conducting any rearing of Grey Partridge.

Both the 1st hunter, Hörsne, and 2nd hunter, Lojsta, are individually utilizing around 5000 hectares for hunting all kinds of game species. The 3rd hunters', resident in Lojsta, hunting team utilize 3000 hectares with a ratio approximate 50% forest and 50% arable land. The area used by the 4th hunter utilize is unknown.

All farmers have their dwelling houses in the southern parishes, but a majority of them own and utilize land outside the parishes they were resident in. The age of the farmers vary between 30-56 years. The 1st farmer, Linde, took over the farm 1992. Today the 1st farmer conducts diary herding with a herd of 110 cows. The farmer own and utilizes 75 hectares of farmland and buy ley/grassland from neighboring farmers. Currently they are cultivating 20 hectares of corn, wheat and barley and 55 hectares of ley/grassland.

The 2nd farmer resides in Lojsta and conducts cattle herding of 450 cows and holds a small herd of 25 sheep. The 2nd farmer utilizes 300 hectares arable land, were in total 100 hectares are corn and ley/grassland. The remaining 200 hectares are oilseed plantations such as spring-and winter rapes and cereal plantations.

The 3rd farmer is utilizing 180 hectares of fields and farmlands were mostly wheat, barely, corn and rapeseeds are sown and 110 hectares of forest land. The farm holds a dairy herd comprising of 90 cows, but occasionally there are over 200 animals in the barn. This farmer resides in Lojsta parish.

The 4th farmer has an interest in both hunting and farming. However, this farmer has no interest in hunting birds and therefore is the 4th farmer represented as merely as a farmer. The farmer is resident to Hemes parish. The respondent yearly holds a pig production of 3000 animals and a plant production of 200 hectares. No cattle or cows are to be found on the farm therefore are no ley/grasslands produced. Despite 200 hectares of arable land holds owns the 4th farmer 150 hectares of forest.

All responding farmers agreed on that few or no historical remains (mounds of stones, stone-walls, ditches, and etcetera) were to be found on their land. All framers mentioned that they spray and use pesticides to minimum obstruction. If no outbreak of harmful insects or plants erupts are fields sprayed 1-2 times per year. The authority respondent is working at the Swedish County Administration Board positioned in Visby city.

Interviews

To investigate the respondents' willingness to conduct favorable actions for the partridge population stakeholders from Gotland municipality were interviewed. In total nine qualitative interviews conducted during one week in late October 2014. The empirical material for this study was collected during face-to-face interviews at the stakeholders' accommodations. An interview manual based on literature reviews was conducted as a guide through the interviews. The manual consist of questions divided into themes (appendix 1) as well as a list of 18 actions for the respondents to rank (table 1). To test the reliability of the interview manual a phone interview was conducted with a farmer resident in Västra Götaland before interviewing the stakeholders.

The socio-demographic theme focuses on questions about the participants, gender, age education and what they do for a living. Socio-demographic questions are important to discern differences in opinion which can be underlying factors resulting in the answers they provide.

Land use and property, second theme, focuses on questions about the participants' role as a stakeholder and about the land they utilize. In the predictions to this study it was assumed that stakeholder holding large hectares are more prone to refrain from land beneficial for wildlife in general, as it may affect them to a lesser extent proportionally. Information about livestock production, the types of crops grown and whether they are hunters and if so are they hunting Grey Partridge at the moment, where also of interest to know, since it may affect their attitudes to the Grey Partridge.

Third theme, biological information, aimed to collect information about knowledge and interest about the species among the stakeholders. Another prediction within this study were whether the participants knowledge was a contributing factor or to their opinions. This assumption was tested by questions about the habitat they perceive Grey Partridge reside in. We also wanted to know their interest of the species, whether they had a genuine interest or were theirs interest to have a hunt-able population. Another question was if partridges were present on the land they utilized at the moment. Also if they had noticed whether the population has decreased or increased and what they thought to be the causes. Within this theme questions about their opinion about actions they thought are beneficial and if they are conduction any wildlife beneficial actions at the moment were asked.

The fourth theme was the essential and the most informative for this study and include the 18 actions (table 1). Based on criterias' inter alia whether they get compensation or not, they were asked to rank them with a cursor. A cursor facing upwards indicate positive to the action, the action is doable or willingness to conduct the certain action. A downward cursor indicates negative to the action, the action is not doable or the respondent lacks willingness to conduct that certain action. They were also allowed to rank with a neutral cursor that indicate no opinion, the action is doable but there is other actions they thought is of greater importance or that they had too little knowledge to comment.

The questions in the themes differed varied slightly depending on the participants' role as a stakeholder. From the interview manual a number of questions were send out in advance together with a short information sheet, to give the respondents a smattering of how the interview will be conducted and the aim of this study. All interviews were recorded with the permission of the participants and lasted between 42 – 96 minutes. All interviews were thoroughly scrutinized and all important and informative information were selected. While listening comparisons and differences between the stakeholders were noted for subsequent analysis. Confidentiality was maintained through this study and all specific quotes are referred to as hunter (x) and farmer (y) independent of the order they were interviewed. The interviews, interview manual and the 18 actions were conduct in Swedish and all information was translated to English by the author.

Selecting of actions to rank in support of Grey Partridge management

There are many possible and suggested actions (table 1) of various difficulties to conduct, costs for the stakeholder and profitability for the partridge, available to enhance the Grey Partridge population. All actions in table 1 have been mentioned in literature, fact sheet or

articles as to various degrees being beneficial to enhance the partridge population. In order to obtain a comparable result, both assumed and found realistic and less realistic actions were chosen. If only low cost or easily conducted actions would have been selectable to rank the result would possibly have been misleading. If easy and low cost action only were available to rank one could assume the respondents would have a positive attitude to all actions. In that case information about actions they experience a less or no positive attitude towards, and why, would have been missing.

Table 1. Description of potential actions. How they beneficial for the population of Grey Partridge and when to conduct them to benefit the population at highest extent. Also a list of references for further reading is attended. The actions are ranked from the action with highest number of upward cursors to the one with no upward cursor.

Number	Period advantageous to perform action/s	Action	Description	References
1	August - March	Pursue an efficient predator control	Predation is one of the contributory causes to the population decline. Potts and Rands among others claim reducing populations of predators are essential to enhance partridge populations.	Potts, G.R. 1986. & Rands, M.R 1998
2	Spring	Plow the fields during spring instead of autumn	Areas of suitable habitats are reduced in autumn and winter when fields are ploughed. By plough fields during spring it increase the amount of suitable habitats for the partridge during these harsh seasons.	Meriggi, A. et al. 1991
3	Winter	Shoveling snow free patches in grassland and winter crops	Partridges tend to use pastures and open areas at a higher extend then row crops during winters with deep snow cover. During winters with snow-crust is it importance that the birds have access to snow-free patches in order to search for food.	Smith, M.S., et al. 1982. & Carroll, J.P et al. 1995. & Mykrä, S et al. 2010
4	Depends on cereal/crop sown	Spray-free zones in e.g. crop fields, grassland, ley	Juvenile partridge are dependent on an insect diet the first weeks of their lives. Increased use of herbicides is believed to have led to a reduction in the number of insects available in cereals. Management practices such as unsprayed areas ensure a diverse flora and fauna are central to ensure an effective management plan of the partridge population.	Borg, C. & Toft, S. 2000.
5	Autumn	Save headland turns and field edges when cultivating,	A headland is the area at the end of the field used for turning around with agricultural machinery. Selective use of pesticides is essential to increase the amount of food available at the headlands. The aim with headlands is to encourage the development of annual arable weeds	Aebischer, N.J. 1997

		harvesting or/and plowing	and insects of the areas most frequented used by partridges.	
6	Year round	Refrain from partridge hunt	In a Norwegian study were hunters asked about their willingness to abstain from hunting ptarmigan. Results from that study showed that hunters vary in terms of willingness to abstain from hunting ptarmigans. Based on their result is there an interest to investigate however hunters on Gotland were willing to abstain from partridge hunt and which underlying factors contributing to their answers. Studies about to which extent refraining from partridge hunt is enhancing the population on Gotland have not been found.	Kaltenborn, B.P., et al. 2012
7	Late Summer - Spring	Supplementary feeding of field birds	A variety of actions to enhance the partridge population are available and supplementary feeding is one of them. Naturally they feed on seeds and part-plants but wheat and buckwheat are preferable if available as supplement.	Aebischer, N.J. & Ewald, J.A. 2004. & Jensen, P.E. 2015.
8	Summer	Rearing and releasing of Grey Partridge	The Grey Partridge is easily bred in captivity and are often bred for shooting. However the survival rate of reared birds released is low. Despite the low survival rate are stakeholders breeding and releasing partridge. In this study it is of interest to know why, is it due to ignorance about the chances of survival or is it because they want to have a population they can hunt and train their dogs on?	Mykrä, S. et al. 2010. & Parish, D.M.B., & Sotherton, N.W. 2007
9	Late Summer - or as late as possible	Trimming of grassland, ley and fallow later in season	In respect to the brooding hen, juveniles and other animals rearing their young during the most prolific months grasslands, leys or fallows are preferably not trimmed between 1/5 - 15/7.	Jensen, P.E. 2015. & Aebischer, N.J. 1997
10	Spring	Create more ley/grassland fields	Partridge survive cold weather, hunger and escape from predators better in an agro diversity. If your land has few hectare of non- cereal fields would you be willing to create more hectares of such a kind?	Mykrä, S. et al. 2010
11	Spring	Beetle banks	Beetle banks are grass-sown ploughed ridges created to provide	Thomas, S.R.

		to increase food availability	vegetation beneficial for insects, which are an important food source for juvenile partridge. In autumn two plough furrows, around 40cm high and 1.5-2 meter wide are created. The banks can be sprayed to dispose undesirable weeds and flowering heads can be topped to limit spread into the field, no further management should usually be necessary. The banks can be placed along edges, between wells or at other desired locations.	et al 2001. & Thomas, S. 2000.
12	Year round	Ecological agriculture instead of conventional	In ecological farming no pesticides, herbicides or inorganic fertilizers are used. Ecological farming leads to a higher weed and insect diversity, which is favorable for many species connected to farmlands.	Kuijper, D.P.J., et al. 2009
13	Spring	Create a biodiversity fallow	Recommended species to sow into a biodiversity fallow are inter alia clover, meliot, black medic, birds'-foot-trefoil, vetch and chicory. The fallows are recommended to be at least 10m wide. Before august are no cutting or trimming allowed, but in autumn are occasional cutting recommended.	Rosqvist, G. 2003. & Haaland, C et al. 2011.
14	Spring	Fields set-aside for the game species and birds instead of active agriculture	Most commonly to create set-aside fields is to let fields naturally regenerate a vegetation cover in the absence of agrochemical inputs. Set-aside areas, 20 meter minimum width, 0.3 hectare minimum size, are preferable.	Dicks, L. V et al. 2013. & Sotherton, N.W. 1998
15	Any season	Trim bushes/trees to avoid that they becomes lookout points for raptors	Hedges and shrubbery are kept under a height of 2metres and free from trees to prevent lookout point for avian predators. The banks are cut every 2-3 years to prevent overgrowing and promote nesting cover	Aebischer, N.J. 1997
16	Year round	Use double	Pastures are often connected to farmland fields and where also	Jensen, P.E.

		fencing to create zones free of grazing	fields/grasslands and lays are let to be grazed after harvest. By putting up double fences it can create a suitable habitat for partridges and small wildlife between the grazed areas	2015.
17	Autumn	Direct seeding instead of sowing after plowing	Direct seeding means that the seeds are sown without any further processing in the preceding crops residue. Partridges benefit from the stubble and waste seed left on the ground when direct seeding are use.	Rosqvist, G. 2003. & Potts, G.R. 1986.
18	Depends on cereal/crop sown	Sow with wider row spacing to create open spaces	Rainy summers are harsh for the juveniles, dense vegetation dry up slow and the juveniles are in great risk for hypothermia. By sowing with wider row spacing it creates less dense vegetation and areas for the juvenile partridge to dry up.	Mykrä, S. et al. 2010

Result

Ranking of actions

All participants were asked to rank 18 actions with cursors indicating their attitudes. After analyzing the collected data were the actions ranked based on number of upwards cursors received. Actions received highest numbers of upward cursors are ranked first (table 2). Of all actions ranked four actions received no negative response from any of the stakeholders.

In current situation were all hunters in greater or lesser extent engaged in hunting foxes and all agreed the fox hunt could further increase. Three farmers, were also positive to pursue a more efficient hunt on predators, however the fourth uttered that only corvid species should be hunted at a greater extent. All farmers thought the responsibility for conducting this action was at the hunters. Plowing fields during spring instead of autumn also received eight upward cursors. A uniform answer among all farmers were received, plowing in spring instead of autumn would be the most beneficial to enhance the Grey Partridge and a willingness to conduct this action exist.

Fields appropriate to plow during spring instead of autumn are we already to high extend conducting this action on. But certainly there are maybe possibilities to greater extension save fields to plow at spring (Farmer, 1).

Table 2. Summary of number of upward cursors each action received. The actions are ranked from the one that received the highest total number of upward cursors (eight) to the lowest ranked (none). Hunters and farmers desire for financial compensation to conduct actions is also demonstrated. An E represents the County Administration Board desire to get through compensation in the new Rural Development Program 2014-2020. Pos = Positive-, Neg = Negative- and Neu = Neutral opinion.

Number	Action	Hunters			Farmer			Total			Authority	Hunter/Farmer
		Pos	Neg	Neu	Pos	Neg	Neu	Pos	Neg	Neu	Comp is desirable	Comp is desirable
1	Pursue an efficient predator control	4	0	0	4	0	0	8	0	0		
2	Plow the fields during spring instead of autumn	4	0	0	4	0	0	8	0	0		
3	Shoveling snow free patches in grassland and winter crops	3	0	1	4	0	0	7	0	1		
4	Spray-free zones in e.g. crop fields, grassland, ley	4	0	0	3	0	1	7	0	1	E	2
5	Save headland turns and field edges when cultivating, harvest or/and plowing	3	1	0	3	1	0	6	2	0		2
6	Refrain from partridge hunt	2	1	1	4	0	0	6	1	1		
7	Supplementary feeding of field birds	3	1	0	3	1	0	6	2	0		
8	Rearing and releasing of Grey Partridge	3	0	1	2	2	0	5	2	1		2
9	Trimming of grassland, ley and fallow later in season	3	0	1	2	1	1	5	1	2	E	

10	Create more ley/grassland fields	1	2	1	4	0	0	5	2	1		
11	Beetle banks to increase food availability	3	0	1	1	2	1	4	2	2		2
12	Ecological agriculture instead of conventional	2	1	1	2	2	0	4	3	1	E	
13	Create a biodiversity fallow	1	1	2	2	1	1	3	2	3		1
14	Fields set- aside for the game species and birds instead of active agriculture	2	1	1	1	3	0	3	4	1		3
15	Trim bushes/trees to avoid that they becomes lookout points for raptors	1	1	2	2	1	1	3	2	3		
16	Use double fencing to create zones free of grazing	1	0	3	1	2	1	2	2	4		2
17	Direct seeding instead of sowing after plowing	1	1	2	0	3	1	1	4	3		
18	Sow with wider row spacing to create open spaces	0	2	2	0	4	0	0	6	2		

Creating open areas in grasslands/fields by shovel snow free patches when the snow cover is deep or covered with snow crust where ranked as a mediocre action to preform according to the 2th hunter.

The Grey Partridge are an unintelligent species, you can shovel up snow free areas and supply them with seeds and they still don't utilize the area. They can be positioned 20metes from a shoveled area and they don't use it because they don't realize the patch is beneficial for them. (Hunter. 2)

Five of the actions require farmers to allocate or reserve arable land. Main reason to a negative attitude from both groups of stakeholders towards those actions is that they are already in need of all land they can use to survive economically.

We need all the land we can process to survive economically and if compensation for the land we set aside is awarded are we willing to consider actions beneficial for the biodiversity but are less favorable for us as landowners. (Farmer. 1)

Despite a less positive attitude for allocate land from the farmers are two actions of that kind ranked relatively high. Spray-free zones are one of them. Spray-free zones have seven respondent ranked as an action beneficial for the Grey Partridge. When this study were conducted were farmers required to leave sprayed-free zones near ditches visible as blue on the map. New regulations are to be set in 2015 and if this regulation is maintained or changed remains to be seen (Jordbruksverket. 2015). This means that all farmers were at the time of the interview saving patches where pesticides weren't used. Two farmers stated that financial compensation for doing this action and saving headlands turns and field edges is desirable.

Refrain from hunting partridge, supplementary feeding and rearing were all actions addressed mainly to hunters. It was also them reporting the greatest differences in opinions regarding these actions. All hunters reported that they at the moment did not carry out any partridge hunt. But, occasionally hunters did take out one or two individuals, never less the small harvest hunters take out are not affecting the survival of the partridge population.

One hunter possessed a negative response to conduct supplementary feeding to enhance the wild partridge population, claiming that wild partridge are hard to feed and they seldom utilize the feeding stations. The remaining three hunters were positive to the action and were at the moment feeding both partridges and pheasants on their land. No hunter reported a negative attitude towards rearing and releasing and all four were or have been conducting this action. However one hunter reported that rearing and releasing are an acceptable action as a momentary action to increase the population. Three farmers were negative or neutral to rearing/ releasing and supplementary feeding reported that they have no intentions to conduct any of those actions, but hunters are welcome to conduct them on my land. The 4th farmer claimed that partridge were already present at their land, so releasing was not necessary.

Rearing and releasing increase the population temporary, but if no other actions are taken it's a waste of our time and money. If financial compensation were paid it would be more profitable to both rearing and supplement feeding. (Hunter. 1)

Trimming of grassland, ley and fallow were ranked relatively positive and viable by hunters. Three farmers had a negative attitude to conduction this action. They thought it's an action beneficial to enhance the population of partridges but no had the willingness to conduct it. The 4th farmer, being the only participant with an interest in both hunting and farming, harvested to the extent it was possible all fields as late as possible with respect to the wildlife.

We harvest the grassland and ley as fodder to our livestock. We have small margins within we can harvest/ trim the fields, in just one week has the nutritional content decreased markedly in the straws, so it is not an optional action. My belief is that the willingness to conduct this action is low (Farmer 2).

Beetle banks, biodiversity fallow and fields set- aside for the game species and birds are ranked with mean value of 3 positive respondents. Negative comments about beetle banks were inter alia arable land were wasted, and it appears to be a tedious action to conduct. One farmer was positive and thought it would be a beneficial action for the partridge and other animals feeding on insects. However, all four agreed that location of beetle banks should be positioned to the edges of the fields. Same attitudes could be discernible for biodiversity fallow and fields set- aside for the game species and bird life. Many respondents also mentioned that financial compensation were desirable for those three actions.

Actions ranked with few or no positive cursors were considered as unrealistic to perform, less beneficial for the species or the respondents experience lack of knowledge about the specific action. Maintaining bushes and trees to avoid lookout points for raptors received an overall positive ranking. Mainly the stakeholders ranking neutral or negative thought that it was a viable action and many has a willingness to conduct it but considered there are more beneficial actions available; hence they did not rank it with an upward cursor.

Analysis

Questions that have guided this study were the following;

- How did the different stakeholders' e.g. hunters, farmers or authorities view the decrease in numbers of the Grey Partridge and its needs in relation to its species requirements? Do disagreements arise in these matters between the stakeholders?
- How did the stakeholders view the possible actions to enhance the Grey Partridge population on Gotland? Did they have different opinions about the actions which they were asked to rank? Which contributing factors could explain the potential differences?
- Based on opinions from foregoing questions what action/actions did they consider most/least beneficial for the Grey Partridge population? Which are they most/least likely to conduct and under which circumstances, e.g. financial compensation?

Based on education, prerequisites both financial and number of hectares available among the participants, different opinions and attitudes among the participants were expected.

The general comment among the interviewed stakeholders was that Grey Partridge is present on the land they utilize either for farming or hunting. Whether the population had increased or decreased uttered a number of the farmers difficulties to answer, since they had

not put any particular attention to the population, or its fluctuations, until they were approached to participate in this study. All populations, regardless of species naturally fluctuate (Potts 1970), and all hunters experienced that population fluctuations have increased during recent years. Both hunters and farmers agreed about which habitat requirements the Grey Partridge need. Both parties also reported that the species are in need of food and shelter year around and most actions would presumably enhance the population if they would be implemented properly. Nevertheless, the reasons and attitudes why they ranked them as they did differed (table 2).

Disagreements on ranking actions arose within and between the stakeholder groups. All four hunters reported they had before, or were currently implementing actions conceivably directed to them to conduct, e.g. rearing/releasing of Grey Partridge, supplementary feeding and actions related to hunting. However, hunters' thoughts about actions efficiently to increase the population of Grey Partridge differed. Rearing Grey Partridge is difficult and expensive and the behavior of reared birds appears different as compared to wild-borne specimens (Putala et al. 1997). A reared bird requires to higher extent supplementary feeding during the winter to have any chance to survive (Parish et al. 2007) No farmers had objections to let willing hunters to either rear or release Grey Partridge or hunt predators on their land, but no farmer was willing to conduct any of that themselves.

Attitudes to refrain arable land to support the Grey Partridge

The majority of hunters reported they thought and experienced actions requiring refraining of arable land (and thereby also causing financial losses to the affected farmers) were most beneficial for the population of the Grey Partridge. Yet they uttered understanding that farmers reported a negative opinion about such actions, not profitable or neutral for them. Three of the investigated actions require direct refraining of arable land, such as establishing beetle banks, set-aside fields for the wildlife and biodiversity fallows. Two of the requires indirect abstaining where the harvest would be either reduced or impaired such as spray-free zones and saving headland turns while plowing, spraying or harvesting.

When the farmers were asked about their willingness to conduct actions requiring losses of arable land, a certain willingness to enhance the Grey Partridge existence emerged. The interviews revealed that all farmers requested financial compensation to consider conducting actions where land is refined (table 2). The result showed that willingness to refrain from land was somewhat correlated with how many hectares the farmer utilized. Farmers that utilize larger areas of land, such as the 3rd farmer (180 hectares of arable land) perceived to have a more positive attitude to refrain land than the farmer utilizing a smaller area such as the 1st farmer (75 hectares of arable land). The 4th farmer (200 hectares of arable land) showed highest acceptance to benefit the local wildlife.

As both a farmer and hunter I have an interest in both supporting the wildlife and to survive as a farmer. The few hectares I set-aside are not to gain the Grey Partridge in particular, but all the species present (Farmer 4).

The four most negatively ranked actions (number 15, 16, 17, and 18) were by all participants considered to be beneficial for the population, however, the vast majority of stakeholders uttered that there were actions more realistic or beneficial available. All farmers reported that use of direct seeding instead of processing the land before sowing (action number 17) would not be feasible on the calcareous soils found on Gotland and the

use of wider row spacing while sowing (action number 18) would lead to financial losses that they would not be compensated for. Maintaining and/or managing bushes/trees (to keep vegetation for shelter, but cut down trees of certain height) to avoid lookout points (action number 15) for raptors was an action many were willing to conduct, however the majority were also skeptical whether it would be worth the effort.

Actions in relation to the seasons

An interesting result from this study was that willingness to enhance the Grey Partridge population was strongly connected with the actions beneficial for the Grey Partridge during autumn and winter seasons. Action numbers 2, 3, 5, and 7 are all actions beneficial for the Grey Partridge during harsh weather conditions and were ranked with eight to six upward cursors. Cold and/or snowy winters are critical periods for the Grey Partridge. The average winter loss in Grey Partridge populations across the UK is around 53%, whereas in France it seems to be only around 27% (Game and Wildlife Conservation Trust. 2008). But what if enhancements are needed during other periods of the Grey Partridge year-cycle?

Predation is considered as one of the major threats to nesting Grey Partridge (Rymešová. et al. 2012). Adult mortality varies in many bird populations throughout the year with respect to environmental conditions (Rymešová. et al. 2012). Males are expected to suffer a higher predation risk during the mating period, whereas females and offspring were expected to be more vulnerable at the time of laying, incubation and rearing of the juveniles. Mortality of females Grey Partridge during this period may be as high as 73% (Rymešová. et al. 2012). It was shown by Rands (1998) that Grey Partridge nest predation decreased with increasing amounts of dead grass and increasing distance from gaps in the nearby hedgerows. The creation of actions increasing the amount of dead grass and, inter alia, set-aside strips, hedges, fallows, through agri-environmental schemes have been encouraged in Western Europe farmland management (Bro. et al. 2004). By creating a cover from both predation and harsh weather throughout the year within a cereal crop or field those actions present several advantages. Increasing edge abundance, thus provide both food and shelter for adults and increasing the abundance of insects for the juveniles, so do also the diversifying of cover types, and creating a heterogeneity within fields, also clutches are preferentially laid within 15 meters of the field edges, hedges or fallows (Bro. et al. 2004).

Based on this knowledge one may conclude that a Grey Partridge management plan is necessary to implement throughout the whole Grey Partridge annual-cycle. Stakeholders can help enhance the population by creating suitable habitats to the species through its life-cycle periods, i.e. the pairing period, the nesting period, the covey period (Rymešová. et al. 2012) and the grouping of flocks during autumn and winter (figure 3) such as increasing the amount of shelter and food near field edges and carry out sufficient effective predator control.

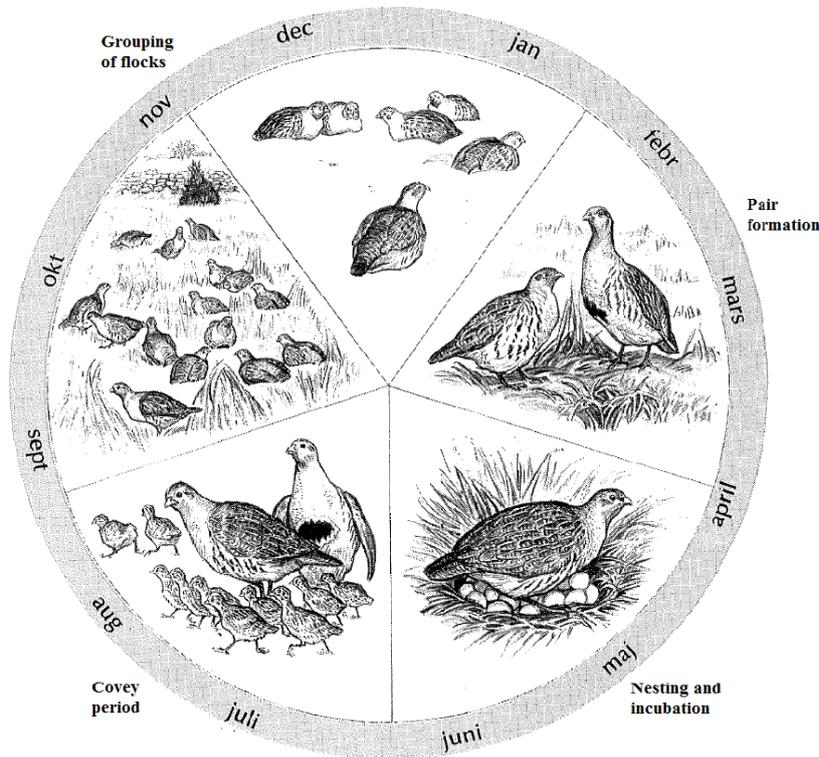


Figure 3. Annual- cycle of the Grey Partridge. (Photo: Svenska Jägareförbundet. 1989).

Participants' suggestions to enhance the wildlife

Shelter and increased food availability for both adults and juveniles of many of species can be created by encouraging collaboration between affected parties of stakeholders, in this case hunters, farmers and the Gotland County Administrative Board. While interviewing the participants, several interesting and potentially additional actions, not listed in table 2 were suggested. One hunter proposed an action requiring compromises from all stakeholder parties that could increase willingness so refrain from land and potentially even ease their work of conducting several of suggested actions to enhance the local Grey Partridge population. For example a field with irregular protruding edge- zone difficult and/or costly to cultivate and harvest could be set-aside fields to enhance populations of wildlife species (figure 4). If farmers would be willing to refrain from those areas and create biodiversity fallows, beetle banks or set-aside fields and hunters could release reared birds and supplement feed all wildlife species on those patches it would benefit several more species except the Grey Partridge. However, to get this action accepted by farmers the authorities need to be willing to compensate farmers ready to do this refraining of arable land. Another suggestion to reduce the number of Grey Partridge and other species killed being run over of the harvesting machine is to frighten off the wildlife before harvest. Before harvesting, hunters with dogs could walk through the fields to frighten off the animals present therein. This action is beneficial for both wildlife and humans. Hunters are given opportunities to train their dogs and the risk of overrun animals in the yield decreases. All hunters uttered a positive opinion and a majority of the farmers reported that collaboration of these kinds can be the starting point for a management plan among stakeholders on Gotland.

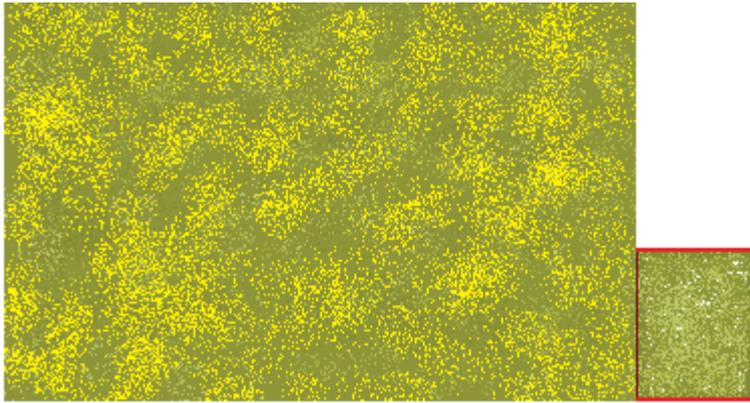


Figure 4. Field with edge- zone (marked with red) preferable to set-aside to conduct actions requiring refraining of usable land. For example, beetle banks or biodiversity fallows can be located in those areas.

Conclusions and future studies

A willingness among stakeholders to conduct actions beneficial for the Grey Partridge exists according to the interviews made. However, although few participants, conclusions can be drawn that the majority of the action would receive higher acceptance if financial compensation were awarded. Another identified conclusion is that those actions easy or cheap to conduct (e.g. 1, 2, 3, and 6) received higher acceptance while, actions believed to be most beneficial and relevant to conduct (e.g. 11, 13, and 14) received lower acceptance among the respondent. All actions the respondents were asked to rank can be implemented in regions with similar local conditions to Grey Partridge populations. Other regions soil-composition (which have an impact on local agricultural activities), weather conditions and population size are factors differing from region to region which could result in differentiations in ranking of actions.

The Grey Partridge is a non-migratory species. Meaning they may require anthropogenic support throughout parts of or its whole life-cycle locally, e.g. an efficient predator control before spring; saving of headlands while harvesting or plowing; create stubble fields during late summer to autumn and/or save spray- free zones during spring to increase the abundance of food and shelter during summer. These are examples of actions beneficial for the species in different seasons of the year.

Before creating a management plan regarding any species, the S.M.A.R.T. – criteria (Bogue. 2005) are common to use to achieve the set objectives. S.M.A.R.T. – criteria is giving to guide in the setting of objectives, for example in implementing a management plan. The term S.M.A.R.T involves five criteria that together forms the word, – Specific, Measurable, Attainable, Realistic and Time (Haglund, E. et al. 2008). The set objective in this study is investigating the possibilities to develop a management plan to enhance and support the population of Grey Partridge on Gotland. Regardless of a management plans potential to enhance a population, if the conception of the plan dispute with the implementers' beliefs, values and attitudes, the establishment of a plan is likely not to be successful. To raise the goals of a management plan, but also the acceptance and understanding, information about those expected to conduct the management plan is essential to possess. A management plan should advantageously incorporate actions accepted by the implementers as well investigate whether acceptance for certain actions could be increased by offering e.g. financial compensation or by assistance of education. The result from this study can be used in the planning as the preparatory work needed

before a management plan is implemented. The results can also be used by stakeholders as information about possible actions available to enhance the Grey Partridge population.

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Figure 1. The IUCN Red List of Threatened Species.

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Figure 3. Svenska Jägareförbundet. 1989. *Lär känna Rapphönan*. Printed by Schmidts Boktryckeri AB, Helsingborg 1989. ISBN 91-7118-613-1

Appendix

Appendix 1. Interview templet used as a guide during interviews.

Frågeformulär för att undersöka lantbrukares, jägares och myndigheters attityder till Rapphöns på Gotland.

Lantbrukare	
Tema 1. Vem är du?	
Nr	
1	Informera om att jag spelar in
2	Kön (Man/kvinna)
3	Ålder
4	Utbildning. Vilken är dina högsta avslutade studier?
5	Vad jobbar du med? Om man har flera yrken "vid sidan av"
6	Har ni permanent boende på Gotland
7	Hur länge har ni bott på Gotland
Tema 2. Markerna/ Gården/ Jakten	
8	Hur länge har ni varit verksamma som lantbrukare?
9	Hur länge har ni haft markerna i era ägor
10	Är gården ärvd eller köpt
11	Hur stor är gården, Hur många hektar av skog, åker, bete?
12	Vilken typa av grödor odlar ni mest
13	Bedriver du ekologisk eller konventionellt jordbruk? Om konventionellt, hur många ha besprutas INTE av dessa?
14	Vilka bekämpningsmedel används mest på era marker, insekticider eller herbicider
15	Hur ofta besprutar ni? Finns det möjlighet att bespruta färre gånger/år?
16	Hur ser det ut med biologiska kulturarvsvärden/ landskapselement på era marker Dessa kan nämligen gynna rapphöns om man gör åtgärder där.
17	Har du någon mark i träda, varför, varför inte?
18	Bedriver ni djurskötsel. Vilka arter och hur många djur ca
Tema 3. Rapphöna	
19	Vad kan ni om Rapphöns?
20	Har ni rapphöns på era marker nu? Om inte har ni haft förut och när hade ni senast rapphöns på era
21	marker Vilket intresse har ni av rapphöns? Emotionellt, genuint intresse för
22	vilt, o.s.v
Tema 4. Rapphöna era ideer	
23	Har populationen av rapphöns minskat eller ökat Varför tror du att populationen av rapphöns minskat och fortsätter att minska? Vilka åtgärder tror ni skulle vara möjliga att utföra för att gynna
24	rapphöns?

25 | Vad gör ni för åtgärd i dagsläget för att gynna raphöns?

Tema 5. Åtgärder

26 | Hur skulle ni ranka dessa åtgärder. Den ni är tror är mest gynnsam för raphöns först, Varför?

27 | Hur skulle ni ranka dessa åtgärder. Den ni är mest villiga att utföra först. Varför/varför inte?

28 | Hur skulle ni ranka dessa åtgärder om ni fick ersättning för dem?

29 | Vilka åtgärder tror du _____ är villiga/ ej villiga att utföra.

Med eller utan ersättning?

Jägare

Tema 1. Vem är du?

Nr

1 | Informera om att jag spelar in

2 | Kön (Man/kvinna)

3 | Ålder

4 | Utbildning. Vilken är dina högsta avslutade studier?

5 | Vad jobbar du med? Om man har flera yrken

6 | Har ni permanent boende på Gotland

7 | Hur länge har ni bott på Gotland

Tema 2. Markerna/ Gården/ Jakten

8 | Hur många år har du jagat?

9 | Vilken typ av jakt bedriver du? Fågel eller annat vilt

10 | Jagar ni raphöns?

11 | Skulle ni vilja kunna jaga (mer) raphöns i framtiden?

12 | Hur många hektar är jaktmarkerna på?

13 | Hur länge har ni jagat på dessa marker?

Tema 3. Rapphöna

14 | Vad kan ni om Rapphöns?

15 | Har ni raphöns på era jaktmarker nu/ Marker

16 | Om inte har ni haft förut och när hade ni senast raphöns på era marker?

Tema 4. Rapphöna era ideer

17 | Varför tror du att populationen av raphöns minskat och fortsätter att minska?

Vilka åtgärder tror ni skulle vara möjliga att utföra för att gynna raphöns?

18 | Vad gör ni för åtgärd i dagsläget för att gynna raphöns?

19 | Vilka åtgärder är ni som jägare villiga att utföra

20 | Jagar ni predatorer på, vilka

Tema 5. Åtgärder

21 | Hur skulle ni ranka dessa åtgärder. Den ni är tror är mest gynnsam för raphöns först, Varför?

- 22 Hur skulle ni ranka dessa åtgärder. Den ni är mest villiga att utföra först. Varför/varför inte?
- 23 Hur skulle ni ranka dessa åtgärder om ni fick ersättning för dem? Vilka åtgärder tror du _____ är villiga/ ej villiga att utföra.
- 24 Med eller utan ersättning?

Myndighet

Tema 1. Vem är du?

Nr

- 1 Informera om att jag spelar in
- 2 Kön (Man/kvinna)
- 3 Ålder
- 4 Utbildning. Vilken är dina högsta avslutade studier?
- 5 Vad jobbar du med? Om man har flera yrken
- 6 Har ni permanent boende på Gotland
- 7 Hur länge har ni bott på Gotland

Tema 2. Markerna/ Gården/ Jakten

Tema 3. Rapphöna

- 8 Vad kan ni om Rapphöns?
Varför tror du att populationen av rapphöns minskat och fortsätter att minska?
- 9

Tema 4. Rapphöna era ideer

- 10 Vilka åtgärder tror ni skulle vara positiva till att utföra för att gynna rapphöns?
- 11 Vad gör ni för åtgärd i dagsläget för att gynna rapphöns?
Skulle ni kunna tänka er att hjälpa markägare/lantbrukare/jägare att gynna rapphöns. Hur?
- 12

Tema 5. Åtgärder

- 12 Hur skulle ni ranka dessa åtgärder. Den ni är tror är mest gynnsam för rapphöns först, Varför?
- 13 Hur skulle ni ranka dessa åtgärder. Den ni är mest villiga att utföra först. Varför/varför inte?
Vilka åtgärder tror du _____ är villiga/ ej villiga att utföra.
- 14 Med eller utan ersättning?

SENASTE UTGIVNA NUMMER

- 2014:8 Full Circle: Upstream and downstream migration of Atlantic salmon (*Salmo salar*) in the northern Swedish river Vindelälven.
Författare: Raven Grandy-Rashap
- 2014:9 Nyckeltal för älg och fodertillgång på tall *Pinus sylvestris* och rönn *Sorbus aucuparia*.
Författare: Mikael Åkerblom Andersson
- 2014:10 Rissepareringens effekter på viltets nyttjandegrad av GROT.
Författare: David Rehmberg
- 2014:11 Fysiska strukturer i Umeälvens gamla älvfåra och dess inverkan på laxsmoltens utvandringsframgång.
Författare: Viktoria Tegenfeldt
- 2014:12 SNP-based conservation genetics of the southern Swedish brown bear (*Ursus arctos*) population.
Författare: Joanna Fahlén
- 2014:13 Comparison of tree cavity abundance and characteristics in managed and unmanaged Swedish boreal forest.
Författare: Sophie Michon
- 2014:14 Habitat modeling for rustic bunting (*Emberiza rustica*) territories in boreal Sweden
Författare: Emil Larsson
- 2014:15 The Secret Role of Elephants - Mediators of habitat scale and within-habitat scale predation risk
Författare: Urza Flezar
- 2014:16 Movement ecology of Golden eagles (*Aquila crysaetos*) and risks associated with wind farm development
Författare: Rebecka Hedfors
- 2015:1 GIS-based modelling to predict potential habitats for black stork (*Ciconia nigra*) in Sweden
Författare: Malin Sörhammar
- 2015:2 The repulsive shrub – Impact of an invasive shrub on habitat selection by African large herbivores
Författare: David Rozen-Rechels
- 2015:3 Suitability analysis of a reintroduction of the great bustard (*Otis tarda*) to Sweden
Författare: Karl Fritzson
- 2015:4 AHA in northern Sweden – A case study
Conservation values of deciduous trees based on saproxylic insects
Författare: Marja Fors