

HUNTING for Sustainability

- a summary of research findings from Spain



Photo: José Ardaiz

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The HUNTING for Sustainability multi-disciplinary research project has been funded by the European Union's 7th Framework Research Programme. The project involved cooperation with a range of institutions and included case studies from Norway, Sweden, Scotland, Spain, Slovenia, Croatia, Ethiopia and Tanzania.

The primary research activity in Spain has been related to **assessing costs and benefits of different management styles for red-legged partridge hunting.**

In Spain, hunting is an important socioeconomic activity, with approximately one million local hunters and many foreign hunting visitors, but not exempt of conflict among other sectors of society. Hunting also currently constitutes a major income in some rural areas, and seems to be an expanding economic activity. Small game hunting, particularly of rabbits (*Oryctolagus cuniculus*) and red-legged partridges (*Alectoris rufa*), is of particular relevance numerically and socio-economically. Partridges, in particular, are a highly valued game among hunters. Hunting is usually associated with habitat or population management, which may be beneficial or detrimental for non-target species. For example, red-legged partridge hunting in Spain is usually associated with predator control, provision of supplementary food or water, habitat improvements (such as provision of game crops, or maintenance of habitat features good for partridges, such as field edges or scrub), or the release of farm-reared partridges to supplement populations. Partridge populations have strongly decreased in recent decades and, as a result, management to improve their populations has increased in intensity. In particular, current management is increasingly associated with the release of farm-reared animals, which has raised concerns among conservationists and scientists.

Through different multidisciplinary approaches, we aimed to better understand the relationships between management tools, their efficacy for hunting, their effect on the environment, and their effect on economics of hunting estates with the aim of, ultimately, suggest ways of promoting sustainable management styles that are beneficial for conservation.



Photo: Francois Mougeot



Commercial estates are associated with more intensive management and the retention of natural habitats

Beatriz Arroyo, Miguel Delibes-Mateos, Silvia Díaz-Fernández and Javier Viñuela

Background

Game management is widely implemented in Spain, affecting more than 70 % of land cover, but few studies have quantified the intensity of different management tools, and whether they vary with estate characteristics or aims.

Research questions

- What are the main management tools used in partridge estates?
- Do they vary among estates with different economic aims (i.e., among those aimed to obtain economic benefits or those whose main aim is to provide access to game to local hunters)?

Methods

Through interviews with game managers, we quantified management techniques and hunting methods in 59 small-game hunting estates in central-southern Spain. We compared non-commercial estates (aimed for leisure, managed mainly by local hunting societies; n=14), non-intensive commercial estates (aimed at financial benefit; n=37), and intensive estates (a special category of commercial estates with administrative permission to release farm-reared partridges without temporal or numerical limits throughout the year; n=8).

Key findings

Commercial estates employed more game-keepers and had more intensive management, including more and larger partridge releases, higher density of supplementary feeders and more intensive predator control. Commercial estates also retained more natural vegetation, which may help to enhance the landscape and biodiversity value of farmland in central Spain.

Driven shooting was much more common in intensive estates than in other type of estates, and overall these estates had much higher annual harvest. Number and frequency of releases were also much higher in intensive estates than in other estates (commercial or not). Number of hunters per day was significantly lower in intensive estates, but because the number of hunting days per year was also much higher there, annual hunting pressure was very similar among the three types of estates.

Conclusions

Overall, commercialisation of shoots allowed higher investment in management and was associated with higher retention of natural vegetation. On the other hand, our results show that differences in management and hunting styles were most marked between intensive estates and other type of estates (both commercial and non-commercial), suggesting that these estates are qualitatively different from other small-game estates, both ecologically (hunting based on releases and driven shooting) and economically (higher inputs and outputs).

Red-legged partridge harvest is more related to hunting effort or intensity of releases than to availability of wild stocks.

Silvia Díaz Fernández, Javier Viñuela and Beatriz Arroyo



Background

A basic rule to attain sustainable use of harvested resources is to adjust take to availability. Otherwise, overhunting may occur. If there is a will to increase availability in order to increase harvest, this may be done by improving natural conditions for population productivity and survival. However, in recent times there is a trend towards the artificial increase of resource availability through (re)stocking. In the case of Spanish partridge estates, this has even led to the creation of “intensive” estates, which have no legal restrictions in relation to number or timing of farm-bred partridge releases. Intensive estates are currently relatively scarce (3 % of all hunting estates in 2006), but there is an increasing demand for this label.

Research questions

- Is harvest of red-legged partridges related to availability or to hunting effort?
- Is it more influenced by availability of wild stock or by release intensity?
- Does this relationship change among intensive and non-intensive estates?

Methods

We used questionnaires to managers to assess release intensity (number of partridges released per km²), hunting pressure (number of hunters × hunting days / km²) and annual harvest (partridges shot/km²) and bird surveys (to assess wild stock abundance) in 50 hunting estates, including 6 administratively labelled as “intensive”.

Key findings

In intensive estates, annual harvest was exclusively related to release intensity, indicating that in these estates hunting is detached from natural resources and approaches an industrial activity based on external inputs. In non-intensive estates harvest was mainly affected by walked-up shooting pressure, secondarily by habitat (higher harvest in estates with more Mediterranean shrubland) and wild stock availability. In these estates, releases did not increase annual harvest, and can be considered an inefficient practice. Additionally, the fit between abundance estimates and harvest was not very tight in estates with low partridge abundance estimates, suggesting possibilities for overharvesting in an important proportion of estates.

Conclusions

Increasing the abundance of wild red-legged partridges and improving the adjustment of harvest to availability, may be the best strategy to increase long-term harvest in non-intensive estates. Additionally, it would be important to create ways for segregating in the market the estates where only wild red-legged partridges are managed from those where releases are used to internalize ecological costs in the management decisions.



EFFECT OF MANAGEMENT ON RED-LEGGED PARTRIDGE ABUNDANCE

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Background

A variety of management methods are applied in most partridge hunting estates, from provision of feeders and water troughs, predator control, habitat improvement or releases of farm-reared partridges.

Research questions

- Is management effective in improving partridge abundance?
- Are all management tools equally effective?

Methods

We used questionnaires to managers to assess management intensity, and field bird surveys to evaluate partridge abundance and productivity in 48 hunting estates in central Spain with the aim of assessing whether post-breeding productivity and abundance of red-legged partridges were related to the intensity of management tools (provision of supplementary food and water, predator control and releases of farm-bred partridges), harvest intensity and habitat.

Key findings

Productivity varied with habitat (being higher in estates with higher proportions of Mediterranean scrub within the agricultural matrix), year, and management practices. In particular, productivity was higher in estates with higher density of supplementary food and water points, but was lower in estates with higher intensity of releases of farm-reared birds.

Post-breeding red-legged partridge abundance was strongly related to productivity. In addition to the variables explaining productivity, post-breeding abundance was strongly and negatively related to harvest intensity (i.e., abundance was lower in those estates where previous harvest was higher than that expected from abundance).

Conclusions

Our study indicates that both habitat and management practices have a strong effect on post-breeding abundances, which suggests that management application is beneficial. However, this effect varied among management tools. The effect of some management tools (like predator control) was too small to be detectable in comparison with those of habitat, or supplementary food or water, for example, so they can be considered globally inefficient. Thus, their use should be reconsidered if only from an economical point of view. In addition, some management tools had a detrimental effect on abundance, in particular releases or an inappropriate harvest level. Management efforts in red-legged partridge estates should focus on those tools that are beneficial, such as supplementary food or water, and minimise those that are clearly detrimental. Future studies should further explore the inconclusive effects of predator control.

The role of economic and social factors driving predator control in small game estates in central Spain

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Background

Important human-wildlife conflicts occur where predators are involved. Predator species may compete with us for the game species, and have thus been frequently controlled by game managers, which has negatively affected many predator populations worldwide.

Although human-predator conflicts are generally embedded into an ecological, economic and social context, most studies performed to date focus only on the ecological aspects. A multidisciplinary framework is necessary for a better understanding of human-predator conflicts.

Research questions

- What are the main methods used for predator control in Spain?
- What are the perceptions of their efficacy by managers?
- Does predator control intensity vary according to the managers perceptions of predators or to the economic aims of the hunting estate?

Methods

Data were gathered through face to face interviews with game managers from 59 small game hunting estates within central Spain.

Key findings

Predator control was employed in 90 % of the estates, but control intensity was very variable among estates. The main methods employed were cage-traps and shooting, but some illegal practices (e.g. leg-hold traps) were also admittedly used. Overall, non-selective methods, such as snares, were more frequently employed in commercial than in non-commercial estates.

Most managers believed that predators had an important effect on prey, and therefore that not doing it would lead to smaller hunting bags. Stronger discourses, such as that hunting would be impossible without predator control, were only used by game managers from commercial hunting estates. The intensity of predator control was higher in those estates that had managers who used stronger anti-predator discourses.

Most managers considered that predator control was effective to reduce the number of predators, but only in the short term. Therefore, they highlighted the need of maintaining predator control every year.

Conclusions

Our results highlight the important role that both social and economic factors (even stronger roles than ecological factors) play driving predator control, and therefore the need of incorporating these factors when making decisions to mitigate the human-predator conflict.



Photo: François Mougeot



Potential benefits of game management for non-game birds of conservation concern in Spain and Portugal

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Background

In southern Europe, hunting and its associated management has been performed for centuries and has potentially had profound effects on landscapes and on the biodiversity they hold.

Thus, game management aimed at improving the populations of red-legged partridges may affect other species sharing the habitat with the partridges, affecting thus the conservation value of hunting estates.

Research questions

- Is the application of management or its intensity related to abundance or richness of other groups of birds of conservation concern, such as passerines, steppe birds or raptors?

Methods

In a first step, we assessed whether there were a higher abundance or bird species richness in hunting estates with game management (n=12) than in those without management (n=12) in southern Portugal. Field surveys were carried out during summer, and the groups of species considered were passerines, steppe birds, ground nesting birds and endangered birds.

In a second step, we aimed to disentangle which game management activities could specifically affect bird abundance and diversity. Raptors and steppe birds were surveyed in 54 small-game hunting estates in central Spain with varying game management intensity. Information about game management was gathered through interviews with game managers.

Key findings

In all cases, habitat had an important effect on bird richness or diversity.

Additionally, and after taking into account habitat effects, steppe birds, ground-nesting birds and endangered birds were more abundant in Portuguese hunting estates where game management was employed than in those with no management. In addition, species richness of steppe birds and ground nesting birds was also higher in these estates.

In Spain, we didn't find any relationship between management intensity and the abundance and diversity of raptors, but having good densities of partridges had a positive effect on the number of raptor species observed. Additionally, some activities leading to improve red-legged

partridges, such as supplementary feeders and predator control, were positively associated with the abundance of steppe birds. In contrast, and once taking all other factors into account, intensive estates were negatively associated with steppe bird abundance or raptor diversity, suggesting lower biodiversity value of that type of management.

Conclusions

Game management for red-legged partridges appear to benefit different groups of bird species of conservation concern in farmland areas of southern Europe. However, this benefit may not be as strong in the case of intensive estates.

As habitat is also an important variable affecting bird richness and abundance, it is very important to maintain the habitats that sustain the high densities of birds of conservation concern observed in managed estates.



Photo: François Mougeot

Values and perceptions of hunting in Spanish hunters

Carolina Vázquez-Guadarrama, Miguel Delibes-Mateos and Beatriz Arroyo



Background

In Spain, hunting involves approximately 1 million people of very different backgrounds, integrating different actors, activities, game species and point of views. Interestingly, the social significance of this activity from the point of view of the main actors, the hunters, has been poorly studied.

Research questions

- What is valued most and least in relation to hunting?
- How do hunters perceive their position within the society?
- Are past or future changes perceived?

Methods

We analysed contents of a monthly section in the main Spanish hunter's magazine that consisted of a fixed questionnaire to hunters. 96 questionnaires were considered.

Key findings

In the discourse of hunters, aspects most positively valued about hunting included human values (e.g. comradeship or friendship, perseverance or commitment of hunters etc) and ecological values (e.g. their love of nature, the view of hunting as a tool for nature conservation, etc). Economic values were only occasionally mentioned.

Negative expressions in relation to hunting were directed towards three sectors of the society: the hunting world itself (i.e. self-criticism of certain hunters or practices), the administration (i.e. current regulation of hunting, which was valued as inadequate) and certain aspects of the anti-hunter organisations (frequently viewed as ignorant of the hunting world and intolerant).

Mixed views were expressed with regard to the current position of hunters within the society. Many hunters viewed themselves as not accepted, misunderstood or even attacked by others, whereas others stated to feel proud to be hunters and comfortable as social subjects.

In relation to the future, the general perception was that there is a predisposition to the extinction of natural hunting, but many also expressed that the future was mainly on the hands of hunters.

Conclusions

Hunters perceive themselves as actors of the natural world (sometimes, the only "really" engaged ones). Additionally, most of the criticisms directed against aspects of the hunting world coincide with those expressed by other sectors of the society. There is thus a high potential for constructive interactions between hunters and other conservationists, to jointly promote sustainable ways of hunting, which is currently impeded through the negative values that hunters have of anti-hunters (and possibly because of the reciprocity of that negative valuation).



Economics consequences of partridge restocking.

Silvia Díaz-Fernández, Miguel Díaz-Fernández, Beatriz Arroyo and Javier Viñuela.

Background

Management of red-legged partridge hunting in Spanish commercial estates increasingly integrates annual restocking of farm-reared partridges. Massive releases in intensive estates allow much higher harvest, but imply also higher investment. Small-scale releases are inefficient to increase abundance or harvest, and are detrimental to wild stocks.

Research questions

- What are the economic consequences of restocking for the hunting estate?

Methods

We gathered information on management in 59 partridge estates through face-to-face interviews with hunting managers. We defined the main generic expenses and revenues of red-legged partridge hunting, and took stock of 9 commercial estates with different release intensity.

Key findings

We found greater revenues, profitability and expenses in intensive estates (massive releases) than in others, but also lesser expenses per partridge hunted. Their great production, much over the limits of wild populations, was a key for their competitiveness. The real options of deferring investments and expanding the offer that restocking gives to hunting estates are another advantage of releases, and may be a possible explanation of the widespread motivation to restock in hunting estates. We found 4 cases where commercial partridge hunting was not profitable (occurring in estates where hunting is a complementary activity), and 3 of them released annually farm-reared partridges. Red-legged partridge hunting in our study estates without releases was profitable, but not competitive with intensive estates within the same market and prices.

Conclusions

There is margin to optimize management costs in estates that manage only wild partridges. Moreover, if releases had a social cost (which should be evaluated) and we wanted to reduce it, mechanisms as internalization of costs, such as market or fiscal differentiation through quality or eco-labels, would be necessary to encourage managers to implement sustainable wild red-legged partridge hunting.

Valuing partridge hunting in Spain: a choice experiment application

Pere Riera, Miguel Delibes-Mateos, Jesús Caro, Javier Viñuela and Beatriz Arroyo



Background

Most game estates devoted to partridge hunting are managed privately and an important proportion of them are managed for commercial purposes. The most widespread hunting method in most estates is walked-up shooting, where hunters shoot partridges as they encounter them. Many hunters describe a walked-up hunting day as a wholesome experience, where the bag may be less important than other factors (how pleasant is the day, the surroundings, the thrill of the hunt, being able to share the meat with friends, etc).

Research question

- What are the attributes that influence the money hunters would be willing to pay when hunting partridges?

Methods

We implemented a choice experiment valuation exercise of commercial walked-up red-legged partridge hunting in central Spain. The experiment was designed for shoots comprising the following attributes: the expected amount of partridges shot; the quality of the partridges (high, i.e. wild stock or closely resembling; or low, i.e. farm-reared); the landscape (purely farmland, or including natural vegetation); presence of non-huntable species of conservation value; possibility of hunting other small game; and price charged.

The survey was conducted between December 2011 and June 2012. Overall, we collected 400 questionnaires. Final analyses are in course.

Key findings

All of the attributes were significant determinants of choice, but partridge quality was one of the most important ones. As expected, hunting more birds was preferred over hunting a lower number of partridges, but an important proportion of respondents preferred hunting a lower number of high quality birds than a higher number of low quality partridges.

The opportunity to hunt additional small game, like rabbits or hares, was highly appreciated by hunters. In general, the presence of natural vegetation was more appreciated by partridge hunters than that of animals of conservation concern.

As expected, having to pay more with everything else as constant was perceived negatively, but the average hunter would be willing to pay more for hunting good quality partridges, and for hunting in estates with natural landscapes.

Conclusions

Results suggest that clearly identifying estates with high quality (i.e., non-released) partridges and more natural vegetation (which has other conservation values in farmland) would help sustain the economic profitability of those estates, as they could attract hunters willing to pay for those attributes. This would in turn help maintain estates with overall good conservation value.

Summary and conclusions

Estates dedicated to red-legged partridge hunting in the Iberian Peninsula are mainly farmland areas with varying degree of natural vegetation (mainly Mediterranean scrubland or pastures) mixed within the agricultural matrix. Our studies have shown that the commercialization of hunts is associated with more intensive management and a higher proportion of natural vegetation (associated with higher nature value in farmland areas). In Portugal, areas managed for hunting contained higher densities of birds of conservation concern than areas of similar habitats not managed for hunting. Within central Spain, analyses on management activities and their effect on bird guilds showed that supplementary food was associated with higher densities of granivorous steppe birds, and fox control with higher densities of non-granivorous steppe birds. Management (in particular, habitat and supplementary food) was reflected in higher partridge densities, which in turn were associated with higher raptor richness in Spain. Small-scale partridge releases seemed to be inefficient to increase partridge abundance or bags, and large-scale partridge releases (such as those carried out in intensive estates), although having a direct positive impact on harvest and thus estate economies, were negatively associated with steppe bird abundance or raptor diversity, suggesting lower biodiversity value of that type of management.

Broadly, our results suggest that, in Iberian farmland, game management activities directed to benefit wild red-legged partridges and other associated small game (in particular, habitat management, predator control or food enhancement) have positive effects on other farmland birds of conservation concern, but that these benefits disappear when management is intensive and based on large-scale releases of farm-reared partridges. However, the latter is much more profitable economically. Thus, there is a need to maintain economic sustainability of wild red-legged partridge estates managed in a sustainable way, and thus contributing to overall conservation of farmland wildlife.

From a policy perspective, our results highlight that clearly identifying those red-legged partridge estates in Spain that have management leading to the sustainable use of wild stock (i.e., no releases, good habitat quality, investing on food supplementation and with an adequate predator control policy) would have benefits for biodiversity, and would also attract hunters willing to pay more per hunt, which would help the economic sustainability of those estates. One way to make such identification could be the implementation of a Game Quality Label, which is currently under discussion in various regions of Spain. In addition, there could be schemes “penalizing” economically those estates carrying out unsustainable management, such as those based exclusively on released birds, in order to internalize the environmental damage they do. One way of doing that would be to increase taxation there. In fact, these types of institutional solutions have been frequently requested by hunters and game managers, as occurred during the interviews we carried out in this project. Most managers and hunters stated their negative views on released partridges but recognized their importance to maintain the economic role of hunting in some regions. Under this perspective, they requested institutional arrangements (for example the label mentioned above) to promote the hunting of wild partridges.

The understanding of human-wildlife conflicts requires a multidisciplinary framework that is rarely considered. In this work, we have combined ecological, economic and social information to assess the potential costs and benefits of hunting on conservation. This multidisciplinary approach has improved our understanding on the potential conflicts between hunting and other land uses. On the other hand, the combination of these disciplines has allowed us to identify potential ways to make hunting a sustainable activity that favours the conservation of biodiversity and at the same time provides economic resources in rural areas.



Photo: François Mougeot



Please note that many of the research findings presented in this summary are still undergoing analysis, but will be peer-reviewed through submission to open-access academic journals. For further information and research findings from HUNT please visit:

<http://fp7hunt.net/>

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