Environmental Impact Assessment for the Proposed Anjar Responsible Hunting Area

Table of Contents

Table of Figures

Study Area

The study area encompasses the village of Anjar, which is located on the level plain of the Beqaa valley. The eastern border of the village of Anjar reaches the middle of the Anti-Lebanon western slopes.

Anjar comprises a marshland formed by rivers and springs, which create a typical habitat for African Eurasian water birds, in addition to a breeding habitat for the Syrian Serin, a species which is considered to be globally threatened (Vulnerable). This is one of the major factors that lead SPNL and Birdlife International to consider the villages of Anjar and Kfarzabad as an Important Bird Area (IBA) in 2005.

Additionally, due to the high biodiversity in the area and due to the livelihood values, the area was declared as a Hima (community based management system) by SPNL and by the Municipality of Anjar. The marshlands sustain the livelihood of the surrounding farmers and fisheries, as well as supply fresh water to more than 30 villages nearby.

However, due to the over extraction, misuse and the lack of management of the available water resources in the villages of Anjar and Kfarzabad prior to their declaration as Hima, the water resources were affected in terms of quality and quantity, leading to the degradation of the biodiversity. Additionally, the water supply shares were apparently a conflicting issue between the various stakeholders, who are supported by different political and sectarian backgrounds. Some of the water resources available are shown in Figure 1. The study area is also rich in agricultural lands, and these can be seen in Figure 2.

This report will target a selected area that makes up to 30% of Anjar. The related area was selected according to a set of approved criteria, which define a Responsible Hunting Area (RHA).

Figure 1 Water canals: one aspect of Water Resources within the Proposed RHA

Figure 2 Agricultural Lands within the Proposed Anjar RHA

Objective

This report is an Environmental Impact Assessment (EIA), which is a tool used to establish the positive and negative impacts of certain activities on the environment and the biodiversity, in this case, establishing a controlled hunting area. The report will indicate the potential impact of game birds hunting with its associated expected management within the proposed

Anjar RHA on biodiversity, with a focus on the non-target species and wider habitat.

Practices Associated with the Different Types of Hunting

The impacts of hunting on biodiversity vary widely depending on various factors, which include:

1- Types and styles of hunting (shooting, trapping, driving…)
2- Regulatory framework and laws
3- Current biodiversity and sensitivity of species

These factors will be further reviewed in this report, including a brief section on hunting with traditional and modern methods in relation to habitats and the management practices associated with game bird hunting in Lebanon and specifically in Anjar.

The information used to develop this report has been acquired from various sources including books and reports provided by the Society for the Protection of Nature in Lebanon (SPNL), literature review from general research, experts in the field of biodiversity and from various field visits to the site in question. The major part of this Environmental Impact Assessment relies on bird data and technical and scientific advices provided by Ghassan Ramadan-Jaradi, a professional ornithologist and expert in hunting management.

Rationale

In Lebanon, hunting is practiced by people of all ages and occurs throughout all seasons of the year. Millions of birds are killed each year due to hunting, and many of the species hunted are considered to be internationally threatened species. Consequently, the protection of birds is a shared responsibility, which requires a coordinated multinational approach. Hunting is an important socio-economic activity in Lebanon, and it includes shooting, trapping using nets, snares, lime sticks, traps and decoys, use of poisons and other methods in order to catch and kill birds. The hunting activities in Lebanon include a very large number of people and immense areas of lands with hunters, trappers, weapon and ammunition manufacturers, bird-trap makers, caged bird sellers and restaurant owners involved. There are nearly 20,000 officially registered shooters in Lebanon (statistics dating back to 20 years ago), though the

actual number is believed to be more than 10% of the Lebanese population, a number high in comparison with the percentages present in countries like Finland (6%), Ireland (3.4%) and France (2.6%).

The number of birds being hunted in the country has increased to nearly the industrial scale in the country, due to new hunting methods and equipments, increased availability of guns and cheap ammunition, easier access to remote areas, high disposable incomes, and increased leisure time. These factors contributed to diminishing the population of native game species.

A recent study related to illegally killed bird species in Lebanon in cooperation with BirdLife International in 2014 has revealed that almost 4 million birds are illegally hunted annually (Ghassan Ramadan Jaradi, *pers. com*) (refer to Figure 3).

In addition to the disturbance from shooters at hunting sites, the poisoning of birds and the pollution of their habitats from pesticides and lead shots, particularly in wetlands, also imposes a serious environmental threat. Nearly 40 million cartridges are being sold annually, which are estimated to make up to 1,680 tons of lead. This is due to the lack of enforcement of the Law and the application of the relevant Decrees, in addition to the shortage in the number of internal security forces in charge of overseeing the enforcement of theLaw. A proposed solution for all these major issues is to limit hunting to "Responsible Hunting Areas" (RHA) (shown in Figure 4), where hunting is managed over municipal/community lands and controlled by municipality police/rangers. To do so, an EIA is a must to see what type of impacts hunting imposes on biodiversity and on non-target species, particularly globally threatened species, and to find out how to mitigate the negative impacts of hunting within the proposed Anjar RHA.

Figure 3 ***Illegal hunting of 111 Bea-eaters, 34 Orioles, 16 Turtle Doves, 4 Quails, 4 Rollers, 4 Lesser Grey Shrike, one Short toed Lark, and one Masked Shrike.***

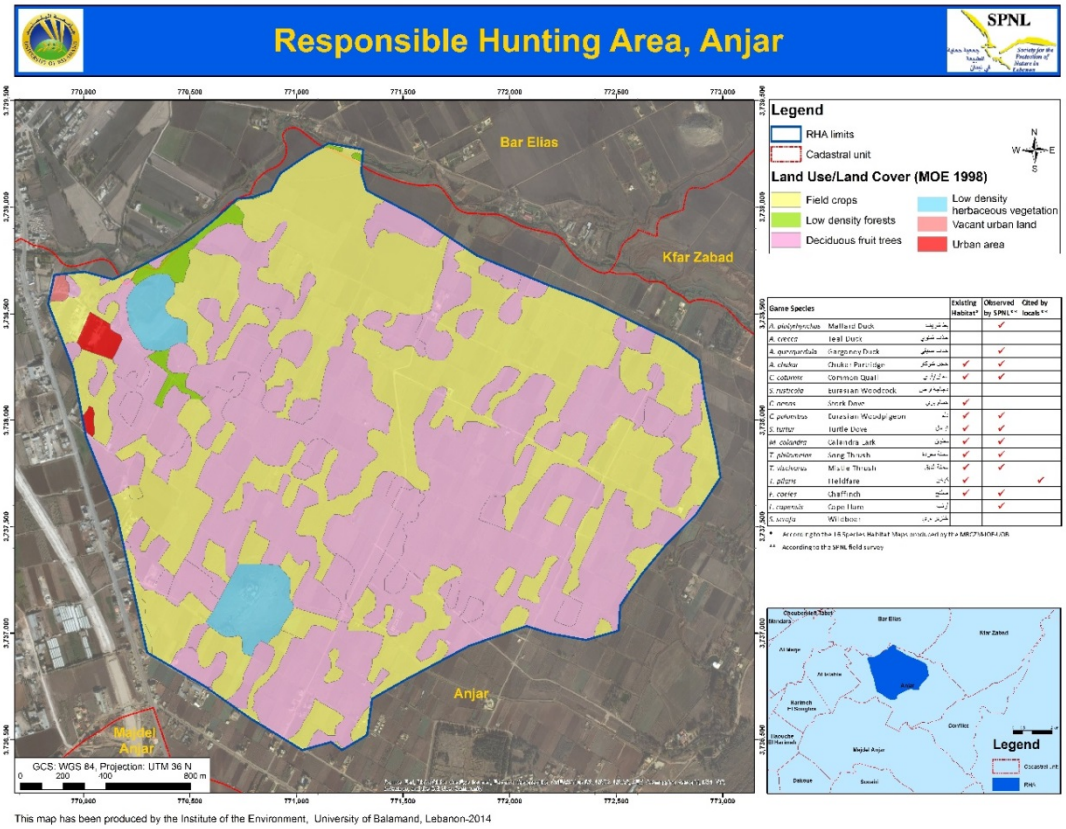


Figure 4 Proposed RHA in Anjar

Governance and Management of Hunting in the Anjar RHA.

In Lebanon, governance and management of hunting is characterized by poor Law enforcement, lack of resources and capacity among government institutions and NGOs concerned with hunting of birds, poorly developed communication and data-sharing systems, poor public and hunter awareness of the impact of hunting, and past conflicts between hunters and conservationists. Additionally, much of the debate on the management of bird hunting has taken place at the national level with relatively minimal local community input. Consequently, there is a need for cooperation to develop collaborative efforts and partnerships between all groups concerned with the hunting of wild birds in the country. In response to the above, the Lebanese Environment Forum (LEF), in collaboration with the Society for the Protection of Nature in Lebanon (SPNL) will test controlled hunting within an area located at Anjar. The Anjar Municipality, a well-organized local authority, will ensure that the hunting activities are in accordance to the hunting Law 580/4 and the wildlife through proper management and appropriate measures, in order to be a model that could be replicated in other areas of Lebanon.

The proposed Anjar RHA will be legally distant from the Anjar IBA; hence, it is believe that the birds that flee from the RHA might find appropriate refuge in the Anjar IBA. Moreover, it is believed that the fleeing birds may also find a safe resting and feeding area in the Kfarzabad IBA and the Kfarzabad Hima, which are located to the north of Anjar, and complement it with the single difference that the Kfarzabad Hima is unlike the Anjar Hima in which the Anjar RHA is located. In the Kfarzaabd Hima, hunting is banned by the local community, by the Hima management team and by the local farmers. The current situation in Anjar and Kfarzabad offers an opportunity for research, monitoring and comparing habitats and species in three different sites, managed in three different ways:

1- The IBA (Anjar and Kfarzabad)
2- The RHA (Anjar Hima)
3- The no hunting area (Kfarzabad Hima)

The game birds belong to three (3) species of ducks (Mallard, Teal and Garganey), three (3) species of doves (Woodpigeon, Turtle Dove and Stock Dove), three (3) species of thrushes (Song Thrush, Mistle Thrush and Fieldfare), Woodcock, Quail, Chukar, Calandra Lark and Chaffinch (refer to *Figure 5*). The game mammals are limited to the Wild boar and Cape hare (not available in Anjar).

Figure 5 Different Types of Game Birds

In general, birds (game and non-game birds) are classified as *res nullis* (nobody's property). The allowed hunting methods include archery, shooting and falconry, according to the hunting Law in Lebanon. The hunting of birds is done at an individual level or in small groups, where it is typically done by "walked up shooting", where a line of guns walks through the habitat of the birds and shoots at the species that become visible to them. The Hunting Law in Lebanon imposes a bag limit for every game bird species. Habitat and species management, and predator control (if needed), will be carried out intensively for game bird hunting by LEF, SPNL and the Anjar Municipality at the proposed Anjar RHA.

Article 8 in the Hunting Law 580 states the following: "It is strictly forbidden to hunt in cities, villages, picnic areas, public gardens, protected areas; and areas that have been categorized as important heritage sites, or less than 500 meters distance from residential areas, religious sites, public or private infrastructure, even if the hunter is using arms that work by air or gas pressure. It is also prohibited to display hunted prey on the car and on main roads", while Article 7 of the same Law states the following: "None of the wild birds or animals in Lebanon is considered to be the property of

anyone. The land owner or the investor of the land has the right to prohibit hunting on it by placing "No Hunting" signs on the entrance of the land, according to agreed practices". As for the hunter, there is a requirement in the hunting Law for him to pass a mandatory hunting examination, in order to obtain a hunting permit, to have a license for the possession of a hunting rifle and to buy, on annual basis, a hunting insurance from any insurance or reinsurance registered company. Where everything seems to be controlled by the government, land management is at the discretion of the hunter.
To summarize, the style of governance for game bird hunting in Lebanon is a government owned style, in which game and hunting rights belong to the government, or are otherwise controlled by the government, when the landowner ask the Ministry of Environment to forbid the hunting on his own or invested/leased land. Hunting is regulated by license, and there are usually imposed bag limits, which may or may not be based on monitoring of game populations.

Hunting Styles in Lebanon

The hunting of quails in Lebanon is normally done by "walked up shooting" over dogs. The hunting of ducks however, is done by a "hide shooting" style. For partridges, the hunting style encompasses both, the "walked up shooting" style and "hide shooting" style. The hunting style for doves, thrushes and larks is "stand up shooting" rather than the "walked up shooting" style, in which the hunter stands in a field or near tree stands, and waits for the game bird to pass over their head, or waits for the game bird to be flushed by dogs (dogs flush a game bird by first finding it and then driving it away from its hiding place, making it visible for the hunter).

Falconry is permitted, but it is not normally adapted in Lebanon, since it requires wide-open areas and special techniques, which are currently unfamiliar to the regular hunter in Lebanon.

The Law does not permit some hunting styles, and these will not be permitted within the proposed Anjar RHA, since the RHA is meant to be a demonstration and example of the proper implementation of the Lebanese hunting Law.

Hunting Dependent Management Practices in the Proposed Anjar RHA and their Impacts on Biodiversity

The most commonly expected management activities for game bird hunting in the proposed Anjar RHA, and in other RHAs and other parts of Lebanon are examined in this section. Additionally, the popularity of practices and the impacts of these practices on biodiversity are also discussed. The management practices include:

1- Tree Stands Management
2- Grazing Management
3- Habitat Management
4- Crop Management
5- Field Margins and Hedgerows
6- Species Management
7- Predator Control

Tree Stands Management

Due to the lack of natural forests within the perimeter of the proposed Anjar RHA, hunters and managers within the RHA should manage the artificial small strands currently available in the study area. The RHA management should take into consideration the game birds habitat suitability when managing tree-strands habitats, though the management itself is not usually aimed at game bird hunting specifically (Figure 6).

The management team of the Anjar RHA, as well as the hunters, is expected to be aware of the habitat requirements of tree-stand species, such as the thrushes. The management guidelines for tree-stands that benefit game birds do not exist in Lebanon, making it difficult to management the existing tree stands, however, planting new stands rich in mixed deciduous and evergreen trees with a developed low story could be beneficial to both, the hunters and the birds. It is noteworthy that for the management of tree stands, the use of fertilizers and biocides should be avoided, as these impose detrimental effects, in addition to creating opening s in the canopy of the stands, in order to encourage herbaceous plant growth.

Figure 6 Hunting of Thrushes near Tree Stands

Grazing Management

The management of the proposed RHA in Anjar shall also include grazing control. Grazing management can be done by controlling the number and the regime of sheep and goats grazing over the areas where the crops are harvested or in the lands to be ploughed.

Having low levels of grazing could benefit most birds by revealing insects, crawling invertebrates and creating fire-protecting belts around trees. On the other hand, high levels of grazing should be avoided, since beneficial plant species could be removed, and grass covers could be detrimentally affected. The high number of grazers, in the absence of management, damages heather and reduces upland plant species diversity due to a dominance of coarse grass species (DeGabriel et al. 2011). The lands that will be managed for game birds will be under a rest-rotation, or deferred-rotation grazing system, in order to allow for reduced periods of disturbance during critical game bird life-cycle stages (Anderson & McCuistion, 2008). The most adverse effects of rangeland grazing on non-game species result from heavy use of riparian areas, and a subsequent loss of food and cover, along with a general reduction in habitat diversity.

This is observed in places where there are riparian areas in the country, including Anjar, where the riparian habitat is shared by the IBA and the

RHA (Figure 7). Grazing in riparian areas has adverse impacts for game and non-game birds too, which is why grazing in riparian areas should be stopped to allow shrub and understory species establishment, which will on its turn, stabilize stream banks and enhance the fish population.

Figure 7 Riparian Habitat

Habitat Management

In the proposed Anjar RHA, hunters are planning on burning and cutting grasses and heaths at different height levels, starting from the ground, this is in order to generate and maintain a mosaic of different grass heights to provide optimal foraging, attracting habitats and provide cover from natural predators (Figure 8). This practice is expected to be beneficial to most hunters and game birds, as it diversifies the microhabitats to attract a variety of game birds, but detrimental to many non-game species, chiefly passerine and particularly pipits, that are targeted by hunters (Ramadan-Jaradi, *in prep*) and that are preferably frequenting non-burnt areas.

In this kind of managed areas, passerine non-game species should be protected due to the fact that they prefer unmanaged natural areas

(Haworth & Thompson, 1990; Tharme *et al*. 2001). Many species avoid short grass open habitats because these habitats don't offer them cover from predators, which is why the managing party of the RHA in Anjar should leave some patches of scrubs and shrubs, in which birds can find refuges. The ideal practice would be to increase the richness of bird species in the RHA through a rotational grass burn/cut process, as it would allow for the growth of invertebrate population that is part of the bird species diet. It is also known that the birds' diversity increases with increased structural diversity of the vegetation (Ramadan-Jaradi, 1975 and 1984).

In North America, hunters disturb the habitat by burning, "disking" (mechanically opening up habitat patches) and by applying herbicides in game bird management in order to maintain a habitat mosaic, to promote the growth of food plants and to control brush and hardwoods (Holechek *et al*. 1982; Webb & Guthery, 1983; Peoples *et al.* 1994; Welch *et al.* 2004). If prescribed, burning may increase the abundance or diversity of non-game bird species, but this may not be the case right after the burning treatment, this may occur at later stages of ecological succession, when the structure of the vegetation becomes more complex. According to Petersen and Best (1987), prescribed burning of sagebrush to produce a habitat mosaic, including open patches of forbs and bare ground, increased the number of non-game bird species relative to unburned areas, thus, "disking" in the proposed RHA may be used to create a mosaic of successional stages in scrub habitat to benefit Common Quail Management, and may reduce the number of scrub dwelling non-game birds, but may be beneficial to other non-game species (see Vega & Rappole, 1994).

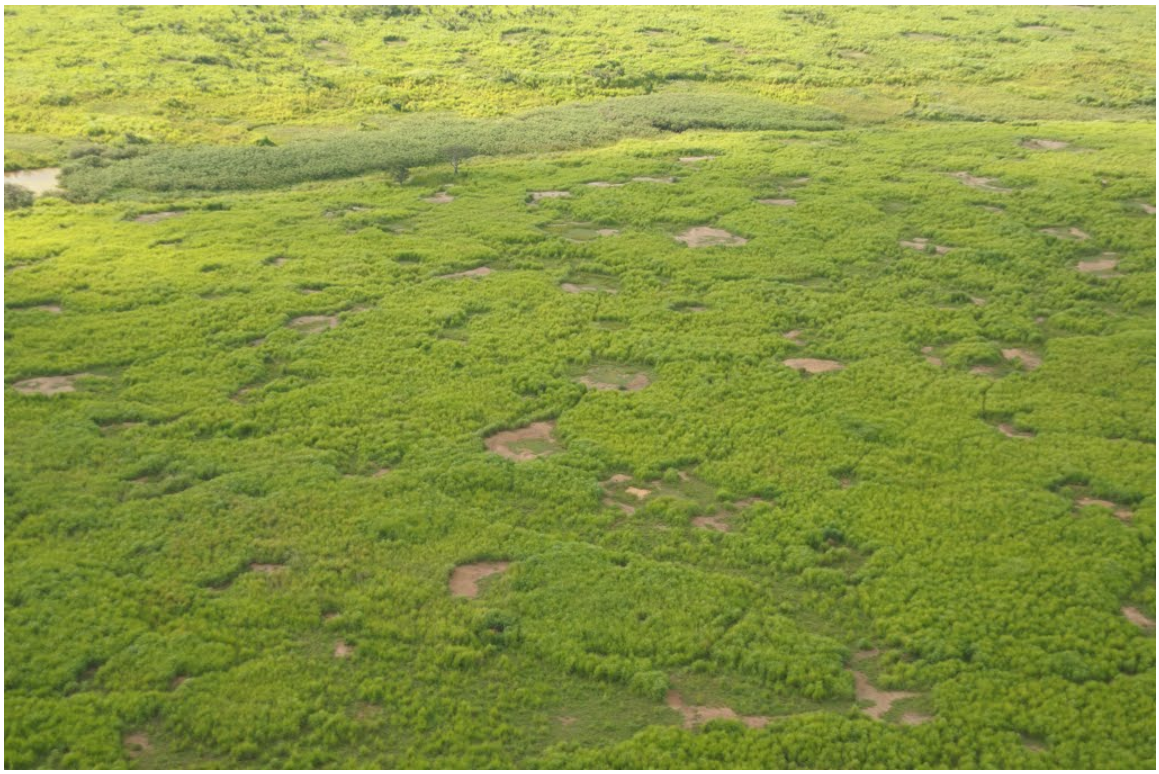


Figure 8 Mosaic Grassland Managed for Hunting

Crop Management

Famers in the proposed Anjar RHA will be invited by the hunters and managers of the RHA to grow game crops, which will in order, provide cover and food for allowed birds for hunting during critical seasons of the year, mainly post-breeding periods or hunting periods (Figure 9). For example, planting maize strips, cereals and kale based crops in a mosaic on the mountain slopes at Anjar may benefit the Chukar Partridge and Common Quails by ensuring both summer and winter cover, though this management may increase predation risks at strip-field edges. In general, the management needs the planting of food plant plots, such as wheat, millets and oats, and these plantings should be made in areas where native plants or agricultural plots do not provide sufficient food for birds. The planting of cover and food crops seems beneficial for a range of farmland species, though only a few studies have analyzed its effects in detail (Sage et al. 2005). For example, Sage et al (2005) showed that winter and summer game crops held higher densities of songbirds than did adjacent arable crops.

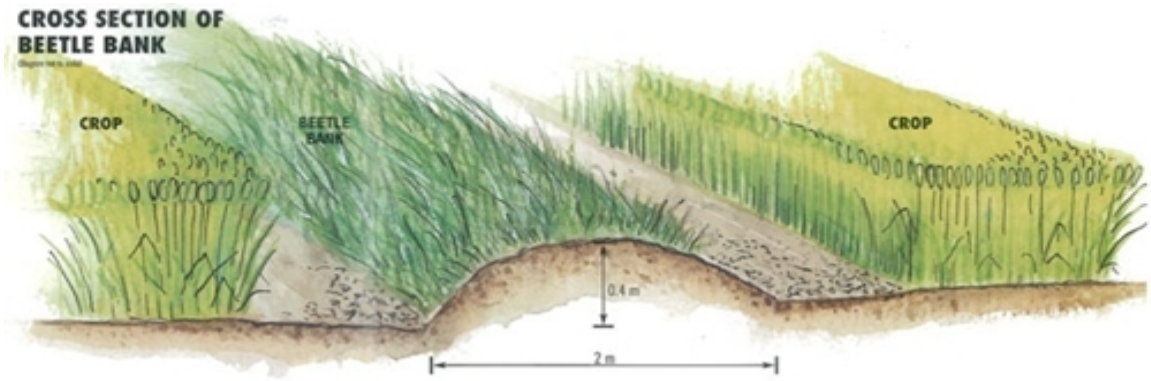
Figure 9 Crop Management

The use of agro-chemicals is not allowed around the crop edges during breeding periods. Evidence shows that the reduction of pesticide use needed in order to increase the food supply for game birds also increases diversity or abundance of invertebrates, birds and small mammals (Wilson 1994).

Another management practice, also designed as a Chukar Partridge management tool, comprises of the creation of "beetle banks" (raised ridges across the middle of an arable field planted with tussock-forming grasses). These are designed primarily to enhance populations of polyphageous invertebrate predators in arable field systems, to help control aphid pests in the adjacent crop (Chiverton 1989; Anon 1995b). Beetle banks seem to be beneficial to game birds (Thomas, Goulson & Holland 2001), though they have not been designed originally with this

purpose. Beetle banks are apparently beneficial for farmland wildlife overall, primarily by providing suitable habitats for a range of species and reducing the use of pesticides in crop protection. Nevertheless, there is no evidence that beetle banks are used in Lebanon to directly or indirectly manage game birds.

Finally, game bird management may include delaying crop harvesting outside the RHA to protect nests from destruction. Most of the threats identified to be responsible for the decline of seed eaters are from early crop harvesting, causing nest failure in Europe for Red-legged partridges, corncrakes and other species.



Field Margins and Hedgerows

Hedgerows are important for both game birds and farmland wildlife. Accordingly, game management may have positive effects by contributing to the retention of hedges in the proposed Anjar RHA. However, game hedges may not be the most favorable to wildlife, as management for game bird shooting recommends relatively short and narrow hedges, with few mature trees (Rands & Sotherton 1987; Sotherton & Rands 1987), whereas for instance, the highest bird species richness and overall abundance is associated with tall and wide hedges, with many trees (Parish et al., 1994) (Figure 10). In all cases, the proposed Anjar RHA needs to have a variety of hedges (short and long, narrow and wide) to benefit a variety of birds, mainly game birds. Herbaceous field margins are also beneficial to both, game birds and wildlife in general, mainly in areas with many farms. Management of herbaceous strips for game birds will be an essential part of the RHA management to reduce the negative impacts of farming operations like pesticide spraying, while improving the use of the area for breeding and wintering birds.

Figure 10 Field Margins and Hedgerows

Species Management

The two main practices associated with species management of game birds are: 1) the control of disease and parasites, and 2) the provision of supplementary food and water. These are largely frequent practices throughout Europe and North America.

1) Control of Diseases and Parasites

The control of diseases and parasites is related to species that are bred and reared in captivity like partridges, quails and released into the RHA or other types of hunting areas. These released birds are known to be more prone to high levels of parasitic infections than are wild birds. In the case of the proposed Anjar RHA, should the managing authority decide to release birds for hunting, it will need to use anti-parasite drugs to treat captive reared game birds prior to their release. These drugs can be added to feeders around release sites. This method is more likely to benefit wild birds than releases in the absence of such measures, as there is the potential to pass infections to the wild population.

2) Provision of Supplementary Food and Water

The provision of grain is a common management practice in hunting areas, particularly in agricultural habitats. Releasing partridges in the proposed Anjar RHA should typically be supported by provisioned grain from release until the end of the shooting season, in order to maintain body condition and retain birds in shooting areas. It is assumed that such provisioning has positive impacts on other grain/seeds eater species. There is also a suggestion that concentrating birds around feeders might increase the risk of disease transfer and predation.

Provision of supplemental water that is common in arid parts of Europe and North America doesn't apply at Anjar.

Predator control

Predator control is a traditional practice in game bird management and has been applied across many countries. Predator control targets a large variety of predators, mainly raptors, foxes and jackals. This practice is particularly common in relation to the management of important socio-economic game birds, such as partridges and quails. In rural areas of Lebanon, some owners of hunting clubs that are using released birds for hunting, have eliminated foxes and jackals as a management tool in their artificial game hunting area and its surroundings. Crows, ravens, and members of the mustelidae family are frequently hunted in some areas, whilst in others, falcons and eagles, which are legally protected, constitute the main target. Hunting clubs, which are predominantly relying on released birds, and not on a breeding population, are less likely to operate consistent predator control outside the shooting season (Bicknell et al. 2010).

Predator control should not be applied for game birds in Lebanon, or elsewhere, since predator management should tend to focus on managing habitats in order to minimize predation risk, and this is to be done by removing dens and perches, improving cover, increasing the size and density of habitat patches and reducing patch isolation. There is, however, a growing interest among some hunters and game managers in applying direct predator control (e.g. (Burger 2001). Rollins and Carroll (2001) suggest an "Integrated Pest Management" (IPM) approach, a concept that was developed in relation to the strategic control of crop pests. IPM advocates that non-lethal (i.e. habitat management) approaches are applied as a first defense, and lethal approaches (i.e. predator control) are applied "surgically" to reduce costs and minimize risks to non-target species. The Lebanese conservationists support are against predator control as to increase populations for hunting. This makes predator control a contentious subject, especially that predator control is also considered as a factor destabilizing predator guilds, and thus, being detrimental for conservation. Illegal predator control affects the abundance and distribution of legally protected species, such as birds of prey. The effects of predator control on game birds, non-game birds and illegal predator control are further discussed:

a) Effects of Predator Control on Game Birds

Predator control often increases the breeding success of small game birds, and thus, the size of the autumn (harvestable) population and the breeding density. However, because control of top predators may cause meso-predator release, predator management practices should be carried out carefully. Additionally, it should be noted that the most important factor in the efficacy of predator control, is the efficiency of predator management.

Figure 11 Predator Control

b) Effects of Predator Control on Non-game Species

Predator control often increases the breeding success of small game birds, and thus, the size of the autumn (harvestable) population and the breeding density. However, because control of top predators may cause meso-predator release, predator management practices should be carried out carefully. Additionally, it should be noted that the most important factor in the efficacy of predator control, is the efficiency of predator management.

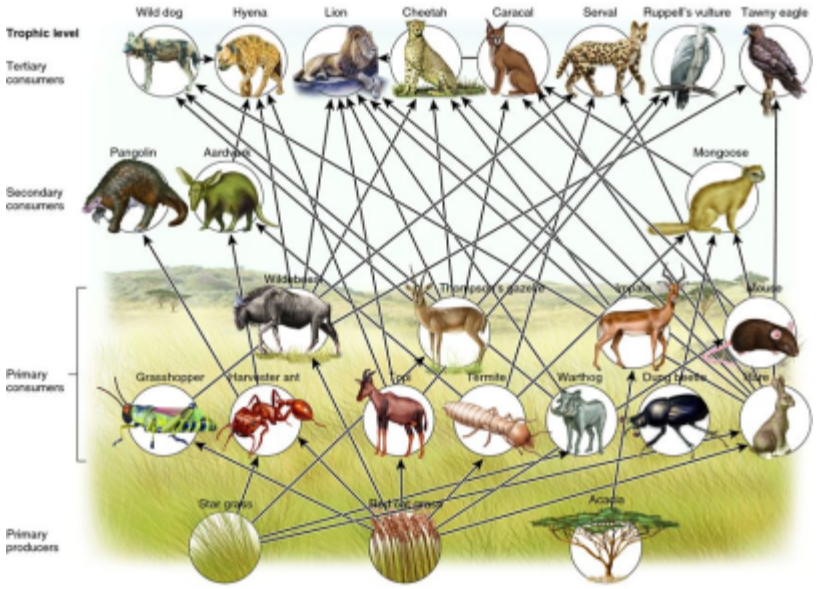


Figure 12 Top Predators (top row) and Meso-Predators (below)

c) Illegal Predator Control

There will be conflicts between the management of economically important game birds and the conservation of legally protected raptors. However, in Lebanon, this conflict is minimized due to rarity of raptors in term of richness and density. Species like the Golden eagle, Short-toed Eagle, Booted Eagle, Bonelli's Eagle, Long legged Buzzard, Marsh Harrier and Hobby Falcon have high proportions of game birds in their diets, and that harriers, buzzards and Bonelli's and booted eagles are locally important predators, however, the extent to which any of these species negatively impact game populations is very low due to their rarity in the country. Furthermore, the Short-toed Eagle feeds almost exclusively on reptiles and chiefly on snakes, which may feed on game species or their eggs and fledglings.

A number of methods to reduce the conflicts between raptor persecution and game bird management include habitat management, diversionary feeding, and control under a quota system.

d) Rearing and Releasing

The National Council of Hunting in Lebanon often releases a number of partridges, quails and pheasants into nature in an irregular sequence and unregulated practice. This may lead to increase the shooting bag limits, but the increase of game birds through releases may increase the number of predators, since more food will subsequently lead to more predators, which is a matter that at the same time will lead to a decrease in the

game population. The introduction of game birds into hunting grounds is a widespread and growing practice around the world, though it remains rare in some countries and has been banned in others. The birds should frequently be released just before the shooting season, with the aim of achieving hunting yields higher than that possible from wild stocks. In other cases, the objective is to restock depleted or declining local breeding populations, thus assisting in their sustainable harvest. However, long-term survival of released birds may be lower due to altered behavior in relation to wild predators and generally high predation rates. Ecological effects of introducing hand-reared birds into hunting areas may result primarily in demographic interactions with the native breeding populations, introduction of exotic species and genetic pollution, and the spread of diseases and parasites.

e) Effects of Rearing and Releasing on Wild Stocks

The detailed quantitative assessment of the effects of releases and restocking on the demography of wild game bird stocks is lacking in Lebanon. The contribution of hand-reared birds to the breeding population may be small, because they have lower rates of survival and breeding success than their wild counterparts. This is related to the poor behavioral, morphological and physiological capacity of hand-reared birds to live in the wild, rendering them extremely susceptible to starvation and predation.
In Lebanon, releases of Red-legged partridges into areas with Chukar partridges were associated with crashes in the wild stocks. However, the Red-legged shyly crossbred with Chukar. Hybrid and all other introduced Red-legged partridges had quickly vanished due to hunting, predation by foxes and jackals and raptors and due to the spread of pathogens through reared and released individuals. The spread of pathogens is a potential problem in any species translocation program, but it may be particularly serious in the case of hand-reared game birds, due to the artificial environment of aviaries and the high stocking densities. Furthermore, the high densities of game birds, from rearing farms in the wild impose another sanitary problem. which is due to the spread of parasites. However, the spread of parasites can be controlled through intermittent release of birds into the wild.

Other impacts

Other possible biodiversity impacts may include accidental by-catch, which could for example be of Chukar partridge during another released

partridge species shoot, lead poisoning from ingestion of ammunition (Kreager et al. 2008; Knott et al 2010) and disturbance for non-target species (Sastre et al. 2009).

Mitigation Measures for the Safety of Hunters

Handling firearms can be risky if not handled carefully. Preventing hunting accidents depend on knowing firearms and handling them skillfully and safely.

Firearm Safety at Home

International statistics show that more than half of the fatal firearm accidents occur at home. Thus, it is important to stick to strict safety rules such as:
Lock firearms in a safe place out of reach of children.
Store ammunition in a different place.
Make sure that firearm is unloaded before allowing it in any living area.
Practice safety rules when handling firearm at home:
Point the firearm into a safe direction.
Always check that the chamber and magazine are empty.
Keep your finger out of the trigger.
If firearm is taken from storage, to show guests, make sure they understand safety rules of handling firearms[1].

Hunting Accidents

Hunting accident occurs when a hunter directly or indirectly causes injury to himself or another person while using a firearm. The most common causes of hunting accidents are:
Hunter Judgment Mistakes: e.g. mistaking a person for game or not checking the background before firing. Note that it is recorded that most hunting accidents occur due to these mistakes.
Safety Rule Violations: e.g. pointing the firearm in unsafe direction or forgetting safety rules while crossing a fence.
Lack of Control and Practice: which can lead to accidental discharges and stray shots.
Mechanical Failure: such as improper ammunition or obstructed barrel in the firearm[2].

[1] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p62".

Firearms can be carried safely and still has it ready for quick action. The Four Rules of Firearm Safety are:

- **Firearm**: Control the direction of your firearm at all times
- **Trigger**: Keep your finger outside of the trigger guard until ready to shoot, and directly after you shoot.
- **Action**: Treat every firearm as though it were loaded. Open the action and visually check if it is loaded
- **Target**: Be sure of your target, and what is in front of it and beyond it[3]

Proper Field Carrying Method for Firearms

- ***Trail Carry***
  Leave a hand free for balance, but don't use it when you're behind someone. Not recommended when walking in snow or brush – debris can get in the barrel.
- ***Sling Carry***
  Easy carry for long walks through open fields. Keep a hand on the sling so that it does not slide off your shoulder if you fall. Not recommended for thick bushes because the firearm could slip from your shoulder.
- ***Elbow or Side Carry***
  Comfortable, but it has the least muzzle control. Use it when no one is in front of you.
- ***Two-Handed or "Ready" Carry***
  Provides the best control, especially in thick bushes or when you need to fire quickly.
- ***Cradle Carry***
  Comfortable and secure. Reduces arm fatigue.
- ***Shoulder Carry***
  Good choice in waist-high bushes. Do not use it if someone is behind you.

Selecting the Right carry when hunting with Others

Carry selection is based mainly on muzzle control and the hunting field.

- If three hunters are walking side by side, the ones at the sides may carry their firearms pointing to the side away from their companions

---

[2] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p63".

[3] Pamphlet: Oregon Hunter Education Program, Teaching Safe and Responsible Hunting, Oregon Department of Fish and WildLife, p3.

or to the front. The one in the middle should carry firearm to the front or upward.

- If three hunters are walking in single row, the one on the lead should have the firearm pointed to the front and never over the shoulder. The hunter in the middle should have his firearm pointed sideways. The hunter in the back can point his firearm to the side or the back.
- When facing another hunter, avoid the use of trail carry, forward facing or elbow side carry.
- Remember to choose the right carry when your hunting companion is a dog[4].

Crossing Obstacles

- Always unload the firearm before crossing any obstacle or fence.
- Place the firearm on the other side of the fence or obstacle, with the muzzle pointing away from you. Then, cross the fence and retrieve your firearm.
- Pull the firearm toward you by the butt, never by the muzzle.
- If two people are crossing, one person gives the other the two firearms, crosses first, the retrieves the unloaded firearms from the other person[5].

SAFELY LOADING AND UNLOADING FIREARMS

This is highly important as it might lead to tragedy if handled wrongly. Here are the instructions:

Loading Correctly

- Point the muzzle in a safe direction.
- Open the action, check the barrel and chamber for obstruction.
- Put the safety on.
- Load the ammunition.
- Close the action.

Unloading Safely

- Point the muzzle in a safe direction.
- Keep your finger outside the trigger guard.
- Open the action.
- Remove the ammunition; eject cartridges or shells.

[4] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p65-66".

[5] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p67".

- Count shells or cartridges in order to make sure the gun is empty.
- Ensure safety is on.
- Visually check that the chamber and barrel to make sure they are clear[6].

SAFELY TRANSPORTING FIREARMS

The general rule for safely transporting firearms is:

- Always unload and case firearms before transporting them. The action should be open.
- Lean the firearm against a secure rest. The vehicle does not provide a secure resting place. If the firearm accidently falls, it might discharge or be damaged.

SAFETY ZONE OF FIRE

Safety zone of fire is the area where the hunter can shoot safely. Before starting the hunting trip in a group, hunters should agree on the zone of fire each hunter will cover. A zone of fire depends on many factors including;

- Hunter's shooting ability.
- The game being hunted.
- The hunting environment.
- Hunting strategy adopted.

A hunter's zone of fire changes with every step. This is particularly true when groups are hunting birds, rabbits or other small game.

- For safety purposes, it is best to restrict to three hunters in a group. For new hunter, two hunters is enough.
- Hunters should be spaced 25 to 40 yards apart and always in sight of each other.
- Each hunter has a zone of fire of 45 degrees in front of him.
- If the game turns back to your direction, it is best that all hunters hold their fire[7].

OTHER SAFETY CONSIDERATIONS

Self control and Target Identification

[6] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p68".

[7] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p69-70".

- Some hunters may become anxious or excited during hunting, which can lead to careless behavior. They may soot at sounds, color, movement,…they might even swing a loaded firearm towards their companion.
- Take care of self control & shoot only in a clear zone of fire.

Accuracy

- Practice for shooting accurately. This is not only important for successful hunting, but also a safety measure. Some accidents have occurred when stray bullets hit people around.

Alcohol and Drugs

- Consuming alcohol before or during the hunt is risky because it impairs several functions such as: Coordination, hearing, vision, communication, and judgment.
- Drugs can have the same effect. [8]

Important Safety General Reminders

- ✓ Never go on a hunting trip alone in the field.
- ✓ Wear Hunter Orange clothing (on your head and upper torso) to reduce chances of being mistaken for game.
- ✓ Wear eye and ear protection, and never play with firearms.
- ✓ Only use the correct ammunition for your firearm, and be aware of the range of your ammunition.
- ✓ Be sure the barrel and action are clear of obstruction.
- ✓ Be sure your firearm is safe to operate, and know how to operate it safely.
- ✓ Remember to re-engage your firearm's safety after shooting, and double-check the safety frequently in the field.
- ✓ Unload your firearm in the field and keep the action open when the hunt is over. *Never* enter a vehicle, camp, or house with a loaded firearm.
- ✓ Never point a firearm at anything that you do not want to shoot.
- ✓ Never use firearm's scope as binoculars for spotting or looking for game – you may be pointing your loaded firearm at someone.
- ✓ Never climb a fence or tree, or jump a ditch or log, with a loaded firearm.

[8] Adapted from "Today's Hunter in Missouri, a guide to hunting responsibly and safely, Kalkomey Enterprises Inc., 2009/2011 edition, ch6, p71".

- ✓ If you slip while walking, control the muzzle, unload, and check the bore for obstruction before continuing to hunt.
- ✓ Never shoot a bullet at a flat hard surface or water.
- ✓ Always develop a hunting plan, let others know the plan, and then stick to the plan.
- ✓ Establish safe zones-of-fire, especially when hunting with companions.
- ✓ If companions violate any of these rules, bring it to their attention immediately. *Refuse* to hunt with anyone who refuses to correct their behavior.
- ✓ Store firearms and ammunition separately, locked up and out of reach of children.
- ✓ Avoid alcoholic beverages and drugs before or during hunting or shooting[9] [10].

Conclusions

Game birds will be widely managed at the proposed Anjar RHA in order to improve and maintain hunting yields. This shall be done by manipulating those factors considered limiting for their populations. In some cases, this management will be intensive, in order to maintain the high numbers of birds required for "driven shooting", a practice which is usually common in hunting reserves. The main game bird species hunted and associated management practices vary from an RHA to another. There are however, some management practices which are common to many scales, including; improvement of breeding and feeding habitats, the control of natural predators, the direct provisioning of food and water, and the release of farm-reared game birds to increase harvest. These practices are widespread and implemented at large scales, and may have a significant impact on biodiversity at the levels of genes, species and ecosystems.

Two types of governance linked to game bird management in Lebanon were identified and these are: 1) state regulated, and 2) state owned. Under state regulated governance, hunting rights partially reside with the landowner, hunting is regulated, to some extent, by the state who, or whose agents set harvest limits, which may or may not be informed by

[9] Pamphlet: Oregon Hunter Education Program, Teaching Safe and Responsible Hunting, Oregon Department of Fish and WildLife, p3.

[10] Manual, "Today's Hunter in Missouri, a guide to hunting responsibly and safely", Kalkomey Enterprises Inc., 2009/2011 edition, internal cover page.

monitoring of populations and/or harvest data. State regulation seems to discourage intensive private management of game populations and habitats. Under the state owned governance, the right to hunt resides with the state and hunting is regulated by license, and there are usually harvest limits set, which may or may not be informed by monitoring.

Hunting styles can be broadly categorized as 'driven' or 'walked up' shooting. Driven shooting requires high densities of game birds and is associated with intensive management through rear and release of game birds, particularly partridges and quails, predator control, habitat management, and in some areas, provision of supplementary food, water and possibly medication. High intensity management has the greatest potential to impact on other species and wider biodiversity. In agricultural landscapes that are subject to intense management, there is evidence that game management can have a positive effect on other species, though whether these practices are more common in game managed areas or not remains to be identified. In more natural landscapes however, the effects of game management are less clear, with some positive and negative impacts documented, though the legal and illegal management of predators clearly impacts on the predator themselves and wider predator and prey assemblages and predator control remains the most controversial aspect of game bird management. Walked up shooting, on the other hand, requires much lower game bird densities, and consequently less, or in some cases, effectively no direct species or habitat management. While the less intensive management tends to cause fewer potential threats to non-target species, the fact that walked up shooting is more often carried out on common lands raises issues over potential over harvest and sustainability.

Habitat management for game birds is widespread and common mainly in Europe and North America. Some practices in Lebanon, such as habitat disturbance, planting of game crops and grazing control are specifically implemented to benefit game birds and there are a number of documented positive and negative impacts on non-game species, particularly in agricultural habitats. However, evidence suggests that they are more common in game areas than in non-game areas. The lack of evidence also makes it difficult to assess the overall benefits of supplementary feeding and provision of water, which are common practices in some lowland and rear, and release game bird management systems, while they likely have positive impacts on other species, there may be some increased risk of disease transfer and predation.

Predator control is particularly common in relation to the management of important socio-economic game birds such as partridges and quails. Predator control is rarely applied in Lebanon for game bird populations, but it is practiced only at individual level. Predator control can reduce predator numbers and may also have an indirect impact on other species

by altering the structure of the predator guild and non-game bird prey communities. The effect of predator control on species other than game birds remains undefined. Both positive and negative effects may be expected, and the relative importance of both would depend on the type and extent of control exerted. No studies have shown negative effects of predator control on other species, but the available information for positive effects is inconclusive. The (illegal) control of predators of conservation importance has detrimental effects in some areas and species.

Rear and releases of game birds tends to increase the harvestable population of target game species, but not necessarily the breeding populations. Releases may have major negative effects, through the loss of genetic diversity and the introduction of diseases and parasites, yet there is limited information about the extent and significance of these processes in the wild. The main way in which releases are likely to affect non-game species seems to be through potential habitat modification, competition, genetic contamination where release densities are high.

References

Anderson, A. & McCuistion, K.C. (2008) Evaluating strategies for ranching in the 21st Century: Successfully managing rangeland for wildlife and livestock. *Rangelands,* **30,** 8-14.

Anon (1995) Guidelines for the management of field margins. *The Game Conservancy, Fordingbridge, UK*.

Bicknell, J., Smart, J., Hoccom, D., Amar, A., Evans, A., Walton, P. & Knott, J. 2010. Impacts of non-native gamebird release in the UK: a review. **RSPB Research Report no. 40**. Sandy, UK

Burger, L.W. (2001) Quail management: issues, concerns, and solutions for public and private lands—a southeastern perspective. . *Quail V: Proceedings of the Fifth National Quail Symposium,* (eds S.J. DeMasao, W.P. Kuvlesky, F. Herna´ndez & M.E. Berger), pp. Pages 20-34. Texas Parks and Wildlife Department, Austin, TX. 52

Chiverton, P.A. (1989) The creation of within-field overwintering sites for natural enemies of cereal aphids. *Brighton Crop Protection Conference - Weeds*, pp. 1093-1096. BCPC Publications, Farnham, UK.

DeGabriel, J.L., Albon, S.D., Fielding, D.A., Riach, D.J., Westaway, S., and Irvine, J.(2011) Sheep removal leads to greater impacts by deer on heather and reductions in plant diversity. Journal of Applied Ecology.

Haworth, P.F. & Thompson, D.B.A. (1990) Factors associated with the breeding distribution of upland birds in the south Pennines, England. *Journal of Applied Ecology,* **27,** 562-577.

Holechek, J.L., Valdez, R., Schemnitz, S.D., Pieper, R.D. & Davis, C.A. (1982) Manipulation of Grazing to Improve or Maintain Wildlife Habitat. *Wildlife Society Bulletin,* **10,** 204-210.

Hollifield, B.K. & Dimmick, R.W. (1995) Arthropod Abundance Relative to Forest Management Practices Benefiting Ruffed Grouse in

Knott, J., Gilbert, J., Hoccom, D.G. & Green, R.E. (2010) Implications for wildlife and humans of dietary exposure to lead from fragments of lead rifle bullets in deer shot in the UK, *Science of the Total Environment*, **409**, 95-99.

Kreager, N., Wainman, B., Jayasinghe, R. & Tsuji, L. (2008) Lead Pellet Ingestion and Liver-Lead Concentrations in Upland Game Birds from Southern Ontario, Canada. *Archives of Environmental Contamination and Toxicology,* **54,** 331-336.

Peoples, A.D., Lochmiller, R.L., Leslie Jr., D.M. & Engle, D.M. (1994) Producing Northern Bobwhite Food on Sandy Soils in Semiarid Mixed Prairies. *Wildlife Society Bulletin,* **22,** 204-211.

Ramadan-Jaradi ,G. (1975) .- *Etude de la structure du peuplement d'oieaux nicheurs de la hêtraie de la Sainte- Baume (Var).*Thèse 3e cycle , Aix -Marseille.

Ramadan-Jaradi ,G . (1984) .-*l'avifaune des Emirats Arabes Unis, étude faunistique et caractérisation des peuplements.* Thèse d' Etat . Aix -Marseille.

Rands, M.R.W. & Sotherton, N.W. (1987) The management of field margins for the conservation of gamebirds. *Field Margins* (eds J.M. Way & P.W. Greig-Smith), pp. 95-104. British Crop Protection Council Monograph Nº 35. BCPC Publications, Farnham, UK.

Rollins, D. & Carroll, J.P. (2001) Impacts of predation on northern bobwhite and scaled quail. *Wildlife Society Bulletin,* **29,** 39-51.

Sage, R.B., Parish, D.M.B., Woodburn, M.I.A. & Thompson, P.G.L. (2005) Songbirds using crops planted on farmland as cover for game birds. *European Journal of Wildlife Research,* **51,** 248–253.

Sastre, P., Ponce, C., Palacín, C., Martín, C. & Alonso, J. (2009) Disturbances to great bustards (<i>Otis tarda</i>) in central Spain: human activities, bird responses and management implications. *European Journal of Wildlife Research,* **55,** 425-432.

Sotherton, N.W. & Rands, M.R.W. (1987) The environmental interest of field margins to game and other widlife: a Game Conservancy view. *Field Margins* (eds J.M. Way & P.W. Greig-Smith), pp. 109-112. British Crop Protection Council Monograph Nº 35. BCPC Publications, Farnham, UK.

Tharme, A.P., Green, R.E., Baines, D., Bainbridge, I.P. & O'Brien, M. (2001) The effect of management for red grouse shooting on the population density of breeding birds on heather-dominated moorland. *Journal of Applied Ecology,* **38,** 439-457.

Thomas, S.R., Goulson, D. & Holland, J.M. (2001) Resource provision for farmland gamebirds: the value of beetle banks. *Annals of Applied Biology,* **139,** 111-118. 69

Vega, J.H. & Rappole, J.H. (1994) Effects of Scrub Mechanical Treatment on the Nongame Bird Community in the Rio Grande Plain of Texas. *Wildlife Society Bulletin,* **22,** 165-171.

Webb, W.M. & Guthery, F.S. (1983) Response of Wildlife Food Plants to Spring Discing of Mesquite Rangeland in Northwest Texas. *Journal of Range Management,* **36,** 351-353.

Welch, J.R., Miller, K.V., Palmer, W.E. & Harrington, T.B. (2004) Response of Understory Vegetation Important to The Northern Bobwhite Following Imazapyr and Mechanical Treatments. *Wildlife Society Bulletin,* **32,** 1071-1076.

Wilson, P.J. (1994) Botanical diversity in arable field margins. *Field Margins – Integrating Agriculture and Conservation* (ed. N.D. Boatman), pp. 53-58. British Crop Protection Council Monograph Nº 58. BCPC Publications, Farnham, UK.