HUNTING ENVIRONMENT IMPACT ASSESSMENT
FOR THE PROPOSED
ROUM-QAYTOULEH RESPONSIBLE HUNTING AREA

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INTRODUCTION

Hunting and humans are closely related. Humans have been hunting since the beginning of humanity, when the only food source was obtained by hunting. As time has passed, humans have progressed, and figured out many other sources of food, for example farming. Over Hunting kills wildlife which may be important to humans. This affects humans in that if the animal species, including bird, becomes endangered, it will throw off natural predation and it will be more expensive to buy the meat or the services of that animal. The endangerment of species can cause many different things to humans. For example, if one animal is endangered, its predator will also become endangered. Ultimately it will affect humans, with food, resources and ecosystem services.

Hunting contributes large amounts of money to the country's economy. It creates many jobs, where people can make a living for themselves and also it increases trades. With a strong economy the country can prosper and many benefits can be given out to the people of the country. Hunting contributes far more to the Canadian economy each year than the $823.8 million last reported by Environment Canada. This is a very large sum of money, and is a great source of income. Without hunting, wildlife damage would rise 221 per cent across Canada and the U.S., costing $70.5 billion a year. Countries cannot afford to lose this large amount of money, so they insist to continue hunting. These sources of income are selling the meat of the animal that has been hunted. Selling the fur, or other exterior parts of the animal, and lastly the money hunters spend on the hunting license and equipment itself.

On the other side, hunting effects many things, including our own environment. Although generally most of the affects are negative, there are some positive effects to the environment. The positive effects include population control. Hunters kill animals that have large population, and this can cause those animals to die out due to the lack of food. Hunting these animals will help with population control. The money hunters spend on their hunting licenses may be pumped back into programs that help protect and enhance wildlife and the

environment. If hunting is well regulated, as sports or recreational involvement, there are no major affects to the species, if anything it may help bring back species from the edge of extinction. Many wildlife managers view sport hunting as the principal basis for protection of wildlife.
Having said that, there are also many negative affects to hunting, which complete overshadow the positive effects. Hunting affects the biosphere, which is where the living organisms exist, it affects the biosphere because wildlife is directly related to the biosphere and hunting disrupts natural order. Overhunting will cause the decline in the particular animals species, this will effect everything around it, for example other animals, plants and trees. It directly affects the natural environment in that it throws off natural predation and population growth of the wildlife. Hunting also disrupts migration and wintering of birds and hibernation of mammals. This is because when animals go to migrate, they may be killed by hunters and due to fear, they may not hibernate or winter.

The hunters themselves go on hunting trips, which causes them to drive long distances until they reach a hunting ground. This causes them to emit CO2, adding to their carbon footprint. Once the hunters arrive at their desired location, they usually set up a camp site. At the camp site there are campfires and a lot of littering, which is harmful to the wildlife. The smoke that is emitted by the fire negatively impacts the animals, and the litter on the ground may cause animals to choke. These affects endanger both wildlife and the environment.

Another serious threat to the environment and wildlife is the illegal form of hunting, which is called poaching. Legal hunting cuts down over hunting by poachers due to the fact that hunting has strict laws against over hunting. Legal and seasonal Hunting protects habitats and preserves wilderness ecosystems. Hunters continue to serve as wildlife managers.
In brief, all the negative impacts of hunting are dominated and controlled within the Responsible Hunting Areas of Lebanon that are identified according to local and international criteria, designed to be on municipal lands, and managed by local communities, in order to appropriately implement the Law of Hunting of Lebanon.

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

RATIONAL

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 equipment, 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 1 & 2).

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 the Law. A proposed solution for all these major issues is to limit hunting to "Responsible Hunting Areas" (RHA), 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 Roum/Qaytouleh RHA.

Figure 1: Illegal shooting of raptors in Lebanon

Figure 2: Illegal hunting of song birds

SOURCE OF INFORMATION FOR THE REPORT

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 birds data and technical and scientific

advices provided by Ghassan Ramadan-Jaradi, a professional ornithologist and expert in hunting management.

PRINCIPLE OF RHAS IN LEBANON

Establishment of Lebanese RHAs is an attempt to balance the needs of wildlife with the needs of people using the best available science where the area should be of certain size to ensure hunting security and possibility of hunting for almost everyone within the carrying capacity limitation and the presence of the most searched game species on the site. RHAs allow game hunting with bag limit under the control of the local community that is represented by the local authority, the municipality. Management within RHAs draws on disciplines such as mathematics, chemistry, biology, ecology, climatology and geography to gain the best results. RHAs contribute to reduce the loss in the earth's biodiversity by taking into consideration ecological principles such as carrying capacity, disturbance and succession, and environmental conditions such as physical geography, pedology and hydrology with the aim of balancing the needs of wildlife with the needs of people. RHAs management may require reforestation, pest control, nitrification, denitrification, irrigation, coppicing and hedge laying. Aldo Leopold, one of the pioneers of wildlife management as a science, defined the RHAs as "the art of making land produce sustained annual crops of wild game for recreational use".

Unlike the United States where RHAs management practices are often implemented by a governmental agency to uphold a law, such as the Endangered Species Act of 1973, Lebanon tends to manage its RHAs through municipalities and groups formed from the local communities as the latter are the most interested in making revenues from recreational activities within the wise harvest and the sustainable use perspectives.

STUDY AREA CHARACTERISTICS

Roum and Qaytouleh are located in Jezzine District (Qada'a), an administrative division of South Lebanon Governorate (Mohafazah). The municipalities of Roum and Qaytouleh are members of Federation of

Jezzine Municipalities. Roum coordinates are: 33°32'56.33"N & 35°31'37.36"E and Qaytouleh coordinates are: 33°32'7.42"N & 35°33'7.58"E.

Roum and Qaytouleh are 69-72 km respectively away from Beirut, the capital of Lebanon. Their elevations are approximately 880 to 890 meters above sea level. Roum surface stretches for 968 hectares (9.68 km²) and Qaytouleh surface area is about 311 ha (3.11 km²) (see figure 3).

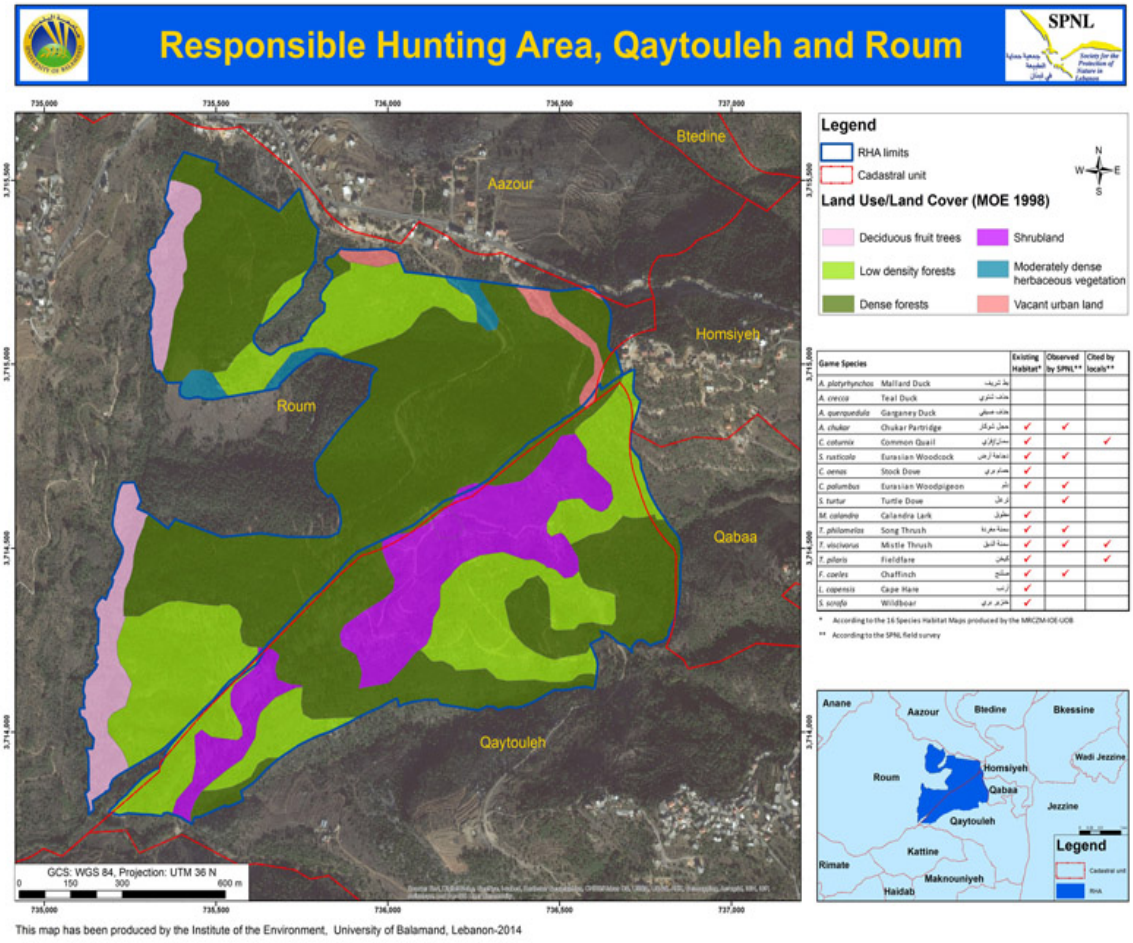


Figure 3: MAP of Roum/Qaytouleh RHA

The RHA of Roum/Qaytouleh is shown on the map above and it occupies more than 1000000 m². It is formed from rocky hills, slopes, terraces, and valleys with mainly pine forests, olive groves, oak woods (Figure 4) and cultivated areas. The RHA is a communal/municipal land that is 500 meters away from human agglomeration. The area hosts wolves,

jackals, weasels, foxes, Stone Martens, Bats, and variety of snakes, agamas, and lizards beside Greek Tortoise.

Figure 4: Oak wood in Roum/Qaytouleh RHA.

Figure 5: Pine wood in Roum/Qaytouleh RHA.

Game species observed: >4 species: Song Thrush, Woodcock, Turtle Dove, Chaffinch, Chukar Partridge, Woodpigeon, Wild boar (Figure 6).

Game species cited by locals: Fieldfare, Stock Dove, Mistle Thrush.

Other species recorded: Olivaceous Warbler, Sparrow, Barn Swallow, Barn Owl, Tawny Owl, Lesser Kestrel, Lesser White Throat, Sardinian Warbler, Black Redstart, Blackbird, Robin, Blackcap, Great Tit, Kestrel, Greenfinch, Goldfinch, Spotted Flycatcher, Wren, Cetti's Warbler, Chiffchaff, Long-legged Buzzard, Common Bazzard, Pelican, Short-toed Eagle, Red-backed Shrike, Masked Shrike, Lesser Spotted Eagle, Levant Sparrow Hawk, White-throat Warbler, Chaffinch, Hoopoe, Spanish Sparrow, Northern Wheatear and Long-legged Buzzard.

Figure 6: Bird species observed.

In this report, we

1. Collate and synthesize existing data on potential direct hunting impacts in the Roum Qaitouleh region;

2. Review the factors driving human hunting in Lebanon and the empirical evidence for indirect ecological impacts of hunting, and discuss how the Roum/Qaitouleh of the twenty-first century are going to be shaped by the hunting activities within the RHA; and

3. Consider how the future scenarios for land-use change (LUC) and climate change outlined in this report are likely to influence, and interact with, the drivers of wildlife hunting, to explore the potential long-term consequences for the Roum/Qaitouleh region.

4. Review the impact of the management of hunting on Roum/Qaytouleh.

5. Provide necessary mitigation measures where and when appropriate.

THE HUNTING FOOTPRINT

Roum and Qaitouleh are among the off road areas of Lebanon that are regularly accessed by hunters.
The biological impact of hunting comprises both the direct impact on prey species (removal of individuals) and the cascade effects of changing ecological function across the trophic web, as species declining under extreme hunting pressure change their ecological interactions with others. Responsible and sustainable hunting activities contribute to reducing these direct and indirect impacts.

(a) Prey species

An estimated 80 species of birds are currently hunted for recreational purposes and 13 species for meat consumption (Quails, partridges, thrushes, ducks, and pigeons) and occasional trade. The Law of hunting already inhibit the hunting of the 80 species and much more by limiting the hunting to the 13 species indicated right above plus one small passerine species, the Chaffinch. The enforcement of the Law by the local and municipal resources limit the hunting to the 14 bird huntable species and 2 mammal huntable species (Wild boar and Hare).

(b) Changes in species assemblages

Wildlife species are not equally affected by hunting, although some general ecological rules are clear: large, low-density, slow-reproducing and specialist species will be more vulnerable to increases in predation pressure than smaller, fast-reproducing and high-density generalist species.
The dramatic declines recorded for some species due to unregulated hunting will radically alter functional relationships in which they play a key role. However, the detrimental and cascading effects of losing large birds from an ecosystem are not always visible in forests and woods where forest cover and tree density are often used as proxy indicators of ecosystem health.
Although loss of the large non huntable species may cause the most obvious ecosystem changes, other shifts in species composition will also have important impacts on pine grove structure and function. Small species released from predation pressure and competition as their natural predators and competitors are hunted to low densities, yet themselves unattractive to human hunters, can find conditions of high hunting pressure favorable and densities may even locally increase, with knock-on consequences for the area's ecology. Local people noted that local extirpation of Chaffinch around the villages of Roum and Qaytouleh occurred recently due to hunting activities during the spring time. This is reasonable because the Chaffinch is a resident breeding species

hunted during its breeding period, a matter that affects its sustainability. The decrease in number of this species and few other species (Local people statement) that play a role in the middle level of the trophic web, as seed dispersers and producers of food for the higher trophic levels, makes it a key part of the ecosystem: changes in the abundance of the entire guild are certain to have multiple consequences for the ecosystem. Some hunters managing hunting areas for safety purposes have killed the snakes on which the Short toed Eagle usually feed. The Short-toed Eagles have already been lost from heavily hunted areas in Lebanon due to loss of the species which are their prey base, rather than direct persecution.
The respect and application of the Law of hunting within the RHAs is the first mitigation tool for stopping the alteration of the food chain and decimation of the Apex trophic pyramid.

(c) Sustainability of hunting offtakes

Without a proper application of the Law in Lebanon, the sustainability of hunting offtakes is far from being reached. Elsewhere, considerable effort has been made in the last 20 years to develop indices and methods for evaluating hunting sustainability. However, contemporary impacts depend enormously on the history of the local area and the dynamic interactions between hunters and the local wildlife community. Impacts of a given hunting pressure can only be predicted in the light of the area's recent past, which has already shaped the communities of both hunters and their available prey. None of the sustainability indicators currently found helpful have been used in Lebanon, and empirical data on wildlife population trends remained the only valid measure of hunting impacts at the species level. If current hunting offtakes are unsustainable, both direct impacts and cascading ecological impacts will intensify over coming years unless hunting practices change. Here again, the Roum/Qaytouleh RHA is supposed to ensure, through its regulations that are compatible with the hunting Law, the sustainability of the hunting offtakes.

(d) Ecosystem function

Ecological systems are shaped by 'top-down' forces, such as predation, and 'bottom-up' forces, such as climate or land use (Terborgh *et al*. 2010). Empirical studies give evidence for relational changes between species and disruption of ecological function in hunted areas. Functional changes recorded relate to structural changes in woods, changes in species diversity and richness, seed dispersal, pollination and soil nutrient cycling.
Lebanese hunting systems are biased towards heavy offtakes of seed-dispersing frugivorous birds. The latter disperse the seeds of the

majority of tree species (Marquis 2010). At higher altitude, the overhunting of the Fieldfare reduces the survival of *Juniperus excelsa* seedlings that depend on them. Birds dispersing seedlings of tree species contribute a high proportion of the overall carbon-storage capacity of forests. Carbon storage may therefore erode over time if tree regeneration is hampered by changes in avifaunal guilds, including extinction of specialized disperser species like Jays, thrushes and Nuthatches or increases in seed-predating species enjoying ecological release from their predators (Dirzo et al. 2007). As a remedy to this dysfunction of the ecosystem, the Roum/ Qaytouleh RHA is expected to maintain the relation predator-prey and to protect the seed dispersers in areas of high ecological importance through awareness, guidance, access to information and knowledge and enforcement of hunting regulation.

Impacts of land-use change (LUC) and climate change on Roum/Qaytouleh structure and function will be influenced by both climate change and LUC as well as by hunting over the coming decades. We summarize the climate change and LUC scenarios outlined in this report and go on to discuss their potential interaction with the ecological changes caused by hunting, already in motion.

(d.1) Land-use change: reduced habitat for species, more forests and woods accessed

Economies of Roum/ Qaytouleh rely partly on extractive activities, allocating part of their territories to agriculture and extensive harvest of pine stones. The hunting activities may significantly influence forest disturbance through unregulated human access and increased access to forest and wood areas increases the pressure of hunting on the biodiversity of the area. Future LUC in Roum/Qaytouleh RHA is difficult to predict beyond the medium term in a region (Middle East) of political and economic instability; however, under current socio-economic conditions, land use may change rapidly, even in the short term. The use of the land as a responsible hunting area will refrain any logging or road expansion, driven by increased demand on quarries products that may be imposed as a remedy for the current poor socio-economic conditions.

(d.2) Climate change impacts.

Climate models for Lebanon suggest that direct impacts of climate change on the region's vegetation, including forest cover, may be lower than previously thought by the Intergovernmental Panel on Climate Change. These models predict an increase in temperature, and

increased dry signals for the region, yet importantly also suggest that extreme precipitation or drought events are unlikely to increase (Malhi et al. 2009). Although extreme change linked to temperature and drying, such as devastating forest fires, seems likely for Lebanon. Forest resilience has been used to mean the resistance of the vegetation to change (Huntingford 2013); however, ecological function in even a seemingly 'resilient' forest may be significantly affected by the relatively small increases in temperature predicted. Increases in annual temperatures over years have been correlated with a decline in the fruiting and flowering of some tree species, while increasing the fecundity of others (Chapman et al. 2005). How Lebanese ligneous species will respond to rapidly changing temperature is poorly understood, but significant impacts on forest species composition or tree productivity could potentially change food availability for birds, affecting bird ranging patterns and densities across the area (Tutin and White 1998) and initiating trophic cascades as prey distributions, seed dispersal functions and nutrient cycling are in turn changed. These changes would be likely to be additive to any trophic change initiated as a direct result of hunting.

DISCUSSION

In this report, we set out to assemble the current empirical knowledge on hunting, its extent, drivers and direct and indirect ecological consequences, and to consider how interactions between hunting and current scenarios for LUC and climate change, outlined in this report, might influence the future of the Roum/Qaytouleh land.

The data reviewed show that hunting has not been studied in detail at several sites in the two villages over the past two decades. Drivers of hunting are very similar across all countries (Brashares et al. 2011) and direct impacts on species are broadly similar across the Middle East. Ten years ago, Wilkie *et al.* (Barnes et al. 1991) postulated that hunting, rather than habitat loss, would be the greatest driver of wildlife declines due to increasing road access, and Barnes further predicted that the insidious effects of hunting on wildlife populations would not be realized until species were close to collapse. Barnes' and Wilkie's hypotheses have been upheld for large species (Henschel et al. 2011). However, data on the true status of smaller species, which form the bulk of the harvest are almost entirely absent. As the extent and drivers of the ecological changes underway across the world's ecosystems in the twenty-first century become apparent (Estes 2011), research paradigms must widen to become more multidisciplinary. Research on individual impacts of climate change, LUC or hunting risks missing the interactions between these factors. Considering one without the others could lead to widely different conclusions on the future health of lands, and

conservation, management and research priorities. Furthermore, it is worth noting that without greatly improved regulation, intensified drivers will result in intensified hunting offtakes and an increase in the rate of ecological change that these offtakes are effecting. The improved regulations that build on the breakdown of the details cannot be tailored at the national scale but at the level of sites within the country, such as the RHAs sites.

Good hunting management practices and planning are clearly vital to maintaining ecological function in the RHA and must be incorporated into research priorities and overall land-use and climate change strategies, as well as impact assessments and private sector management practices on the ground. Conservation practitioners elsewhere have shown that multiple-use landscapes under efficient management can maintain the wide-ranging species critical for seed dispersal, sustain game populations for hunting needs and support threatened species, if a few design rules are applied through appropriate management of the hunting activities, integration of good hunting practices and ensuring sufficient resources are allocated to controlling hunting and enforcing management plans.

IMPROVED HUNTING PRACTICES & CHALLENGES

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 Roum/Qaytouleh.

GOVERNANCE AND MANAGEMENT OF HUNTING IN THE ROUM/QAYTOULI 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 Society for the Protection of Nature in Lebanon (SPNL) will test controlled hunting within an area located at Roum/Qaytouleh. The Roum/Qaytouleh Municipalities, well-organized local authorities, 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 Roum/Qaytouleh RHA is legally distant from nature reserves, parks, protected areas, IBAs.

The game birds belong to three (3) species of ducks (Mallard, Teal and Garganey [all three species are not available in Roum/Qaytouleh]), three (3) species of doves (Woodpigeon, Turtle Dove and Stock Dove), three (3) species of thrushes (Song Thrush, Mistle Thrush and Fieldfare [Fieldfare is apparently not available in Roum/Qaytouleh]), Woodcock, Quail, Chukar, Calandra Lark and Chaffinch (refer to Figure 7). The game mammals are limited to the Wild boar and Cape hare.

Figure 7: Different Types of Game Birds of Lebanon

In general, birds (game and non-game birds) are classified as 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 (No bag limit is fixed for the two mammal species). Habitat and species management, and predator control (if needed), will be carried out intensively for game bird hunting by SPNL and the Roum and Qaytouleh Municipality at the proposed Roum/Qaytouleh 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. Even though there are recent stories on hunting with falcons in Jabal Turbul and Donnieh were medium open areas are available.

The Law does not permit some hunting styles, and these will not be permitted within the proposed Roum/Qaytouleh 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 ROUM/QAYTOULEH RHA AND THEIR IMPACTS ON BIODIVERSITY

The most commonly expected management activities for game bird hunting in the proposed Roum/Qaytouleh 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

The management team of the Roum/Qaytouleh 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 creating tree-stands that benefit game birds do not exist in Lebanon and are not needed in Roum/Qaytouleh where they do naturally exist.

Grazing Management

The management of the proposed RHA in Roum/Qaytouleh shall include grazing control. Grazing management can be done by controlling the number and the regime of sheep and goats grazing over the grasslands of the Roum/Qaytouleh and 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 tree-stands. 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 lands, and a subsequent loss of food and cover, along with a general reduction in habitat diversity.

Habitat Management

In the proposed Roum/Qaytouleh RHA, hunters may plan 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 (**Error! Reference source not found.**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 Roum/Qaytouleh 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).

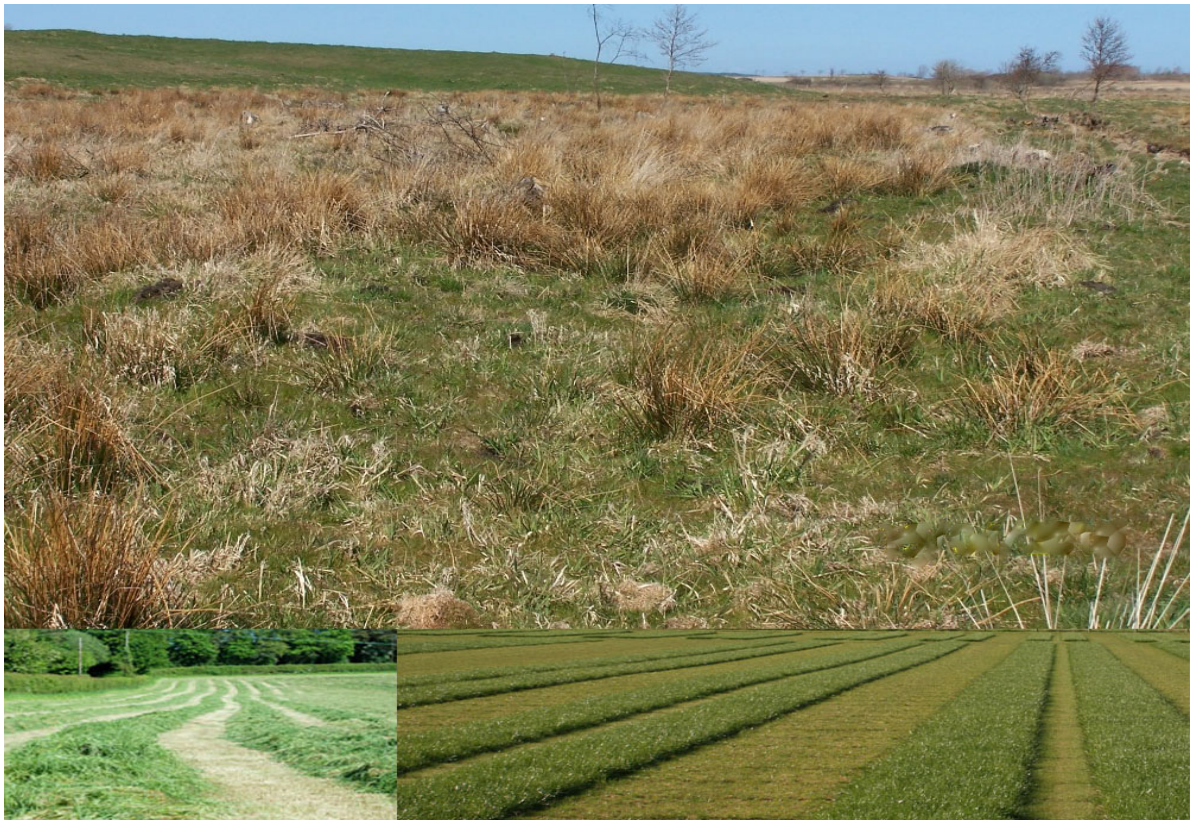


Figure 8: Grassland in mosaic managed for hunting.

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).

Crop Management

Famers in the proposed Roum/Qaytouleh 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 (**Error! Reference source not found.**). For example, planting maize strips, cereals and kale based crops in a mosaic on the mountain slopes 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

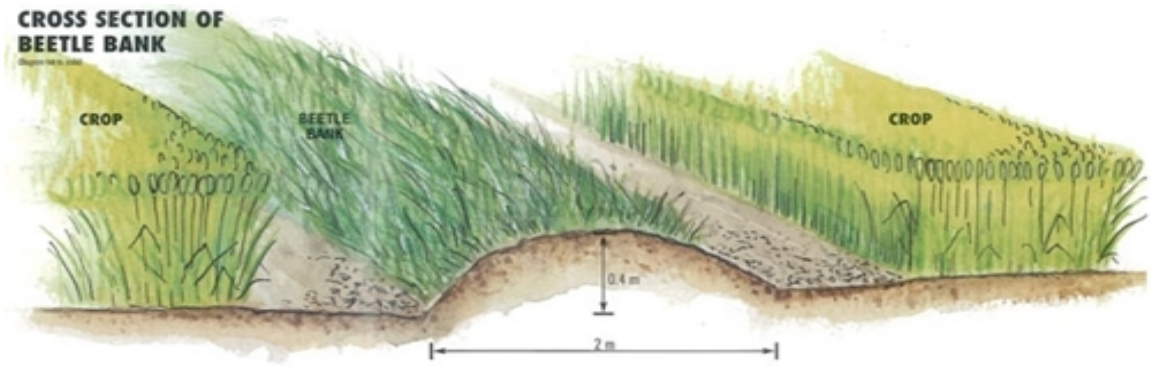
Figure 9: Crop management

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.

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 Roum/Qaytouleh 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 3). In all cases, the proposed Roum/Qaytouleh 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 3: Field Margins and Hedgerows

In Europe, whenever organic farmers plough out their clover leys, they deliberately leave a 2m strip of clover and grass around the boundary of the field. This creates a field boundary preventing nettles, thistles, cleavers, and sterile brome from entering into the open wheat crops, whilst providing a diverse habitat for beneficial insects as parasitic wasps which can enter the cereal crops and control aphids (Sheepdrove, 2010).

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, pheasants and 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 Roum/Qaytouleh 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 or pheasants in the proposed Roum/Qaytouleh 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 do apply in fall season at Roum/Qaytouleh.

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 (Figure 11). 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 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 4: 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.

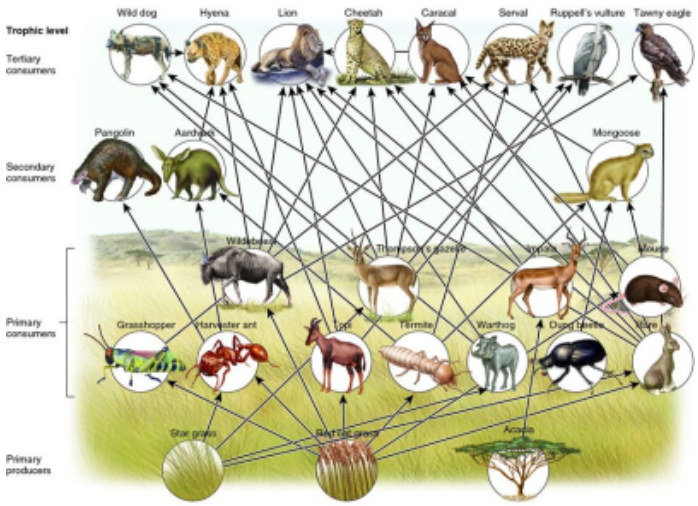


Figure 5: Top Predators (top row) and Meso-Predators

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 includes 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 was 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 IN LINE WITH EU ACTION POINT 7B) OF THE EU BIODIVERSITY STRATEGY 2020

Action point 7b) of the EU Biodiversity Strategy 2020 requires the European Commission to carry out further work with a view to proposing

by 2015 an initiative to ensure there is no net loss of ecosystems and their services (e.g. through compensation or offsetting schemes).
The Federation of Associations for Hunting and Conservation of the European Union (FACE) objectives are to actively contribute to the No Net Loss (NNL) Initiative and to communicate the potential role of European hunters for implementing the measures. European hunters have been contributing to biodiversity conservation through various projects and activities including the restoration of a wide range of habitats from the mountains to estuaries. They are also active throughout Europe in control of invasive predators, monitoring of species to inform game management decisions and awareness-raising activities.
Lebanese true hunters are not away from such contribution to biodiversity conservation. They contributed through sustainable hunting and respect to the hunting Law. Since the information note of FACE aims at showing the potential role of hunters to the mitigation hierarchy steps and the NNL initiative currently developed by the European Commission, it is useful to indicate hereinafter to Lebanese hunters and conservationists the strategy of FACE to contribute to NNL Initiative. In the meantime, this indication provides more information on the possible collaborations with rural stakeholders when implementing NNL measures.

Mitigation hierarchy and hunting as proposed by FACE

The mitigation hierarchy is a tool that helps manage impacts of anthropogenic activities on biodiversity, through the observance of four basic steps. **Avoiding** and **minimizing** human impacts on biodiversity are the two first priorities of the hierarchy. Measures should be then taken to **restore** ecosystems where impacts couldn't be avoided or minimized. Finally, any residual impact should be **compensated** through offsets in order to achieve NNL.
The first two steps of the mitigation hierarchy aim at avoiding and minimizing any impact generated by human activities on nature and biodiversity. This is directly linked to the concept of sustainable use which hunters continuously put into practice through their activities.
Monitoring and assessing the status of huntable species and other wild animals ensure the development of mechanisms to avoid any significant impacts and, this can include temporal and spatial restrictions on hunting or use of quotas or voluntary limits. The overarching objective of hunting is to ensure a huntable surplus and promote balance in animal populations.
The third step represents the measures taken to rehabilitate/restore degraded habitats after having been exposed to impacts that could not be completely avoided and/or minimized.

Lots of restoration activities are conducted by hunters in order to enhance wildlife and game populations. These activities are clear examples of incentive-driven conservation by hunters. Their practical knowledge and field experience could therefore directly contribute to the implementation of those measures.
The fourth step consists of offset activities that are to be undertaken if residual impacts remain after avoidance, minimization and restoration actions have been carried out. Usually, when conducted sustainably, hunting activities contribute to the first three steps of the mitigation hierarchy.
However, areas managed for hunting and hunting reserves could be seen as potential offsets, carried out cost-effectively through voluntary engagement by hunters.

Hunting and Sustainable Use

While monitoring activities represent a first essential step, it is necessary to go one step forward for implementing sustainable measures. From the hunting perspective, the sustainable uses principles are carried out through the hunting restrictions and management plans. Their purpose is to council the various interests from the hunting, forestry and agricultural perspectives while ensuring the sustainable development of wildlife populations. There are a lot of examples where hunters are gathering relevant data in order to improve sustainability of hunting practices: In Italy, several projects aim at monitoring migratory waterbirds in order to get reliable information on migration period and then use it as technical data for determining hunting periods.
Surveys made by the Finnish hunters contribute to improving knowledge about mammal and waterbird populations, their development and trends, interactions and impact of hunting, in order to set hunting quotas or derogations and propose management and conservation actions.

Hunting and Habitat Restoration

Finally, European hunters are also active in restoring wetland, farmland and forest habitats so that wildlife and game populations are maintained. Identifying disturbed habitats and carrying out actions to restore native flora and fauna is a significant contribution from hunters to biodiversity conservation.
In Italy for example, restoration of wetlands through indigenous shrub species planting, organic farming and low intensive work have made both huntable and other wild species recover.
British hunters have been creating new water bodies and published guidelines for ponds management and creation, in order to contribute to sustaining the quality of the pond landscape in the UK.

Conclusion

Hunters have no interest in the loss of natural areas and, therefore, help in avoiding degradation of habitats or ecosystems. Even though hunters do not conduct projects concretely following the framework developed at European level, a significant proportion of their activities can bring an added value to the potential measures for No Net Loss.
Hunters can provide practical knowledge in habitats/populations management and share their field work experience.
Given that the conservation measures undertaken by hunters and its associated governance is well established, it is crucial to consult hunters in the initial stages of the NNL initiative process and implementation. As for the FACE, Lebanese hunters should also contribute to engage in the NNL process.

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].

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

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].

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

[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.

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 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.

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

- 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.
- 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

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

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

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

- 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

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

- 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.
- ✓ 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.

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

- ✓ 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 Roum/Qaytouleh 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 outside Lebanon. 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 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 'walked up' shooting. Driven shooting requires high densities of game birds and is associated

[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.

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.

Finally, monitoring of species to inform game management decisions and awareness-raising activities is a must.

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