Research Institute of Wildlife Ecology
University of Veterinary Medicine,
Vienna

Institute of Landscape Development, Recreation and Conservation Planning, University of Natural Resources and Life Sciences, Vienna

ISWIMAN

Integrated Sustainable Wildlife Management

Principles, Criteria and Indicators
for Hunting, Forestry, Agriculture, Recreation

Annex 3

PCI-Set for the Interface AGRICULTURE and Wild Animals / Wildlife Habitats /Hunting

Full and Abbreviated Version

Friedrich Reimoser, Wolfgang Lexer, Christiane Brandenburg, Richard Zink, Felix Heckl, Andreas Bartel

ISBN_Online: 978-3-7001-7216-1

DOI: 10.1553/ISWIMAN-2

Vienna, 2013 (2nd, improved edition)

Supported by the Man and Biosphere (MaB) Programme of the **Austrian Academy of Sciences**

Preliminary Remarks and Instructions for Use

The present Set of Principles, Criteria and Indicators (PCI) refers to the interfaces of sustainable agriculture and sustainable hunting (focused on the Wienerwald Biosphere Reserve as a case study). It addresses itself to farmers (managers, operators of agricultural enterprises, owners of agricultural land).

The Assessment Set is for self-evaluation by farm managers and is designed to allow for an examination of sustainability of agricultural management activities with a view to the lasting conservation of native wildlife species and their habitats as well as a sustainable practice of hunting. This is not intended to question the production, in line with environmental requirements, of food, feedstuff and biogenic raw materials and fuels as the prime goal of agricultural activities. However, as land users, farmers play a part in shaping and preserving landscapes; they thus also share the responsibility for the habitat functions of agriculturally used areas as well as for the effects of their activities upon wild animals and the needs for sustainability of other interests. Wild animals, the quality of their habitats and thus also the sustainability of hunting are significantly influenced by agriculture. Interaction between agriculture and hunting may entail synergistic effects but also unwitting negative impacts on land use needs of other groups. In the sense of a multi-functional understanding of agriculture, the following assessment system should enable farmers evaluate the extent to which their agricultural activities take into account wild animals, their habitats and the requirements of sustainable hunting. The focus is on current and potential contributions on the part of agriculture to a sustainable preservation of wildlife habitats, native wild animal species and the sustainability of hunting.

The assessment within the scope of this Set of Indicators relates only to the options of farmers for influencing the sustainability of hunting, together with a lasting preservation of wild animal populations and wildlife habitats rich in species. For an assessment of the potential influence of other interests (hunting, forest management as well as leisure and recreation management) upon the sustainable future of wild animals, wildlife habitats and hunting, separate Sets with their respective Principles, Criteria and Indicators have been developed.

A note for owners of agricultural land: As landowners, but depending on the size and arrangement of their land, farmers are very often also persons entitled to hunt and lessors of the right to practise hunting. By exercising their responsibility as landowners entitled to hunt, e.g. via the drafting of lease contracts, farm managers may also contribute to sustainable hunting, in particular in terms of the economic and socio-cultural aspects of sustainability. Owners of smaller plots of agricultural land are, as a rule, members of hunting co-operatives. Contractual regulations in terms of hunting laws (lease contract, etc.) are generally not concluded by the individual small landowner but by his or her representatives in the hunting co-operative. In this case, the evaluation of sustainability should be made by the landowner's representative responsible for the respective hunting territory, such that. the unit of assessment is the hunting territory concerned. Every owner of agricultural land is, however, free to examine his or her own attitude with regard to the sustainability criteria given in this Set. This may be of particular interest if his or her views are not fully expressed or represented by those of the hunting co-operative.

For the Busy Reader

1. **Direct entry** with point scores accompanying the indicators (framed) for Ecology, Economy, and Socio-Cultural Aspects.
2. **Explanations** to be read only when needed.
3. **Simple Evaluation:** *Prepare an A4- format sheet of paper with three double columns (for ecological, economic and socio-cultural aspects).* Read the *maximum point scores* of the indicators evaluated and enter them underneath each other on the left; on the right, enter the score you assign to your respective territory (scores should range from the maximum to the minimum given in the assessment framework). Finally, add the scores across the six columns and express the sum of the scores you assigned in terms of the percentage of the sum of the relevant maximum values (separately for ecological, economic and socio-cultural aspects). If you achieve 76-100 % of the sum of maximum point scores for an assessment aspect, your sustainability evaluation is "very good" for this aspect; in case of 51-75 % "good," 25-50 % "intermediate," 0-24 % "bad," and in case of negative scores "very bad."
4. **Extensive User Information** for applying the PCI Framework as well as for a full evaluation of the self-assessment is given in the final report on the study.
5. **Short Version of Assessment:** A short version of the PCI Framework enables a limited assessment of sustainability. The numbers of the indicators foreseen for this purpose (most important indicators) are underlined and highlighted in grey (e.g. **Indicator 1**).

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DEFINITION OF TERMS

- **Farmer** refers to persons responsible for the planning and carrying out of agricultural measures on agricultural plots of land. As a rule, they are managers/cultivators or owners of agricultural land or managers of an agricultural enterprise.
- The term **game** refers to those wild animal species (furred game and feathered) which are subject to hunting laws, including species with no open season. Unless indicated otherwise, the terms **game** and **wild animals** are used in the same sense. Conversely, the term wild animal species refers to those wild animal species that are (or were) "huntable" as "game," or otherwise influenced by hunting (e.g. on account of hunting laws, regulations, and hunting practise).
- The term **threatened** refers to those wild animal species whose long-term survival within their natural range is endangered to varying degrees, or questioned. As a rule, these are species threatened with regional extinction, are declining continuously, are particularly rare, or have temporarily disappeared and are now returning, and are thus often classified as "protected species" under the nature conservation laws. The degree to which a species is threatened results, as a rule, from various risk factors that interact to varying degrees, and which, when combined, influence the conservation status of the species. If these factors occur, they are to be interpreted as warning signals suggesting that the respective species may be threatened. These risk factors are first and foremost: low population size; continuously declining populations (continuously decreasing number of populations and/or individuals of a species); small or decreasing range (contraction of distribution area); specialised habitat requirements of a species; habitat loss, habitat fragmentation, deterioration of habitat quality (low or decreasing availability of habitats); direct adverse human influence (e.g. on account of excessive hunting, excessive use, persecution, etc.) pressure by invasive, non-native species (e.g. Zulka et al., 2001; Primack, 1998). In varying combinations and with differing emphasis, most of the factors mentioned account for status of threatened species on red lists as well as their classification as protected species in accordance with nature conservation laws. The degree of endangerment that indicates, so to speak, the probability of survival or risk of extinction of a species in a certain area, is categorised through Red Listing processes. IUCN Red List categories include "extinct" and "extinct in the wild", followed by categories of "critically endangered," "endangered," "vulnerable", within which a species is considered threatened with extinction, and the pre-warning level of "near-threatened" (e.g. Zulka et al., 2001; IUCN, 1994, 1999). If a wild animal species is listed on a relevant red list – e.g. the Red List of Threatened Animals in Austria (Zulka, 2005) and Red Lists of the Federal Provinces – and classified into one of the above categories of endangerment, the respective species is to be considered a threatened species in the sense of this study[1]. Equally, species protected by Austrian nature protection and conservation laws (species protection regulations), EU community laws (Bird Protection Directive, Flora-Fauna-Habitats Directive) and international species protection agreements (e.g. the Convention on the Conservation of European Wildlife and Natural Habitats – Bern Convention; Convention on the Conservation of Migratory Species of Wild Animals – Bonn Convention) are considered to be threatened species in this document.
- The term **sensitive** refers to those wildlife animal species to which one or more of the above endangerment factors apply, even if the respective species has not (yet) been red-

[1] http://www.umweltbundesamt.at/umweltschutz/naturschutz/artenschutz/oasis/oasis_abfrage gives access to an Internet databank compiled by the Federal Environment Agency – Austria that allows queries as to the endangerment classification of individual species on different red lists. With regard to species relevant in terms of hunting, regularly updated information relevant in terms of hunting laws (hunting and closed seasons) on the basis of the hunting laws of the Austrian Federal Provinces is made available.

listed as “threatened” or “near threatened.” In particular those wildlife species are to be considered sensitive which, on account of specific (population-) biological features such as specialised habitat requirements (including size and quality of habitat), low reproduction potential, low dispersal capacity, are particularly sensitive vis-à-vis additional endangerment factors such as excessive hunting pressure, decreasing distribution, strongly increasing predation and competitive pressure from other species, or rapid changes of environmental conditions. In a hunting context, however, also native huntable game species are to be classified as sensitive if hunting them sustainably cannot be considered guaranteed in a certain area on account of their unfavourable conservation status or unfavourable trends in the respective species and/or its habitat. These species may often only be taken in small numbers or demand particular consideration on the part of hunters.

- The term **person permitted to hunt** or **owner of a hunt** refers, for the purpose of this study, to the owner or tenant(s) of hunting rights. Additionally there are those who hunt by permission of landowner/game tenant and owners of stalking districts.
- The term **person owning the right to hunt** refers in Austria to the landowner.
- The term **tenant** refers to the tenant of a proprietor’s or co-operative hunt (person permitted to hunt).
- The term **lessor** refers to the owner or representative of the owner of a proprietor’s or co-operative hunt.
- **Potential natural wildlife species inventory** is to be understood as the spectrum of wildlife species representing the currently achievable optimum circumstances in terms of biodiversity and near-natural conditions, taking into account the irreversible changes that have occurred in the course of the development of the cultural landscape as well as the existing economic and socio-cultural impacts on wildlife habitats that cannot be influenced by hunting. The “potential natural wildlife species inventory” is thus the range of wildlife species possible under the current habitat conditions, which pertain to the native spectrum of species (autochthonous, typical for the region) of the respective geographic region. „Native wildlife species“ are, in the sense of the potential natural wildlife species inventory:
  - those species that have outlasted the latest Ice Age or have immigrated thereafter and before and/or without human intervention[2];
  - recolonising species that used to be native in a certain area whose populations temporarily ceased to exist and which now are returning to their original ranges, either without human intervention (immigration of species, e.g. elk/moose (*Alces alces*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), otter (*Lutra lutra*)), or through re-introduction into their original habitats (e.g. Alpine ibex (*Capra ibex*) and Alpine marmot (*Marmota marmota*) within their original ranges of distribution);
  - native species that have disappeared on account of human influence (eradication, habitat changes).

  As far as today’s cultural landscape basically still has habitat potential for the species mentioned, these species are to be considered part of the potential natural wildlife species inventory.

  This is not to be confused with **“new residents” (alien species, neobiota)**, which have arrived at a certain territory (in this case, Austria) later than 1492 through direct or indirect human influence. With regard to Austria, these are, among huntable wildlife species, e.g. fallow deer, Sika deer, moufflon, wild rabbit, racoon dog, racoon, nutria and wild turkey. These species are *not* considered part of the potential natural wildlife species inventory.

[2] So-called primary native or indigenous species

Those animal species that had become established under human influence in pre- and early history up to the end of the Middle Ages (1492) (such as, probably, the brown rat) are not relevant for hunting in Austria and thus need not to be considered for the purpose of this study.

- **Hunting management plan (hunting plan)** is to be understood as the planning ahead of any hunting-related activities, in particular in terms of time, area, and personnel. It comprises the goals and measures of hunting management for the respective hunting area and serves the purpose of providing long-term orientation for the hunting practice. Key components are e.g. to ensure that hunting accords with the needs of other land users, to take into account the optimum time and area for hunting the relevant game, and to give consideration to rare, non-hunted species. A hunting plan may exist in thought or in writing; with regard to sustainable hunting practice, however, a written hunting plan is preferable.
- **Hunting bag plan** (as a part of a hunting management plan) is a list of the numbers of each species (sex, age classes) planned to be shot or trapped (hunting bag planned before the hunting season starts).
- **Off-take list** (as a part of the hunting management plan) is a list of the numbers of each species (sex, age classes) really shot/trapped/killed by traffic accidents/ found dead by other reasons (hunting bag documented when the hunting season closes).
- **Culturally unacceptable game impact** is to be understood in this context primarily in terms of the ecologically unacceptable (harmful) influence of game on vegetation. The impact of game on vegetation comprises food intake (grazing, browsing, bark peeling) as well as rubbing to remove velvet from antlers and territorial tearing or gnawing. The concept of “culture” differs from economic considerations. Culture refers from an overall societal perspective to, in the case of forests, the functions beyond that of timber production, including shelter, leisure and recreation for people, but also to the provision of ecological value from other vegetation (e.g. orchid meadows rich in biodiversity). This is the fundamental view represented by the competent authorities on the basis of the respective (Austrian) legislation. The lack of some important natural enemies of our herbivorous wild animals as well as anthropogenic influences on our wildlife habitats (most of all land use) accounts for the fact that they are mostly not near-natural environments. This influences local densities and distribution patterns of wild animals, in particular ungulates, which damage vegetation beyond tolerable limits.
- **Wildlife habitat** is defined as the “living space” or “site” (the habitat) of wild species populations and/or individuals of a wild species. The habitat needs of the wild animals concerned define the area of wildlife habitat they require. The wildlife habitat must meet key habitat functions (food, cover and reproduction area). Environmental factors (such as noise, temperature, light, climate, soil, etc.) must neither exceed nor fall short of the species-specific limit of tolerance of the wild animals. The wildlife habitat may consist of several separate habitat sectors.
- **Migration** and **Dispersal** are movements of animals. Migration is the repeated movement of animal populations leading to seasonal changes of place and entails a change of range of a species. As well as seasonal habitat change (e.g. passing from summer to winter habitat in red deer) there may also be migration to breed. Dispersal is the lasting movement of individuals away from a natal area or subsequent point of settlement, and is often omnidirectional unless constrained in particular directions by topography . It plays a significant role in terms of the necessary gene flow within and among populations of a species, and thus in terms of the preservation of the species, its distribution, the colonisation or re-colonisation of habitats. In the absence of regular genetic exchange via such ”gene flow corridors,“ the risk of species and populations becoming regionally extinct will increase.

- Landscape sectors in which migration or dispersal primarily happens are termed **migration axes (routes)**.
- **Wildlife corridors** are bottlenecks within a migration axis or the habitat of wildlife species caused by barriers or an unfavourable environment. A salient characteristic of a corridor is its favourable structure compared to the surrounding environment, allowing for a link between separate habitat sections.
- The term **constricted corridor** is used to describe a constriction of a wildlife corridor or wildlife route on account of natural or anthropogenic barriers to a minimum width without any possibility of bypassing it locally, i.e. wildlife species are forced to adhere to the corridor as a consequence of specific topographic conditions (forest corridors, steep slopes, canyons, water courses, etc.) or artificial obstacles (fences, road barriers, walls, settlements, etc.) which create local bottlenecks.
- **ÖPUL** is the "Austrian Agri-Environmental Programme." The initials refer to the promotion of agriculture that is appropriate to the environment, extensive and favourable for nature. The programme is supported through the European Agricultural Fund for Rural Development as well as the Rural Development Programme of Austria. Along with ÖPUL, there are other publicly subsidised **agri-environmental measures** pursuing similar goals (e.g. the Ecopoint Programme).
- **Use** is to be understood in the comprehensive sense of the IUCN Policy Statement on the Sustainable Use of Wild Living Resources (IUCN, 2000); it includes all forms of consumptive and non-consumptive use of natural resources. Sustainable hunting and/or sustainable hunting-related use includes hunting certain animal species without the animals that are killed having to be used in a consumptive way (e.g. red fox (*Vulpes vulpes*), if its population increases on account of anti-rabies vaccination and thus endangers the population of other species).
- The term **forest manager** refers to all persons responsible for the planning and carrying out of forest-related measures. As a rule, these are forest managers and cultivators, including the skilled personnel responsible for the forest cultivation and management activities (foresters, heads of forest district/division), forest owners or managers of forest enterprises (forestries, forestry operations).
- **Leisure and Recreation management** covers persons active and organisations representing groups of people that benefit from the recreational use of the Wienerwald Biosphere Reserve. It also includes as stakeholders the officials and decision-makers responsible for the planning, regulation and control of leisure and recreational activities. This group of actors includes the Biosphere Reserve management, municipalities, regional managing bodies, tourism federations and associations, alpine associations, sports associations and other representatives of certain recreational interests (horse riders, mountain bikers, hikers, etc.), landowners and representatives of relevant authorities.

Assessment Set for Integrated, Sustainable Wildlife Management

Part: AGRICULTURE

Principles, Criteria and Indicator scoring

1 ECOLOGY

Explanation: The primary goal of agriculture is the production of agricultural products (food, feedstuff, biogenic raw materials and fuels). Along with its functions of production and supply, agriculture and farmland also provide society with other services (such as employment, recreation, protecting habitats against natural dangers and construction, and preserving agricultural heritage) as well as providing some ecosystem support services and underpinning for biological diversity. That agricultural activities are multifunctional, and not merely the production of agricultural goods, reflects ties and responsibilities of landowners toward society.

About one third of the area of the Wienerwald Biosphere Reserve is dedicated to agricultural use; thus, a major part of the non-forested, open landscape is subject to agricultural influence, either directly (production) or indirectly (landscaping). Co-existence of various agricultural uses (arable land, intensive managed grassland, extensive meadows and grazing land, meadows with scattered fruit trees, vineyards, etc.), as well as the mosaic of forests and open land, results in a high diversity of landscapes types. They comprise arable landscape types and large meadows and grazing lands as well as glades, and landscapes characterised by vineyards and meadows with scattered fruit trees or orchards (AVL / Becker et al, 2004). With careful management, development of open, agriculturally dominated cultural landscape can contribute considerably to maintaining and fostering the traditional character of a region as well as to biological diversity. The multifunctional character of agriculture, in particular within a Biosphere Reserve, underpins preservation and active shaping of a diverse and regionally distinctive cultural landscape.

Farmed landscapes are not only for production and recreation, including tourism, but also habitats for wildlife communities and areas for hunting. Any form of agricultural use puts its characteristic stamp on the diversity and quality of wildlife habitats and on the diversity of wild species. Ecological functions of sustainable agriculture thus also include preservation and improvement of wildlife habitats and diversity of wild animal species. Harmonising agricultural measures with hunting management can be highly supportive in this regard.

In terms of the ecological aspects of the interactive field of agriculture – wild animals/wildlife habitats/hunting, the Principles, Criteria and Indicators for sustainable integrative wildlife management are thus oriented toward an improvement of wildlife habitats and diversity of species of native wild animals. In contrast, agriculture has only a comparatively small influence upon the genetic diversity of wild animal species; this is why this aspect is not directly assessed in this context.

1.1 Principle: The preservation and improvement of wildlife habitats is an objective of agricultural activities

Explanation: The management of land contributes significantly to shaping habitats of wild animals, whether deliberately or unwittingly. Many wild animal species of the Wienerwald region depend primarily or even exclusively upon open landscapes characterised by agriculture. Farmers thus share the responsibility for the creation, preservation and development of habitats for wild animals that are diverse, adequate and rich in species.

The assessment criteria summarised under this Principle refer to taking the needs of wildlife habitat into account , supporting the preservation and improvement of wildlife habitats by hunters, helping to avoid game damage and measures aiming at preserving and creating habitats for wild animals on farmland, including linking biotopes.

1.1.1 Criterion: Agricultural activities relate to wild animals and hunting

Explanation: The landscape-shaping effect of agriculture puts its stamp on the diversity, adequacy and quality of habitats for wild animals in open areas. Agricultural areas should as a rule also be available for hunting and thus provide a backdrop for hunting management.

If agricultural managers are aware of these functions and the potential effects of their activities on wildlife habitats and the sustainability of hunting, they will be able to adjust their management measures at least to some extent to the habitat needs of wild animals as well as to hunting-management-related requirements. However, this requires a certain amount of insight into wildlife ecology and how hunting management relates to agriculture, as well as a readiness to harmonise measures with hunting. The following Indicators have been designed to allow an examination as to whether this fundamental relationship exists between agricultural activities and wild animals as well as sustainable hunting.

1.1.1.1 Indicator 1: Support for meeting hunting requirements for wildlife species that need to be reduced

Explanation: Hunting bag plans and other hunting requirements are important control instruments of game management. When done correctly, drawing up a hunting bag plan provides an opportunity to respond flexibly to changes in game populations as well as to stresses resulting from game damage by increasing or decreasing the bag. Hunting bag plans are, so to speak, the link hunting establishes between the status of vegetation, the regulation of game populations, and aspects of nature protection and conservation. They serve both the preservation of game populations at levels usable for hunting in a sustainable way and the avoidance of game damage unacceptable in terms of regional culture. Along with the general hunting bag plans prescribed by the authorities, the present Indicator also addresses itself to potential additional hunting obligations, for game species which need to be reduced (in some locations and at certain times), which hunting tenants or other long-term hunting customers (hunters by permission of landowner/game tenant with contracts of at least one year) may be contractually obliged to fulfil. In the Wienerwald region, wild boar are a game species which in terms of regional culture needs to be reduced; however, presently, neither the hunting laws of Lower Austria nor those of Vienna provide for hunting bag plans prescribed by the authorities. Hunting requirements of this kind may be advisable not only for wild boar but also for various neozotes (non-native species).

Whether hunting requirements can be met by the persons permitted to hunt depends also on factors outside the immediate influence of hunting itself. Non-hunting land users in the wildlife habitat may often strongly influence the scope for hunting game and thus the success of hunting. Along with forest management and disturbances of the wildlife habitat caused by intense recreational use, this is also true for agriculture. Persons entitled to use land for agricultural purposes may contribute to a great extent to making hunting requirements achievable by providing, in co-operation with the persons permitted to hunt locally, adequate practical hunting opportunities in sectors of hunting territories characterised by agricultural activities. This may for example be achieved by way of allowing for sufficiently broad field edges between forests and arable crops to be used as hunting aisles, or by establishing open areas for hunting inside maize fields. As this contributes to avoiding or reducing game damage to crop lands, it is of immediate interest to the farmer. Moreover, meeting hunting requirements for game species that need to be reduced may be supported by co-ordinating agricultural and hunting measures in terms of time and space, for example by co-ordinating harvest times as closely as possible with the planning of hunting, in order to increase the efficiency of regulatory hunting in autumn (in open-land territories, concentrated regulatory hunting as a rule does not start until after the fields have been harvested, as efficient hunting requires good visibility of the game.) Further options to support hunting consist in allowing hunting installations on farmland (such as high seats) on as well as gearing agricultural measures to planned driven and/or intensive hunting.

The evidence that hunting requirements are taken into account can be confirmed by local hunters. The period of reference is the relevant planning period for hunting.

Indication and score:	3	Efficient hunting of wildlife species which need reducing in numbers is optimally supported by agricultural measures (e.g. by creating hunting opportunities, allowing for installations on the hunting territory, co-ordination of measures with hunting in terms of time and space, etc.)
	0	Efficient hunting of wildlife species which need reducing in numbers is only on some occasions supported by agricultural measures (e.g. by creating hunting opportunities, allowing for installations on the hunting territory, co-ordination of measures with hunting in terms of time and space, etc.)
	–2	Efficient hunting of wildlife species which need reducing in numbers is not supported by agricultural measures (e.g. by creating hunting opportunities, allowing for installations on the hunting territory, co-ordination of measures with hunting in terms of time and space, etc.), even though hunters have expressed the need for such support.

1.1.1.2 Indicator 2: Existence of a strategy to harmonise agricultural measures with hunting

Explanation: Anthropogenic influences such as agriculture and forestry, tourism, road construction, settlements, nature protection and conservation, etc., have a defining impact upon wildlife habitats. On open land, agriculture significantly influences the availability and quality of wildlife habitats and their hunting management. This Indicator assesses neither the *success* of harmonising agricultural management with hunting nor individual measures, but only the *existence* of a strategy for harmonising agricultural measures with hunting. Such

strategy requires communication and mutual agreement between land managers and hunters. If there is contact with the persons permitted to hunt and agreement has been achieved on the fact that there is a need for harmonisation (relevant management measures, dates, particular hunting events, particularly important or sensitive areas from the point of view of hunting, infrastructure and need of materials, etc.), this qualifies as an “existing strategy.” A written record of the results of the harmonisation process would be advantageous.

A strategy to harmonise agricultural measures with hunting can express itself in taking into account hunting-related requirements and interests regarding:

- mowing and harvesting times
- sowing times
- creation and maintenance of hunting opportunities
- avoiding losses of animals during mowing and harvesting
- measures to avoid game damage
- allowing for hunting infrastructure on agricultural lands (high seats, etc.).

Indication and score:	2	A strategy to harmonise agricultural measures with hunting exists
	–1	There is no strategy to harmonise agricultural measures with hunting

1.1.1.3 Indicator 3: Giving consideration to potential harmful effects on wild animals from chemical pesticides, e.g. in plant protection

Explanation: The present Indicator refers to plant-protection chemicals (herbicides, fungicides, insecticides, rodenticides, etc.) whose toxic properties act upon target organisms in order to protect plants and plant products against noxious organisms; this does not include physical, biotechnological or biological methods of pest control.

Any application of a chemical pesticide signifies a contamination of ecosystems with substances not naturally available. This may principally entail risks to humans, animals, ecosystems and or the entire environment in particular if plant protection agents are applied without being tested or released without official authorisation, or applied inappropriately – e.g. overdosed (AGES, 2008; Umweltbundesamt, 2008). Plant protection agents are subject to a legally prescribed authorisation procedure which guarantees, in principle, that approved pesticides, provided they are properly applied, will not cause intolerable damage to ecosystems or non-target species. The underlying assumption here is that farmers only apply tested and authorised plant protection agents whose use, in accordance with state of the art of science, precludes unspecific effects and direct or indirect harmful impacts on wildlife.

However, whenever chemical pesticides are used to combat noxious organisms, we can never entirely exclude a certain risk – depending on the toxicity (strength of the poison), persistence (duration of action of the active agent) and selectivity (band-width of target organisms) of the active agent applied – of unspecific effects upon non-target organisms (non-target effects) and accumulation of toxic residues in the food chain. Both may – directly or indirectly – cause damage or stress to wild animals (e.g. rodenticides in birds of prey) and possible even to humans.

A risk of harmful effects upon wildlife may also be caused if plant protection agents are applied improperly or not in line with the legal provisions, e.g. as a consequence of

(unintentional) overdosing. We must also take into account that any risk assessment of toxic substances includes uncertainties of knowledge and that the chemical behaviour of many synthetic substances in the environment as well as potential harmful effects upon non-target organisms are not always fully known. Deficits in knowledge in this regard may be due to a multitude of organisms entering the environment non-naturally, complex interactions with other substances, bio-transformation processes, accumulation effects, dose-dependent threshold phenomena as well as varying sensitivities and ranges of tolerance of animal species, to give only some reasons. This complicates a complete assessment of the effects of agro-chemicals upon the animal world.

In the view of deficiencies in knowledge and remaining uncertainties, the precautionary principle suggests minimising to the greatest extent possible the use of substances with a risk potential that cannot be fully evaluated. Given that on the other hand, agriculture cannot live entirely without chemical pesticides, responsible farmers are called upon to sensibly weigh use and risks off against each other and apply plant protection agents principally with restraint and differentiation. Particularly in the Biosphere Reserve, and especially in core and cultivation zones, it should also be an option not to refrain from the use of pesticides altogether. Refraining from using yield-increasing resources is a measure qualifying for subsidies under the “Austrian Agri-Environmental Programme” (ÖPUL), which can offset potential yield losses.

Apart from fully refraining from chemical plant protection agents, farmers can also use alternative, residue-free pesticides (biological, biotechnological, mechanical and other methods of organic farming) as well as, if necessary, the use of products proved to be not detrimental to the environment. In addition, in wildlife-biologically sensitive zones (habitats of rare and threatened species, hatching, grazing and birthing areas, etc.), the use of pesticides can be avoided at least in some areas (measure subsidised under the “Austrian Agri-Environmental Programme” (ÖPUL). A reduction in use may also be achieved by observing economic damage thresholds as a decision criterion: Only when the cost of damage to a crop is higher than the cost of the use of pesticides will the agent be applied. Selective application, too, may be considered (treatment of individual plants, weed sites).

Indication and score:	2	Agricultural managers refrain from applying chemical plant protection agents
	1	Legally authorised chemical plant protection agents are applied with restraint (e.g. only selectively and time-limited or in case of threat of exceeding economic threshold limits); in wildlife-biologically sensitive areas (hatching areas, habitats of rare and threatened species, field edges and other grazing areas); in adjoining buffer-zones and on grassland, no plant protection agents are applied at all.
	0	Legally authorised chemical plant protection agents are applied with restraint (e.g. only selectively and time-limited or in case of threat of exceeding economic threshold limits), but no particular consideration is given to wildlife-biologically sensitive areas.
	–1	Chemical plant protection agents are applied area-wide and without consideration to wildlife-biologically sensitive areas.

1.1.2 Criterion: Giving consideration to the influence of game on vegetation

Explanation: This Criterion and the subsequent Indicator are meant to assess the consideration given to avoiding or reducing negative impacts of game on ecologically precious grasslands (meadows, lawns, pastures) through agricultural measures. In the Wienerwald region, ecological damage to valuable grassland areas is caused mainly by wild boar. As wild animals are unaware of boundaries, agricultural measures within one's own area may influence how game impacts vegetation on adjoining areas.

1.1.2.1 Indicator 4: Preventing game damage which is unacceptable in terms of regional culture

Explanation: Regional culture is here defined as comprising nature conservation in general and thus also conservation of native animal species; it also includes the continuation of agriculture and forestry, hunting and fishing, as well as the right of access to farmland and forests. The term "regional culture" comprises in particular the functions of open farmland (biological diversity, visible features of the landscape, character of the cultural landscape, etc.) that go beyond the production of biomass (food, feedstuff, biogenic raw materials and fuels) from a point of view of society as a whole, with a special emphasis on the habitat function and the ecological value of vegetation (e.g. species-rich orchid meadows). We speak of game impacts unacceptable in terms of regional culture if these functions of grasslands or cultivated pastures are impaired. The views of society in this respect are principally reflected in the way the responsible authorities apply relevant legislation.

Game impacts which are unacceptable in terms of regional culture are to be understood in this context primarily in terms of ecologically unacceptable (harmful) impacts of game on farmland vegetation. This refers mainly to game damage of ecologically valuable grassland areas, as when wild boar grub up meadows, lawns and pastures. In addition, strong grazing pressure on account of excessive populations of ruminant cloven-hoofed game species (red deer, roe deer, fallow deer, European mouflon) may cause changes in vegetation and even degradation of some sensitive grassland biotopes. The consideration of regional culture

transcends economic aspects here. While game damage to arable cultivation (cash crops) is economically relevant, it is not a regionally unacceptable factor for the present Indicator.

This is particularly important for the landscape or species-composition value of meadows, short-grassland and other pastures, especially grassland habitat types of Community interest on Appendix I of the Habitats Directive (including protection of the Natura 2000 site "Wienerwald-Thermenregion"). This encompasses protection for nature reserves, other protected landscapes and extensive natural landmarks in the Biosphere Reserve, which are subject to provincial nature protection laws and contractual conservation measures and projects (e.g. as part of the "Austrian Agri-Environmental Programme" (ÖPUL) measure of "cultivating ecologically valuable areas," or some projects by nature protection NGOs). In the Wienerwald Biosphere Reserve, ecologically valuable grassland areas may, in the sense of the present Indicator, comprise, for example, the following types of grasslands: dry meadows, dry and nutrient-poor (oligotrophic) grassland, dry (xeric) and semi-dry grassland, dry and oligotrophic meadows, bedding meadows, orchid meadows, natural hay meadows, pastures dependent on livestock, highly valuable special botanical sites (glades with orchid stands, among others) (AVL / Becker et al., 2004). In many cases, ecologically precious grassland sites are situated in core zones and cultivation zones of the Biosphere Reserve. Game influence undesirable in terms of regional culture is caused in particular if attaining the envisaged cultivation and development goals in cultivation zones and/or nature protection and management goals in core zone areas are jeopardised.

Game damage on agricultural areas, in particular damage caused by wild boar, are frequent and wide-spread in the Wienerwald region: 75 % of farmers questioned within the scope of the project confirmed registering game damage on managed lands within the last three years; 61 % of farmers questioned regarded the density of wild boar as "too high." As opposed to damage from eatng annual field crops, grubbing-up of grassland by wild boar may cause long-term damage to vegetation stands that is often difficult to repair or cannot be repaired at all. If the farmer participates in a relevant ÖPUL measure with the area concerned, this may entail loss of subsidies under ÖPUL or the obligation to repay them.

A special case of negative game influence upon agricultural sites is the destruction of nests with eggs or young of ground-breeding bird species. If the bird species affected are protected, threatened or rare species (e.g. corn crake (*Crex crex*) in the Wienerwald region), this, too, is a case of game influence intolerable in terms of regional culture.

Basically, strongly increasing damage to farmland caused by wild boar, which is intolerable in terms of regional culture, is to be regarded as a direct consequence of the strong recent increase in wild boar populations. It is first and foremost hunters who are responsible for regulating wild boar populations, yet the mode of forest management, too, has an influence upon the distribution and behaviour of wild boar. In either case, however, co-operation between farmers and hunters can considerably support avoiding game damage. After all, modern agriculture has contributed to the population growth of wild boar on account of the abundant availability of food. For the purpose of the present Assessment Set, only the influence of agriculture can be evaluated: the possible contributionst of hunters and forest managers, as well as leisure and recreational management, are considered in separate Sets for those interests.

Although farmers have limited options for avoiding or reducing game damage that is intolerable in terms of regional culture, they are able to make a tangible difference through:

- Communication and harmonising measures with hunters:

  It is crucial for farmers to inform the persons locally responsible for hunting about game damage as it occurs, to request hunting measures to combat such, and to seek consensus regarding the best way of tackling the issue. Only then can effective measures be taken on the hunting side. By concentrating hunting, especially game drives, in areas of ecologically valuable grasslands, the attractiveness to wild boar of

those parts of their territories can be reduced, and increased hunting pressure may drive them away. For the hunters, this means an initially increased hunting effort; but reduced game damage compensation payments should provide a sufficient incentive. In addition, adequately distributed grazing areas in adjoining forest parts of a hunting territory may in some situations distract wild boar. Liaising across the boundaries of hunting territories is of advantage in this context. Measures of this kind may be initiated and called for by agricultural managers. Equally, by consistently demanding compensation payments for game damage to grasslands, farmers can contribute to raising hunters' awareness of the problem.

- Avoiding attraction:

  Field crops attractive to wild boar as a food source (e.g. maize) should not be planted in the immediate surroundings of valuable grasslands. Mast-producing tree species (e.g. oak trees), too, may have a strong attraction and should not be planted in close proximity to ecologically valuable meadows.

- Reduction of the susceptibility to game damage of grasslands by way of refraining from organic fertilising (stable manure, slurry):

  In particular on low-nutrient sites (oligotrophic grassland, dry/xeric and semi-dry grassland), the biological activity of the soil (living biomass in the soil) is stimulated by fertilisation, which makes these areas more attractive for wild boar to dig for food. Apart from this effect, any kind of fertilisation brings about changes in the species composition of the vegetation and should thus be refrained from on grassland sites worth protecting; for valuable grasslands fostered under the Austrian Agri-Environmental Programme (ÖPUL) (most of all through the measure of "cultivating ecologically valuable areas"), a prohibition to use fertilisers and/or limitations on the amount of fertilisers used are foreseen for reasons of ecological value.

- Protection measures:

  To protect meadows and grasslands of particularly great ecological value (e.g. orchid meadows, corn crake nesting areas, etc.) as well as in case of severe and frequent habitat damage caused by wild boar, technical protection measures such as fencing, scent fences and similar installations are an option. However, due to potential barrier effects for wild animals (habitat fragmentation), this measure should, not be applied over large areas and only as a temporary remedy. Fences of this kind ought to be agreed with the relevant nature conservation authority as well as with hunters. If consensus is sought with the persons responsible for local hunting, it is conceivable that hunters take over the costs (or costs are split). In turn, hunters would have to spend less on compensation payments for game damage.

- Communication and harmonising measures with forest management:

  By way of specifically shaping forest habitats (improvement of grazing, rest zones for game, establishment of hunting aisles and hunting areas to facilitate hunting, etc.), but also by calling upon hunting tenants and customers to focus on wild boar, forest managers and owners are able to contribute to reducing game damage on open territories. Communication with farmers and forest managers to this effect, as well as requesting close co-ordination of farming and forestry measures, are important prerequisites in this regard.

The following Indicator assesses the extent to which farmers make use of options to constrain and avoid culturally unacceptable game impacts. Please note the regulatity of exchange of information and the handling of any arising conflicts are assessed under "Socio-cultural Aspects" in the form of separate Indicators (see Indicator 24, Section 3.2.1.1, and Indicator 25, Section 3.2.1.2); the present Indicator refers exclusively to communication and co-ordination of measures with the aim of avoiding game damage.

Indication and score:	2	Any existing options for agriculture to avoid game impacts that are intolerable in terms of regional culture, in particular damage to ecologically valuable grasslands, are made use of.
	1	Some options for agriculture to avoid game impacts that are intolerable in terms of regional culture, in particular damage to ecologically valuable grasslands, are made use of. However, there is room for improvement.
	–2	Agriculture itself contributes to game impacts that are intolerable in terms of regional culture.
	x	Not applicable, no score (the farm has no grasslands that are valuable in terms of ecology or regional culture.)

1.1.3 Criterion: Preservation and creation of linking biotopes

Explanation: By enriching agricultural lands with biotope-linking landscape elements or by preserving such elements, the overall ecological permeability of agricultural lands for wild animals can be improved. Equally, specific measures can be taken to make supra-regional migration routes and wildlife corridors more attractive. Agricultural areas may serve as (partial) habitats for certain wild animal species, but, at the same time, cause fragmentation, for primarily woodland wildlife species. Specific biotope linking measures can both improve the habitat function for wild animal species that mainly inhabit open land and reduce barrier effects for woodland species and/or wide-ranging wildlife. Taking this into account is an aim of integrated farm planning. Subsidies to this effect are available via the Austrian Agri-Environmental Programme (ÖPUL) “farm management plan for nature conservation” or “regional nature conservation plan.” There are, however, also a number of other measures under the Austrian Agri-Environmental Programme that facilitate creation of biotope linkages for wild animals if applied adequately.

1.1.3.1 Indicator 5: Measures to improve and preserve biotope linkage for wild animals

Explanation: The fragmentation of wildlife habitats by roads, railway lines, settlements and industrial zones, as well as tourist establishments, has a central influence on habitat quality for wild animals. Open-land areas with little structure, which are characteristic of modern landscapes shaped for mechanised farming, with large homogeneous fields and large-scale arable areas in particular, may often dissect the habitats of woodland animals as well as cause habitat loss and impair migration and smaller-scale game routes. Moreover, (permanent) game-proof pasture fencing and game fences may impair biotope linkage for wild animals and thus their natural spatial behaviour.

This Indicator refers to the preservation and improvement of general habitat linkage. This applies particularly to local and small-scale game routes frequently and regularly used by wild animals to satisfy their habitat needs and as connections between partial habitats, such as for their daily travel between cover and grazing areas, as excursive routes when searching for food, or for seasonal migration between winter and summer habitats. Landscape structures that link biotopes and allow natural, species-specific spatial behaviour of wild animals are essential habitat components. If wild animals are restricted in using these

structures, this will generate incomplete partial habitats less apt to meet their needs, or severely change their spatial and temporal activity patterns. All structural elements serving as cover, resting and feeding habitats for wild animals are appropriate for biotope linkage in open areas. These are, in particular, hedges, copses (coppices) and riparian woody communities, which offer wild boar and small game cover and protection throughout the year and are also used by several bird species as habitats, breeding and hatching habitats and vantage points. In addition, non-agricultural herbaceous and grassy intermediate structures, such as peripheral zones on the edge of meadows, strips of wild herbs on arable land, field edges, steep banks, (arable) set-aside, shrubby strips along watercourses with peripheral herbaceous vegetation, etc., contribute to biotope linking by offering grazing opportunities along movement routes. Moreover, grassy and herbaceous permanent vegetation can contribute to alleviating food bottlenecks during the winter. With regard to all structural elements, it is important that their position allows them to serve as biotope islands and corridors for wildlife, apart from their use as guiding structures. The smaller the distances between such elements, the more likely they are to be used by wild animals as movement routes. Agriculture can, both by caring for and preserving existing structures and - in case of insufficiency – by establishing linkages (restructuring, re-enrichment with intermediate structures) contribute considerably to biotope connectivity for wild animals. Both preserving and establishing a large number of such landscape elements qualifies for subsidies under the Austrian Agri-Environmental Programme (ÖPUL).

Compared to other agricultural landscapes in Austria, the agriculturally-dominated open areas of the Wienerwald Biosphere Reserve are largely characterised by small-scale field plots and well equipped with linking elements. Particularly in the consolidated arable landscapes of the north-western foothills and the south-eastern basins, however, there are also dominant larger plots of arable land with relatively few linkages (AVL / Becker et al., 2004). The Wienerwald region is, in addition, jeopardised by a process of continuous general homogenisation of intensive arable areas. This is why the preservation and development of existing biotope linkages, and thus the application of this Indicator, also makes sense in areas where biotope linking is presently sufficient.

When biotope-linking structures are re-established (e.g. by planting of woods and hedges on arable land), it is important that such landscape-shaping measures should retain the typical character of the landscape. Newly established landscape elements, for example, must not impair existing sensitive habitat structures. In certain landscape areas, keeping large extensively managed areas open and providing such spaces may be a key habitat quality factor for open-land species ; however, the suitability of habitats for threatened or sensitive species dependent upon large open lands is more limited in most parts of Austria, by the “clearing” of landscapes than linear elements that create landscape compartments. This Indicator does not refer to larger afforested areas or re-afforestation of open lands: in the Wienerwald Biosphere Reserve, a further increase of forest is neither a necessary nor desirable measure for connectivity, and forest areas are increasing anyway.

Conversely, in many areas of the Wienerwald region the high proportion of forest restricts the connectivity of open habitats, so that the linking of open areas can contribute significantly to preserving a regionally typical diversity of sensitive species which inhabit open land. Thus, this Indicator has to be applied differentially, depending on the prevailing landscape character and availability of species in a specific region.

In any case, measures to improve biotope linkage should be carried out on the basis of consultation with nature conservation experts and/or relevant authorities.

Owing to the fact that the effects of habitat dissection mostly transcend the local level as a result of the wide-ranging behaviour of many game species, the application of this Indicator may also make sense beyond the limits of individual farms. In particular, enterprises whose land-holdings are widely scattered can only be assessed in the context of their oveall effect. The promotion of regional nature protection plans within the scope of the Austrian Agri-

Environmental Programme (ÖPUL) offers opportunities for supra-regional harmonisation of biotope linkages.

Indication and score:	3	Numerous agricultural measures are being taken to improve deficient biotope linkages and/or preserve adequate linkages for wild animals.
	1	Individual measures are being taken to improve deficient biotope linkages and/or preserve adequate linkages for wild animals, but there is room for improvement.
	–2	No measures are being taken to improve deficient biotope linkages and/or preserve adequate linkage for wild animals.
	–4	Agriculture is responsible for increasing fragmentation of wildlife habitats.

1.1.3.2 Indicator 6: Giving consideration to important migration routes, wildlife corridors and other essential routes

Explanation: Migration routes[3], wildlife corridors[4] and other essential routes[5] are linear biotope linkage structures that facilitate movement, migration and dispersal particularly for wide-ranging wildlife species. They serve to link biotopes regionally, supra-regionally and even nationally. Migration (including reproductive migration of species like red deer) is defined as the movement of individuals or populations causing a seasonal change of location. Dispersal plays a significant role in the necessary exchange of genes within or between populations of one species, and thus in the preservation of a species, and in the recolonisation of habitats. In the absence of regular genetic exchange, and of recolonisation of habitat fragments, the risk of regional extinction of species and populations increases.

Wild animal species with wide-ranging migration and movement behaviour are, in the Wienerwald, particularly red deer and wild boar, but potentially also large predators such as bear (*Ursus arctos*), lynx (*Lynx lynx*), or wolf (*Canis lupus*). Wildlife corridors well equipped with biotope structures, however, are also preferred by other wild animal species.

Knowing about locations, course and use of important regional, supra-regional or cross-country axes of game movement (including those of large predators such as bear, lynx or wolf) is a prerequisite for being able to establish measures for preserving or reinstalling the links between habitats, as well as including migration routes into agriculturally relevant measures. As “shapers of landscapes,” farmers are encouraged to seek information from hunters, forest managers, regional nature experts, nature conservation authorities or nature protection advisors on the position of corridors, migration routes and other essential routes of wild animals; this information also needs to be provided freely by the groups of persons mentioned. It is only through recognising such movement routes that their ecological

[3] Migration route: Landscape area preferred for movements of individuals or populations resulting in a permanent or seasonal change in location (gene flow corridors, spreading corridors).

[4] Wildlife corridor: A bottleneck in a migration route or the habitat of wild animals caused by an unfavourable environment or barriers. The most salient characteristic of a corridor is its favourable structure for wild animals compared to the remaining environment, allowing for a connection between separated habitat areas.

[5] Essential route: Constriction of a wildlife corridor or wildlife passage by natural or anthropogenic barriers to a minimum width without any possibility of local circumvention; passages that wild animals are forced to take on account of specific territorial situations (forest corridors, steep slopes, canyons, watercourses, etc.); local bottleneck situations.

functioning can be preserved and improved. There is a multitude of options to make important migration routes, corridors and other essential routes more attractive:

- Landscape-shaping measures require as a rule consent by the landowner. Thus, an active role or at least the consent by the owner of agricultural land is crucial for implementation.
- On open terrain, routes of movement, corridors and other essential routes can be made more attractive and usable also during the day by establishing habitats to provide cover, rest and grazing opportunities, which may function both as guiding structures and also as biotope islands for temporary sojourn by wildlife (hedges, riparian woody communities, wind shelter belts, planted field edges, set-aside). If long open stretches are crossed, their attractiveness can be increased by planting woody communities on arable lands (providing temporary cover). When introducing new landscape elements, a near-natural species composition and structure is desirable.
- Existing landscape linkage elements in open terrain should connect with tongues of forest and other important guiding structures in the immediate surroundings, in order to make it easier for wildlife to use and adopt them as routes.
- Conversely, in large closed areas of continuous forest, migration routes can be specifically created and preserved for open-range species.
- Existing natural barriers such as steep slopes should be softened and new artificial barriers such as fences avoided. Barriers necessary for agricultural purposes can be installed in ways that enable wild animals to surmount them easily; at main migration times, fences can be opened. In areas of wildlife corridors, fences not permanently required should be constructed for easy removal.
- The adoption of artificial game-crossings (game bridges, artificial game corridors, “green bridges” across railways, motorways, etc.) along transport routes can be greatly increased by means of biotope-shaping measures. Farmers can help integrate game routes into the landscape by establishing (or permitting the establishment of) guiding structures such as shrubland on arable and grazing areas, which have a channelling function and increase the accessibility of green bridges and similar installations for wild animals. Wildlife underpasses under roads should never be used as parking (e.g. for agricultural machinery) or storage areas. In addition, hunters can be supported in increasing the attractiveness of artificial game corridors by planting strips of grazing on arable land and installing watering places (wallows) and salt licks.

As migration routes and corridors across large areas do not fall within the competency of one single farmer, planning must give consideration to the regional situation and requires intensive communication with all land users concerned. Co-operation with the surrounding agricultural managers should aim at developing regionally adapted concepts and their implementation. Consultation and financial subsidies for measures to actively increase the attractiveness of corridors, migration axes and other essential routes for wildlife can be applied for under the Austrian Agri-Environmental Programme (ÖPUL) “operational management plan for nature conservation;” for cross-operational co-ordination, the “regional nature conservation plan” measure under ÖPUL applies particularly well. Participation in these measures can serve as an indicator that consideration is given to the issues relevant for this Indicator. Measures initiated by farmers to increase the attractiveness of migration routes and corridors should be co-ordinated with nature conservation organisations, hunters and/or the Biosphere Reserve management.

Indication and score:	3	The agricultural manager is aware of existing important wildlife migration axes, corridors and other essential routes; options to make them more attractive are readily adopted.
	1	Information on important wildlife migration axes, corridors and other essential routes are not available despite efforts on the part of the agricultural manager to this effect.
	–3	Important wildlife migration axes, corridors and other essential routes are known to the agricultural manager, but are not given consideration; or no efforts are being made by the agricultural manager to seek relevant information.
	x	Not applicable, no score (there is evidence of no important wildlife migration axes, corridors and other essential routes)

1.1.4 Criterion: Specific preservation and improvement of wildlife habitats

Explanation: The suitability of wildlife habitats for native wild animal species is, mainly for anthropogenic reasons, limited to some extent. Seasonal habitats that a few years ago used to be freely accessible for wildlife are now inaccessible, difficult to access or mere relicts. Many of these limitations of habitat quantity and quality may be reduced, or even removed entirely, through biotope care and management measures.

Biotope improvement measures may often be initiated by the person practicing hunting and are, as a rule, subject to consent by the landowner. However, farmers, too, have a wide range of opportunities to take action. Consultation with nature conservation experts provides a favourable basis for agri-environmental measures to be selected and implemented for wildlife. In doing so, nature conservation interests should harmonise with wider wildlife ecological interests in most situations.

In assessment for this Criterion, it is important for improvement measures not to benefit exclusively those species that are economically important or otherwise attractive to hunters. The measures should also covering habitat requirements of threatened, sensitive or less hunted native game species. Management measures for economically important species must not have a negative impact on threatened species, such as may be caused, e.g., by providing bait or feed sites. Regional lists of current wildlife species, of the potential natural wildlife species inventory, of threatened wildlife species (e.g. on the basis of relevant Red Lists) and of protected species (according to nature protection and conservation laws, the Flora-Fauna-Habitats-Directive, Wild Birds Directive, etc.) may be valuable tools in this regard. Measures to improve and preserve wildlife habitats that benefit native game species as a rule also benefit animal species that are not hunted.

The preservation or improvement of wildlife habitats is assessed according to participation in agri-environmental measures, dealing with seasonal (food) bottlenecks as well as lasting changes in area use.

1.1.4.1 Indicator 7: Participation in agri-environmental measures to improve and preserve habitats

Explanation: Agri-environmental programmes such as ÖPUL (the Austrian Agri-Environmental Programme to promote agricultural production methods compatible with the

requirements of protection of the environment, de-intensification and preservation of natural habitats), as well as subsidising programmes by hunting associations and some nature protection and conservation associations, create a multitude of opportunities for comprehensive biotope improvement, in particular for threatened and sensitive species.

Even if inspections focussed on ecology and nature protection (within the scope of ÖPUL) are, in practice, strongly oriented toward vegetation ecology, it can be assumed that they are also effective for wild animals. Presently, it is mainly the following ÖPUL measures that offer opportunities of shaping habitats in a wildlife-ecologically favourable manner: cultivation of valuable areas (late mowing dates, conditions regarding fertilising, number of harvests and requirements regarding the harvest date), preservation of landscape elements, potential refraining from cultivation, regional water protection measures such as grassland buffer strips, field flower strips under the measure of "ecological management of arable and grassland areas" and, as an overriding co-ordination measure, the "operational management plan for nature conservation."

Farms that for some reason do not yet participate in agri-environmental programmes, but which nevertheless implement measures improving and preserving habitats and which meet the standards of the subsidising regulations of agri-environmental programmes, will be able to assess the implementation of such measures on the basis of the present Indicator.

Indication and score:	4	The agricultural enterprise participates with regard to all suitable areas in agri-environmental measures contributing to the preservation and improvement of wildlife habitats (within the scope of subsidies if available).
	2	The agricultural enterprise participates with regard to some suitable areas in agri-environmental measures contributing to the preservation and improvement of wildlife habitats (within the scope of subsidies if available).
	–2	The agricultural enterprise does not participate in agri-environmental measures contributing to the preservation and improvement of wildlife habitats.
	x	Not applicable, no score (the agricultural operation is not entitled to participation in agri-environmental programmes or has no suitable areas to do so).

1.1.4.2 Indicator 8: Diverse habitat components on agricultural lands

Explanation: Native wild animals are first and foremost dependent upon landscape components that are often not at the focus of agricultural interests. Small bodies of water, hedges, small forests, single trees, etc., offer a multitude of functions: food, cover, places of rest, nesting, breeding and hatching, protection against the weather, territorial marking, other species-specific behaviour, and many more. The ecologically favourable, characteristics and density of such elements often have historical backgrounds and vary regionally, setting the landscape character and being adapted to the opportunities this landscape provides. Certain forms of use, such as scattered fruit trees or dry stone wall terracing are good illustrations of elements that provide habitats and shape landscapes.

Agricultural measures may also contribute to minimising seasonal bottleneck situations for wild animals regarding the availability of food and cover. Bottleneck situations for wild animals are temporary shortages (in most cases in food supply). They may have anthropogenic reasons (e.g. food shortage on account of harvesting throughout agricultural

areas in autumn, or during times of intense leisure activities), or natural reasons (e.g. low food availability at high altitudes during the winter). Agriculture influences the availability of food and cover seasonally: in summer, the great availability of food and cover induced by agriculture (depending on the crops) creates conditions favourable for strong population growth, which leads to increased game densities in particular in open areas. In autumn, lasting throughout winter into spring, this availability of food and cover is abruptly reduced as fields are harvested. Modern agriculture with its efficient machinery often induces large-scale re-shaping of wild animals' habitats within only a few hours. Cloven-hoofed game is thus pushed back into forests where it causes game damage unless it is reduced in time through hunting. Winter mortality will then gradually increase and the condition of the game will weaken on account of competition. Agricultural opportunities to minimise seasonal bottleneck situations are, for example, creating grazing and cover all through the year by shaping appropriate habitats in open agricultural lands (permanent vegetation: field edge strips, set-aside, winter greening, etc.), preserving and/or establishing landscape elements (e.g. by avoiding herbicides at field edge, etc.), re-converting arable lands into meadows, leaving land fallow and management of fallow lands, re-structuring of large management units on arable land, winter greening, leaving strips of maize for grazing, etc. Long-term crop rotation in arable farming as well as staggered harvesting dates favour slow transitions in habitat quality from season to season.

The quality of areas with regard to this Indicator may be documented by way of statements on the part of nature conservation or, for example, by way of participation in the ÖPUL (Austrian Agri-Environmental Programme) "operational management plan for nature conservation",

Indication and score:	4	On account of diverse near-natural landscape elements and small to intermediate structures typical of the regional landscape, the agricultural land offers high-quality habitats of native wild animals; existing structural elements are preserved, cultivated and developed.
	2	The agricultural land is deficient in near-natural landscape elements and small to intermediate structures in comparison with the regionally typical landscape; measures to improve structural diversity, however, are implemented as far as possible.
	–2	The agricultural land is deficient in near-natural landscape elements and small to intermediate structures in comparison with the regionally typical landscape ; few or no measures to improve structural diversity are implemented.
	–4	Agricultural measures lead to a reduction of near-natural landscape elements and small to intermediate structures.

1.1.4.3 Indicator 9: Change in wildlife habitats on account of changes in land use

Explanation: Running an agricultural enterprise is subject to repeated adaptations in operations and thus also in terms of land use. This does not refer to the annual change in arable crops within the scope of crop rotation but rather to lasting changes in the management mode: If, for example, a meadow is turned into arable land, this will have lasting effects upon wild animals' habitats. On account of the diverse habitat needs of wild animals, consequences may vary: grazers will lose a source of food, hatching and nesting places may be destroyed, while for other species, in particular synanthropic species such as

wild boar, new food sources become available. Other conceivable changes in area use may be: afforestation or establishment of short-rotation crops and/or tall-growing annual crops for energy from biomass production; setting agricultural land aside or abandoning it to succession processes or construction, re-converting arable land into meadows and/or planting of permanent meadows, etc.

Evaluations of such changes in use – whether favourable or unfavourable – ought to made with a view to the native wildlife species that are threatened or sensitive. Common species whose populations are not threatened may be more fit to cope with such habitat changes and frequently even benefit from shifts in our cultural landscape.

Indication and score:	3	If the agricultural operation has induced changes in land use over the last five years, these changes benefited the wildlife habitats (re-conversion of arable lands into meadows, land parcelling with structural enrichment).
	2	The agricultural operation has not induced lasting changes in land use over the last five years (conversion of grassland into arable land, afforestation, planting of short-rotation crops, allocation of building land, construction) with unfavourable effects upon wildlife habitats.
	–2	The agricultural operation has over the last five years induced lasting changes in land use on one or more parcels of land (conversion of grassland into arable land, afforestation, planting of short-rotation crops, allocation of building land, construction) with unfavourable effects upon wildlife habitats.

1.2 Principle: Agricultural activities should endeavour to preserve and enhance the diversity of species

Explanation: By game we understand those wild animal species that, on account of hunting laws, are subject to hunting. Other wild animal species (e.g. small mammals, insects, songbirds, amphibian, reptiles, fish) as well as micro-organisms are not given special consideration in this context, although they may interact with game. Agricultural activities influence the diversity of game species both on account of actively shaping habitats and agricultural management. Agricultural activities should contribute to the preservation and enhancement of the diversity of species in the interest of completeness of a regionally typical wildlife species inventory (see below).

1.2.1 Criterion: Agricultural measures improve and preserve habitats to accommodate the potential natural wildlife species inventory of the region

Explanation: “Potential natural wildlife species inventory” is to be understood as the spectrum of wildlife species representing the currently achievable optimum circumstances in terms of biodiversity and near-natural conditions, taking into account the irreversible changes that have occurred in the course of the development of the cultural landscape as well as the

existing economic and socio-cultural impacts on wildlife habitats that cannot be influenced by hunting. The “potential natural wildlife species inventory” is thus the range of wildlife species possible under the current habitat conditions, which pertain to the native spectrum of species (autochthonous, typical for the region) of the respective geographic region. „Native wildlife species“ are, in the sense of the potential natural wildlife species inventory:

- those species that have outlasted the latest Ice Age or have immigrated thereafter and before and/or without human intervention [6];
- recolonising species that used to be native in a certain area whose populations temporarily ceased to exist and which now are returning to their original ranges, either without human intervention (immigration of species, e.g. elk/moose (*Alces alces*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), otter (*Lutra lutra*)), or through re-introduction into their original habitats (e.g. Alpine ibex (*Capra ibex*) and Alpine marmot (*Marmota marmota*) within their original ranges of distribution);
- native species that have disappeared on account of human influence (eradication, habitat changes).

As far as today’s cultural landscape basically still has habitat potential for the species mentioned, these species are to be considered part of the potential natural wildlife species inventory.

This is not to be confused with “new residents” (alien species, neobiota), which have arrived at a certain territory (in this case, Austria) later than 1492 through direct or indirect human influence. With regard to Austria, these are, among huntable wildlife species, e.g. fallow deer, Sika deer, moufflon, wild rabbit, racoon dog, racoon, nutria and wild turkey. These species are *not* considered part of the potential natural wildlife species inventory. Those animal species that had become established under human influence in pre- and early history up to the end of the Middle Ages (1492) (such as, probably, the brown rat) are not relevant for hunting in Austria and thus need not to be considered for the purpose of this study.

Any measures undertaken to actively improve habitats should be shaped according to a species list as described above. Sensitive and threatened species should be given particular attention.

1.2.1.1 Indicator 10: Taking into account a current and potential natural wildlife species list

Explanation: If agricultural managers are aware of the existence of a current and a potential natural wildlife species list, this is an indicator of a functioning flow of information between hunters and agriculture. Knowing about wildlife species lists is a sound basis for the habitat needs of the currently present and potential natural wildlife species to be taken into consideration by agricultural managers. In addition, it confirms the interest and, if necessary, the active seeking of information on the part of farmers. Information relevant in this context must on the one hand be provided by the hunters, and, on the other hand, farmers should also actively seek such information.

In order to be able to compare the existing wildlife species inventory with the inventory of potential natural wildlife species, it is necessary to draw up a regional list of the potential natural wildlife inventory. Bearing in mind the anthropogenic influence upon the natural environment (agriculture, forestry, settlements and housing, transport rail/road, leisure and recreation, etc.), the unsuitability of the recently altered cultural landscape for the original native and regionally typical wildlife species can be evaluated and thus a potential natural list

[6] So-called primary native or indigenous species

of wildlife species prepared. Wildlife-ecological spatial planning in terms of regional culture may also provide an important basis for drawing up a list of potential natural wildlife species. Drawing up such a list is only envisaged and only makes sense for larger and fairly homogeneous territories in terms of the type of cultural landscape. Comparing the current with the potential natural wildlife species list allows conclusions as to the completeness or incompleteness of the potential natural species inventory (in accordance with the given economic and socio-cultural environment).

What we should be aiming at is a current and potential natural wildlife species list for the entire Biosphere Reserve. The obligation to update this list lies with the hunting institutions; agricultural managers may provide support. However, farmers are able to influence the process of drawing up such a list by actively inquiring after it and demanding it; if a list exists, farmers can make their input in terms of biotope shaping.

Indication and score:	3	There are current and potential natural wildlife species lists, people have been informed about them and agricultural measures for wildlife are planned from these lists.
	1	There is evidence that no current and potential natural wildlife species lists exist, but farmers can demonstrate that they have asked about and called for such lists.
	–2	Current and potential wildlife species lists exist and people are aware of their existence, but agricultural measures for wildlife are not planned or carried out according to the lists.
	–3	The farmer is unaware of whether a current and a potential wildlife species list exists.

1.2.2 Criterion: Agricultural measures accommodate the habitat needs of wild animals

Explanation: Along with specifically shaping biotopes, agriculture, even within the scope of its regular management measures, has an influence upon wild animals and conflicts with their habitat needs. The following Indicators assess the extent to which these needs are being considered both in terms of space and time.

1.2.2.1 Indicator 11: Giving consideration to the habitat needs of threatened, sensitive and recolonising wildlife species

Explanation: Preserving structural elements such as field edges and hedges, copses, etc. creates biotope elements that provide both food and cover as well as breeding, hatching and resting opportunities to wild animals. The need for detailed consideration is greatest for the threatened, sensitive or recolonising species of the relevant area.

Management, can take the needs of wild animal species into account, e.g. by mowing at a height clear of eggs and nests and by allowing for opportunities of escape through planning crop management routes (e.g. mowing from the centre to the periphery).

The consideration given to habitat needs of threatened, sensitive and recolonising species may be documented, for example, on the basis of confirmation by the hunter responsible for the area concerned, or by regular consultation between hunters and farmers to this effect.

Indication and score:	4	There is proof that threatened, sensitive and/or recolonising wild animal species are favoured by agricultural measures (e.g. development and preservation of habitat elements through agri-environmental measures).
	–1	Threatened, sensitive and/or recolonising wild animal species are given no consideration in agricultural activities.
	–4	Agricultural activities cause loss or impairment of habitats of threatened, sensitive and/or recolonising wild animal species.

1.2.2.2 Indicator 12: Giving consideration to the reproductive biology and life-cycle of threatened and sensitive wild animal species

Explanation: The reproduction of wild animal populations usually follows a distinct annual rhythm. Disturbances in sensitive stages may have lasting effects upon the reproduction of a species. Disturbances in mating of capercaillie (*Tetrao urogallus*) and protected, threatened or sensitive bird species may, for example, put breeding at risk that year. Haymaking in early summer may cause considerable losses of young deer, and brown hares are threatened by large-scale synchronised harvesting in autumn. Management can often give consideration to such sensitive stages or sites and shift the respective works to a more favourable date and/or exempt important areas of reproduction of rare and sensitive species from management altogether.

Whether the reproductive biology and rhythm of life of threatened and sensitive wild animal species are taken into account can be confirmed by the hunter responsible for the relevant land, or documented in regular consultation between hunters and farmers.

Indication and score:	4	Areas and times critical for threatened, sensitive wild animals are given consideration in the planning of relevant agricultural activities.
	1	Areas and times critical for threatened, sensitive wild animals are given *some* consideration in the planning of relevant agricultural activities.
	–4	Areas and times critical for threatened, sensitive wild animals are *not* given consideration in the planning of agricultural activities.

2 ECONOMY

Explanation: Agriculture influences the economic sustainability of hunting and/or the management of a hunting ground, on the one hand, because it is often administered by the landowner (and thus the person entitled to hunt), and also any hunting co-operative or society permitted by the agricultural operation must apply hunting laws. On the other hand, land management of free areas has an impact on the scope for hunting, and reduces or increases the susceptibility of areas to game damage through the choice of crops. A positive and working interaction between hunting and agricultural management produces "socially sustainable" co-operation between the two managing parties which as far as possible, are aware of and respond to each other's needs.

2.1 Principle: Securing and/or improving the profitability of hunting is an objective of farm management

Explanation: The Criteria under this Principle assess contributions agricultural managers can make to the profitability and market value of hunting in their capacity as landowners entitled to hunt.

2.1.1 Criterion: Contributing to the profitability of hunting in the medium term

2.1.1.1 Indicator 13: Supporting the marketing of regional game products

Explanation: Despite the high quality of the meat, the average profits from selling game are generally low. Experience has shown that good marketing and special customer service can raise profits from game considerably above the average regional prices. Some farmers have established a marketing system which aims at achieving additional value for their products on account of emphasising their regional origin. Similarly, game might achieve higher prices when marketed as a regional specialty. Farmers may support such regional marketing, for example by offering game products in farm produce shops, on markets, or via marketing communities and advertise them on the basis of a trade mark of origin. Creating a regional game label for the Wienerwald Biosphere Reserve would, in addition, strengthen the consumers' identification with the products and their origin, and promote sustainable regional development, which in turn promotes marketing of regional agricultural products.

This Indicator apples in particular to farmers who sell at least part of their own produce via direct marketing. If a farmer is not concerned with marketing his or her own products at all, active support for the selling of products derived from hunting can hardly be expected.

Indication and score:	2	A recognised quality brand (label) for regional game products exists and farmers support their sale, or farmers support the creation of a respective quality brand.
	1	Farmers support the marketing of regional game products by other means
	–2	The marketing of regional game products is not supported although there would be options to do so.
	x	Not applicable, no score (there are no options to support a regional brand or options for marketing game.)

2.1.2 Criterion: The value of hunting is preserved and/or improved by farm management

Explanation: Agricultural managers are able to exert considerable influence upon the value of a hunting operation through their activities. Agricultural measures that have a positive effect upon the market value of a hunting territory are positively assessed under this Indicator. In this context, any measures contributing to the preservation and improvement of wildlife habitats, the diversity of wildlife species, wildlife density without damage to the natural environment and thus the bag achieved by hunting are suited to meet the conditions under the present Indicator. Equally, measures contributing to avoiding game damage (and thus to reducing compensation payments for game damage), improving scope for hunting game and the installations necessary for hunting have a fundamentally positive effect upon the market value of hunting.

2.1.2.1 Indicator 14: Agricultural measures to improve the market value of hunting

Explanation: Apart from the influence of the average regional market value (site-related factors such as proximity to a city or attractive landscape), the assumed or actually achievable market value of a hunting operation results mainly from the diversity of wild animal species, the bags achieved, the (average) quality of trophies and the scope for hunting (how accessible, developed and well-equipped is the hunting ground?). All these factors can be both positively and negatively influenced by agriculture.

All agricultural measures that reduce the susceptibility to game damage, the extent of game damage and thus compensation payments for game damage, or improve the diversity and quality of habitats, or increase the potential diversity of wild animal species and increase the attractiveness of the landscape (recreational effect of hunting), may have a positive influence on the hunting value of an area and thus contribute to the economic sustainability of hunting. For examples of agricultural measures corresponding to these goals, readers are referred to the Explanations under the Indicators 5 to 12 (Section 1.1.3.1 to Section 1.2.2.2).

Indication and score:	1	Agricultural measures contribute significantly to a high market value of hunting.
	0	Agricultural measures do not make a noteworthy contribution to the market value of hunting.
	–1	Agricultural measures reduce the market value of hunting.

2.1.2.2 Indicator 15: Support of hunting ground installations

Explanation: The equipment of a hunting territory with installations such as grazing areas for game (strips of grazing land on agricultural lands, grazing meadows), feeding places, salt licks, high seats, trails, paths and scrambles) are to some extent necessary for running a hunting operation and play a role in defining the attractiveness and thus the market value of a hunting ground. However, the establishment and maintenance of hunting ground installations requires the consent of the landowner. By allowing such infrastructure, the landowner contributes to augmenting the market value of a hunting operation. By providing building materials and/or workforce (e.g. for the construction of high seats), etc., the owner is able to provide active support and thus foster the market value of hunting.

Indication and score:	1	The establishment and maintenance of hunting ground installations necessary to keep up an effective hunting operation is allowed and actively supported by the owner.
	–1	The establishment and maintenance of hunting ground installations necessary to keep up an effective hunting operation is allowed but not actively supported.
	–2	The establishment and maintenance of hunting ground installations necessary for an effective hunting operation is prevented.

2.2 Principle: Accommodating efficient game hunting is an objective of farm management

Explanation: The existence of practical hunting opportunities has a significant influence on the value of a hunting operation, i.e. the market value of a hunting territory and the achievable returns from leases. Only with adequate scope for hunting will wildlife be regulated efficiently and thus game damage be prevented.

2.2.1 Criterion: Creating scope for hunting on agricultural land

2.2.1.1 Indicator 16: Establishing sufficient hunting areas

Explanation: If persons permitted to hunt wish to establish hunting aisles, e.g. on field edges, and hunting areas on arable lands, they need, as a rule, the landowner's consent. As the establishment and maintenance of these areas in some cases require interventions with the permanent vegetation and sometimes cause yield losses on managed lands, it makes sense to gear such measures to agricultural planning. Adequate hunting opportunities both contribute to regulating game populations and, at the same time, are able to decrease hunting pressure; both factors have a positive effect upon lessening game damage.

The Indicator assesses whether the forest owner/manager allows for as many hunting areas (hunting aisles and areas installed for this purpose) as necessary. For an assessment of whether existing hunting areas are sufficient to regulate game populations in the interest of regional culture, the size, number, spatial distribution and temporal use of these areas needs to be taken into account.

The need for hunting areas should be raised by the hunters, giving farmers an opportunity to respond and improve the hunting opportunities. In return, this allows for a better protection of agriculturally managed lands by hunting-related measures (e.g. intensive hunting).

Indication and score:	2	Sufficient hunting opportunities are specifically established or preserved (hunting aisles at the forest-field border, hunting areas on arable lands) in order to support efficient hunting in the interest of meeting hunting targets.
	–2	The hunting opportunities (hunting aisles at the forest-field border, hunting areas on arable lands) are not sufficient for supporting efficient hunting in the interest of meeting hunting targets, despite the fact that hunting methods have been adjusted to the circumstances.
	x	Not applicable, no score (hunters have not expressed any such needs.)

2.2.1.2 Indicator 17: Harmonising agricultural measures with hunting

Explanation: Agriculture has a defining impact on wildlife habitats, their suitability for native wild animals and their use for the purpose of hunting. This Indicator does not assess these impacts but whether communication about them has been established between farmers and hunters, and to what extent agriculture actually harmonises its measures with hunting interest groups.

Agreement may, for example, be sought on: habitat-shaping measures, prevention of game damage, avoiding game losses (game protection), time and place of agricultural measures (sowing, reaping, mowing) as well as adequate options for intensive hunting.

The aim is to establish well-attuned, lively communication channels that promote direct agreement without great expense in time or effort. This can only be achieved on the basis of a readiness for co-operation both on the part of hunting and agriculture. This will render the common system of agriculture and hunting more effective.

Indication and score:	3	Communication channels between farmers and hunters have been established and are used on a regular basis for agreement on pro-active measures or, if necessary, their short-term harmonisation with hunting.
	1	Communication channels between farmers and hunters have been established but are used only occasionally for agreement on pro-active measures or, if necessary, their short-term harmonisation with hunting.
	–1	Communication channels between farmers and hunters have been established but are not used for agreement on pro-active measures or, if necessary, their short-term harmonisation with hunting.
	–3	Farmers are unaware of the contact persons on the hunting side and (or) no communication channels have been established (despite this fact); there is no regular contact to harmonise agricultural measures with hunting.

2.3 Principle: Contributing to avoiding game damage is an objective of farm management

2.3.1 Criterion: Farm management takes into account the susceptibility of agricultural crops to game damage

2.3.1.1 Indicator 18: Giving consideration to the susceptibility of agricultural crops to game damage

Explanation: Through the choice of site, cultivation mode, selection of crops and crop management, farmers can influence the susceptibility of their cultivated areas to game damage. Susceptibility to game damage may be reduced by spacing measures, avoiding susceptible crops in close proximity with places serving as cover for game, and offering grazing areas as well as potentially allowing intensive hunting .

A confirmation by the hunters to this effect will serve as proof.

Indication and score:	4	There is evidence that agricultural management and crop planning and its practical implementation pays regard to the susceptibility of agricultural crops to game damage in an optimum manner.
	2	There is evidence that agricultural management and crop planning and its practical implementation pays regard to the susceptibility of agricultural crops to game damage.
	0	Agricultural management and crop planning only occasionally pays regard to the susceptibility of agricultural crops to game damage or is only occasionally implemented in this way.
	–2	Agricultural management and crop planning does not pay any regard to the susceptibility of agricultural crops to game damage.

2.4 Principle: Farm management aims to benefit from synergies with hunting

2.4.1 Criterion: Agriculture forms an economic unit with hunting

Explanation: Agriculture, together with hunting and other anthropogenic forms of use (forest management, tourism, housing and industrial areas, transport infrastructure, etc.) puts its stamp on wildlife habitats. The goal of any form of anthropogenic use is to actually benefit from it. It thus makes sense for agriculture to form an economic unit with hunting and other human activities in wildlife habitats.

By leaving fallow growth over a prolonged period of time, for example, game will cope with the winter more easily. Losses of young animals, nests and eggs can be avoided by optimising and adapting mowing times. Hunters, too, are able to minimise damage to agricultural crops by carefully choosing their hunting strategies. Co-operation may entail advantages for both interests.

2.4.1.1 Indicator 19: Confirming a common policy

Explanation: A fundamental requirement for forming an economic unit with hunting is regular contact and coordination with hunters or those who represent their interests. The forming of a unit of common economic action will be confirmed by the hunters or those who represent their interests on the hunting territory.

Indication and score:	2	Those using the wildlife habitat for hunting confirm an optimum common economic policy.
	1	Those using the wildlife habitat for hunting confirm an optimum common economic policy but with room for improvement.
	0	There is no confirmation by those using the wildlife habitat for hunting of a common economic way of acting.
	–1	Those using the wildlife habitat for hunring indicate that farm management acts in a counterproductive manner.

2.4.2 Criterion: Optimising planned changes in wildlife habitats

Explanation: Many changes in our wildlife habitats that have an impact on large areas are neither of hunting nor agricultural origin (road and railway construction, housing and settlements, tourism, power plants, etc.). With regard to many of these changes affecting larger areas, negative impacts on wildlife habitats may be minimised, if not avoided altogether, if wildlife-ecological aspects are given timely consideration when it comes to planning. Interdisciplinary spatial planning, in which agriculture is an equal planning partner with hunting and other wildlife management, is a way to optimise planned changes in the wildlife habitat.

2.4.2.1 Indicator 20: Commitment of agricultural managers to interdisciplinary wildlife-ecological special planning (WESP)

Explanation: Wildlife-ecological spatial planning is an instrument of integrated management of wildlife populations and habitats to re-establish a balance between the habitat needs of wild animals, the carrying capacity of ecosystems for wildlife populations, and the various different user interests on the part of society (hunting, agriculture and forestry, tourism, general spatial planning). Along with the preservation of habitats of native wildlife species and guaranteeing their sustainable use, avoidance of user conflicts and unacceptable game-induced forest damage remain ulterior goals. WESP may be carried out on the basis of legal provisions, on a voluntary basis on the regional level, as well as on the basis of individual initiative on the part of the hunters. Integrating WESP into general spatial planning ought to be an objective.

In most cases, however, WESP has to be assisted as well as required by the parties involved. The effectiveness of WESP depends on whether the stakeholders concerned accept it and actively support its implementation. Along with hunting, this is particularly true for persons involved in agriculture and farm management. Aspirations to this effect on the part of owners of a hunt and hunters in general should be documented.

Indication and score:	4	Wildlife-ecological spatial planning (WESP) exists, and farm managers actively support its implementation.
	2	WESP does not exist, but farm managers support its establishment.
	–1	WESP does not exist, nor is there any evidence that farm managers support its establishment.
	–3	Wildlife-ecological spatial planning (WESP) exists, but farm managers do not actively participate in its implementation.

2.4.2.2 Indicator 21: Commitments of agricultural managers in planning and projects with impacts on wildlife habitats

Explanation: On account of their expert knowledge of their managed lands, farmers should be called upon to contribute their knowledge and expertise to planning and projects that have a potential to impair wildlife habitats. This contribution can be important in terms of reducing negative impacts on wildlife and on the economic and aesthetic value of hunting.

In the course of project planning, agricultural managers are as a rule made a party to the procedures. This allows them to act not only in the interest of agricultural production and preserving their property but also to have a say when it comes to shaping wildlife habitats and hunting options in a sustainable manner. Ideally, local hunters' expertise and knowledge of the area is also actively involved.

Road construction projects serve as an example in this context: Along with their barrier effects on wildlife ecology, they may also result in a dissection of hunting grounds, economic devaluation of separated parts of hunting territories, and a reduction of the recreational value of hunting. When it comes to building new roads, farmers are affected, have as a rule party status and can be an important source of information for assessing the impact of projects upon hunting and wildlife ecology. Citizen participation, as part of environmental impact assessments, provides further formalised opportunities to comment on projects and influence them to some extent. Legally established ecological compensation and mitigation measures to reduce negative impacts of projects provide another basis for considering wildlife-ecological as well as agricultural and hunting-related aspects (artificial game routes, ecological population improvement, planting of vegetation structures, creation of substitute biotopes, etc.). Consolidations of properties in the course of agricultural planning, changes in area use, forest-pasture regulation projects, infrastructural buildings, designation of industrial and commercial areas, recreational installations, restoration of natural water courses or nature protection and conservation projects are further examples of habitat-changing measures which give scope for involvement of agricultural managers and persons owning the right to hunt, which makes sense in everyone's interest. In most cases, the agricultural side will have to actively offer and/or request co-operation, even without formal status in participation processes.

Indication and score:	2	There is evidence that agricultural managers become actively involved in agricultural (consolidations, changes in area use, construction of paths and trails, etc.) and non-agricultural (road construction, infrastructural buildings, recreational establishments, etc.) planning and projects in order to prevent a deterioration of conditions for wildlife habitats as well as for the practice of hunting; in doing so, they seek co-operation with the hunters.
	–1	Agricultural managers do not become actively involved in planning and projects relevant to wildlife and hunting in order to prevent a deterioration of conditions for wildlife habitats and hunting.
	x	Not applicable, no score (no habitat-changing planning and projects during the past three years).

3 SOCIO-CULTURAL ASPECTS

Explanation: In agriculture, leasing land is very common. This is why farmers are often perceived exclusively in terms of their function as managers/cultivators of an area without the ability to grant hunting rights. However, farmers who own land and thus are entitled to hunt, are able to influence the way hunting is practiced on their territory, even if only through their vote in the hunting cooperative. In this case, farmers are *also* to be recognised in terms of their role as landowners.

The socio-cultural aspects we are looking at refer first and foremost to the relationship between agricultural managers/landowners and persons permitted to hunt as well as to the relationship with persons directly or indirectly related to hunting, wild animals and wildlife habitats (e.g. forest managers, persons seeking recreation).

Particularly with regard to socio-cultural aspects, it is difficult to definine clearly measurable indicators for assessing the sustainability of hunting. The quality of communication, for example, does not lend itself easily to an assessment within the narrow confines of clear-cut and verifiable indicators. The indicators thus comprise only those socio-cultural aspects that can typically be recorded in practise.

Under the socio-cultural section, four aspects are dealt with that foster positive interaction. This is not to say that there should not be any conflicts, as creative tensions can enrich the way people interact. Much rather, we will be talking about how conflicts can and should be tackled. In order to be able to prevent conflicts, a certain extent of knowledge of the other party's points of view is necessary. The status of knowledge of agricultural managers about wildlife ecological and hunting-related effects of their own management measures is given great importance among the socio-cultural indicators.

3.1 Principle: The hunting-related interests of the local population are given consideration by landowners/farmers

3.1.1 Criterion: The owner of agricultural land actively supports a balanced regional approach by adequately involving local hunters

Explanation: As a consequence of the close ties of hunting to land, of hunting traditions and the (necessary) relation of hunting to the local environment and the local community, opportunities for local hunters to hunt in their own region are an important social and cultural aspect of hunting. The landowner, too, can significantly influence the extent to which local hunters are involved – e.g. by his or her decision to whom the hunting right is leased.

3.1.1.1 Indicator 22: Giving consideration to territory for local hunters

Explanation: Owners of agricultural lands (including joint owners in agricultural communities), or other holders of hunting rights, have two options in hunting law for exerting influence through granting the right to practise hunting.

- Owners of plots of agricultural land of a minimum size of 115 ha are entitled to hunt as proprietors. Persons entitled to hunt as owners can, within the framework of hunting laws, freely decide upon the leasing of the hunting territory concerned.
- By exerting their influence in hunting co-operatives or agricultural communities, and in particular by making use of their right to vote and/or exercising a function (member or chairperson of the hunting committee) in hunting co-operatives or agricultural communities, even owners of agricultural lands not practicing hunting themselves have an option of influencing in how far hunting opportunities are made available to local hunters – including hunters who do not own land linked with a right to hunt.[7]

The readiness to enable local hunters to practise hunting indicates a landowner's contribution to the regional integration of hunting and its local acceptance; this is also of importance in the context of the contribution of hunting to the regional rural identity. This is particularly true with regard to the Wienerwald region, where, on account of the high demand for hunting opportunities – also from non-resident hunters – as well as high prices for hunting leases compared to the prices in the rest of Austria, hunting opportunities for local hunters are often limited.

The assessment focuses mainly on the efforts by the owners of agricultural lands to integrate local hunters who are not entitled (through land ownership) to hunt. This can be documented, for example, on the basis of minutes of meetings and voting protocols of hunting co-operatives and/or hunting committees.

A balanced reconciliation of interests between local hunters entitled to hunt and local hunters not entitled to hunt – including hunters by permission of landowner or game tenant – is an important prerequisite for hunting to be socio-culturally sustainable. Such reconciliation of interests is also important for the local acceptance of hunting by the non-hunting population. This Indicator is assessed on the basis of questioning the hunters concerned.

[7] Both in Vienna and in Lower Austria, proprietorial hunts must have a minimum size of 115 ha. According to the hunting laws of the Province of Lower Austria (*Niederösterreichisches Jagdgesetz)*, those plots of land pertaining to a municipal area but not recognised as proprietor's hunt form the hunting territory of the hunting co-operative. On the lands jointly owned by an agricultural community, the respective community is entitled to a proprietorial hunt. The hunting committee and its chairperson are the elected organs of a hunting co-operative; the right to hunt must be leased by the hunting co-operatives to individual persons or hunting societies, who, in turn, may be entitled to sub-lease the territory. The right to practise hunting may also be leased by agricultural communities. Pursuant to the hunting laws of the Province of Vienna (*Wiener Jagdgesetz)*, those plots of land that qualify for hunting but are not recognised as a proprietorial hunt, form the municipal hunting territory; for this territory, the City of Vienna, as the representative of the owners of all lands concerned, administers the hunting laws. Municipal hunting areas and proprietorial hunts of agricultural communities have to be leased or managed by experts.

Indication and score:	2	The owner of agricultural land or other disposer of hunting rights actively supports provision of adequate hunting for local hunters; the interests of the local population in using land for hunting is considered in a satisfactory manner.
	1	The interests of the local population in using land for hunting are only partly considered, even though this is supported by the owner of agricultural land or other disposer of hunting rights.
	–1	The owner of agricultural land or other disposerof hunting rights does not actively support the interests of local hunters.
	–2	The owner of agricultural land or other disposer of hunting rights acts against the interests of local hunters.
	x	Not applicable, no score (the farmer does not hold a right of disposal over land; there is no way of influencing the granting of rights to practise huntin)

3.1.1.2 Indicator 23: Giving adequate consideration to non-resident hunters

Explanation: Offering sufficient hunting opportunities to local hunters is to be considered a prime objective in terms of socio-cultural sustainability. We should also consider that meeting ecological requirements of sustainability needs a sound knowledge of the hunting territory and the local natural environment. Local residents have an advantage there.

Nevertheless, the needs of non-resident hunters (hunting guests, hunters without local hunting opportunities) ought to be considered adequately and in accordance with the local conditions and opportunities (e.g. size of hunting ground and hunting bag plan), in order not to entirely preclude this group of people from practising hunting. Non-resident hunters are expected in this context to be willing to give thorough consideration to local conditions; in countries with hunting ground systems (which tie the right to hunt to landownership), seeking technical advice from local hunting experts is recommended.

With regard to the influence of owners of agricultural land (including joint owners in agricultural communities) or other disposers of hunting rights, there are basically the same considerations as explained under Indicator 22 (Section 3.1.1.1).

Indication and score:	1	The owner of agricultural land or other disposer of rights to hunt actively supports adequate hunting opportunities for non-resident hunters; they are adequately integrated into the general practice of hunting.
	0	Non-resident hunters are not offered adequate hunting opportunities, even though this is actively supported by the owner of agricultural land or other disposer of hunting rights.
	–1	The owner of agricultural land or other disposer of hunting rights does not actively support giving adequate consideration to non-resident hunters, even though there is demand to justify this.
	–2	The owner of agricultural land or other disposer of hunting rights prevents adequate consideration being given to non-resident hunters, or resident hunters are over-represented vis-à-vis non-resident hunters.
	x	Not applicable, no score (the farmer does not hold a right of disposal over land; there is no way of influencing the granting of rights to practise hunting)

3.2 Principle: Agricultural managers/landowners have a regular exchange of information with hunting interests, contribute to avoiding conflicts and help settle conflicts

3.2.1 Criterion: Contacts, exchange of information, and avoidance and settlement of conflicts with local stakeholders

Explanation: From a socio-cultural point of view, it is of prime importance that the justified interests of all sides involved are given consideration. Differing interests, goals and perceptions as well as disagreement between farmers and hunters may cause conflicts. In order to avoid or positively settle conflicts, constructive conflict management strategies should be applied, and an exchange of information between the interest groups hunting locally and the farmers should be fostered at as early a stage as possible. In doing so, a fair reconciliation of diverging interests should always be sought, including, if possible, representatives of other interests.

3.2.1.1 Indicator 24: Exchange of information with interest groups hunting locally

Explanation: For mutual acceptance and harmonising measures between farmers and hunting interests, a regular and continuous exchange of information between both sides is important. This is the only way of integrating agricultural interests properly into the planning of hunting, and vice versa. Another indicator is whether persons representing hunting interests are regularly and actively invited to co-operation and co-ordination, or even merely given information, by the agricultural managers. Organised instruments of opinion exchange and mutual harmonisation include: invitations to communication fora, to locally specific (including non-hunting-related) events and to regular information and discussion meetings as well as institutional gatherings or regular informal get-togethers of the local farmers. This is not to be confused with co-determination in the sense of a formal right to vote. Rather, it is whole-hearted participation in information flows and consultation (see also www.partizipation.at/anwendung.html). Moreover, it is important to include hunting management with other forms of land use in preliminary and other issues of land management planning. This guarantees reconciliation of the needs of landowners and other interests.

Regular exchanges of views may help to avoid many a disagreement, soften altercations before they escalate, or at least settle them soon after they arise. While exchanges of views may take place irregularly and informally, established, organised and regular meetings provide a better framework. They are a sign that farmers, in the sense of a positive culture of debate, openly and actively support a favourable conversation climate.

A regular exchange of information with hunting interests demands openness vis-à-vis hunting activities from the farmers; it also requires that they actively respond to information and communication offered by hunters, but also actively offer information and communication to the hunters. What is more, regular contact is a prerequisite for a mutual basis of conversation (qualitative-emotional component).

Indication and score:	3	Agricultural managers/landowners initiate regular exchange of information with local hunting groups about measures both groups take for wildlife and hunting.
	1	Agricultural managers/landowners participate in regular exchange of information with local hunting groups about measures both groups take for wildlife and hunting.
	–2	There is no regular exchange of information with local hunting groups about measures for wildlife and hunting.

3.2.1.2 Indicator 25: Conflict management strategies

Explanation: This Indicator does not intend to eliminate differences in opinion altogether. Sometimes, differing views, if they are expressed respectfully and on a factual basis, harbour potential for creative, innovative and efficient solutions. An indication of whether a conflict is dealt with in a solution-oriented, factual and respectful manner is whether a de-escalating approach is taken and an "escalation scale" is observed, i.e. by first seeking direct conversation (on the spot, for example, or in an informal setting); as a next stage, an impartial third person is involved to act as a moderator (e.g. in the form of hunting and game damage commissions, arbitration boards, etc.); and only as a last step will the matter be taken to court. Even in the case of conflicts between smaller groups on the one hand (e.g. hunters, forest managers, landowners) and larger groups on the other (e.g. persons seeking recreation such as mountain bikers, horse riders, etc.), this indicator may be applied by getting in touch with relevant stakeholders from the other side and raising the matter with them.

Indication and score:	2	In coping with conflicts related to hunting, agricultural managers/landowners have, over the last three years, *always* sought the means with the least escalation potential (escalation step with the lowest possible escalation intensity, e.g. direct personal conversation ahead of conversation moderated by an impartial third person, ahead of taking the matter to court).
	–1	In coping with conflicts related to hunting, agricultural managers/landowners have, over the last three years, *not always* sought the means with the least escalation potential (escalation step with the lowest possible escalation intensity, e.g. direct personal conversation ahead of conversation moderated by an impartial third person, ahead of taking the matter to court).
	–2	In coping with conflicts related to hunting, agricultural managers/landowners have, over the last three years, *never* sought the means with the least escalation potential (escalation step with the lowest possible escalation intensity, e.g. direct personal conversation ahead of conversation moderated by an impartial third person, ahead of taking the matter to court).
	x	Not applicable, no score (there has been no conflict over the last three years)

3.3 Principle: Agricultural activities give consideration to game welfare

Explanation: Farmers are generally aware of their responsibility vis-à-vis wild animals and nature. Agricultural activities need to be oriented toward the welfare of wildlife.

3.3.1 Criterion: Agricultural activities cause as little pain for wild animals as possible

Explanation: Immediate damage to wild animals on account of agricultural activities occurs when machines are used, in particular when mowing meadows in early summer. Agriculture should aspire to minimise pain for wild animals caused by farm management practices.

3.3.1.1 Indicator 26: Avoiding management-induced losses of wild animals

Explanation: Mostly roe deer, but also brown hare, partridge, pheasant, fox and other wild animal species are at risk from machine-mowing of meadows and harvesting of fields. Young animals in particular seek shelter from predators in high meadows and often respond with freezing instead of fleeing. Losses of wild animals may to a certain extent be avoided by preventive and adaptive management measures.

As a preventive measure, deterrents may be installed on the eve of the mowing day in order to cause does, for example, to leave their young that night in surrounding undisturbed areas (e.g. forest). This measure is recognised as being fairly (cost-)effective if the deterrents are installed for one day only so that animals do not habituate to them. Wildlife detectors attached to tractors, despite their infrared and microwave sensors are not always effective. Infrared wildlife finders used by hunters, however, have been very successful in detecting fawns. This technology requires that meadows are walked with the equipment before mowing. Walking the territories with dogs, as well as following recommendations by hunters to farmers on favourable mowing times, are further preventive measures.

In order to save fawns, but most of all brown hares and ground nesters (which cannot be found with wildlife detectors), a combination of mowing methods in and wildlife detectors is a promising option. In general, fields and meadows are mown from the outside inwards. Consequently, wild animals flee toward the centre, where they are killed. Mowing inside outwards is considered a simple change in the mowing method with great effectiveness in reducing machine-induced killing of animals during mowing. Fleeing animals are forced to escape to secure neighbouring areas, provided young animals are at least two to three weeks old. With regard to the mowing methods, it is also important to keep the additional effort needed for turning the machinery as low as possible, which is why spiral mowing from the inside toward the outside also needs to be adjusted to the local area conditions. Larger, longitudinal meadows, for example, may be longitudinally subdivided in order to be able to mow the resulting partial areas inside outwards. These new mowing methods demand no or hardly any additional effort– merely a readiness for change on the part of the farmers (Böck & Pötsch, o. J.).

Successful measures to avoid management-induced losses and damage to wild animals require in particular that hunters be informed in advance of the planned mowing dates. Farmers and hunters should co-operate in considering and carrying out these protection measures.

Indication and score:	3	No losses of wild animals are caused by agricultural measures.
	1	Losses of wild animals are caused by agriculture, even though measures have been taken to avoid such losses.
	–2	Losses of wild animals are caused by agriculture without measures being taken to them.
	x	Not applicable, no score (no agriculture-induced risk to wild animals).

3.4 Principle: The landowner/manager supports hunting that favours wild animals reproducing naturally in the wild

3.4.1 Criterion: No animals raised in breeding or other enclosures are made available for hunting

Explanation: In some hunting areas, game from (breeding) enclosures or aviaries is released before the hunt in order to achieve higher game bags during the year of the release. This is particularly common for pheasant (*Phasianus colchicus*), mallard (*Anas platyrhynchos*) and wild boar (*Sus scrofa*). Sometimes, the animals are even brought into close proximity of the hunting stands in single cages to be released within hunting range. There may even be "ordering" beforehand of the number to be bagged as well as the weight of the animals to be shot. Pheasants released that way and surviving the hunt have little chance of surviving in the wild later on. Both the selling of game from breeding or captivity for the purpose of hunting sports and the release of such animals for hunting should be rejected from a hunting-ethical perspective. Releases immediately before hunting for the purpose of increasing the game bag are not compatible with socio-cultural sustainability. Meeting this criterion thus requires that hunting be suspended for an adequate period of time after the release, and that it refrain from taking a majority of the released animals soon thereafter.

This criterion does not apply to the re-introduction or re-stocking of wild animals of native species if they are raised and released in accordance with species-specific needs and animal protection standards for the purpose of building up self-reproducing wildlife populations (e.g. ibex (*Capra ibex*), grouse (*Tetrao sp.*).

The hatching of eggs and raising of chicks from nests destroyed or threatened to be destroyed through mowing, followed by the release of these wild animals, also does not fall under this criterion.

3.4.1.1 Indicator 27: Not selling animals from enclosures or aviaries for hunting

Explanation: If owners of agricultural lands keep game in enclosures/aviaries, the animals thus kept are not made available for hunting purposes.

Indication and score:	0	No animals raised in enclosures or aviaries are sold, or otherwise passed on, for the purpose of hunting.
	–4	Animals raised in enclosures or aviaries are sold, or otherwise passed on, for the purpose of hunting.
	x	Not applicable, no score (landowner does not keep animals in enclosures/aviaries)

3.5 Principle: Agricultural managers are aware of the effects of their activity on wild animals, habitats, and hunting

Explanation: Through their activities, farmers not only create production areas but also important resources for further use (e.g. recreational use). Especially in the hunting context, the work of farmers results in habitats for wildlife communities rich in species, as well as hunting areas. Any form of agricultural use puts its stamp on and influences the availability, diversity and quality of wildlife habitats, the diversity of wildlife species as well as the way they can be managed in terms of hunting. This entails major responsibilities for wildlife habitats as well as justified interest in using territory for hunting. An important condition for agricultural measures to be geared to the needs of wildlife and to be co-ordinated with hunting is sufficient and regularly updated knowledge and awareness of the impacts of one's own activities.

3.5.1 Criterion: Agricultural managers consciously deal with the effects of their activities on wildlife, habitats and hunting

Explanation: It is essential that farmers are aware of the effects of their activities upon wild animals and the hunting of these animals, as their actions or omissions have potential impacts upon wildlife-ecological balances and hunting management. Awareness can be raised by relevant information which may be conveyed, for example, by way of regular communication with expert hunters. Educational measures of wildlife ecological and/or hunting relevance, on the basis of which farmers are able to keep their knowledge up to date, are equally important.

3.5.1.1 Indicator 28: Improvement of knowledge about wildlife-ecological and hunting-related effects of agricultural measures

Explanation: Many actions taken or omissions made within the scope of farm management have a potential impact upon the balance of nature and ecosystems; this includes influencing wild animals, their habitats and, as a further consequence, the hunting of these animals. It is thus desirable for persons involved in farm management to deal consciously with the consequences of their actions, whether or not they are aware of these consequences, via interdisciplinary education and regularly update their knowledge in this regard. This can be documented in the form of any activity suited to contribute to high-quality knowledge transfer. Examples of compliance are: attendance at relevant educational and further training events (lectures, expert meetings, discussion events, excursions, etc.), but also relevant literature

and seeking information of direct or indirect wildlife-ecological relevance offered, e.g. by agricultural operations, farm-management related educational and consulting institutions and organisations of nature protection and conservation; joint educational activities with groups of persons involved in hunting are also conceivable in this regard.

In applying this Indicator, it should be borne in mind that educational sources of general ecological and nature and species-protection-related contents may provide valuable help in dealing with ecological aspects concerning wild animals and/or hunting. If such sources are made use of, this may be entered on the positive side of the assessment, provided the source is directly or indirectly related to wildlife ecology and hunting. If there is no evidence of a suitable source of knowledge on wildlife ecology and hunting relevance to farmers, the assessment of the present Indicator does not apply.

Indication and score:		
	2	Over the last three years, several education and further training activities with relevance to wildlife ecology and/or hunting (events, excursions, etc.) were attended.
	1	Over the last three years, one of the above education and further training activities was attended.
	–1	Over the last three years, none of the above education and further training activities was attended.
	x	Not applicable, no score (there is no evidence of sources of education with relevance to wildlife ecology and/or hunting.)