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"Governing Wildlife Commons?" A Comparative Analysis of Switzerland's Three Hunting Systems

Working paper de l'IDHEAP 11/2000
UER: Politiques publiques et environnement

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Comparative analysis of the formation and the outcomes of the institutional resource regimes in Switzerland

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Vergleichende Analyse der Genese und Auswirkungen institutioneller Ressourcenregime in der Schweiz

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Analyse comparée de la genèse et des effets des régimes institutionnels de ressources naturelles en Suisse

Project financed by the Swiss national science foundation

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ANALYSE COMPAREE DE LA FORMATION ET DES EFFETS DES REGIMES INSTITUTIONNELS DE RESSOURCES NATURELLES EN SUISSE

Partant du constat de l'accroissement significatif et généralisé de la consommation des ressources naturelles, le projet a pour ambition d'examiner, dans le cas de la Suisse, quels sont les types de régimes institutionnels -régimes composés de l'ensemble des droits de propriété de disposition et d'usages s'appliquant aux différentes ressources naturelles, de même que des politiques publiques d'exploitation et de protection les régulant- susceptibles de prévenir des processus de surexploitation et de dégradation de ces ressources.
Dans le cadre de ce projet de recherche financé par le Fonds national suisse de la recherche scientifique (FNRS), il s'agit, dans un premier temps, d'analyser les trajectoires historiques d'adaptation et de changements des régimes institutionnels des différentes ressources sur une durée d'environ un siècle (1900-2000). C'est l'objet des différents screenings.
Dans un second temps et à l'aide d'études de cas, ces transformations de (ou au sein des) régimes institutionnels sont analysées sous l'angle de leurs effets sur l'état de la ressource.
L'ambition finale de cette recherche est de comprendre les conditions d'émergence de "régimes intégrés" capables de prendre en compte un nombre croissant de groupes d'usagers agissant à différents niveaux (géographiques et institutionnels) et ayant des usages de plus en plus hétérogènes et concurrents de ces différentes ressources.
Le champ empirique de la recherche porte plus particulièrement sur cinq ressources que sont: l'eau, l'air, le sol, le paysage et la forêt.

VERGLEICHENDE ANALYSE DER GENESE UND AUSWIRKUNGEN INSTITUTIONELLER RESSOURCENREGIME IN DER SCHWEIZ

Ausgehend von der Feststellung, dass die Konsumraten natürlicher Ressourcen weltweit stetig steigen, untersucht das Projekt, ob und welche institutionellen Regime in der Schweiz einer Übernutzung und Degradation von solchen Ressourcen entgegenwirken. Solche Regime bestehen aus der eigentumsrechtlichen Grundordnung (Eigentumstitel, Verfügungs- und Nutzungsrechte) und der Gesamtheit der ressourcenspezifischen öffentlichen Nutzungs- und Schutzpolitiken.
In einem ersten Schritt zeichnen wir nach, wie sich die institutionellen Regime verschiedener Ressourcen über eine Dauer von ungefähr hundert Jahren (1900-2000) angepasst und entwickelt haben. Diese überblicksartigen historischen Analysen bilden den Inhalt der verschiedenen Screenings.
In einem zweiten Schritt werden mittels Fallstudien die Wirkungen von Veränderungen eines institutionellen Regimes auf den Zustand der Ressource evaluiert.
Mit dem Projekt soll das Verständnis dafür erhöht werden, unter welchen Bedingungen „integrierte Regime“ entstehen können: Wie kann es zu institutionellen Regimen kommen, welche die zunehmend heterogenen und konkurrenzierenden Nutzungen einer steigenden Anzahl von Nutzergruppen aus verschiedenen geographischen und institutionellen Ebenen berücksichtigen?
Als empirische Beispiele stehen in diesem vom Schweizerischen Nationalfonds zur Förderung der wissenschaftlichen Forschung (SNF) finanzierten Projekt die fünf natürlichen Ressourcen Wasser, Luft, Boden, Landschaft und Wald im Zentrum.

COMPARATIVE ANALYSIS OF THE FORMATION AND OUTCOMES OF RESOURCE REGIMES IN SWITZERLAND

In the context of a significant and widespread increase in the consumption of natural resources, the aim of this project is to determine, in the case of Switzerland, which type of institutional regime (the property and uses rights pertaining to the different natural resources as well as the public policies regulating their exploitation and protection) would most effectively prevent the overexploitation and degradation of these resources.

In the first stage of this project, financed by the Swiss National Science Foundation, we will analyse how previous institutional regimes evolved over a period of one hundred years (1900-2000). Several screenings will be devoted to this issue.

The next stage of our research will be devoted to the analysis, based on several case studies, of these modifications from the point of view of their impact on the state of a given natural resource.

The final aim of this research project is to understand the conditions necessary for the elaboration of an "integrated regime" which would take into account the growing number of users at various levels (both geographical and institutional), as well as the increasingly varied and competing forms of consumption of these resources.

This study will focus on five main resources: water, air, soil, landscape and forests.

INSTITUT DE HAUTES ETUDES EN ADMINISTRATION PUBLIQUE
Fondation autonome associée à l'Université de Lausanne et à l'Ecole polytechnique fédérale de Lausanne

"Governing Wildlife Commons?" A Comparative Analysis of Switzerland's Three Hunting Systems*

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UER: Politiques publiques et environnement

Working paper de l'IDHEAP no 11/2000
novembre 2000

* Paper Presented at The 8th Biennial Conference of the International Association for the Study of Common Property (IASCP), " Crafting Sustainable Commons in the New Millennium ", Bloomington, Indiana, May 31- June 4, 20

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Abstract

This paper presents a comparative analysis of the three different hunting systems which have historically emerged in Switzerland : (1) a state monopoly system, (2) a license based system and (3) a leasing based system. The research design starts from the conviction that such a territorial proximity of these contrasted systems constitutes a highly relevant opportunity to develop a comparative strategy within a *continuum* going from a pure Leviathan solution to a partly self-organized solution.

The paper aims to address the following questions :

- What are the strengths and the weaknesses of the three different systems with regard to the sustainable management of the natural resource in question ?
- What can we learn from the case of fauna resource management concerning the contemporary challenges which common pool resources (CPR) encounter in western countries ?
- What are both the potentialities and obstacles, on the way to a self-organized management of the resource in such a case ?

The findings of this research are the followings:

- CPR self-governance solution is very unlikely to emerge in the Swiss context, because state intervention is necessary to overcome the challenges of wildlife management which are: the absence of vital appropriators' dependence on the resource; the progressive development of local situations of underutilization; the heterogeneity of users leading to multilevel conflicts; the mobility of the resource units; and finally the interdependence of ecosystems.
- However, the historical overview demonstrated the interesting potentials for co-operative solutions, the renting system, a partly self-organized system, having considerable capacities to adapt to such radical changes in the constitution of the resource

Résumé

Cet article présente une analyse comparée des trois différents systèmes de chasse qui ont émergé historiquement en Suisse: (1) le système de monopole d'Etat (chasse interdite), (2) le système de chasse à permis et (3) le système de chasse à affermage. Le design de recherche est fondé sur la conviction que la proximité territoriale de systèmes de chasse aussi contrastés constitue une opportunité particulièrement intéressante de comparaison de ces différents systèmes situés sur un *continuum* allant du monopole d'Etat à un système partiellement auto-organisé (système d'affermage).

L'article traite plus particulièrement les trois questions suivantes:

- Quelles sont les forces et les faiblesses des trois différents systèmes sous l'angle de la gestion durable de la ressource?
- Que pouvons nous apprendre, à partir du cas de la gestion de la faune, en ce qui concerne les enjeux de la gestion des ressources naturelles possédées en commun (*common pool resources*) au sein des pays occidentaux industrialisés?
- Quelles sont à la fois les potentialités et les obstacles à l'émergence de solutions auto-organisées de la ressource dans un tel contexte?

Les conclusions de la recherche sont les suivantes:

- L'émergence d'une gestion auto-organisée de la faune sauvage est très improbable dans le contexte helvétique dans la mesure où une intervention étatique est indispensable pour répondre aux défis que sont (1) l'absence de dépendance vitale des appropriateurs vis-à-vis de la ressource, (2) l'émergence de situations locales de sous-exploitation de la ressource, (3) le caractère hétérogène des différents groupes d'usagers de la ressource menant à des conflits multi-niveaux, (4) la mobilité de la ressource et, finalement, (5) le caractère interdépendant des écosystèmes implique une gestion coordonnée de la ressource en même temps que de son espace vital élargi.
- Toutefois, l'analyse historique a montré l'intérêt, dans l'optique d'une gestion durable de la ressource, des solutions de cogestion telles que celle de la chasse affermée, système ayant de meilleures capacités d'adaptation aux changements radicaux qu'a connu l'état de la ressource.

TABLE DES MATIERES

O° Introduction

Since the 15th or 16th century, in Switzerland, wildlife has been a common-pool resource under state-property regime. It constitutes what we can call a *régale d'Etat*[1]. The organization of hunting became a legal competence of the states (cantons) which at that time constituted the Swiss Confederation. Throughout this period until the XIXth century, the states regulated and organized the practice in a very varied and uncoordinated way. During the second part of the XIXth century, the dramatic decrease in wildlife population, a direct consequence of this uncoordinated regulation of hunting practices, led to a strong intervention by the new Federal (central) state.

According to the Federal Constitution of 1874, the Federal state is entitled to legislate on the regulation of hunting, on the protection of a number of endangered species, as well as of big game in the alpine regions. However, the property rights on the game (the hunting *régale*) remain the privilege of the states and *not* of the Federation. This monopoly is of fiscal nature[2]. Thus, only the cantons (the states) are entitled to receive fees resulting from the sale of hunting rights (Petitpierre-Sauvain 1999; Zimmerli 1951)[3]. As we can see, unlike a number of other European states such as France, Germany, Austria, Belgium or the Netherlands, there is, in Switzerland, *no relation between landed property and hunting rights.* Game or wildlife is, like in the US (Buck 1998), not the property of the landowner.

In this resource regime, institutionalized through the coming into force of the federal law of 1925 (revised in 1986), the Federation is responsible for determining *what* can be hunted (definition of the protected species), *when*, *where* and *how* (that is, with which means, types of weapons and munitions). The central state also fixes the relevant sanctions. The states are responsible for defining *who* is entitled to hunt as well as for *choosing the hunting system* (licence or renting) and organizing and monitoring the practice in the state. The states are also free to organize monitoring through game-keepers.

This division of responsibilities between the states and the federation has led historically to the progressive development of various hunting systems in the country:

1° a licence-based system (*chasse à permis*) is present in sixteen cantons of central and western Switzerland : the state administration monitors the resource as well as the progress of hunting and fixes animal quotas for hunters who can hunt on the entire territory of the state;

2° a renting-based system (*chasse affermée*) is present in nine cantons of the northeastern part of the country : for a period of six or eight years, the state leases the different hunting territories to local associations of hunters and delegates to them the responsibility for monitoring and managing the fauna on *their* territory. The cantonal administrations, however, fix the quotas of the animals to be shot at the state level. As we will see, this system resembles to a certain extent a self-organized regime.

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1 The formal (legal) situation concerning property rights is however somewhat more complex. Wildlife and game do not belong to anybody (res nullius), but the state, here the cantons (the states), have a " regalian " right over the resource's appropriation (the hunting régale) and are, consequently, exclusively entitled to receive fees resulting from the exercise of this right. But, once shot/dead, game animals belong to the hunter who killed them.

2 Most of the hunting administrations are integrated in the states public finance departments.

3 In 1917, an attempt to institute federal property rights (a federal hunting régale) in order to finance social security encountered massive opposition and was abandoned.

3° a state monopoly system (*chasse interdite*) in one canton (Geneva) : since 1974, hunting is completely forbidden and state gamekeepers are responsible for the management of wildlife and its living territory.

In view of the coexistence of such contrasted resource management systems within the same country, the paper aims to address the following three questions :
- what are the strengths and the weaknesses of the three different systems with regard to the sustainable management of the resource ?
- what can we learn from the case of wildlife resource management with regard to the contemporary challenges which common-pool resources encounter in the western developed countries ?
- what are both the potentialities and obstacles in the perspective of a self-organized management of such a resource ?

Finally, the two central objectives of the paper consist on the one hand, in pointing out the characteristics of the resource, as well as the requirements of its management, that, in the Swiss context, render the development of a collective action towards self-organizing wildlife management - i.e. without state intervention - very unlikely. On the other hand, by focusing on the lessons learned from the *renting system*, the paper also examines the conditions and the potentialities of cooperation between state administration and local self-organized arrangements.

The paper is divided into five parts:

In the first part, I briefly describe the three systems, focusing on their main features and respective peculiarities in connection with the organization of hunting and the management of the wildlife resource.

In the second part, the three systems are classified regarding to the four (classic) types of property regime that are: private property, state property, common property and open access (*res nullius*) (Bromley 1992). This classification enables the different hunting systems to be located on a *continuum* between state property regime and common property regime. A comparison of the characteristics of the internal organization of the different systems will lead to a discussion of the strengths and the weaknesses of each system.

In a third part, a brief analysis of the available national statistics regarding the evolution of wildlife populations and hunting practices during the last 30 years (1968-1998) highlights the contrasted impacts, outcomes and "performances" of the three different systems.

In the last part of the paper, various attempts to interpret, explain and assess these contrasted impacts and outcomes are developed.

The systematic confrontation of the three hunting systems with the eight design principles of long enduring self-organized CPR regimes developed by Elinor Ostrom will allow pointing out some of the obstacles to the development of pure self-organized solutions, as well as, *by extension*, suggesting some explanations to the contrasted outcomes highlighted through the hunting statistics. Three explaining hypothesis are developed focusing on: (1) the *physical* characteristics of the resource, (2) the role of ideas, knowledge and the scientification of wildlife management, (3) the increasing importance of interpolicy coordination within the resource regime as a result of the increasing heterogeneity of the resource uses.

In the conclusion, I try to draw some lessons from the case of wildlife concerning the question "how much autonomy should a common-pool regime have?"

1° Switzerland's three hunting systems[4]

A. THE LICENCE SYSTEM

The basic principle of this system consists in the possibility for all the inhabitants of a state[5], who have passed an appropriate exam, to hunt a certain quota of game animals fixed by an administrative and political decision on most of the state territory, with the exception of the federal hunting reserve (called *districts francs*), during accurately delimited periods of the year.

The state territory is generally divided, depending on the size of the canton, in 10 to 15 districts, each monitored by an official game-keeper. His job consists in monitoring the hunters operating in the district placed under his jurisdiction, as well as the state of wildlife. One of the most important aspects of his mission consists in fact in producing trustworthy data and empirical knowledge concerning the fluctuations of the wildlife population living in his district. Game keepers are the most significant contributors to the state wildlife statistics[6]: verifications and systematic observation are regularly made in the field, and specific records are kept for the most mobile species.

Using this information, the state consultative hunting commission[7] meets once a year, before the beginning of the hunting season in order to fix: the price of the licence[8], the length of the various hunting periods according to the species[9], the quotas of the different species available for each hunter[10], as well as some special conditions concerning more noble and rare species[11].

The annual game quota is proposed by this commission and adopted or modified (very rarely) by the responsible minister in the state executive. The quotas are fixed on the basis of quantitative as well as qualitative information collected and analyzed by the state hunting administration, with the help, in certain cantons, of a wildlife biologist. In the practice however, changes in the quotas allocation per hunters has been proved to be very difficult to realize, hunters being very conservative and attached to their habits and privileges.

In fact, the most remarkable development in some advanced states during the last 5 years specifically concerns the development, in collaboration with wildlife biologists, of various innovative techniques in *recording*, *monitoring* and *planning* of wildlife populations. Here are some interesting examples:

- In order to tackle the structural problem of the *mobility* of the resource affecting wildlife management, a group of neighboring cantons from the central and western part of the country are developing a new concept of "interstate management program" for the most

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4 The elements prensented here are the result of a collective empirical inquiry carried out in 1998 in the framework of the teachings of Prof. Peter Knoepfel (IDHEAP) on environmental policy (Nahrath, Rosenkranz, Tille, 1998).

5 It is alo possible to buy a licence and hunt in a state other than the one of domicile.

6 But hunters do also contribute to this statistic to the extent that they have the obligation to inform the hunting administration within an interval of 72 hours every time they shoot an animal.

7 This commission is usually composed of representatives from (1) the state administration (hunting, forest, police), (2) the cantonal hunting associations, (3) other actors concerned (nature protection associations, representatives from agriculture, biologists, the communes).

8 This price is relatively stable, between CHF 800.- and 1'000.- (about USD 500.- to 600.-)

9 Usually between one or two months a year in autumn, sometimes winter.

10 The definition of these quotas can be very precise indicating the sex and approximate age of the animal to be shot.

11 For example, the right to shoot an ibex (reintroduced at the beginning of the XXth century in the Swiss alps) is attributed following the toss principle.

mobile species (for example, red-deer and roe). Such a program requires set of data that is as reliable as possible, as well as substantial monitoring means. In this respect, some problems have recently emerged within the collaboration with the canton of Lucerne, participating in the program and practicing the renting system without any game-keeper[12].

- Following the objectives of the latest federal hunting law of 1986, and in order to be able to manage wildlife not only with the aim of protecting the minimal game stock for the hunters, but also in an attempt to achieve sustainable protection of biodiversity, the canton of Bern (probably the most innovative of the country[13]) has developed very sophisticated planning methods. Of more particular interest, is the attempt to manage the resource not only in a quantitative perspective, but also in a qualitative one. Planning efforts focus on the capacity to intervene on the *spatial distribution* of wildlife. Models of mobility are designed in order to make predictions on the spatial and morphological evolution of the live-stock.
In order to better tackle this problem of the spatial distribution of wildlife, the same administration developed a cartographic concept allowing all the sources of wildlife disturbance on the state territory to be spatially indexed. The first group of disturbances that have been analyzed are the ones caused by tourist activities in the alpine regions. By developing this concept, the desired aim in the future, is to be able to better organize the cohabitation of wildlife and human activities within the living territory of the former.

- Last but not least, the artificial reintroduction of lynx during the 1970's as well as the natural return of wolves[14] has led to the development of a national program (called KORA) supported by the ministry of environment in order to manage the presence of these two predators. Despite the emergence of very strong opposition from hunters as well as from sheep-farmers (lynx and wolves have been killed despite the fact that they are strongly protected by the federal law), this program is particularly interesting because it is based on the idea of a possible reemergence of a process of "natural" wildlife regulation by predators. In fact, the analysis of the effects of the lynx's reintroduction in the western and, progressively, central part of the country has shown that it has a very positive impact on the spatial distribution of the live-stock (i.e. on biodiversity) and contributes thus to facilitating a sustainable management of the forest.

Once their quota is attributed, hunters are allowed, in the licence system, to hunt all over the state territory. They can organize themselves in small groups that should not exceed four persons and are authorized (in some states) to exchange their quotas within the group.

12 Data furnished by the states with renting systems are very probably less reliable: unexplained variations between the annual records are much more frequent in this system than in the licence one.

13 Bern is also one of the biggest cantons (territorially) and possesses the second biggest wildlife stock in Switzerland: about 20%.

14 It seems that, contrary to the assertions of the hunters who claim that wolves are purposely imported by some groups of ecologists, wolves are naturally migrating through the Alps from South to North and are coming into Switzerland from Italy and France. Unfortunately for them (the wolves), they are arriving in a region, the canton of Wallis, where hunting is a very popular and lively activity and where hunters and livestock farmers (farmers are all hunters) constitute a social and to a certain extent political force that render respect of the federal jurisdiction concerning the absolute protection of wolf, a little uncertain.

The absence of any possibility for the state as well as for the local communities (communes, local hunters) to exclude an appropriator from access to the resource[15], as well as the right to hunt almost everywhere on his own state territory, or even to buy this same right for a neighboring canton are considered by the advocates of the licence system, as constituting fundamental "democratic" and "popular" rights.

As a consequence of this political impossibility to limit the number of hunters in this hunting system, the *licence system has long been considered as more "game consuming" then the renting one*.

Thus, very early (1876) and in order to prevent an excessive depletion of the resource and to better manage the relation between the stock and the yield of the resource, the Federal government forced the licence's alpine cantons to agree to the creation of protected areas on their territory functioning as game reserves (called *districts francs fédéraux* and *réserves cantonales de chasse*) thus providing an absolute protection of the "capital" of the resource (Zimmerli 1951b). The main idea was that, in such a situation, only strong state-controlled intervention would be able to keep under control the depletion process engendered by the impossibility to intervene on the number of hunters. These hunting reserves still exist today. They have however been progressively integrated as an instrument of an emergent encompassing nature protection policy. They however still constitute a *central masterpiece* of the licence system in the absence of which, the system would probably not have been able to survive.

B. THE RENTING SYSTEM

The renting system is characterized by a totally different basic principle. This latter consists in the idea that the basic unit of a hunting system is not the individual hunter, but the *local association*. The local association rents a hunting territory (an *affermage*) from the commune on which the territory is located. As the number of *affermages* (hunting territories) is limited, the number of local associations and consequently of hunters is, contrary to the licence system, also *limited*[16].

The links between the members of the *affermage* are very strong and the expenses and benefits are shared between all the members of the association. Thus for example, game animals that are shot do not formally belong to the hunter, but to the hunting association. Admission or exclusion are subject to the approval of all members of the hunting association. Access to the resource is thus dependent on two different conditions: (1) to have successfully passed the state exam and (2) to be accepted as a member of one of the *affermage* associations.

The renting contract between the commune and the hunting association lasts between 6 and 8 years. At the end of this period the contracts are reattributed by the commune (sometimes through the system of selling by auction). Experience has shown that there is very little uncertainty in the process of the reattribution of the *affermages*. A general and consensual agreement prevails most of the time[17]. Nevertheless, opportunities for an open competition between associations do formally exist.

The hunting association is accountable to the canton and the commune for the use and management of the hunting territory as well as of the wildlife living within it. More

15 The only possibility to exclude someone from the access to the resource is the mechanism of the exam that one should succeed in order to be entitled to buy a licence. But this mechanism is largely acceptable in the hunters‘ view, in the sens that it is considered as respecting the democratic or "republican" principle consisting on selecting the appropriators depending on their intrinsic competences, that is independantly from any criteria of social, local or political appartenance.

16 The number of members an association accepts depends on the size of the affermage.

17 Even though, there are every time when the affermages are reattributed, some cases that goes to the court.

particularly, the association is responsible for monitoring the resource (statistics, qualitative state), the (self)monitoring of the hunters (behavior, weapons, respect of the quotas, distribution and accomplishment of the common tasks), the territorial protection of wildlife. Enlarged associations exist which are responsible for the management and hunting of the most mobile species. Finally, the hunting association has to bear half the costs of the damage caused by fauna to agriculture. This delegation of responsibility has some advantages for the members of the association: they have the fundamental right to accept or exclude non-members from access to the resource, the hunting periods are significantly longer than the ones of the licence system, members of the association can (in accordance with club customs) invite friends or acquaintances to hunt in the *affermage*, state control of the members' behavior is more loose, there is considerable freedom to organize hunting activities within the affermage (for example the possibility of constituting teams or groups, or of defining the way in which the quotas are reallocated), finally, historically, the *affermage* has long perpetuated the old tradition of " autumn hunting ".

A (theoretical) consequence of these shared responsibilities is that members of such associations have strong incentives to collaborate in the good management of the *affermage*, as well as of the resource (wildlife).

However, if the system of *affermages* is, as we can see, characterized by a strong component of self-organization and -monitoring, a large part of the resource management is still the prerogative of the state. In fact, the state administration defines the goals of the planing as well as the quotas allocated to the different affermages through consultation within a hunting commission, composed of representatives of the various actors concerned[18], who together devise a hunting plan.

Finally, this *co-managed* system shares also *some* of the characteristics of a *nested enterprise* (Ostrom 1990:90), except the fact that state remains the central actor of the governance structure. Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities occur within this system at different levels of organization. Moreover, the local *affermages* are regrouped in a peak association organized at the state level. It is responsible for the supply of game as well as for hunting statistics. Both sets of data are elaborated by compiling information furnished by the different *affermages* as well as from the official game-keepers (when they exist)[19]. It also defends the interests of the local associations against the state authorities or other interest groups of rival users (agriculturists, tourists, members of nature protection's organizations, walkers, riders, etc.).

C. THE STATE MONOPOLY SYSTEM

This system, implemented in one state only (the canton of Geneva), can be considered as an non-conceded state monopoly regime. In fact, since the acceptation, in May 1974, of a popular initiative emanating from animal protection organizations, hunting is completely forbidden over the whole state territory. The state environmental administration has been entitled with the task of monitoring and regulating wildlife and its vital environment. In

18 The commission encompasses representatives of the hunters, foresters, of the agriculture, of the communes and finally of the nature protection associations.

19 In 1996, the 16 cantons operating a licence system employed together 163 official game-keepers (and 528 auxiliaries) for 19'574 hunters (=1 game-keeper for 120 hunters). At the same time, the 9 cantons operating a renting system employed only 9 official game-keepers (but a large number of auxiliaries) for 11'939 hunters (=1 game-keeper for 1326 hunters). 6 of these 9 cantons do not dispose of any official game-keeper

order to accomplish this task, the administration employs 13 full time official game-keepers[20].

The decision-making process is the responsibility of two distinct commissions, instead of one (in all the other states): beside the usual consultative commission[21], a constitutional commission[22] has been instituted which is entitled to deliver exceptional authorizations to shoot animals, depending on the damage caused by the fauna to the forest or agriculture. These shoots are usually carried out during the night by the game-keepers.

Although it is true that such a system seems to have the advantage of being exclusively oriented towards the management of biodiversity, and is *de facto* dissociated from the problems caused by the monitoring of hunters, this method of managing wildlife nevertheless has a certain number of severe inconveniences:

1° This "Leviathanist" solution is very expensive: financing of the costly administrative means used for its implementation is not counterbalanced by the income derived from the hunting *régale*.

2° There is no possibility of partly delegating the job of regulation to the hunters. This seems to be a unreasonable solution to the extent that hunters not only constitute a source of conflict, but, when competent, can also provide a very interesting solution for the management of wildlife: contrary to the official game-keepers, hunters are not *paid* but *agree to pay* a certain amount to have the right of access to the resource, and thereby contribute to the task of management.

3° The hunting ethic is not respected by the official game-keepers when shooting animals during the night with illegal weapons[23].

4° Last but not least, wildlife regulation is severely complicated by the fact that, during hunting periods in neighboring regions (in France and other Swiss cantons), game animals, obviously doted with learning capacities, tend to migrate on considerable numbers to the canton of Geneva, transforming it into a vast protected area or natural reserve. Such wildlife movements cause great damage to agriculture and significantly alter the biodiversity equilibrium.

D. COMMENTS

There is no obvious link between local conditions affecting the resource and the choice of the hunting system. A study of the spatial distribution of the different systems within the country (cf. figure 1) shows that neither the topographical conditions, nor the spatial distribution of the species has any immediate influence on the choice of the hunting system[24].

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20 This is a large number compared to the cantons with a renting system. Moreover, the canton of Geneva is territorially a very small one.

21 This commission is, however, characterized by the weak representation of hunters: 1/12.

22 Reflecting the structure of the regional political power situation, this constitutional commission is composed exclusively by representatives of the animal protection and environmental organizations.

23 Federal law strictly forbids night shooting as well as the use of infra-rouge weapons.

24 It is however worth noting (1) that the implementation of Geneva's state monopoly system in a territorially more extended state is most improbable and (2) that all the big alpine states have chosen to retain the licence system.

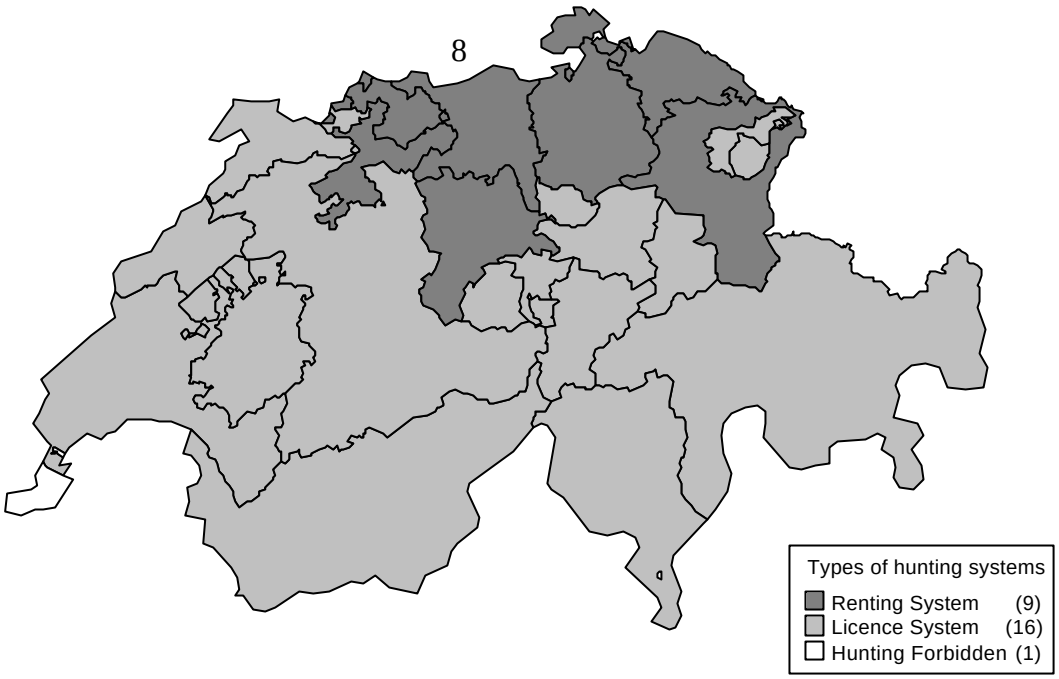

Figure 1: The geographical distribution of the different hunting systems in Switzerland.

It is more probable that the original choice of one or the other system in the different parts of the country has something to do with the sociological structure of the hunting community and probably also with the sociohistorical structure of the regional society. One of the most plausible explanation worth mentioning here is the probable greater permanence in the North East part of the country of some structural aspects of the Old Regime society such as, for example, the structure of land and forest property[25]. Thus, the proximity of the Swiss renting states with the German Land of Bavaria, the Austrian region of Vorarlberg and the French Department of Alsace, all organized according to the renting principle, constitutes a strong argument in favor of this hypothesis.

During the first part of the XXth century, the decision to return to the renting system[26] was justified by the objective of limiting overexploitation of the resource, as the renting system is specifically able to limit the number of hunters (Blanckenhorn 1990). During the 1920' and the 1930', there was a lively debate between the advocates of the two systems. Renting advocates claimed that they encouraged "good" management of the resource, pointing out that the subsequent resource depletion was the direct result of the licence system, while advocates of licensing argued on the democratic right to have free access to the resource and to the practice of hunting, and accused the renting system of being "aristocratic" in this regard. This philosophical/political opposition was perpetuated in the institutions by the creation of two distinct hunters' federations at national level.

It is worth noting that, as a logical result of the principle of allocation of the income generated by the state *régale*, state Governments have usually been in favor of the licence system, while the communes have traditionally been in favor of the renting one.

25 The presence of renting hunting systems could probably be an indirect indicator of the regional differences in the social penetration and effects of the French Revolution.

26 At the end of the XIXth century, the renting system had almost disappeared. Its reappearance dates from the beginning of the XXth century.

2° Salient features of the three hunting systems

These three systems contrast above all in the way the state "regalian" rights (i.e. appropriation, control, and collection of fiscal income) are conceded to the appropriators. A description of the 4 ideal-types of property regimes provides a useful heuristic instrument which can aid in clarifying the situation concerning the main features and principles characterizing these various systems.

Figure 2: Four types of property regimes

	Private Property	State property	Common Property	No Property Open Access
Hunting system	Renting (France, Austria, Germany, etc.)	**State monopoly not conceded** (Switzerland) **Licence** (Switzerland)	**Renting** (Switzerland) Even if this is not "legally" a common property regime[27], one can consider that the *concession* of the appropriation right for several years to the association approximates to a "common property regime".	?
Exclusive title in the hands of (/*conceded* to)	Individuals Corporations	Local-authority level Province/State level Federal level	Groups Corporations	Everybody and nobody
Exclusion of non-owners	Yes	Foreigners?)	Yes	No
Control of access	Individuals and corporations backed by State	State	Groups State	No
Decision-making process in the regime	Individuals and corporations	Administration State Agency	Corporations (co-management concerning the definition and the allocation of quotas)	No
Other examples	Farming land	National Parks State forest	Underground water Grazing land	(clean) air Climate

Source: Knoepfel, Kissling-Naef, Varone, 1998, compiled on the basis of Ostrom, 1990, Bromley, 1991, Devlin and Grafton, 1998.

This figure allows to show what are the main divergent characteristics of the three systems and how they fit with the main components of one or the other property regime. As we can see, the main differences between the licence and the renting systems concern the possession (or concession) of the property titles, the capacity to exclude non-owners, the control of

27 In a strictly legal sense, "common property" does not exist in Switzerland (Leimbacher, Perler 2000): private and public law only recognize two kinds of property regimes: private and state properties. Thus, according to the Swiss civil code, the alpine commons (Netting 1981; Ostrom 1990:61-65) do not constitute a "common property", but are either a communal (state) or private (group) property.

access as well as, finally, the decision making process within the regime. The renting system resembles the ideal-type of common property regime, while the licence one constitutes typically a state property regime.

Without wishing to cut short this historical debate between two opposing points of view, it is still possible, in my opinion, to spot some of the strengths and weaknesses of the three systems, regarding management of the resource:

1° The *State monopoly system* is difficult and costly to implement, as the state administration is constrained to assess the needs and carry out the management activities on its own, i.e. without being able to count on the field knowledge of the hunters. The system is not easily able to adapt to the transformations of the resource system. Moreover, it is hardly compatible with the systems of the neighboring regions, as the countryside around Geneva is transformed into a kind of big natural reserve or "*district franc*".

2° The main *strength* of the *renting system* consists in its capacity to take advantage of the hunters' skills as well as their knowledge of the local situation. It has also the reputation of significantly improving their ecological sensitivity through their *collective* involvement in the management of the resource[28]. It is all the more effective because the *affermages* are attributed during a sufficiently long time period to render the effects of the management concretely observable.
Another argument in favor of this system deals with its capacity to control the localization of the impacts by using the quota system: Contrary to the licence system, quotas of animals are attributed to accurately defined locations (i.e. within an *affermage*) and cannot be used in another part of the state territory.
The elements presented above suggest that this system has also some important *weaknesses*. In addition to criticisms regarding its undemocratic features, it seems that there is some difficulty in producing trustworthy data and statistics, both for the planning of quotas as well as for their accurate implementation. The very small number of game-keepers seems to play a significant role in this respect[29]. Finally, the capacity of the system to monitor and manage the most *mobile* species is significantly weaker than in the more centralized licence system.

3° On the other hand, the main *strength* of the *licence system* resides precisely in its attempt to develop accurate management and planning of the resource uses. So, the historical improvement of the management capacities of the licence system are not only due to the better endowment in professional game-keepers, but are also the result of more centralized management at a probably *more appropriate level*. The regional (state) level seems in fact to be more pertinent in the case of a *mobile* resource like wildlife (cf. the "interstate management program"). Moreover, the joint use of quotas and of the hunting reserves (or *districts francs*) makes it possible to safeguard the reproductive capacity of the resource stock by disentangling the problems resulting from the management of the "capital" (resource stock or system) from those relating to uses of the "interests" (resource units).
The main weaknesses of the licence system have already been mentioned. Historically there was a clear tendency of the system to lead towards overexploitation, especially due to the fact that the number of hunters cannot be limited, contrary to the renting system.

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28 It is of course difficult to accurately "measure" such a phenomenon however it is often mentioned in interviews. A possible indicator could be the publicizing of environmental questions in the official journals of the two hunting associations (renting and licence associations).

29 The problem is thus to know, for example, who monitor the territories located outside the affermages.

In the light of these important organizational differences, an interesting question consists in the analysis of their respective impacts and outcomes[30] regarding the evolution of some representative species' live-stock. This is briefly treated in the next part.

3° A statistical analysis of the impacts and outcomes of the different hunting systems[31]

The results presented below do not constitute an exhaustive study of the respective potentialities of the different systems for the sustainable management of the resource. Hereby, I only want to (1) present the contrasted impacts and outcomes of the different systems and (2) suggest some hypotheses to explain them. In the last part of the paper, I will however go further in the interpretation of these differences.

A (very simple) statistical analysis of the available national hunting and wildlife data over a period of 30 years (1968-1998) reveals some interesting tendencies related to hunting management under the different systems, as well as their effects on the fauna.

The most obvious trend is the general increase of the different fauna live-stock during this time period (cf. the right hand column "National Average" of Figure 3). This increase goes from 42% for roes to 75% for chamois. The case of the ibex is somewhat peculiar in that it was reintroduced in the protected areas (*districts francs*) of some alpine regions at the beginning of the XXth century, that is, exclusively in licence system states. Its presence in a first renting based canton (St Gall) is rather recent. This explains the astonishing increase rate there of near 500%.

30 Referring to Knoepfel, Larrue, Varone (forthcoming) I propose to distinguish between outputs (administrative decisions), impacts (effective behavior of the target group, here the hunters) and outcomes (effects on the resource system). In the following part, statistics can be considered as referring above all to impacts (number of animals shot is a result of hunters behavior), as well as, to a certain extent, to outcomes (the evolution of game live-stock).

31 This statistical section does not take into account the state monopoly system, as the available data are not pertinent: There are no ibex or chamois and only very few roe on its territory.

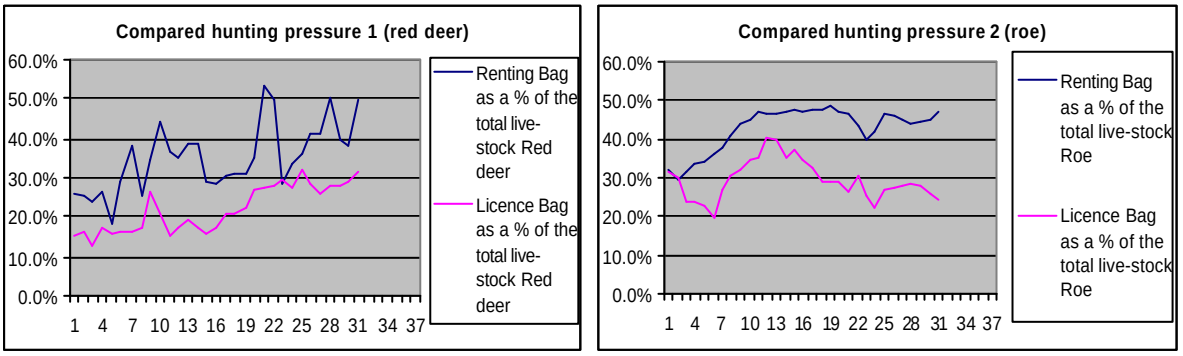
Figure 3: Evolution of game live-stock in the renting and licence systems over 30 years (1968-1998)

Increase of the different live-stock as a % per system	**Renting**	**Licence**	**National Average**
Red-deer	+ 21%	+ 74%	+ 70%
Roe	+ 1%	+ 98%	+ 42,2%
Chamois (Only 10% of the chamois are located in the renting states)	+ 70%	+ 75%	+ 74,7%
Ibex (Only 7% of the ibex are located in the renting states)	+ 489%	+ 222%	+ 232%

Source : Ministry of Environment (OFEFP/BUWAL), hunting section; my own calculation

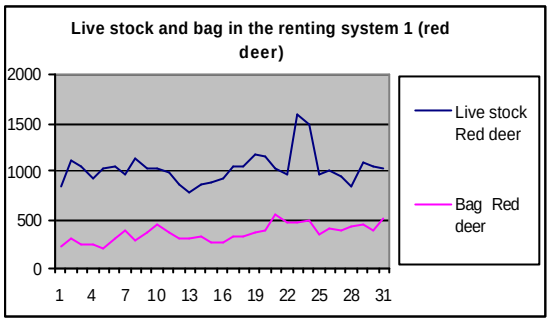
The results of figure 3 show something very interesting and, from a historical point of view, to a certain extent *paradoxical*. The increase rate (above all for roe and red-deer live-stock), far from being homogeneous, is in fact very contrasted between the two systems. Thus, contrary to the situation during the first part of the XXth century, the licence system, during the last 30 years, has been (much) more favorable to the reproduction and the growth of the resource stock than the renting one.
Factors corroborating and emphasizing this first general observation can be deduced from figure A1 (annex 1) comparing the level of the *hunting pressure* exercised within the two different systems. As one can observe in figures 4a and b, this pressure is on average stronger in the renting system. The proportion of game animals shot is in any cases systematically higher in the renting system than in the licence one. This explains of course the differences observed in the increase of the resource stock.

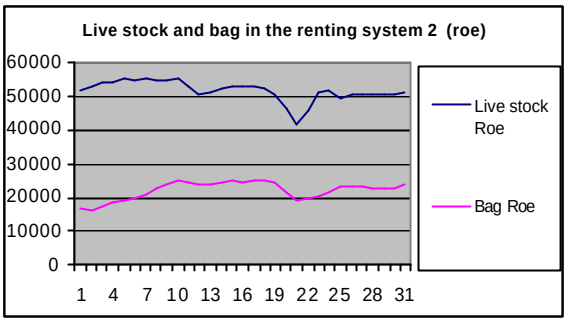
Figure 4a, b: Comparison of hunting pressure between renting and licence systems 1968-1998 (roe and red-deer).



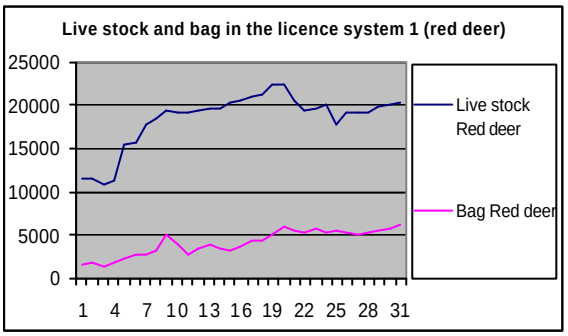
A second interesting observation which can be derived from these statistical data concerns the respective "management philosophies" within the two systems. A comparison (figures 5a and b and 5c and d) of the relation between the curves (expressed in total numbers) of (1) live-stock and (2) game animals shot for different species, tends, in the renting system, to show a closer relation between variations of the total live-stock and variations of the bag, than in the licence one.

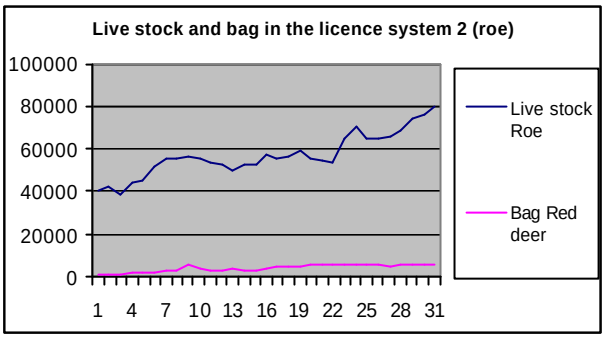
Figure 5a and b: Relation between total live-stock and the bag in the renting system (red-deer and roe)





Figures 5c and d: Relation between total live-stock and the bag in the licence system (red-deer and roe)





In fact, in the renting system (figures 5a and b), the curve of the bag tends to follow variations in live-stock numbers more directly, whereas in the licence one (figures 5c and d), the number of animals shot tends to be more *stable* and *independent* from the annual variation in live-stock numbers. Such a difference seems to indicate that management in the renting system is more sensitive to changes occurring on the (micro)local level and tends to adapt to them more accurately and rapidly. This is still true, even if this adaptation is the result of the sum of different local, independent and loosely coordinated processes. It thus seems that adaptation processes are easier to implement in a renting system than in a licence one, probably due to the fact that the decision-making process is more directly linked to the empirical local situation, and is thus easier to understand for the hunters. In fact, while, in the licence system, a modification of the annual hunting plan simultaneously affects all the hunters of a canton in the same way, modifications in the renting one have very segmented, territorially differentiated impacts. Thus, significant modifications are much more easily implemented in the latter system due to the fact that (1) hunters are more familiar with such changes, (2) the changes are not the same for all the appropriators at the same time, and are less susceptible to lead to collective opposition, and (3) as the consequences of the changes for the hunters are more fragmented, and more directly linked to local conditions, they tend to be more easily understood and accepted.

Although statistically quite clear, the *interpretation* of these results in terms of "*success*" or "*failure*" is however all but evident. If it is true that one of the main objectives of Swiss hunting policy during the last century was to significantly increase live-stock in order to recover from the dramatic situation inherited from the end of the XIXth century, the more

recent objectives of this policy[32], focused above all on the protection of biodiversity, that is, the creation of conditions favoring a judicious spatial distribution of wildlife, avoiding local situations of superabundance. This shift in the main objectives of the policy contributes to rendering the interpretation of the results presented above much more complex and ambiguous.

Thus, depending on the situation faced by the different states, which may vary at the different historical periods from overuse to underutilization, the performances of the two systems will of course be theoretically evaluated in a completely different way:

Figure 6: Contrasting evaluations of the two regimes according to the resource state at the end of the XXth century.

Possible situation at the end of XXth century	**Renting**	**Licence**
Overuse situation	**Weaker** performance because of its difficulty to increase live stock	**Better** performance because of its capacity to increase live-stock
Underutilization situation	**Better** performance because of its capacity to limit the increase of live-stock	**Weaker** performance because of its difficulty to limit the increase of live-stock

As there is no clear indication that renting states are facing underutilization situations or licence ones face overuse, any further empirical evaluation of the system performance would imply conducting systematic research on resource conditions in each of the states.

But the difficulty of such a work would still be aggravated by the fact that the different actors involved in wildlife management tend to express very contrasted opinions concerning the resource management aims. This is typically the case for *state officials*, responsible for fauna management in the different state environmental departments[33]. Depending on their "policy core belief" (Sabatier 1993, 1999) –the focus on *ecocentric* priorities (absolute preservation of biodiversity) *versus* the focus on a more *anthropocentric* priority (supply of an abundant game stock for the hunters)- the officials' oral interpretation of the performance of the two systems has proved to be very different. In some states, for example Wallis or Vaud, the increase of the fauna is still considered as the central goal, whilst in others, for example St Gall, it is viewed as problematic regarding the requirements of biodiversity protection. From the *hunters*' point of view, "success" is of course defined by the increase of the resource stock. Finally, *foresters* and *agriculturists* for their part, support the ecocentric point of view. Thus, the increase of the heterogeneity of the user groups, as well as the existence of some uncertainties and discussions concerning the “right way" to manage the resource in a sustainable way, seems to render the definition of "success" or "failure" criteria much more controversial.

Finally, independently from an eventual “final” objective interpretation of these results, one certitude does however exist which is that *during the last 30 years, contrary to the first part of the XXth century, the renting system has become more game consuming (or able to limit the increase of the resource live-stock, if we want to express it in a positive manner) than the licence one and has contributed to a lesser degree to the general increase of the national live-stock*.

These results tend also to show a significant difference between the “hunting philosophies” of the two systems. My hypothesis is that the centralized and state controlled licence system tends, at a regional level, to develop a more long term oriented management, independent

32 As they are explained in article 1 of the new Federal Law of 1986.

33 I interviewed representatives of 7 states (4 licence states, 2 renting states and Geneva).

from annual variations of the resource numbers; whereas, management in the renting system is the result of the sum of a large number of partial adjustments at the local level.
Once again, the interpretation in terms of sustained use of the resource is mostly ambiguous and depends on the final objective. Thus, both systems seem to have strengths and weaknesses regarding these two objectives.

Figure 7: Strengths and weaknesses of the renting and licence systems regarding the possible objectives of the wildlife management.

Hunting systems/objectives	**Renting**	**Licence**
Increase of live-stock	*Strength*: the capacity to limit the number of hunters. *Weakness*: Contrary to the beginning of the XXth century, the system appear to have been more game consuming during the last 30 years.	*Strength*: Contrary to the end of the XIXth century, the system appears to have been able to significantly increase the resource stock during the last 30 years through strict quotas and protected areas. *Weakness*: Difficulty in limiting the number of hunters.
Management of the spatial distribution (biodiversity preservation)	*Strength*: Capacity to accurately control the spatial localization of the impacts (quotas). *Weakness*: The final effects (outcomes) of this capacity are strongly modified by the uncertainty resulting from the high mobility of certain species.	*Strength*: Development of centralized monitoring and planning facilities consistent with the mobility of the resource. *Weakness*: weaker ability to control the spatial localization of the impacts (quotas).

4° Investigating the obstacles towards collective action in wildlife management

Even if noticeable differences exist concerning the degree of state intervention between the various systems, wildlife management in Switzerland strongly depends on state as well as Federal intervention. Contrary to the *normative* prescriptions sometimes derived from the CPR theory (for example Becker & Ostrom 1995; McKean & Ostrom 1995; Ostrom 1998), collective action towards self-organization has still not proven to be the most efficient way to overcome overexploitation in that case.
My thesis is that *this omnipresence of state intervention is not the result of a possible collective "state oriented bias" of Swiss society, but above all the result of structural constraints related to resource management and uses, as well as the physical and biological characteristics of the resource*.
A pertinent way of pointing out these structural constraints and characteristics of the resource which make self-governance very unlikely consists in systematically evaluating the 8 design principles for "long-enduring self-organized and self-governed CPRs" elaborated by Elinor Ostrom (1990:90, 2000), for the 3 different hunting systems as they developed historically in the Swiss context.
In fact, there are, in my opinion, 2 different ways of considering the possible uses of these 8 institutional design principles: (1) as a *heuristic* instrument, or (2) as a *prescriptive* tool for policy design. In agreement with Stein and Edward's remark (1999:552) on this topic, I am convinced (Nahrath 2000) that, after analyzing western contemporary industrialized societies, the most effective use of these design principles consists in considering them as an analytical tool resembling a weberian "ideal-type". Thus, their systematic comparison with the characteristics of the empirical hunting systems should enable differences with the ideal-

typical principles to be measured/quantified/assessed, pointing out the relevant characteristics of the resource that render collective action unlikely, and, by contrast, state intervention probably necessary.
Finally, identifying these obstacles will also contribute to partly explaining the contrasted impacts and outcomes presented in the statistical analysis.

Figure 8: The degree of conformity of the 3 hunting systems with the 8 design principles for long enduring self organized CPR regimes.

Hunting systems/ Design principles	Non conceded state monopoly (Geneva)	Renting	Licence
1) Clearly defines boundaries of both, (1) the appropriators and (2) the resource	(1) **NO**, there are no direct appropriators (hunters), but a situation in which multiple indirect users (tourism, walkers, animal friends) coexist (sometimes concurrently) with (mostly negatively) affected groups (agriculturists, foresters) (2) **NO**, delimitation of the boundaries is affected by the mobility of the resource	(1) **YES**, only members of the hunting association are entitled to hunt in the *affermage* **But**, indirect (multiple) users (tourism, walkers, animals friends) are however impossible to exclude (2) **NO**, delimitation of the boundaries is affected by the mobility of the resource	(1) **NO**, there is no possibility of limiting the number of appropriators **and** indirect (multiple) users (tourism, walkers, animals friends) are however impossible to exclude (2) **NO**, delimitation of the boundaries is affected by the mobility of the resource
2) Congruence of the rules with the local conditions	**NO**, **but** such a system would be unconceivable in a larger state	**NO**, there is no clear link between the choice of the hunting system and the local conditions of the resource **But**, there is a link between the size of the *affermage* and the number of hunters entitled to hunt on the territory	**NO**, there is no clear link between the choice of the hunting system and the local conditions of the resource
3) Collective-choice arrangement allowing individuals affected by the operational rules to participate in their modification	**NO**, even if hunters could try to change the law through direct democracy	**YES**, **but** this possibility is restricted to a limited number of operational rules within the *affermage*	**NO**, **but** hunters associations have a consultative power that can possibly affect to a limited degree the content of the state decisions
4) Monitoring of (1) the resource and (2) the appropriators is carried out by the appropriators themselves or by monitors accountable to them	(1) **NO** (2) **NO**	(1) **YES**, **but** the planning is *not* the responsibility of appropriators (2) **YES**	(1) **NO**, game-keepers do it (2) **NO**, game-keepers do it
5) Graduated sanctions	**NO**	**YES**, there is a self-monitoring process within the *affermage*, **but**, state officials can also directly sanction deviant behavior	**NO**, sanctions are imposed directly by state officials
6) Rapid local conflict-resolution mechanisms at low-cost	**NO**	**YES**, some mechanisms of this kind exist within the *affermage*, **but** they can be thwarted by official state intervention	**NO**
7) Minimal recognition by external (state) authorities of rights to organize	**NO**	**YES**, hunting associations have some autonomy in their internal organization, **but** this autonomy is limited.	**NO**, no real structured long enduring self-organized body interferes with the hunting practice **But**, formation of informal local groups does however exist which should not exceed 4 persons.
8) Nested enterprises	**NO**	**YES**, appropriation, provision, monitoring of the resource, as well as conflict resolution and governance activities are co-managed by the local hunting associations and the state hunting administration. Enlarged associations also exist for more mobile species	**NO,** except interstate monitoring programs.

Figure 8 help us identify the main obstacles that render collective action towards self-government solutions for CPR situation in the case of wildlife management in Switzerland very unlikely. Even in the case of the renting system –the closest to the ideal-type of common property regime-, it seems that there are severe difficulties in attaining 5 of the 8 design principles.

Principle 1: empirical evidence shows that a clear definition of the appropriators has historically become more and more difficult and unlikely since wildlife/fauna has been subject to increasingly heterogeneous direct or indirect uses[34]. Today, wildlife management does not consist only in organizing hunting practice and monitoring fauna and hunters, but involves the integration and the coordination of a set of heterogeneous practices as well as recognizing that user groups have various impacts on the resource and its living space[35]. In this respect, it is mostly unlikely that boundaries of the (local) group of appropriators coincide with the ones of the resource system. On the contrary, the heterogeneization of the user groups usually implies an extension of their recruitment area, which makes it politically very difficult to exclude external appropriators from access to the resource.

The users' heterogeneity also leads to the development of contradictory ideas concerning the legitimate use of the resource (cf. for example conception of wildlife of Geneva's citizen while accepting the popular initiative forbidding hunting).

A second obstacle brought to light by this first principle concerns the *mobility* of the resource. If this characteristic does not *per se* abolish any possibility of CPR auto-regulation (cf. the abundant examples of auto-regulated fisheries), it nevertheless significantly contributes to rendering it more difficult to develop[36].

Principle 2: As we have already seen, there is no evident link between the choice of the hunting system and the characteristics/peculiarities of the various local situations.

Principle 3: the possibility for appropriators affected by the operational rules to participate to their elaboration and modification is significantly limited, even in the renting system. Thus, local associations do *not* participate in the decision-making process within the resource use policy.

Principle 4: (idem principle 3) The responsibility for monitoring the resource does not include participation in the planing process, which remains the exclusive task of the state administration. The mobility of the resource units, the increase in heterogeneous direct and indirect uses as well as the presence of partly non-local rival groups of users; and finally the necessity to develop more coordinated planning models, including living space management, has contributed significantly to an increase in the transaction costs, making them hardly bearable for a self-organized association based on voluntary reciprocal trust and commitment.

Finally, local *affermage* associations do not have the monopoly of the monitoring of the appropriators' behavior: The state administration can intervene directly on the members of the *affermage* in order to sanction deviant behavior.

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34 One should in fact also consider the immaterial uses of wildlife like, for example, observation, photography, etc. If these uses do not directly contribute to resource depletion, they nevertheless have an impact on it as well as on the way the resource is managed (cf. tourist uses of the resource).

35 Unlike the discussion about "heterogeneity" in the CPR literature (for example Becker, Ostrom 1995; Schlager and Blomquist 1998), the problem to be dealt with does not consist here only in the heterogeneity within the users group, but between various and rival groups of users.

36 There is however in my opinion an important difference between fishes and wildlife management in that the living space of the latter is much more complex, diversified and submitted to contradictory depletive human uses than that of the former.

Principle 7: (idem principles 3 and 4) The minimal recognition by external governmental authorities of the rights to organize is limited to specific and non-planning aspects of the management process.

This first analysis concerning the obstacles faced by collective action in heterogeneous (western) societies can be completed by focusing on the more specific peculiarities of both the attributes of the resource and the attributes of the appropriators (or of the appropriation's process) that are considered as fundamental conditions favoring the development of self-governing associations (figure 9, below).

Figure 9: Conditions favoring the formation of self-governing associations compared with peculiarities of wildlife resource and hunting (adapted from Ostrom 2000:34-35)

ATTRIBUTES OF THE RESOURCE	**IN THE CASE OF WILDLIFE…**
R1 *Feasible improvement*: Resource conditions are not at such a point of deterioration that it is useless to organize, nor are they so underutilized that little advantage results from organizing.	This condition has often *not* been fulfilled during the XXth century. At the end of the XIXth century, the process of resource depletion was so advanced that only a strong centralized state intervention enabled the tendency to be reversed. This is the exact opposite of the situation that prevails nowadays. The progressive emergence of cases of underutilization of the resource does not facilitate the development of self-organizing associations.
R2 *Indicators*: Reliable and valid indicators of the condition of the resource system are frequently available at a relatively low cost.	Reliable and valid indicators exist, but they are not available even at a relatively low cost. Thus, relatively high transaction costs considerably reduce the likeliness of self-organization, by lessening the probability of a substantial benefit resulting from cooperation.
R3 *Predictability*: The flow of resource units is relatively predictable.	The predictability of the flow of resource units depends on the existence of monitoring and planning capacities organized at a larger level than the one of the local groups of resource appropriators.
R4 *Spatial extent*: The resource system is sufficiently small, given the transportation and communication technology in use, that appropriators can acquire accurate knowledge of external boundaries and internal microenvironments.	This could theoretically be the case, but the mobility and the fluctuating boundaries of the resource render the production of such knowledge rather costly and not so accurate.
ATTRIBUTES OF THE APPROPRIATORS (APPROPRIATION'S SITUATION)	**IN THE CASE OF HUNTING…**
A1 *Salience*: Appropriators are dependent on the resource system for a major portion of their livelihood.	This is clearly not he case. However, in order to be able to understand the logic of hunters' behavior one should not underestimate the cultural significance of the hunting practice. To a certain extent, even if hunters do not depend on the resource for their livelihood, they are dependent on it for the satisfaction of deeply rooted cultural preferences and "needs".
A2 *Common understanding*: Appropriators have a shared image of how the resource system operates (attributes R1, 2, 3 and 4 above) and how their actions affect each other and the resource system.	This is hardly the case. If the renting system is clearly more favorable to the development of such a shared image, the mobility of the resource, its considerable spatial extension as well as its fluctuating boundaries contribute to blur this image. More particularly, mobility affects appropriators' perception of how their actions affect each other and the resource system.
A3 *Low discount rate*: Appropriators use a sufficiently low discount rate in relation to future benefits to be achieved from the resource.	Such a calculation is really difficult to envisage in the case of wildlife, because of the fact that mobility and external factors affecting reproduction rate strongly interfere in the whole process.
A4 *Trust and reciprocity*: Appropriators trust one another to keep promises and reciprocally relate to one another.	The probability of the development of relations of trust and reciprocity between the hunters is significantly increased in the case of the renting system in which they strongly depend one another for the good management of the *affermage*.
A5 *Autonomy*: Appropriators are able to determine access and harvesting rules without external authorities countermanding them.	This is partly the case in the renting system, but this autonomy is limited by the fact that hunting associations themselves are not entitled to define the quantity of resource units to be appropriated.
A6 *Prior organizational experience and local leadership*: Appropriators have learned at least minimal skills of organization and leadership through participation in other local associations, or in learning about ways that neighboring groups have organized.	This is or could easily be the case.

Finally, all the remarks and observations made above can be regrouped in three kinds of obstacle making collective action towards self-organizing wildlife management unlikely.

1° The physical characteristics of the resource

Two physical characteristics of the resource constitute severe obstacles to the development of self-organized solution of wildlife management:

- The *mobility* of resource units affects the coincidence between the boundaries of the resource and those of its appropriator group. This absence of coincidence strongly affects local appropriators' capacity to efficiently monitor the resource, as well as to monitor each others behavior. This view is further expanded by Schlager, Blomquist and Tang (1994). They suggest that mobility of the resource units aggravates the CPR problem in four main ways (1994:298):

1° users are more likely to attribute decreases in supply to the behavior of users elsewhere in the system (for an example of this kind see Dalla Bernardina 1988);

2° the users in any one location cannot control the resource flow/movement even if they act collectively;

3° because no one group can control the flow/movement and capture/enjoy the benefits of collective action, users in any one location are less likely to provide benefits for users elsewhere in the system by restraining their own appropriation activities;

4° coordinating activities with users in other locations raises transaction costs.

Thus, monitoring a mobile resource calls for an organization at a higher territorial level than the local one, as well as the development of different and supplementary (most of the time costly) instruments (cf. the example of interstate planning programs).

- The *biological nature* of the resource constitute an interesting element challenging natural resource management. Probably more than other natural resources usually taken in account in the CPR theory (water, grazing, forest), wildlife highlights the problems resulting from the interdependence of natural resource ecosystems. In the case studied here, serious wildlife management cannot exist without a parallel management of its living space. This intertwined management therefore involves an increase in the number of (direct and indirect) user (and/or interested) groups, which, of course, complicates cooperation by increasing transaction costs.

2° The increasing importance of interpolicy coordination within the resource regime as a result of the increasing heterogeneity of the resource uses/users

It is not only the biological nature of the resource that increases the number of users and interested groups to be included in the resource management regime, but also the development of increasingly contradictory uses of nature by humans. Wildlife management, through hunting policy, has progressively faced the central problem linked to the fact that a number of important activities affecting the reproduction process of the resource, such as tourism, leisure, sports, or transport infrastructures, were *not* included (and/or are probably very difficult to include) in local management arrangements. Since 1986, there has been a shift in policy objectives towards the protection of biodiversity and this has further reinforced the need for interpolicy coordination.

3° The role of ideas, knowledge and a more scientific approach to wildlife management

Without doubt, the importance of ideational and symbolic dimensions in human affairs has without doubt been somewhat neglected by the CPR scholars. In my opinion this dimension mainly interferes within the process of natural resource management in two ways.

- The first concerns the way knowledge about resource systems is produced. Focusing exclusively on single use situations, CPR theory tends to underestimate the challenge of producing knowledge about the conditions, requirements, problems, or fragility of self-reproducing resource systems. In my opinion, the view that local empirical knowledge has become less and less able to interpret more and more interdependent processes of resource management is not necessarily that of a narrow minded scientist. Thus, as a consequence of the increasing interdependency of more and more varied uses of the different resource systems, the sustainable management of the system as well as the judicious allocation of resource units is no longer possible without an accurate knowledge of the effects of these hunting activities (as well as all kinds of other human activities), not only on the state of the resource, but also on all the other systems that are interdependent within the encompassing living space (forests, flora, soils, etc.) (Mangel and alia 1997:54-57). This of course involves important costs resulting from the collecting of information and the production of scientific knowledge about the biological process. It is absolutely not clear how collective action could overcome the problems engendered by such costs.

- The second way consists in assessing the role played by ideational or symbolic components in the evaluation and perception of a given situation of the resource by different user groups involved in the management process (Fabiani 1982, 1984). Here we once again find constructivist criticism (Stein and Edwards 1999). As clearly appeared in the case presented here, the definition of "success" or "failure" regarding fauna management does not depend only on objective and clearly defined criteria, but on a social and political stake. The difficulty in formulating an evaluation of the outcomes of the different hunting systems perfectly illustrated the problem.

In our case, characterized by (1) the absence of appropriators' vital dependence on the resource and (2) the progressive development of situations of underutilization, the evaluation of "success" or "failure" of an institutional arrangement for the management of the resource no longer depends on basic and easily accessible indicators of its condition, but on the contrary, on a complexity of social and political factors which together contribute to a definition of the legitimate kind of nature desired. Thus, in Swiss society, today the central question does not consist in finding the best arrangement to avoid the tragedy of the (wildlife) commons, but in finding a collective agreement on the type of nature, and more particularly of wildlife, we want to have. In this respect, strong opposition –not only on the part of hunters- to the presence of all kinds of ancient or new predators (lynx, wolves or bears) provides a significant indication of a possible answer to this question.

5° Conclusion

A (historical) comparison of the three hunting systems in Switzerland through the lens of the CPRs theory allows the formulation of 4 important statements:

1° In my opinion, it has been demonstrated that, according to the present day circumstances, the CPR self-governance solution is very unlikely to emerge in the Swiss context, and that, consequently, state intervention is necessary to overcome the challenges of wildlife management.

2° Comparing and contrasting the different hunting systems with the ideal-typical characteristics of a self-organized CPR regime has allowed severe obstacles to be pointed out to the development of collective action towards self-organizing wildlife management. These factors include: the absence of vital appropriators' dependence on the resource; the progressive development of local situations of underutilization; the heterogeneity of users (or interested actors) leading to multilevel conflicts; the mobility of the resource units; and finally interdependence of ecosystems.

3° It has also brought to light the fact that such situations of absence of vital dependence, local underutilization situations, and heterogeneity of users confirm the constructivist criticism, that insists on the fact that the definition of "success" or "failure" of a resource regime is partly (and sometimes mainly) a result of a process of social and political conflict. The difficulties in establishing clear uncontested evaluation criteria for the different hunting systems is a direct illustration of this thesis.

4° Finally, the historical overview as well as the succinct statistical analysis of the impacts and outcomes of the different systems illustrate interesting potentialities of co-management solutions. The renting system, which was progressively introduced during the first part of the XX^{th} century in order to limit the number of hunters and contribute to a better protection of fauna live-stock, seems in fact to have better capacities to adapt to such radical changes in the state of the resource. This is especially so if we accept the hypothesis of present/current developments towards resource underutilization. Moreover, it has proved to be able to develop a more accurate, flexible and locally differentiated management.

As we can see, the central question that seems to emerge from this analytical overview of the case of wildlife management in a western industrialized country like Switzerland deals with the lessons that we can draw for the management organization of non vital, partially underutilized, common pool resources.
In my opinion, the answer suggested by the comparison of the three hunting systems goes in the direction of the co-management solution following the renting system model. Reconsidering this example under this aspect, 7 brief concluding remarks can be made concerning the "relevant" distribution of competencies between state administration and hunting associations within such a co-management arrangement, thereby tackling the question of "how much autonomy should a common pool resource regime have?":

1° A historical perspective tends to prove that co-management solutions based on a particular distribution of competencies between state administration and partly autonomous local self-governing associations can be suspected to have a better capacity to adapt to the

changes in the state of the resource. This is especially so if we consider the underutilization hypothesis to be plausible. Thus, the co-managed solution has the advantage, contrary to the centralized (licence) one, of allowing more flexible management, because hunters are used to important annual variations of quotas within each *affermage*. In direct relation with the present situation of the local hunting territory, such modifications are more understandable and easily accepted by the hunters. Being fragmented into 50 to 150 *affermages* (depending on the state size), these modifications of the quotas allocated to the hunters do not affect them in a the same way at the same time and thus have less risk of provoking collective opposition towards the *status quo*.

2° Through the delegation to the hunters of significant responsibilities for implementing a number of resource management measures, the renting system has also proved to be able to increase the sensitivity of appropriators to the new central policy aim consisting in biodiversity protection. The delegation of management responsibility to appropriators during a time period sufficiently long (1) to make them feel like the real owners of the resource system and (2) that the effects of their individual and collective behavior have visible and measurable effects on the resource system, contribute to constrain and/or incite appropriators to cooperate in order to conform to the management goals defined at the state level, and avoid sanctions on its part.

3° To the extent that these goals, as well as the delegation of responsibility, do not only concern the management of fauna live-stock, but also of its living space, co-management solution tends to have a better ability to make appropriators attentive to the requirements resulting from interpolicy cooperation, and thus renders its local implementation more effective.

4° Faced with the particular situation related to the management of a non-vital resource, which also tends towards underutilization, the co-management arrangement has the advantage of being able to prevent or limit negative effects on the local self-governing associations resulting from this situation. Thus, state administration is responsible for using different instruments (incentives, constraint, sanctions) in order to preserve or restore the conditions for the development of a reciprocal interest and commitment of the members of an *affermage* towards a self-organized implementation of management measures.

5° The existence of a (state) institution centralizing the tasks too difficult or too costly to be carried out by local associations constitutes a guarantee that they will not be abandoned. I am thinking here more particularly of (1) monitoring of the territories situated outside the *affermages*; (2) the collection of reliable data; (3) their analysis and the production of scientific knowledge about the working of the resource system; (4) the decision-making process concerning the definition of the hunting plan; (5) organization of cooperation with neighboring states; (6) organization of the hunting exams, (7) interpolicy coordination, and, finally, (8) resolution of multilevel conflicts between heterogeneous groups of users.

6° The co-management arrangement has the advantage of being strongly in phase with two historically central features of the Swiss political system namely: cooperative federalism and neo-corporatist practices consisting in the delegation of implementation tasks to non administrative, semi-private associations (especially in the domain of environmental and nature protection).

7° Among the few disadvantages previously mentioned in this paper, the renting system faces, however, one really serious problem which is that of the absence of an equal treatment of the different groups of appropriators, situated at different levels (local, regional, national or even international) concerning their access to the resource. This is a very serious problem, especially regarding the question of sustainability: according to the widely accepted definition of the term, ecological sustainability is only one component of the whole concept. Economic and social sustainability are its two other components. Thus, the most severe problem faced by the renting system is, of course, the social aspect of sustainability. In this respect, the tendency to favor local appropriators to the detriment of those situated at other (regional, national or international) levels is hardly acceptable. That is why one of the priorities of this system should be to invent a means of finding an equitable solution to this problematic situation. I am strongly convinced that such checks and balances are more likely to emerge within the framework of a co-management arrangement allowing the necessary state intervention to synergize with the potentialities of a locally efficient implementation.

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Annex 1 : Hunting data 1968-1998

Years	Renting									Licence								
	Live-stock			Game animals shot			% of game animals shot as a proportion of a total live-stock			Live-stock			Game animals shot			% of game animals shot as a proportion of a total live-stock		
	Red-deer	Roe	Chamois	Red-deer	Roe	Chamois	Red-deer	Roe	Chamois	Red-deer	Roe	Chamois	Red-deer	Roe	Chamois	Red-deer	Roe	Chamois
1968	837	51832	5052	216	16452	918	**25.8**	**31.7**	**18.1**	11618	39910	50456	1772	12575	10905	**15.2**	**31.5**	**21.6**
1969	1122	53597	5636	287	15838	884	**25.5**	**29.5**	**15.7**	11559	42266	49031	1923	12589	10283	**16.6**	**29.8**	**21.0**
1970	1057	54130	5255	253	16869	797	**23.9**	**31.2**	**15.2**	10823	38445	50105	1358	9242	10024	**12.5**	**24.0**	**20.0**
1971	925	54540	5740	246	18313	827	**26.6**	**33.6**	**14.4**	11315	43740	52005	1984	10519	9421	**17.5**	**24.0**	**18.1**
1972	1040	55900	6485	190	19138	827	**18.2**	**34.2**	**12.8**	15390	45285	53830	2384	10384	9805	**15.5**	**22.9**	**18.2**
1973	1047	54950	6660	304	19911	899	**29.0**	**36.2**	**13.5**	15770	52050	56120	2615	10175	9834	**16.6**	**19.5**	**17.5**
1974	970	55560	5820	371	20969	794	**38.2**	**37.7**	**13.6**	17680	55560	57220	2919	14976	11487	**16.5**	**26.9**	**20.1**
1975	1124	55020	6320	286	22503	1288	**25.4**	**40.9**	**20.4**	18500	55040	59220	3266	16874	12070	**17.6**	**30.6**	**20.4**
1976	1035	54900	6580	359	24168	1393	**34.7**	**44.0**	**21.2**	19470	56830	62930	5190	18089	14208	**26.6**	**31.8**	**22.6**
1977	1010	55300	6290	447	24879	1530	**44.2**	**45.0**	**24.3**	19130	55470	61220	4032	19101	14112	**21.1**	**34.4**	**23.0**
1978	976	52875	6105	357	24658	1519	**36.5**	**46.6**	**24.9**	19040	53490	60145	2872	18643	14084	**15.1**	**34.8**	**23.4**
1979	851	50847	6010	297	23557	1311	**34.9**	**46.3**	**21.8**	19497	52582	68844	3378	21216	13022	**17.3**	**40.3**	**18.9**
1980	778	51410	6015	298	23912	1195	**38.3**	**46.5**	**19.8**	19690	50680	57555	3799	20046	13623	**19.3**	**39.6**	**23.7**
1981	850	52330	6445	329	24501	1207	**38.7**	**46.8**	**18.7**	19684	52435	58860	3447	18403	12253	**17.5**	**35.1**	**20.8**
1982	893	52690	6310	261	24844	1273	**29.2**	**47.1**	**20.2**	20315	53080	59320	3186	19786	13858	**15.7**	**37.3**	**23.4**
1983	912	53020	7180	262	24778	1224	**28.7**	**46.7**	**17.0**	20615	57670	59940	3570	20002	13043	**17.3**	**34.7**	**21.8**
1984	1052	52695	7180	321	25166	1337	**30.5**	**47.7**	**18.6**	20995	56150	60720	4387	18365	14056	**20.9**	**32.7**	**23.1**
1985	1052	52300	7180	325	25062	1414	**30.9**	**47.9**	**19.7**	21192	57000	60310	4485	16539	14321	**21.2**	**29.0**	**23.7**
1986	1175	50620	7730	366	24534	1557	**31.1**	**48.5**	**20.1**	22390	59370	62885	4998	17207	14050	**22.3**	**29.0**	**22.3**
1987	1145	46630	7660	400	21775	1643	**34.9**	**46.7**	**21.4**	22295	54890	62630	5945	15964	14801	**26.7**	**29.1**	**23.6**
1988	1034	42250	8373	549	19606	1626	**53.1**	**46.4**	**19.4**	20663	54107	61518	5665	14267	14504	**27.4**	**26.4**	**23.6**
1989	963	46034	8575	478	19879	1769	**49.6**	**43.2**	**20.6**	19355	53735	75957	5394	16317	15732	**27.9**	**30.4**	**20.7**
1990	1584	51457	12399	453	20455	1678	**28.6**	**39.7**	**13.5**	19611	65646	82048	5788	16784	16298	**29.5**	**25.6**	**19.9**
1991	1481	51810	12352	500	21750	1844	**33.8**	**42.0**	**14.9**	19942	70669	85055	5429	15827	16371	**27.2**	**22.4**	**19.2**
1992	964	49458	8924	350	22915	1785	**36.3**	**46.3**	**20.0**	17784	65308	82124	5643	17519	16008	**31.7**	**26.8**	**19.5**
1993	1001	50984	8223	412	23344	2019	**41.1**	**45.8**	**24.5**	19016	65285	83638	5453	17728	16508	**28.7**	**27.1**	**19.7**
1994	957	51185	9116	395	23092	2198	**41.3**	**45.1**	**24.1**	19064	65875	83343	4981	18326	17354	**26.1**	**27.8**	**20.8**
1995	838	51211	8802	421	22690	1916	**50.2**	**44.3**	**21.8**	19197	68472	81947	5433	19599	15779	**28.3**	**28.6**	**19.3**
1996	1106	50484	7952	441	22519	1886	**39.9**	**44.6**	**23.7**	19883	73664	83378	5511	20894	16500	**27.7**	**28.4**	**19.8**
1997	1049	50766	7786	401	22828	2013	**38.2**	**45.0**	**25.8**	19990	76671	86508	5784	19706	15806	**28.9**	**25.7**	**18.3**
1998	1029	51318	8628	509	23951	2096	**49.5**	**46.7**	**24.3**	20264	79261	88380	6387	19432	16447	**31.5**	**24.5**	**18.6**

Source : Ministry of Environment (OFEFP/BUWAL), hunting section; my own calculation