

Analysis of game management in the Game Breeding Centres of the Poznań RDSF between 1995 and 2004

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■ **Abstract**

An analysis of the functioning of 15 Game Breeding Centres was performed in the eight forest inspectorates of the Poznań Regional Directorate of State Forests (RDSF) between 1995 and 2004. It comprised a review of the costs and revenues of game management, the numbers of harvested cervids and wild boars, the quality of trophies, as well as the extent of tasks in the area of forest management, protection and utilization. The analysis showed that the Game Breeding Centres in the Poznań RDSF fulfilled, in majority, the tasks ensuing from the Game Law Act. The need for developing the principles of state policy was emphasized. Also, organizational changes were proposed to be introduced to the running of the Game Breeding Centres.

■ **Keywords**

Population, game inventory, age structure, sex ratio, net population increment, game management plans, culling, trophies, game damages, hunting district management

■ **Introduction**

In accordance with the adopted *State Policy on Forests (State Policy on Forests 1998)*, its aim is to preserve, in the changing natural world, conditions for sustainable multifunctionality of forests, their multi-faceted use and the role they play in shaping the natural environment.

However, there are frequent conflicts of interests between individual stakeholders. Game management, particularly that carried out in the State Forests Game Breeding Centres (GBCs) is a classical example. Sometimes wild animals pose a threat to the forest when their population increases so much that the food carrying capacity of individual biotopes cannot satisfy their needs without causing economic losses. Therefore, rational game management should keep game population at a level determined by the biological equilibrium of a forest ecosystem. In this way, the 'sustainable use principle' laid down in EU Directives (EU Directive 79/4009 EWG, 1978) is implemented.

The Game Breeding Centres carry out their tasks ensuing from art. 28 of the Game Law Act issued on the 13th of October 1995 (Game Law Act, 1995) ... where, in addition to game shooting, other objectives are implemented, related in particular to:

1. Model management of hunting grounds, implementation of the novel scientific and practical achievements in game management,
2. Carrying out research,
3. Reconstruction of the populations of disappearing species of wild-living animals,
4. Breeding of the native species of game animals for the colonization of hunting grounds,
5. Breeding of game animals particularly useful in forest biocoenoses,
6. Training in game management.

The main part of the paper deals with an analysis of item 1.

■ Materials and methods

There are 15 Game Breeding Centres (GBCs) operating in the territory of eight forest inspectorates under the Poznań Regional Directorate of State Forests (RDSF) (Table 1). The area of these game hunting districts totals 92,362 ha or 3.6% of all the game hunting districts' area in the territory of the Poznań RDSF. The forests and forestland in the Game Breeding Centres extend over 34,643 hectares (37.5%).

The research included:

- analysis of game management on the basis of the approved Annual Game Management Plans, Long-Term Game Breeding Plans and Trophy Assessment Reports;
- cost/revenue analysis of game management as an auxiliary activity on the basis of forest inspectorates' reports;
- determination of the actual extent of material tasks in forest management. forest protection and forest utilization significantly impacted by game populations – on the basis of implementation of economic recommendations;
- costs analysis of forest management and protection taking into account the impact of game on those areas of activity – on the basis of forest inspectorates' documents (SILP reports and others).

The first stage – game management analysis – extends over 10 years that is from 1995 to 2004. The remaining stages comprise analyses covering the past 5 years.

TABLE 1
Areas and categories of Game Breeding Centres – Poznań RDSF as of 31.03.2004

Forest inspectorate	No. of game hunting district	Type of game hunting district	Category of game hunting district	Area (ha)		Forest Inspectorate's area (ha)	Percent of Forest Inspectorate's total area
				Total	Forests and forestland		
Góra Śląska	DO 071	field	very poor	4095	166		17.6
Góra Śląska	DO 064	forest	average	4362	2065	22391	18.9
Góra Śląska	DO 070	field	average	5005	2140		21.5
Grodzisk	WI 227	forest	poor	3170	2442	22359	18.8
Karczma Bor.	WI 446	field	poor	4917	549	12739	36.8
Karczma Bor.	WI 447	forest	average	4340	2153		31.5
Krotoszyn	WI 474	field	average	11895	4115	19325	60.4
Krotoszyn	WI 473	forest	average	7288	4686		36.4
Łopuchówko	WI 177	forest	average	9970	4001	25803	37.2
Piaski	WI 483	field	poor	8059	713		37.5
Piaski	WI 480	field	average	5467	951	19754	26.3
Piaski	WI 482	field	average	4150	1060		19.0
Przedborów	LO 090	field	poor	8760	2565	24790	34.5
Przedborów	LO 094	field	poor	8680	3375		33.8
Włoszakowice	WI 441	forest	average	6480	3662	13557	43.1
TOTAL				92 362	34 643		

Source: Annual Game Management Plans, GBC, Poznań RDSF

■ Results and discussion

Optimization of big game population management taking into consideration the need to preserve the necessary equilibrium between wild animals and their environment, as well as the obtainable economic effects should be based on the correct assessment of their number. Any forecasts related to population behaviour without specifying its number before the breeding season is impossible.

The results of game inventory in practically all game hunting districts were based on the so called "full year's observations". The only exception was roe deer the number of which was determined in recent years by the drive census method. In many cases the graphic presentation of inventory levels for the three cervid species (expressed in the number of specimens) over the past 10 years indicates abundance changes year to year. Phenomena of this type occur very rarely in nature. While this can be explained in the case of roe deer

(possible effect of the changed inventory method and the real decline in the number of this species), the inventory results for the red deer and fallow deer populations are hard to accept as fully reliable. The above mentioned, generally known roe deer population decline in the Grodzisk, Łopuchówko and Przedborów Forest Inspectorates in the 1990s, is not explicitly confirmed in the inventory results in other inspectorates. It means that the results obtained by the “full year’s observation” method based on the subjective assessment by hunters and, frequently dependent on the possibility of implementation of culling plans, as well as on the forest condition, are burdened with a gross error. Therefore, the calculated density of cervids, which affects the functioning of individual populations ranging from 29 to over 144 specimens per 1000 hectares of forest, may be untrue. It is likely that the extent of error was due to the obligatory inventory method counting the field ecotype of roe deer and the forest one together. In the case of a small forested area, cervid density referred to such an area is not true.

Density of individual big game species depends on many factors, such as current policy related to the planning and implementation of game harvest, feeding and protection conditions on hunting grounds, climate conditions, co-occurrence of other animals, predation, occurrence of parasites, poaching, diseases, and others. Too small game density is economically unprofitable, while excessive game density threatens its biotope and specimen quality. Therefore, attempts should be at an optimum density.

Inventory is also the main source of determining other elements characterizing individual population dynamics (Table 2), like sex structure, net population increment and mortality (cullings and natural losses).

TABLE 2
Characteristics of cervid population dynamics in GBCs – RDLP Poznań in the years 1995–2004

Population characteristics	Red deer	Fallow deer	Roe deer
Sex structure	1:0.6–1:3.2	1:0.9–1:3.4	1:1.1–1:2.3
Net population increment	60%	60%	43–79%
Culling plans expressed in the per cent of the population status	23–60%	7–55%	4–46%
♂	19–53%	26–50%	28–48%
♀	33–65%	33–59%	40–68%
●	8–30%	10–33%	6–16%
Fulfilment of culling plans in per cent	14–150%	20–121%	46–111%
♂	11–82%	20–66%	22–96%
♀	17–100%	17–100%	11–56%
●	5–45%	9–50%	2–23%
Fulfilment of the culling plan expressed in the per cent of the population status before the hunting period	4–55%	2–27%	3–34%

Source: Annual Game Management Plans, Game Breeding Centres, Poznań RDSF

The above population parameters significantly deviate from the benchmarks quoted in the *Rules of game population management in the breeding centres of the Poznań Regional Directorate of State Forests (Zasady, 2001)*.

The net population increment in all the Game Breeding Centres of the Poznań RDSF averaged 60% of the spring number of females. In reality, net population increment is not a constant value, but undergoes oscillations. The recurring error at the stage of calculating the size of the red deer population usually deriving from underestimation (*in minus*), a nearly regular withdrawal from the set culling plans, particularly in the case of hinds and calves, as well as the often applied too-low net population increment ratio may cause an increase in the size of red deer populations in the entire area. Overestimated reproduction adopted for roe deer populations at the game management planning stage results in a deliberate reduction of the size of this population provided the culling plan is fully fulfilled.

The compared inventory levels for wild boars during the study period of ten years in all game hunting districts show their population increase. According to the documentation the net population increment for wild boars amounted to 72–100% of the spring number of their population. The cullings were planned at 65–156% of its spring status. The fulfilment of the culling plan ranged from 50% to 200%. The kills expressed in the percent of the population status before the hunting season oscillates from 22% to 133%. Except for the Łopuchówko and Włoszakowice Forest Inspectorates, the harvest structure is incorrect. Piglets represent an insufficient percentage in the culls made (minimum share of 20%), while the share of yearlings and older boars is too large (maximum 58% and 57%, respectively).

The adequate game control is the basis for correct game management. By culling we decide about the number of game animals and the quality of its population. Analysis of the level of fulfilment of the culling plans for roe deer, red deer and fallow deer in all the Game Breeding Centres of the Poznań RDSF shows that in most cases the annual culling plans were not fulfilled (79.5%), although there were cases of the plans being surpassed (6.62%). Merely 13.88% of the plans were fulfilled in full (100%). Both cases are reprehensible and should not have happened. Incorrect planning in terms of the number of game animals and harvest structure, plan implementation focused on the production of cervid males, as well as excessive exploitation of medium age-class boars are responsible for further deterioration of the age and sex structure of the majority of boar populations. This in turn results in a decline in the reproductive growth, and trophy quality deterioration.

The marked surpassing of the planned boar culling plans – 51.02% of the Annual Game Management Plans draws our particular attention. This may be the result of an underestimation of the size of individual populations, inadequate culling planning, or assuming incorrect reproductive growth. Irregular seed years of the heavy seeded species of beech and oak and the ongoing changes in farming (seeding structure. e.g. corn) must have had a significant effect on the increased reproduction growth.

The fulfilment of game harvest plans depends on two factors: culling and registered “losses”. The observed development of road infrastructure, particularly in recent years, causes another threat to hunting grounds. For the species occupying large territories, habitat fragmentation and isolation not only limit the possibilities of free roaming, but also contribute to their higher mortality rate on roads. This is a new phenomenon which increases year to year (Jędrzejewski *at al.*, 2004).

The number of “losses” in some game hunting districts is very high. A small number of males and a very large number of females and juveniles, arouse doubts. It should be mentioned that the percentage of harvested stags and bucks is always higher compared with hinds, does and juveniles. Taking into consideration the “losses”, the number of harvested game compared to that planned for culling in the Annual Game Management Plans show a marked increase.

The performed analysis of annualised harvest intensity over the ten years of management in the Game Breeding Centres enables creation of a ranking list for the game hunting districts. Taking into consideration a significant share of the forested area of the game hunting districts exposed to damage from game, the highest game harvest intensity exceeding 16 red deer equivalents per 1000 hectares was noted in the Łopuchówko Forest Inspectorate and a slightly smaller intensity (over 14 individuals/1000 ha) in the Krotoszyn Forest Inspectorate. In the case of boars, the highest annualised harvest intensity exceeding 45 individuals/1000 hectares was reported in the Łopuchówko Forest District Figs 1 and 2).

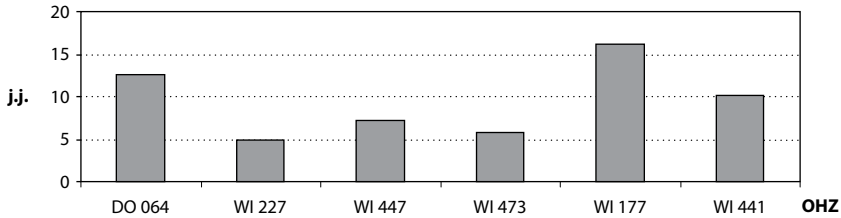


FIG.1. Annual-average intensity of harvesting cervids expressed in the number of individuals per 1000 hectares in the Game Breeding Centres, Poznań RDSF (forest hunting districts) between 1995 and 2004. For explanations see Table 1.

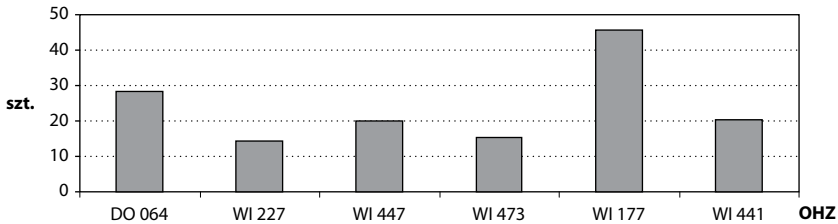


FIG.2. Annual-average intensity of harvesting wild boars expressed in the number of individuals per 1000 hectares in the Game Breeding Centres, Poznań RDSF (forest hunting districts) between 1995 and 2004. For explanations see Table 1.

A compensation for game breeding and protection efforts is the possibility of culling by hunters. The main focus of the Game Breeding Centres is on offering game shooting opportunities to foreign hunters. It is them in the first place who harvests deer males, usually through individual hunts. Their trophies bring the State Forests NFH concrete revenues.

In the majority of game hunting districts, deer males harvested in the period under study did not follow the binding rules. Small deviations occurred already at the planning stage. Unfortunately, gross errors could not have been avoided during culling. Young individuals were killed thus increasing the structural deficiencies in the populations of both red deer and fallow deer. This may have been partially due to the earlier management practices when the 1st and 2nd age-class stags were harvested instead of older individuals. Mature specimens were shot usually by chance.

For a population to develop, grow older and stabilize, it is necessary to seasonally reduce the number of kills in the whole stag pool at the expense of a total reduction of red deer culling, or increased culling of calves. This requires persistent efforts in the entire breeding area. It will probably reduce the financial result of game management during that time, yet positive effects of such efforts will enable the harvesting of stags in higher age-classes in the near future.

Difficulties with correct planning of red deer stag culling in accordance with the *Population Management Rules*, recommending shooting 50% of the 1st age class specimens, 30% of the 2nd age class specimens and 20% of the 3rd age class specimens in all game hunting districts and lack of the possibility to fulfil such a plan indicate occurrence of “*unstabilized populations*” in the Game Breeding Centres. The indicators quoted in the *Rules* concerning breeding areas refer to *unstabilized populations**. The efforts made in the period under study may be considered an attempt at the stabilization of the red deer population.

Also a high percentage of shootings made by foreign hunters not in accordance with the binding individual selection criteria (15.2%) elicit concerns. Shooting young, prospective specimens, such as six pointers in a group of high-body-mass roe bucks sometimes assessed as correct cull, red deer stags in the 1st and 2nd age class with crowns on both antlers, or palm bearing fallow deer bucks in the 2nd age class should be considered reprehensible. To improve the situation, in those hunting districts where conditions are favourable, red deer and fallow deer males should be culled only during individual hunts, while females and calves should be shot in collective hunting, using shooting platforms providing the possibility of selection principles, concurrently maintaining a relative quiet in the hunting ground.

The analysis of trophy weight does not permit drawing definite conclusions concerning the effect of the application of selection principles on the growth of trophy weight.

Many trophies with parameters qualifying them for medals were carried away from the hunting grounds of the Poznań RDSF Game Breeding Centres without any evaluation whatsoever. Assessment of medal-class trophies, particularly those harvested in the State Forests breeding centres should be obligatory.

Photographic documentation – an archive of all trophies harvested in the Game Breeding Centres by foreign hunters created after trophy preparation, as well as photographs of not prepared trophies harvested by home hunters would eliminate any doubts concerning the correctness of culling and trophy evaluation. It would also document the results of the selection-breeding activity in the population of cervids.

* Stabilized population – a population model which in defined environmental conditions has the number of individuals, as well as the age and sex structure optimal for a given species and which in its shape is close to the population living in natural conditions.

There are no records whatsoever about the culling of large medal-class wild boars. All tusks harvested in the State Forests Game Breeding Centres from fully-grown wild boars weighing over 80 kilograms should be obligatorily presented for evaluation.

The average body weight of red deer, fallow deer, roe deer and wild boars harvested in individual game hunting districts is highly diversified. This is probably due to the presence of young specimens in the culling, as well due to the intensive harvest of younger age-class males. On a country scale, the body weight of specimens harvested in the State Forests Game Breeding Centres increases year to year. In the Poznań RDSF "Centres", this tendency does not occur in any of the game hunting districts.

The average weight of wild boar carcasses in the period under study (5 seasons) ranging from 33.4 kg to 46.9 kg in the game hunting districts ruled by the same *Management Rules*, points to some essential differences in the harvesting of this species by age group between Forest Inspectorates. The average weight exceeding 35 kg was reported in no more than three game hunting districts. In seven districts the average weight exceeded 40 kg. Practically, all the game hunting districts should immediately and decidedly increase the culling of piglets and reduce the harvest of yearlings. This may be difficult particularly in the game hunting districts harvesting small numbers of wild boars during one season. Attempts at damage reduction frequently induce culling of game individuals regardless of their age or weight.

A marked growth in the population size of foxes observed over the past ten years, as well as a growing number of confirmed cases of fox attacks at roe deer fawns have necessitated analysis of the fox inventory results year after year and the fox harvest ratio (per 1000 ha). Both parameters were compared for the "Centres" where a roe deer population decline was reported. Both, the inventory and culling data shown in the Annual Game Management Plans elicit doubts (too low). The roe deer population behaviour can, in part, be linked to the insufficiently controlled growing population of foxes.

Depending on the environment quality evaluation including factors such as the existing nutrient base, vegetation cover and the pressure deriving from human activity causing disturbance on the hunting ground, actions should be taken to improve the game dwelling conditions. Game management as an auxiliary activity must always be subordinated to the core activity – timber production – carried out in the framework of silviculture.

Not long ago forest management was based on a clear cutting system. After regeneration, the large, insulated clear cut areas were covered with thick herbal and grassy vegetation. This plentiful feeding base underwent changes with the growing stands entering subsequent development stages. Recent years have seen a decline in the number and area of clear cuts. The stand conversion program introduces still new cutting series. The incurred silviculture costs entail necessary fencing works. Proper management of hunting grounds aimed at enriching the natural feeding base in the forest and providing appropriate land for the cultivation of attractive agricultural plants derives from the necessity to balance the requirements of silviculture with the need to ensure optimal habitat conditions for the game living there.

The shown area of the browsing plots providing growing food for game, as well as the area of managed mid-forest meadows is, including the area of game hunting districts, absolutely insufficient (in some game hunting districts it shrinks year in year out). How regretful – the managed meadows and pastures could in part compensate for the lack of

browsing plots. Many areas recently selected for afforestation (in the framework of forest cover augmentation) could be good mid-forest or nearby-forest meadows, if only necessary works were performed, such as renovation or reclamation, adequate fertilization and liming or obligatory mowing. A good fodder can thus be obtained, like hay for winter feeding, concurrently preserving managed meadows – wonderful feeding grounds producing insolated food for most part of the year, thus retaining game in the forest. Mid-forest meadows should represent 2%-5% of the forest area in forest ecosystems (Halls, 1973; after Bobek *at al.*, 1984). In eight game hunting districts, the area of browsing sites and meadows shown in the Annual Game Management Plans as of 31.03.2004 can be considered sufficient. In the remaining seven districts, it is too small.

The number and length of buffer strips, certainly reducing the damage caused to crops, seem to be insufficient. This results from the continued high level of agriculture damage. It is the level of damage that should decide about the number of buffer strips, their length, frequency felling rotation, seeding density and the amount of put out fodder. In the framework of “summer supplementary feeding” of wild boars, the location of buffer strips and the regularity of supplementary feeding are very important.

The existing natural food resource and the proper management of hunting grounds should be sufficient for the dwelling game in all seasons.

During the growing season, game selects natural food in the appropriate amount and of the appropriate quality. The situation differs during winter, when the temperature drops down to very low and the ground is covered with a thick layer of snow. Then, access to forest floor vegetation is difficult and poor habitats are devoid of shrub shoots or undergrowth.

To supplement the food resource when natural food is scarce, forest inspectorates are obliged to feed game in winter as prescribed in art. 13 of the Game Low Act. As this may essentially reduce damage caused by game, rational feeding of wild animals in the Game Breeding Centres is necessary.

However, attention should be drawn to the right proportions between different kinds of feed offered to animals. Fresh fodder should represent the highest percentage, followed by dry fodder and then by concentrated fodder.

According to these indicators, the amount of dry fodder per the number of game inventoried on 31 March 2004 in all game hunting districts is insufficient. The situation of feeding game with concentrated fodders looks better. In 12 game hunting districts, the amounts of put out fodder comply with the recommendations, while in 3 districts, they are insufficient.

The amount of fresh fodder for supplementary feeding of game needs re-analyzing. Practically, the assumed amount for feeding one specimen of game in winter is 100 kg for the red deer, 20–25 kg for the roe deer and 50 kg for the wild boar (Paślowski, 1956). Analysing the game inventory levels in 6 game hunting districts in 2004, the amount of fresh fodder for feeding game was lower than prescribed. Fodder should be put out not earlier than at the end of the winter or in early spring not to cause indigestion in game changing to soft natural food. Taking into consideration the climatic conditions in which fodder is stored and distributed to game, attention should be paid to the risk of its becoming frozen and the possible consequences of that. Therefore, proper care with which fodder is stored, as well as the manner and time of its distribution are very important.

Places preferred by game, particularly in spring time, should be excluded from tending treatments, leaving them to natural succession. Cleaning and thinning mainly of the 2nd age-class stands should be a source of fresh bark for game during winter.

The need for stand conversion, being the result of the administration's errors in forest management, including game management, the establishing of chestnut, oak and beech strip afforestations along forest roads, the introduction of underwood, preferably spruce, providing water to game in hunting grounds all year round, are examples of actions that should be obligatory in the Game Breeding Centres. All these issues should be taken into consideration in the phase of subsequent revisions of the forest management plans.

To enable rational management of red deer sub-populations in areas beyond the boundaries of each game hunting district, breeding areas were established. Long-Term Game Breeding Plans were developed for all these areas, in force since 1997, which took into consideration the population size in 1997 and the target population size in 2007, as well as the net population increment accomplished and the average annual harvest. The above mentioned incorrect, usually underrated inventory results, burdened with a gross error, assuming too low target levels, particularly for cervid species, the partial failure to fulfil culling plans, as well as the high differences between annual plans and the assumptions to Long-Term Breeding Plans for which annual plans should be component elements, were the reasons for putting to doubt the content-related value of these documents.

Changes in the environment mainly induced by human activity have deregulated the fixed, sophisticated dependencies between nature elements. The issue of damage from game has gained economic importance. It is a valid element in the functioning of the State Forests "Centres". In the Forest Inspectorates carrying out more intensive game management (Krotoszyn, Łopuchówko, Góra Śląska), comparing ratings for 2- and 5-year old plantations within the boundaries of a "Centre" with an average rating for similar plantations within the entire Forest Inspectorate points to a significant impact of this management on the quality of young plantations and, consequently, on the quality of future stands. As a result of the relatively low crop ratings in the territory of Game Breeding Centres, the overall rating of crops in these Forest Inspectorates is lower than the average rating for the entire territory of the Poznań RDSF.

Reports "*Evaluation of damage to plantations, thickets and older stands caused by game*" should each time be analyzed in the context of game inventory results. The largest extent of damage to young plantations and thickets (except for damage less severe for economy – up to 20%) is reported in the Góra Śląska, Krotoszyn, Łopuchówko and Przedborów (thickets) Forest Inspectorates. Annual observations of damage from animals and cervid population dynamics should be performed in an objective manner (Borkowski, 2001). The description of damage changes gives an answer to the question: "Will the current status of damage or, in other words, will the actions undertaken in the area of forest protection from game, hunting ground management and culling policy enable the forester to fulfil the set silviculture target."

Liberalization of the principles governing the evaluation of damage caused by game resulting from the new Forest Protection Instruction 2004, has not resulted in a significant damage decline in most of the Forest Inspectorates. This means that in some Forest Inspectorates damage has increased.

An attempt to determine the dependence between the extent of damage to young plantations and thickets and cervid density in the Poznań RDSF Game Breeding Centres

in the period under review has failed, as no clear correlation between those parameters have been found.

The same results have been obtained by comparing the impact of the size of areas protected against game on the extent of damage to young plantations and thickets. The analysis, however, has failed to find a clear correlation between those parameters in the Forest Inspectorates under review.

On the other hand, an analysis of damage to agriculture shows high diversity in the paid average value of 1 hectare of reduced area. Therefore, it is very important for Forest Inspectorates to prevent such damage. Properly established and distributed “buffer strips” and areas of supplementary feeding of game, as well as adequate cooperation with landowners or neighbouring hunting clubs in damage reduction may be very helpful.

The amount of costs incurred by Forest Inspectorates on forest protection against damage from animals (except for the Przedborów and Włoszakowice Forest Inspectorates) is not proportional to the number of harvested game, the conditions of young plantations and thickets, and the costs related to the fulfilment of silviculture tasks for which game was a significant source (fill planting, supplementary planting). The application of some protection methods should be subject to a thorough analysis, particularly in the context of expended cost amounts (chemical and mechanical treatments). The area of protected plantations in the period under review was reduced (7 Forest Inspectorates). Proportional reduction was observed in the costs incurred for forest protection against game (7 Forest Inspectorates).

The quality and methods of fencing forest young plantations, the selection and the forms of mixing species on regenerated areas, the increased number of plants per hectare resulting from the updating of Silviculture Rules, as well as the proper placement and amount of browsing trees might contribute to the reduction of expenses in the silviculture field.

The cost/revenue analysis performed in the Centres for the period 2000 – 2004 shows worrisome differences in individual item groups in the Centres, particularly as concerns costs. The high costs of organizing hunts compared with the marginal spending on the improvement of game habitat conditions, the low hunting district management costs, the not so high spendings for supplementary feeding of game and the quite high amounts paid in compensations for damage from animals, call for the introduction of radical corrections as concerns the proportion of the spent money. The performed 5-year analysis of game hunting district management costs per 1 hectare supports this opinion. The findings indicate that these outlays are one of the lowest in Poland. On the other hand, the costs of organizing a hunt per piece of harvested big game are one of the highest in the country.

The amount of generated revenues depends in the first place on the extent of interest of foreign and home hunters in the offer, then on the possibilities of satisfying their needs and the situation prevailing on the domestic and international meat markets. So, the possibilities to significantly increase revenues in Forest Inspectorates are rather limited.

A detailed analysis of the game management results shows that only one Game Breeding Centre – WI 227 in the Grodzisk Forest Inspectorate has, over the past five years, generated losses. In the remaining Centres, negative results have been sporadic.

Being concerned about the good game management result, particularly in the game hunting districts with large meadow areas, attempts should be continued to restock the

game hunting districts with some small game species, as an alternative to a more sophisticated big game management in the State Forests Game Breeding Centres.

By reviewing game management in the Game Breeding Centres in the territory of the Poznań RDSF it is impossible not to deal with its impact on the functioning of Natura 2000. Therefore, already at the conceptual stage of protection planning, attention should be drawn to the provision concerning game harvesting limitations. This is particularly important for the following reason: if some area has so far preserved its nature's values qualifying it for being included in the network of "normal use" terrains, this means that the recent method of game management has complied with the interests and requirements of nature conservation (Perzanowska J., Makomaska-Juchniewicz M., 2003; after Makomaska-Juchniewicz M. and Tworek S., 2003).

Game population management in the State Forests NFH, specifically in the State Forests Game Breeding Centres, in line with the quite rigid regulations, norms and directives, is extremely complicated and not easy. This result from the fact that nobody has so far determined explicitly and in detail the targets which game management should fulfil in the multifunctional forest management model. This is linked to the need to develop *a long-term game management state policy. Absence of such a policy, combined with frequent changes in the short-term game management assumptions (mainly by the State Forests NFH management) elicits serious difficulties in the long-term game management planning* (Dzięciołowski, 2001).

Analysis of the ten-year activity of the Game Management Centres should give an answer to the main question: Did those Centres fully fulfil the goals resulting from art 28 of the *Game Law Act*?

In most of the game hunting districts, the Forest Inspectorates carried out the set goals. However, not in all of them they were fully fulfilled. Among many reasons, the main ones are the following:

- who and how were the game management districts turned into the Game Management Centres operated before,
- number of game animals at the moment of establishing the Game Breeding Centres,
- diversified environmental conditions in the game hunting districts,
- the manner of game management in the game hunting districts neighbouring the Game Breeding Centres,
- the level of knowledge, experience and involvement of the State Forests Administration.

Summarizing the activity of the Centres focussed on the fulfilment of the tasks resulting from art. 28 item 1 of the *Act*, such as *carrying out model game management, implementation of the new scientific and practical achievements in game management*, it should be strongly emphasized that a hunt associated with game harvesting is not the leading goal, as ***hunting should be the means to generate funds to fulfil all the other functions for which the Game Breeding Centres have been called into being*** (art. 28 section 2. items 2–6 of the *Game Law Act*), including:

- **Research carried out in the Game Breeding Centres by different scientific organizations** from across Poland. Their research scope is very broad and the subjects pursued there are essential not only for game management. The results will

- be applied in the broadly understood forest management carried out by Forest Inspectorates.
- **Reconstruction of the populations of disappearing wild animal species** requires considerable financial outlays. Therefore, it can be pursued in the State Forests Centres. Introduction of the fallow deer, stocking of hunting grounds with pheasants and reintroduction of partridges are carried out under scientific supervision – these are very positive examples of implementation of the provisions of art. 28 of the Act.
 - **Breeding of native game animal species for colonization of hunting grounds** is carried out only in the Przedborów Forest Inspectorate. Pen breeding of hares under natural conditions has been continued since 2004. The first caught hares were reintroduced to the hunting ground in 2005. At the same time cage breeding of hares by the “Czech method” was started.
 - **Breeding of game animals particularly useful in forest biocoenoses.** The wild boar is foresters’ ally. Wild boar populations in individual Forest Inspectorates with Game Breeding Centres are preserved at the required level guaranteeing continued utilization of this species and damage is maintained at a level which guarantees that the current population density is tolerated.
 - **Training in game management.**

The State Forests Game Breeding Centres organized in the period under review many training courses for both the State Forests NFH staff and the persons not associated with forests. The training embraced a broad range of subjects related to the implementation of the latest achievements in game management science and practice, particularly management in the game hunting districts, game inventory and correct hunting practices, with the preservation of the old game shooting traditions and customs.

In view of the above, fulfilment of the other functions ensuing from the provisions of the Act by the Poznań RDSF Game Breeding centres should be rated positive.

■ Conclusions

1. The long-term management planning in the Game Breeding Centres requires a clear-cut definition of the state policy, particularly of the State Forests NFH, in the area of game management in the binding multifunctional forest management model.
2. One Forest Inspectorate – one Game Breeding Centre. Recent functioning of 15 Game Breeding Centres based on 15 game hunting districts can and should be simplified by combining two or three neighbouring game management districts into one. As a result, there will be eight game breeding centres, one in each of the eight Poznań RDSF Game Breeding Centres (in accordance with the provision of § 1 item 2 of *Directive no. 54 DG LP dated 03.11.1998*).
3. Taking into consideration the instability of farming and its significant impact (in the case of damage occurrence) on game management in the State Forests game hunting districts, as well as the period necessary for the improvement of the functioning of structures in big game populations, evaluation (including financial) of game management in individual Game Breeding Centres in Forest Inspectorates

- should be performed at 5-year intervals like in the case of the planned inspections by Forest Inspectorates resulting from the period of validity of the Forest Management Plan.
4. Head Foresters should be provided with effective tools enabling efficient game management through:
 - adaptation of the *Sectoral Plan of Accounts* to the needs of current game management analytics;
 - simplification and improvement of the game management application enabling its use in the State Forests IT System offering huge possibilities in the area of data gathering;
 - improvement of the HUNTER program (or creation of a similar one) with a well developed economic section to the extent enabling periodical economic analyses;
 - incorporating to a broader extent the game management needs in the Game Breeding Centres into the forest management plans.

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■ Streszczenie (Summary)

Analiza gospodarki łowieckiej w ośrodkach hodowli zwierzyny Regionalnej Dyrekcji Lasów Państwowych w Poznaniu w latach 1995–2004

Prowadzenie gospodarki łowieckiej w ośrodkach hodowli zwierzyny napotyka na bardzo poważne trudności. Elementami wyróżniającymi tę gospodarkę są: uzyskiwany corocznie wynik gospodarowania w danym obwodzie oraz realizacja celów wynikających z art. 28 Ustawy z 13 października 1995 r. Prawo łowieckie.

Gospodarka łowiecka w dzisiejszych uwarunkowaniach jest tylko działalnością uboczną w leśnictwie, co oznacza, że musi być podporządkowana celom gospodarki leśnej. Przy takim modelu gospodarowania obowiązkiem leśników jest minimalizowanie kosztów oraz maksymalizacja zysków. Jest to zadanie niezwykle trudne, ponieważ ani szkód w lasach, ani w gospodarce rolnej nie można całkowicie wyeliminować. Powstałych w ten sposób strat nie da się zrekomensować przychodami uzyskanymi jedynie z gospodarki łowieckiej.

Próba pełnej analizy gospodarki łowieckiej prowadzonej w ośrodkach hodowli zwierzyny, w ramach działalności ubocznej oraz wpływu tejże gospodarki na działalność podstawową, pozwala ją ocenić w poszczególnych nadleśnictwach w aspekcie merytorycznym, w pewnym wymiarze ekonomicznym, jak również w zakresie przestrzegania zapisów obowiązującego prawa.

Szczegółowa analiza funkcjonowania ośrodków hodowli zwierzyny w Regionalnej Dyrekcji Lasów Państwowych w Poznaniu wykazuje istotne różnice zarówno pomiędzy nadleśnictwami, jak i pomiędzy poszczególnymi „Ośrodkami” w ramach jednego nadleśnictwa. Główną przyczyną jest konieczność różnego sposobu gospodarowania w obwodach określonych jako polne (8 obwodów) oraz leśne (6 obwodów). Warunki składające się na kategoryzację obwodów, lokujące je w przedziale od obwodu bardzo słabego do obwodów średnich, a także udział powierzchni leśnej ohz w ogólnej powierzchni nadleśnictwa wynoszący od 10,9% do 45,5%, jak również wysoki współczynnik fragmentacji obwodów i związana z nim długość granicy polno-leśnej są kolejnymi przyczynami takiego stanu rzeczy.

Zmiany realiów gospodarczo-kulturowych obserwowane w ostatnich latach w Polsce oraz pojawiające się głosy o konieczności zmian w gospodarce łowieckiej w kontekście gospodarki leśnej wręcz nakazują znaleźć odpowiedzi na pytania: jakie cele stawiane będą przed gospodarką łowiecką, jaka liczebność zwierzyny będzie tolerowana oraz jaki poziom szkód powodowany przez zwierzynę będzie dopuszczalny?

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