

## MORTALITY STRUCTURE OF THE PROTECTED AND STRICTLY PROTECTED WILD ANIMALS FROM VOJVODINA REGION DURING ONE-YEAR PERIOD

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**Summary:** In the research performed during the one-year period from 2011. to 2012., the cause of death of protected and strictly protected wild animals was determined. Animals submitted to necropsy where they were examined and the cause of death was determined: the aim was to find practical solutions to eliminate the causative agents or alleviate their effect. A total of 56 mammals and birds, from 12 different species were submitted for necropsy. Bacteriological, toxicological and chemical investigations from different tissues were performed. The results revealed several major factors that caused the disease including *E. coli* infection, exhaustion and hunger, shooting and pesticide „Furadan“ poisoning. Some seasonal regularity was observed in mortality pattern. In most cases, mortality matrix included human factor.

**Key words:** wild animals, mortality, habitat, poisoning, disease

### Introduction

The Autonomous Province of Vojvodina extends over 21506km<sup>2</sup> and represents one of the largest and rare centers of biodiversity in Europe. However, many animal species are endangered and face extinction.

For centuries, man had changed and adjusted its natural environment for his own practical needs. Nowadays plough lands dominate over the forests, meadows and bog-lands. Due to sudden and complete changes, including the lack of natural environment - habitat, persecution and annoyance of certain species, ecosystems have become depleted and poor. Many species, dominant in the past, have disappeared.

The Law on Nature Protection, Article No. 93 [1] and the Bylaw on declaration and protection of strictly protected wild plants, animals and fungi [2] were recently adopted. By these regulations, veterinary service takes active part in health protection of wild animals, particularly in protected species.

In the paper *causa mortis* of protected and strictly protected wild animals during the one year period from 2011 to 2012 was determined. The aim was to detect and analyze the mortality structure in order to give practical solutions to eliminate the causes or alleviate their effect.

### Material and Methods

The investigations were carried out at the Scientific Veterinary Institute Novi Sad. A total of 56 mammals and birds, belonging to 12 different species including eleven avian and one mammal, were submitted to necropsy. Internal organs were sent for microbiological investigations including bacteriology culture, parasite and virus detection, and chemical including pesticide and toxic trace elements.

### Results and Discussion

The results of investigation are summarized in Table 1.

The death bodies of White Stork (*Ciconia ciconia*) and White-tailed Eagle (*Haliaeetus albicilla*) were found on March 30, 2011 on location forests Potisje (Forests of Kanjiža, sector 16c).

The female stork was older than one year, underweighted and post mortal decomposition was absent (Figure 1). The complete bacteriological examination of stork corpse organs showed the presence of *Escherichia coli*, *Salmonella enteritidis* and *Streptococcus beta hem*. The long exhausting journey before the arrival to the habitat and coligranulomatosis caused death in this migratory bird (Figure 2).

The eagle was female in well preserved and good general condition. It was found in the forest nearby the river Tisa on the ground under a tree with nest (Figure 3). Postmortem examination revealed a sharp fishhook. It was attached firmly to a piece of wire approximately 10 cm long that was tied up to a twine. The soft tissue of the cranial side of gizzard was mechanically deteriorated and in the middle of the gizzard- fundus, there were tiny vertebral particulates, belonging to a prey that was decomposing. The bird died because of mechanical deterioration of the gizzard.

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Figure 1. White Stork.



Figure 2. Coligranulomatous enteritis in the stork.



Figure 3. White-tailed Eagle.

Two swans (*Cygnus olor*) were found on November 11, 2011, on Futog territory on two localities named „Petrovacki kanal“ and bog „Širajak“. The two localities are a permanent habitat and mating area for two different flocks. Since both swans were in the late phase of decomposition, only Avian influenza was tested and found negative.

Table 1. Cause of death/ pathological finding in wild animals submitted for examination.

Species	Number of animals submitted to necropsy	The cause of death/pathological finding
White Stork ( <i>Ciconia ciconia</i> )	1	coligranulomatosis
White-tailed Eagle ( <i>Haliaeetus albicilla</i> )	2	mechanical damage of gizzard poisoning with lead and arsenic
Swan ( <i>Cygnus olor</i> )	4	two undetermined two cachexia gravis (starvation)
Gull ( <i>Larus cachinnans</i> )	32	furadan poisoning (insecticide)
Wild duck ( <i>Anas platyrhynchos</i> )	9	furadan poisoning
Dipper ( <i>Podiceps nigricollis</i> )	1	shooting
Otter ( <i>Lutra lutra</i> )	1	shooting
Eurasian Coot ( <i>Fulica atra</i> )	1	cachexia gravis (starvation)
White Egret ( <i>Ardea alba</i> )	1	cachexia gravis
Grey Egret ( <i>Ardea cinerea</i> )	1	cachexia gravis
Common Buzzard ( <i>Buteo buteo</i> )	2	poisoning with lead and arsenic
Long-eared Owl ( <i>Asio otus</i> )	1	shooting
Total:		
12 species	56	-

In the first half of April 2011, a sudden death of 70 young gulls (*Larus cachinnans*) and numerous wild ducks (*Anas platyrhynchos*) in the wider area of Ludos Lake was recorded. Similar pathological finding was present in both species: the crop, proventriculus and gizzard were filled with red colored corn beans. This finding coincided with the beginning of spring planting so furadan poisoning was suspected and later confirmed (Figure 4, 5, 6). The diagnose was set: alimentary intoxication.



Figure 4. Wild Duck, a male (ahead) and a female (behind).



Figure 5. Wild Duck : upper parts of digestive system filled with corn beans.



Figure 6. Upper line: Coot (left) and Wild Duck; lower line: two Gulls.

In summer, a dipper (*Podiceps nigricollis*) and an otter (*Lutra lutra*) were found dead at the same locality. The small dipper had visible coagulated blood on back feathers. Necropsy showed gunshot wound (*vulnus sclopetarius*) of

small caliber (Figure 7). The other was in well condition. Skin was clearly damaged with a bullet (*vulnus sclopetarius*), most likely of small caliber (Figure 8, 9).



Figure 7. Dipper: gunshot wound in the back.



Figure 8. Otter.



Figure 9. Otter: gunshot wound.

On February 23, 2012 necropsy was performed in two swans: one female approximately one year old and a male several years old, one Eurasian Coot (*Fulica atra*), one White Egret (*Ardea alba*) and one Grey (Blue) Egret (*Ardea cinerea*) (Figure 10,11,12,13). They were all found on a location of Jegrička, near the village Čurug. Heavy snowfalls and extremely low temperatures were recorded at the time and emergency was declared on the territory of Serbia. Necropsy findings were poor. However in all birds some grass fragments, small stones and sand colored with bile in the gizzard and empty intestine were present (Figure 14,15). Due to the hard and extremely long winter, birds most likely starved to death (*Cachexia gravis*).



Figure 10. Swans



Figure 11. Eurasian Coot



Figure 12. Grey Egret



Figure 13. White Egret



Figure 14. Bare content in gizzard of swan



Figure 15. White Egret: hemopericard

On March 7, 2012 on a dump near the river Tamiš at the area of Farkaždin, gamekeeper found female White-tailed Eagle that had died and two Common Buzzards (*Buteo buteo*), a male and a female. According to the gamekeeper, a dog that was half-eaten was found nearby. Small pieces of meat were found in beak of birds so it was speculated that the birds have eaten the dog (Figure 16,17). Both the eagle and the buzzards were in good body condition at the time of death. Toxicological investigation confirmed poisoning with substance based on arsenic and lead (concentrations not presented).



Figure 16. Female White-tailed Eagle



Figure 17. Common Buzzard

Necropsy of the Long-eared Owl (*Asio otus*) submitted on March 26, 2012 from village Stanišić showed gunshot wound in the upper chest region (Figure 18,19).



Figure 18. Long-eared Owl shot in the chest



Figure 19. Gunshot wound in the owl

In the investigation performed in one-year period, the cause of death was determined in submitted birds from eleven avian species and one mammal (otter). The results indicate that hard winter conditions and human factor may play a predominant role in mortality matrix (Table 1). Some seasonal regularity was determined, too. In winter starvation of swans, egrets and coot, occurred due to the long period with temperature below zero, deep snow, and ice on water surface, so the food and its availability was poor. Subsequently emaciation and death occurred that was confirmed by findings on necropsy. In addition, starvation was observed in the spring in migratory birds after their arrival to the habitat. In the case of stork, it surely contributed the outcome along with *E. coli* infection. Gunshot wounds and fatal injuries were also a significant cause of death in birds and otter. Killing fish-eating birds is not rare, particularly if nearby fishponds. Forbidden trapping devices, like hooks specially designed for birds of prey are still used despite of the regulations [1, 2]. More stringent policy and education are needed to minimize such illegal activities and positive actions like recently adopted European guidance document on hunting [3] and the example of Danish action plan to reduce wounding of game by shotgun hunting [4]. Several cases of furadan poisoning are described. Although prohibited this preparation is still used in many field crops to control insect population. The cases of pesticide poisoning in wild birds are documented [5,6]. Moreover, ingestion of pesticide-coated seeds induce increased mortality rate in offspring and in the case of high dose exposure reduced egg size and eggshell thickness [7]. Better control is essential and distribution procedure must be practically organized in such a way that the experts make more participation. High content of heavy metal and toxic trace elements in tissues of wild animals indicate not only health problem, but also wider ecological aspect and possible threat to public health [8, 9]. The data on determined concentrations for heavy metals and toxic trace elements are not presented in this study. Their relevance will be discussed as part of a separate study. Due to the lack of data for heavy metal concentration in tissues from

wild animals, the comparison of concentrations determined in clinical samples was made with those available for food and feed [10]. Avian influenza was not determined in this study (no data presented). Serological monitoring has become routine in our region since the first case recorded [11,12], but no new outbreaks have been reported ever since.

### **Conclusion**

The determined cause of death provided data for analyzing the structure of mortality based on post mortem examination and laboratory testing. Moreover, it was possible to suggest measures to eliminate potential detrimental factors and palliate subsequent effects. According to the analysis of mortality structure of protected and strictly protected wild animals, the relationship between the cause of death and season was established:

1. In the spring birds, including storks, wild ducks and gulls, most frequently suffered because of exhausting migratory flight or poisoning by eating the seed that was treated with furadan.
2. During the summer, most birds and otter were shot on/nearby the water surfaces in search for food. In addition, prohibited fish hook with bait, so called „solitary“ was a weapon for killing birds like it was in case of White-tailed Eagle.
3. In the winter accompanied with extreme weather, „hungry mortality“ was predominant. In this study, mostly migratory birds that remained in this region suffered of hunger and died.
5. It was possible to detect some of the most toxic elements including lead, cadmium, arsenic and mercury in different tissues. Highly indicative was the elevated lead concentration in heart, meat, liver and kidney of one eagle. Moreover, in some samples the level of toxic elements was several times above the permitted. These data need analysis that is more detailed so their relevance could be estimated in the future.

Unfortunately, it can be concluded that human factor directly or collaterally responsible for the death of protected and strictly protected wild animals.

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