

BIOLOGICAL PROTECTION OF THE MILITARY AIRPORT AND ITS POSSIBLE OPTIMIZATION

Jozef Mário JUSKO*, Mária ČECHOVÁ, Ľubomír ŠUŤÁK, Matej ANTOŠKO, Anton KORNIIENKO, Jozef SABO

Department of Flight Training, Faculty of Aeronautics, Technical University of Kosice, 040 01 Kosice, Slovakia

*Corresponding author. E-mail: jozef.mario.jusko@student.tuke.sk

Abstract: Nowadays the importance of air traffic safety is more than ever. One of the basic elements that contribute to safety is the biological protection of the airport. The article aims to describe and explain how the biological protection of the military airport Sliach works. The main aim of protection is to create conditions to reduce the overall risk of bird strike or strike with other animals. It can be reached by the implementation of preventive active or passive methods. The objective of the study was to analyse negative sources which attract all kinds of animals. Based on the findings of the research, we can suggest and implement new methods of deterrence in the airport.

Keywords: air traffic, biological protection, bird strike, deterrence

1. INTRODUCTION

The goal of our research is to clarify the essence of the biological protection of the Sliach military airport and to describe the principle of its operation. It is possible to achieve the goals based on the analysis of ornithological research and ecological analysis of the surrounding area of the airport. The idea of this paper is to create conditions to reduce the overall risk of bird strike or strike with other animals. The based on the following research questions:

- What are the possibilities of applying the ecological protection of Sliach airport?
- What are the effects of biological protection on the ecological situation in the surroundings?
- What are the options to reduce the risk of bird strike?

The first historical mention of the airport Sliach is from the first half 30 years of the 20th century. In 1944 played an important role during the Slovak national uprising. After the war, the airport was used by civilian and military operators. From 1968 it was in holding of the Soviet army until their leaving in 1990. In the present, the main tasks are to continuously secure and defend the air space of Slovakia and train pilots. [1] Biological protection is an important element in securing air traffic safety. Airport covers a huge area, where many factors cause the appearance of birds and animals. In general, we identify factors:

- source of food,
- possibility of nesting,
- agricultural activity near the airport,
- place for rest,
- mirroring airport surfaces.[2]

Biological protection aims to create preconditions for reducing bird strikes and collisions with animals. The main tasks are:

- Early gain of info about birds and animals around the airport and correct evaluation of ornithology situation,
- Applying active and passive methods of deterrence,
- Ornithology and biology research,

- Establishing inner and outer ornithology zones.

An executive component is the biological protection station established as a unit subordinate to the commander of the airport Sliač.[3] The unit has at least 6 persons. Mostly they are dog handlers and falconers. For the execution of their duties is necessary to have falconry, hunting, and firearm licenses. [4]

1.1. Application of biological protection

For proper execution of protection is necessary to apply theory and appropriate procedures for ensure air traffic safety. Preventive methods are essential to avoid potential collisions. A high level of success depends on valid information about ornithology a ecological condition in ornithological zones. During every ornithology observation which includes the range of research, mode, season of the year and used methodology is also conducted qualitative and quantitative research together. Quantitative research is visual form of detection and determination bird species. With binocular is especially observed this part of the airport:

- Paved runway,
- Unpaved (grass) areas of the airport,
- Buildings and its surrounding,
- Other biotope at the airport (forest, bushes and others.),
- Adjacent parts of the airport in the direction of take-off and landing, in the area with the expected increased occurrence of birds up to a height of 1,000 m.

In every season of the year is necessary to do one two-day or two one-day research. The purpose of quantitative research is to find out the numbers of birds in searching locations. The result of ornithology research is in the Species card. It is used as an overview of numbers and species of birds. [3]

Table 1 Species card, Source: own

Species card														
Season		I				II			III					
Date:	2018	7	14	2	28	4	11	1 8	2	4	11	18	25	1
	TYPE	1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Common-Buzzard	1	10	1	10	8	6	8	4	8	6	8	8	10
2.	Rough-egged Buzzard			1				1			1			1
3.	Sparrowhawk								1			1		

1.2. Bird Strike

Airport Sliač or tactical wing Sliač operates with subsonic jet L – 39 Albatros (till 2022 with Mig -29). It is used as air support for army and pilot training. Birds mostly fly from the ground up to circa 5000ft above mean sea level. But the highest concentration is at low altitudes, thus most bird strikes occur in the phase of approach and landing. The reason is that the aircraft is flying at landing configuration and a quick reaction of the pilot to avoid collision is not possible. Critical parts of aircraft are the canopy of fuselage and engines. After the hit of a small bird to the engine, there is mostly a damaged compressor. [4]

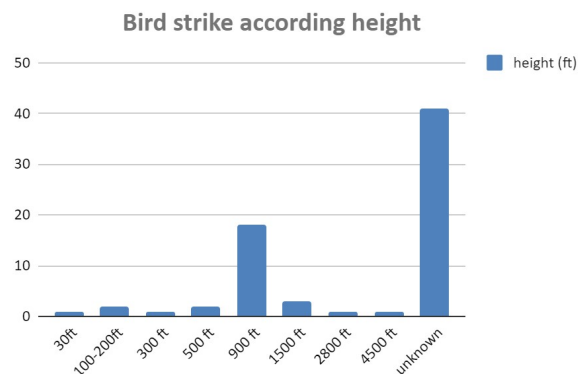


Figure 1. Birds strike according to height. Source:own

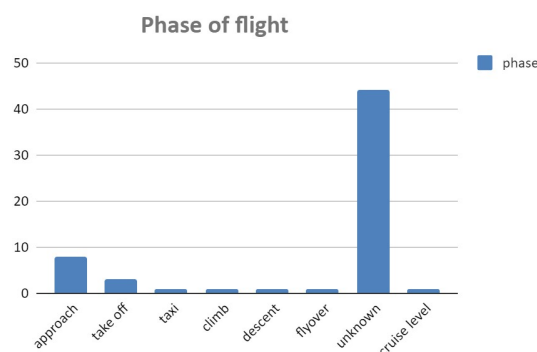


Figure 2. Phase of flight with most bird strikes. Source: own

Statistics show that most bird strikes occurred over the south clearway of the runway. Altitude is between 330ft to 1000ft. According to data from 2006, there were 60 incidents in military service and 12 incidents in general aviation in 2011. From this period there is no evidence of a sudden shutdown of the engine. After processing data, we concluded that the most common height where the bird strike was reported (18 times) was 900 feet. The phase of flight with most bird strikes was unknown but the second was in phase of an approach. The engine or its part was hit in 19 cases. [4]

2. MATERIALS AND METHODS

The objective is to find sources of food which attract birds and animals into airport area. Important is to find conditions which provides birds possibility to gather or to make nest. Also, to specify sources which incite animals for sleepover, build a shelter or hide a cub. Other objective is to identify a role of the airport during flying activity of birds especially in migration season. [3] Airport Sliač is an area with many sources that attracts birds or animals. Those sources are:

- a.) Grange Sliač : located in the centerline of runway. Lot of food sources for birds and animals. Active method is not possible to conduct due to the grange is out inner zone.
- b.) South clearway and taxiways connection: birds crossing taxiways and runway.
- c.) Hron: water birds for whole year.
- d.) Badín Midden and lake: good sources of food.
- e.) Fields: agricultural crops especially corns provide easy source of food for birds and furry animals. The most critical area are middens on south and north of the airport. They are located directly in centreline of the runway. [4]



Figure. 3 Potential animals and birds localization Source:own

The most critical areas are middens on the south and north of the airport. They are located directly in the centerline of the runway. [4]

2.1. Active and passive tools of biological protection of the Sliač airport

Areas where negative factors must be eliminated or limited with using active and passive tools we divide into inner and outer ornithology zone. Inner ornithology zone: rectangle shape, where longitudinal axis is similar as centerline of runway. Width 1000m and length of rectangle exceeds beyond threshold runways about 1000m. [5]



Figure. 4 Inner ornithology zone

Outer ornithology zone: rectangle shape, where longitudinal axis is similar as centerline of runway. Width 2000 m and length of rectangle exceeds beyond threshold runways about 4000m [5].



Figure. 5 Outer ornithology zone Source:own

As instruments of passive biological protection of the airport, we can consider the reduction or prevention of the occurrence of birds and animals in the airport, which is achieved by removing or prohibiting access to the primary source. Those preventive measures are:

- a.) Mowing the grass - implement as soon as possible,
- b.) Adapt flight activities according to the concentration of birds during agricultural work,
- c.) Prohibit the establishment of a municipal waste dump and a wastewater treatment plant,
- d.) Extermination of grass strips,
- e.) Cultivation of neglected places that are covered with vegetation,
- f.) Eliminate pools, marshes, and bodies of water used by waterfowl and wading birds for food.

In inner ornithology zone. Based on measures, which leads to expel or death birds and animals in this area. Using the best method, comes out from individual assessments of ornithology and meteorology situations in desirable area. For active scaring we distinguish these methods:

- a.) Using falcons,
- b.) Bioacoustic scaring,
- c.) Pyrotechnic scaring,
- d.) Shotgun,
- e.) Dogs. [3]

2.2. Possible improvements of biological protection at Sliach airport

To reduce the risk of bird strikes or decrease the population of birds and animals in the airport area, is possible to use other methods and procedures which are not used yet.

Passive methods

Current methods could be supplemented with deratization, disinsection, mowing the grass, and management of the airport surroundings.

- a) Deratization will be useful to remove voles and disinsection is appropriate to dispose of insects.
- b) Mowing must be executed in a very short time. The problematic factor is the height of the grass. It would be suitable to mow grass exactly to 15 cm. In cases where the height is more than 15 cm, falcons have difficulty seeing.
- c) Grange Sliach on the South and grange Badín on the North represent critical parts that have bad impacts on the work of biological protection. Growing crops and biological waste from it, are the main problems, The solution is make an agreement between the airport and granges to seed crops that are not food attractive for birds. If is not possible we suggest amending the agricultural law. [6]

Active methods would be enhanced about system Premier 2020, Scarecrow B.I.R.D. TAB Reporting System and possibility for exercising falcons in the outer ornithological zone.

Active methods

Active methods would be enhanced about system Premier 2020, Scarecrow B.I.R.D. TAB Reporting System and possibility for exercising falcons in outer ornithological zone.

- a.) Premier 2020 is scarecrow's bio-acoustic bird dispersal system. Humane and inoffensive in their function, exploiting natural bird behavior for their success. Emitting distress bio acoustic voice of birds when they are threatened. System is composed of remote control and loudspeaker on the car

b.) Scarecrow B.I.R.D. TAB Reporting System works on similar principle as Premier. In addition, it has integrated several subsystems. It is composed of the tablet, GPS unit, couple of loudspeakers and unit for emitting distress calls. Tablet with GPS unit allows to make full register during scaring or watching. There are created data such as: date, time, place, operator, kind of birds, size of flock, source of attraction, direction of scaring and method what has been used. In some cases we can make a photo report.

c.) Present laws and restrictions allow workers of biological protection use falcons only in inner zone. Amendment of the law to widen area about outer zone would solve the problem. Solutions would bring an increase of safety air traffic as a result of coverage of bigger area with falcons.[7]

3. CONCLUSION

Biological protection of airport Sliac significantly participates on air traffic safety. Protection means to use of various type of passive or active methods to create an inappropriate environment for birds and animals. To do so, is necessary to recognize negative sources in airport areas and beyond airport fences. For this purpose, is conducting ornithology and ecological research to identify negative sources. After analysing data, biological protection worker knows which methods are effective. In general, applies, the best way is the mixture of active methods. The outcome of all procedures should lead to decreasing bird strikes. Data shows, that majority of birds occurs up to 1000 ft. To decrease number of strikes is necessary to applies new methods in passive and active area of protection.

REFERENCES

- [1] Tactical wing general major Otto Smik, Sliac.: *History, mission*. [online]. 2018. Available from <http://lzsliac.mil.sk/23775/>
- [2] Ministry of Defence of Slovak republic.: *S- Let-1-19 -Biological protection of airports*. Trenčín
- [3] Slovak Air Force headquarters of Armed forces of Slovak republic, *Biological protection of airport*, Zvolen, 2014.
- [4] M. Hrabovský: mvdrmarianhrabovsky@gmail.com. Airport Sliac. *Electronic mail*. Message for Jusko J.M.: 7.12.2018 personal communication
- [5] P. Kačmár.P: kacmil@azet. Biological protection of airport. *Electronic mail*. Message for Jusko J.M.: 29.11.2016 personal communication.
- [6] P. Kačmár, M. Hrabovský: Tactical wing Sliac, Sliac, *Experience in the implementation of biological protection*. Personal communication September 1, 2018
- [7] Scarecrow.:Premier 2020.[online]. 2019. Available from <<https://www.scarecrow.eu/premier-2020/>

Received 12, 2023, accepted 12, 2023



Article is licensed under a Creative Commons Attribution 4.0 International License