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COLLISIONS OF THE CZECH AIR FORCES' AIRCRAFT WITH BIRDS DURING 1993-1999.

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Abstract

Our contribution deals with the situation within the Czech Air Force during 1993-1999, it means from the rise of the independent Czech Armed Forces after division of the former Czechoslovakia. Author compares an occurrence of collisions with regard to bird species, daytime and season, velocity and altitude of aircraft, flight phase and the range of damage. According to the short time of research and to the fact that not all collected data were full, this analyse hasn't a universal applicability. However, this study presents some data that are applicable to the last bit and can be useful for pre-flight planning of missions and training flights.

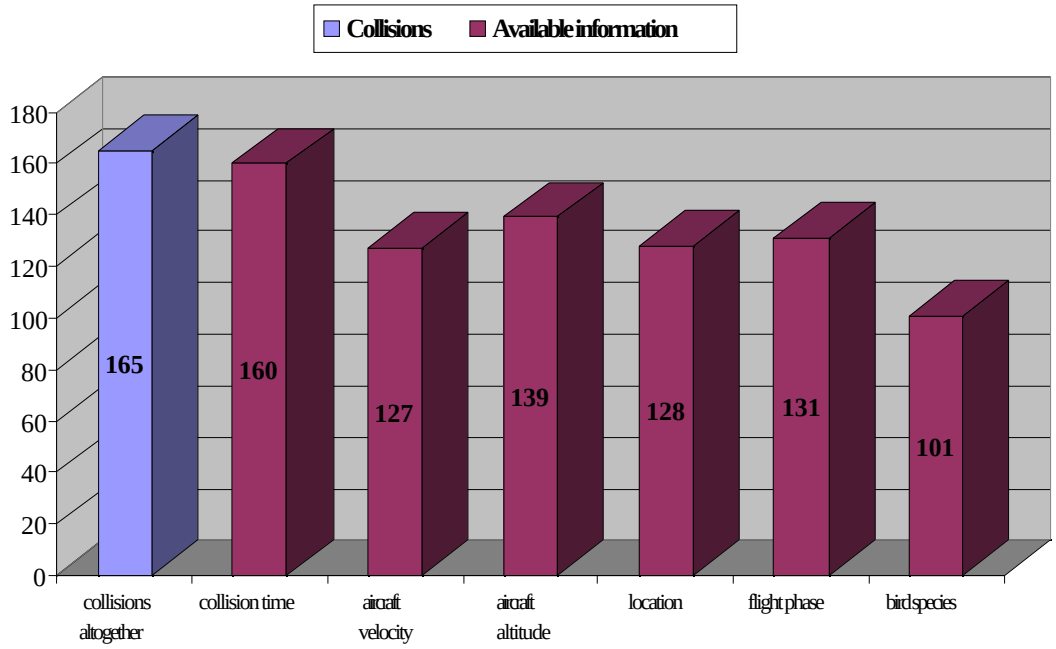
Key Words*:* Avoidance: Pre-flight Planning. Engineering: Helicopter, Engines, Rotors. Bird population***:*** Bird (common name). Statistics: Aircraft (specific type).

Introduction

This contribution compares all known collisions of the Czech Air Force's aircraft with birds, from the origin of the independent Czech Armed Forces in 1993 to the completion of this study in 1999. In the course of this period we have assayed 165 cases altogether. Unfortunately, it hasn't been possible to obtain all needed data due to whether objective or subjective reasons. We have got information:

- on the collision time in 160 cases (97% of all cases),
- on the velocity of aircraft by the collision in 127 cases (77% of all cases),
- on the altitude of aircraft by the collision in 139 cases (84,2% of all cases),
- on location of the collision in 128 cases (77,6% of all cases),
- on the flight phase by the collision in 131 cases (79,4% of all cases),
- on the bird species (identification) in 101 cases (61,2% of all cases).

A list of available data



Within the following chapters we specify an occurrence of collisions with a view to the individual spheres of interest.

Chapter I. Birds participating in collisions - a list of individual species.

With regard to the species of birds and their part in collisions, black-headed gulls, pigeons and swallows (respectively martins) participate equally in the majority of all cases. Kestrels, starlings and swifts compose the next significant group of birds. Looking at the mentioned facts from the point of view of the individual bird species size, we can see that birds of big and middle size are represented approximately at the same level. Consequently, the size obviously isn't the most important factor that determines danger to the frequency of collisions. The big species participate at collisions sporadically according to their less numerousness, but on the other hand these collisions are more dangerous.
The dangerous bird species have some general features of their way of life. They are related to human residences and to airbases at the same time, whether for reason of food (kestrels, gulls) or to build their nests (swallows,

ENGLISH NAME	LATIN NAME	NUMBER OF CASES
Black-headed gull	***Larus ridibundus***	**12**
Swallow or Martin	***Hirundo rustica or Delichon urbica***	**12**
Pigeon	***Columba livia f.domestica /palumbus, oenas/***	**11**
Kestrel	***Falco tinnunculus***	**8**
Starling	***Sturnus vulgaris***	**8**
Swift	***Apus apus***	**8**
Lark	***Alauda arvensis***	**5**
Buzzard	***Buteo buteo***	**5**
Rook	***Corvus frugilegus***	**5**
Horned owl	***Asio otus***	**5**
Turtle-dove	***Streptopelia turtur /decaocto/***	**3**
Teal	***Anas platyrhynchos***	**2**
Owls	***Strigiformes***	**2**
Spotted woodpecker	***Dendrocopos major***	**2**
Bats	***Chiroptera***	**2**
Stork	***Ciconia ciconia***	**1**
Goose	***Anser anser***	**1**
Partridge	***Perdix perdix***	**1**
Lapwing	***Vanellus vanellus***	**1**
Linnet	***Carduelis cannabina***	**1**
Finch	***Fringilla coelebs***	**1**
Wagtails	***Motacillidae***	**1**
Green-finch	***Chloris chloris***	**1**

martins, larks). These species often lead similar lifes in big social comities, colonies or flocks (gulls, starlings), which is profitable to use for active flushing. Considering the fact that a significant number of collisions happen within internal areas of airbases, we have to take above-mentioned factors for fundamental.

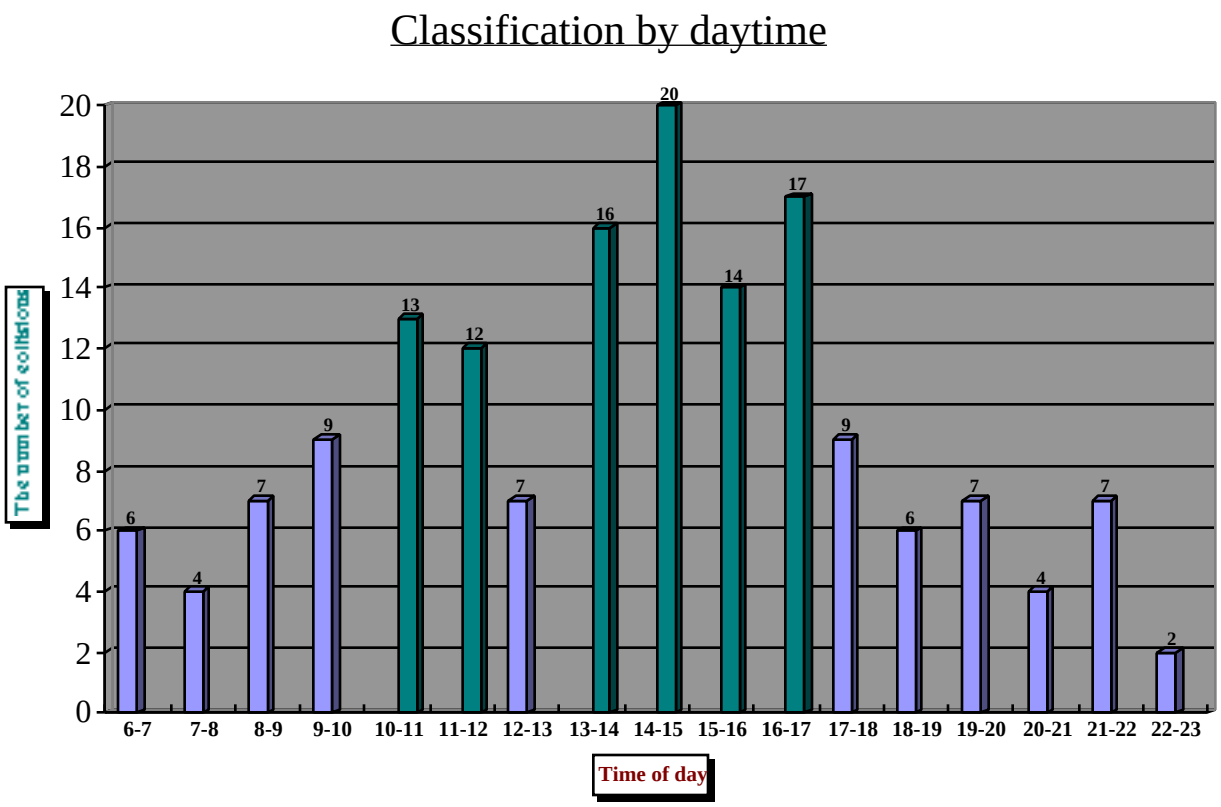
Chapter II. Classification of collisions by months.

The most dangerous season with regard to the risk of collision is the period from May to September, while the biggest frequency of collisions appears in June and August. According to the months change at the same time the bird species that cause most cases change.
From March to June pigeons and turtle-doves are significant species and from June to July gulls and swifts dominate at similar level, while the risk of collision with gulls persist to August. The dominant species of August are without a doubt swallows and martins. During September starlings and buzzards are most often the cause of collisions.

AN "AVERAGE" MONTH WITHIN THE PERIOD 1993-1999	**AN AVERAGE NUMBER OF COLLISIONS WITHIN AN "AVERAGE" MONTH**
JANUARY	0,00
FEBRUARY	0,43
MARCH	1,57
APRIL	1,42
MAY	4,00
JUNE	4,43
JULY	4,00
AUGUST	4,60
SEPTEMBER	4,00
OCTOBER	1,50
NOVEMBER	0,33
DECEMBER	0,17

Chapter III. Classification of collisions by the daytime.

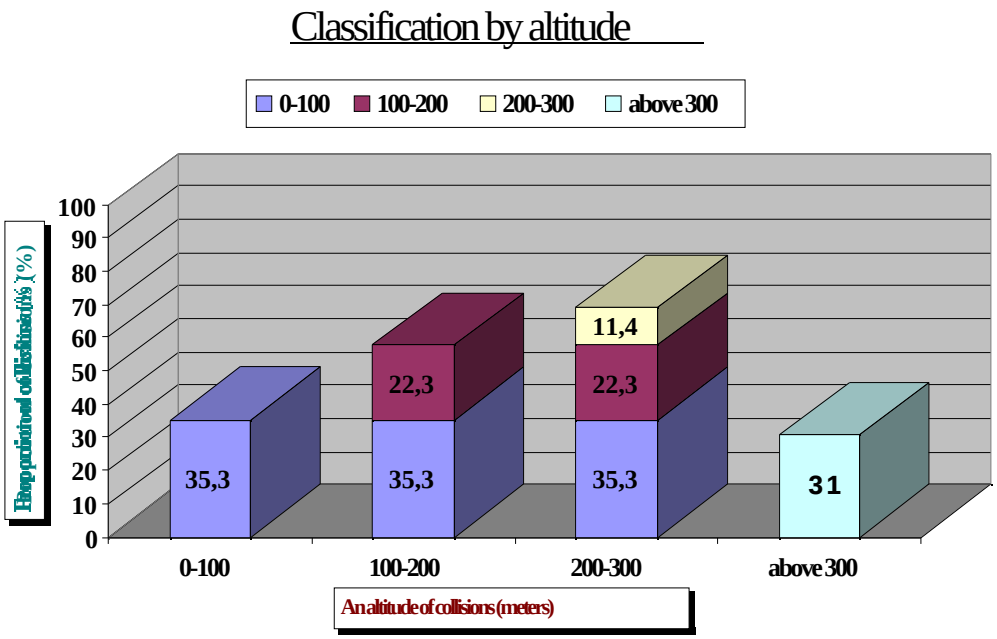
With regard to the daytime, we could evaluate 160 cases. From this number 143 cases (89,4% of all cases) occurred by daylight and 17 collisions (10,6% of all cases) happened in dark (it means more than 30 minutes after the sunset). The following graph shows detailed classification of collisions in single hour intervals:

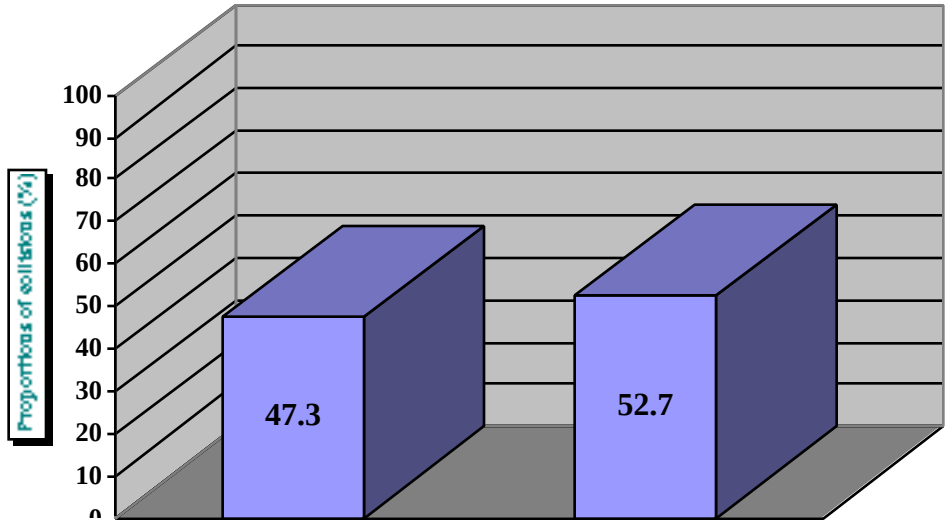


We can see that during a day there are two periods with a higher number of collisions. It is the time between 10-12 a.m. and then between 1-5 p.m. It is likely to discuss, whether these two imaginary peaks are caused by a higher activity of birds or by a more intensive air traffic during these intervals. Unfortunately, we have failed to obtain detailed information on the number of flown hours classified by the daytime. However, mentioned time intervals have to be regarded as the most hazardous periods.

Chapter IV. Classification of collisions by the altitude.

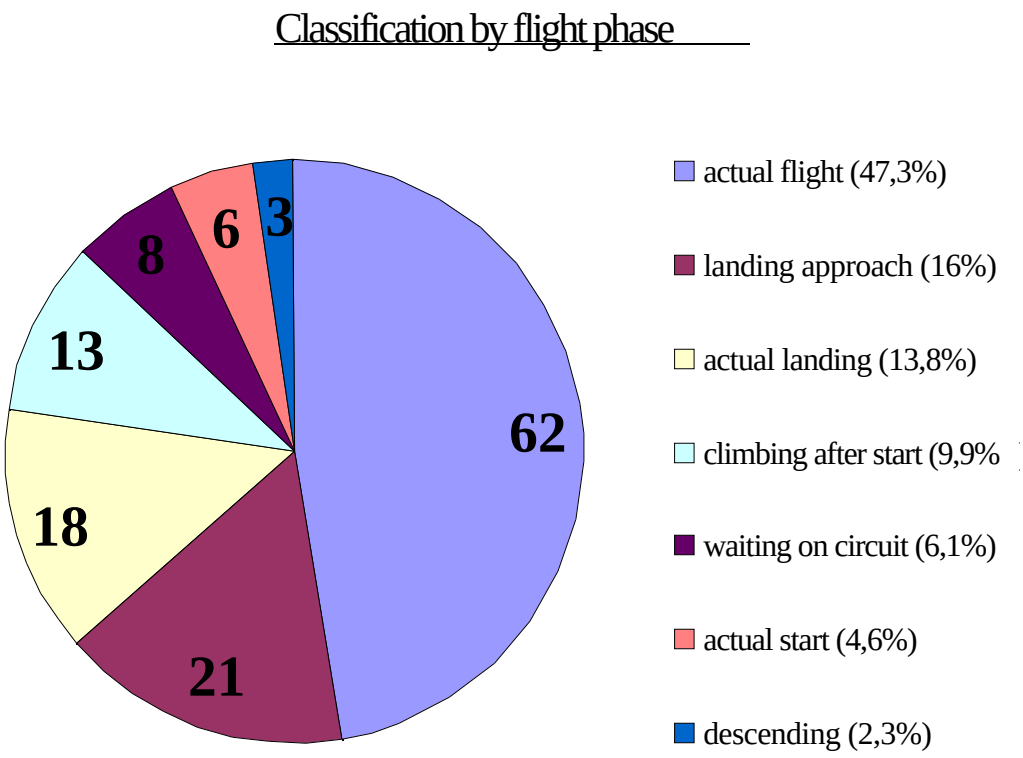
If we analyse altitudes in which collisions occur, we can find out that 35,3% of collisions occurred under 100 meters, 57,6% under 200 meters and 69,0% under 300 meters. With regard to the fact that approximately one half of collisions under 300 meters (52,7% of all collisions) occurred during start, landing or right on runway, it is highly presumable that collisions in the altitude under 300 meters will continue hard to prevent. The second group of collisions under 300 meters (47,3% of all collisions) occurred by an actual flight and therefore it is recommended to plan missions with a view to reduce the movement of aircraft in this altitude to the lowest degree.





Chapter V.Classification of collisions by flight phases.

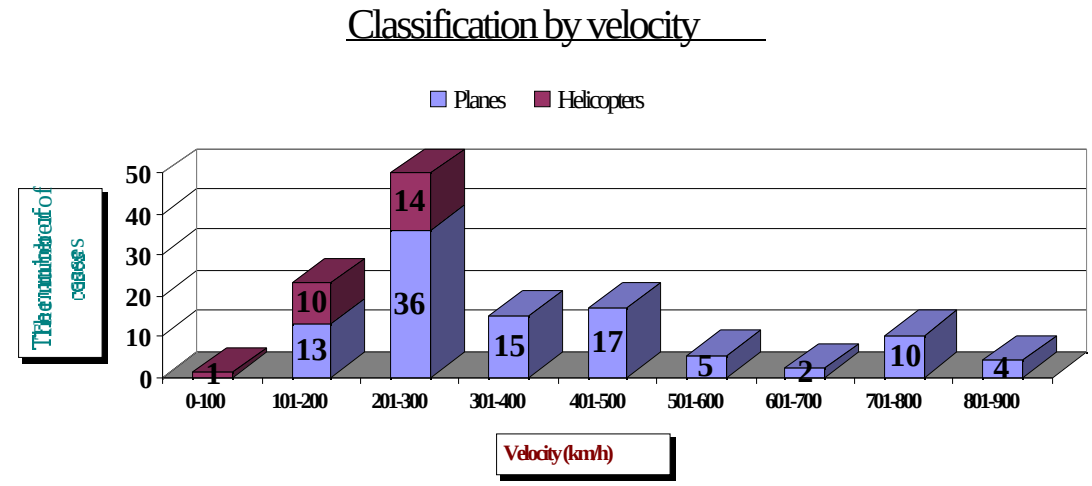
There is a very interesting correlation between the number of collisions that occurred in the phase of the landing approach or an actual landing and the number of collisions that occurred in the phase of the start and climbing which is approximately 2:1. It means that at airbases all active measures to reduce an occurrence of birds has to be aimed above all at the areas of landing approach and an actual landing.

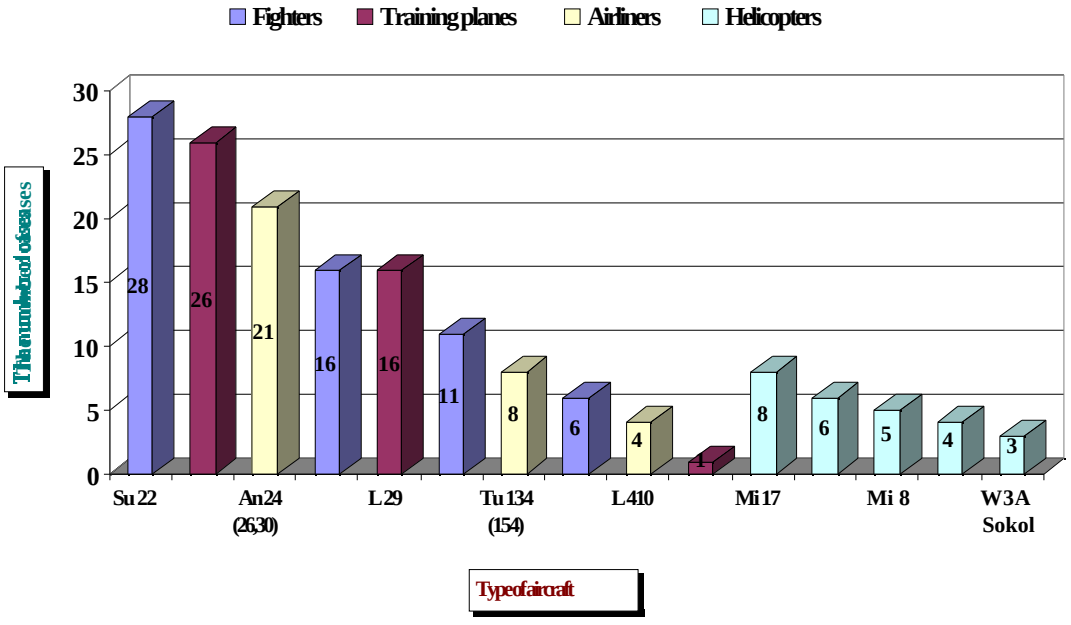


Besides – with regard to the location of collisions – we have verified the fact that a risk of collisions within lowland areas (elevation under 400 meters), along rivers and large water areas is higher than within highland areas.

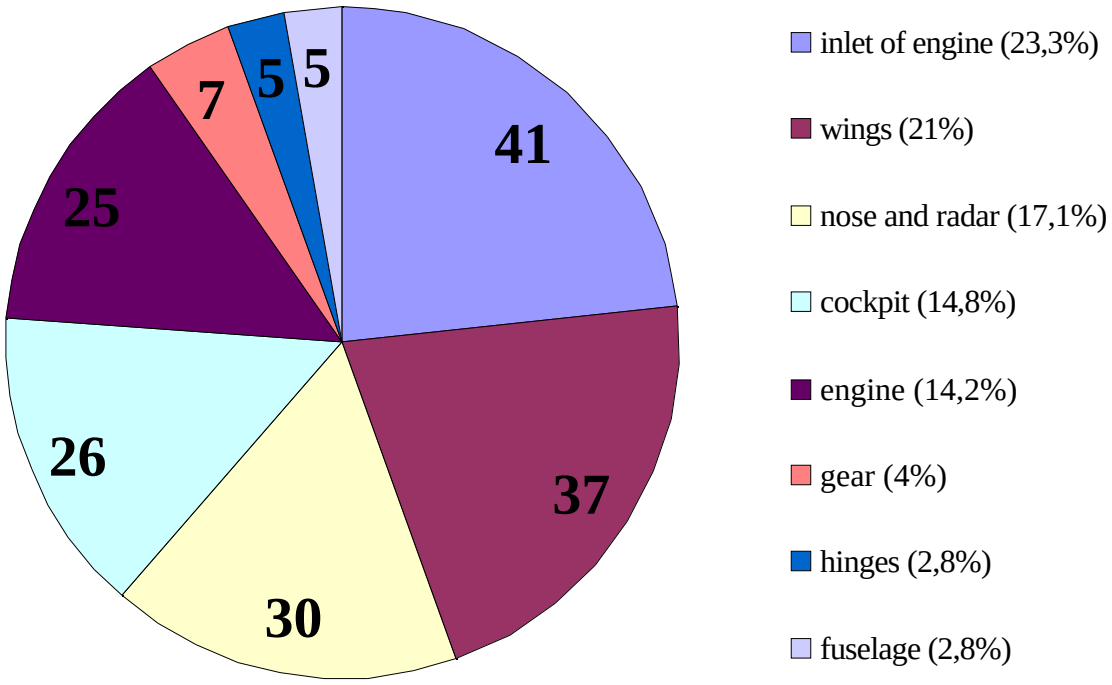
Chapter VI. Classification of collisions by velocity, type of aircraft and the range of damage.

Despite the fact that the following graphs aren't direct usable for protection of airbases, it can be interesting to compare the frequency of collisions by different planes and velocities. The first graph shows that a maximum of collisions of military aircraft (planes and helicopters) occurs at the speed of 200-300 km/h (124-186 mph). Other graphs can't be considered reliable, because there is no similar level of flown hours and therefore these results are valid only for the probed period and they haven't universal applicability.

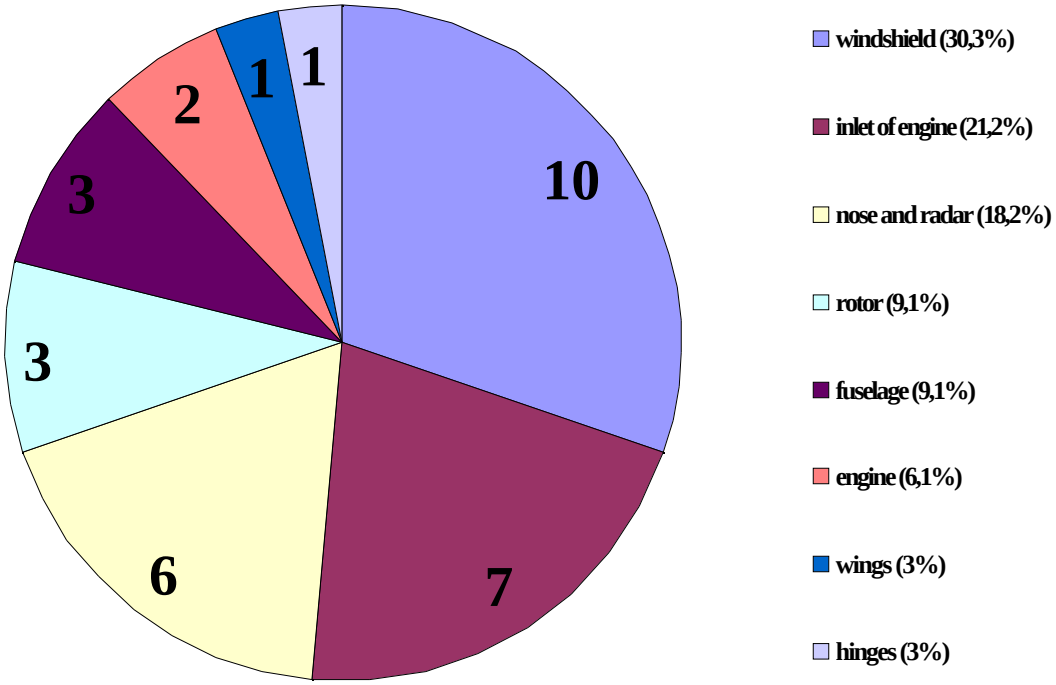




Classification by damage (planes)



Classification by damage (helicopters)



Chapter VII. Conclusion.

Mentioned facts and data have served for working of new measures that were implemented into the activities of biological protection stations in this range:

1. An activity of station members is aimed at the most dangerous species of birds. To reduce an occurrence of gulls, pigeons and turtle-doves they use active measures, in particular trained birds of pray and pyrotechnical methods. In the case of massive occurrence of swallows and martins they propose in advance (during pre-flight planning) a limitation of air traffic. It has proved right to obstruct nesting on buildings (martins) or inside them (swallows) by different technical methods.
2. All measures that reduce an occurrence of birds at airbases are aimed above all at the most dangerous months from May to September and all pilots and crews are periodically advised about the time periods 10-12 a.m. and 1-5 p.m.
3. If it is possible, the training isn't performed at altitudes under 300 meter and during pre-flight planning. The fact that the risk of collisions rises along rivers and large water areas is taken into account.
4. All active measures against birds (biological and pyrotechnical) are concentrated into the areas of landing approach and an actual landing.
5. In the case of collision all available measures are taken to obtain credible data with the emphasis on providing biological material to identify bird species.