THE BIRD-STRIKE PROBLEM IN NORWAY

By Gunnar Lid

As in other countries, the problem of collisions between birds and aircrafts has grown in Norway. Therefore, the problem has been studied - and treated - since 1967, both in the civil and military field. From the spring 1968, I have been engaged in the work, primarily to find methods for a reduction of the problem. Along the extensive coast-line of Norway (more than 1700 kilometers) there are in some areas great concentrations of birds. It follows that the aerodromes situated on the coast have a high frequency of bird-strikes, or potential bird-strikes during take-off and landing. Bird-strikes in flight, as well, are relatively frequent along the coast during migration times, but since migration is deployed over a broad front - particularly the night migration -, in flight collisions are fairly common also over the mainland. The damages done to military aircraft in Norway now amonts to 50.000 - 200.000 dollar a year. In August 1971 we had our first recorded fatal accident. A jet fighter (F5) was hit during a simulated ground attack by a Lesser black-baced gull (weight about 1 kilogramme). The bird penetrated the windshield, probably killing the pilot instantly, and the aircraft plunged into the sea. Speed during the impact was between 300 and 400 knots, and the force of impact was thus between 20 and 30 tons.

In the following I've tried by means of diagrams and tables to give a picture of the bird-strike problem in Norway. The statistical data are chiefly derived from military sources. The relevant data for civil air traffic are regrettably incomplete.

A. Diagram 1 shows bird-strike rate per 10.000 flight hours (Curve A) and bird-strike accident/incident rate per 10.000 flight hours (Curve B), military aircraft only. It shows that the bird-strike rate has varied between 4.0 and 7.0 in the period between 1968 and 1972. The bird-strike accident/incident rate reached a minimum of 0.2 in 1970, whereas it rose to 2.5 in 1972. The Royal Norwegian Air Force had, in 1972, the greates number of birds-strikes with minor damage in its history.

B. Diagram 2 shows the spread of bird-strikes over the months of the years 1961 - 1972, military aircraft only. There are very few bird-strikes during the winter-months in Norway: January,

February, March and Desember. This is to be expected, as most of the accident-prone birds are absent from Norway. There is a slight increase in April and May due to the spring migration. There is a marked increase in June and July due to the juvenile birds starting to fly about, particularly young, inexperienced gulls. The greates number of bird-strikes occur during the autumn migration in August and September. In addition to our own birds at that time, we have a passage of hundreds of thousands of migratory birds from the Arctic. The migration gradually abates in October and November, with resulting fewer bird-strikes.

C. Diagram 3 shows the distribution of bird-strikes in relation to altitude, period 1961-1972, military aircraft only. 63,5 % of bird-strikes occurred at levels between 0-499 feet, including bird-strikes during take-off and landing. Only 6,1 % of the bird-strikes occurred at altitudes of more than 1500 feet.

D. Table 1 specifies phase of flight during bird-strikes, period 1961-1972, military aircraft only. More than half of the bird-strikes (54,2 %) occurred in connection with take-off and landing. In flight bird-strikes (45,8 %), however, are usually more dangerous and far more difficult to prevent.

E. Table 2 classifies bird-strikes by different aircraft, military only. As expected, most bird-strikes involved jet aircraft. No direct comparison can be made between different types of aircraft without taking account of the relevant flight-hours and the type of missions. Never the less, it should be pointed out that the F5 seems to be particularly accident-prone.

F. Table 3 sums up all birds and mammals positively identified as involved in collisions with aircraft in Norway, period 1961-1972, both civil and military aircraft. This is compiled mainly from material sent to me for identification. In connection with a few easily identifiable species of birds, I've also included verbal reports. Altogether 40 different bird species have been involved in collisions with aircraft, plus two hares and one red fox. The preeminent culprit is the common gull, involved in about 40 % of all bird-strikes. Group 2 in the table includes Lapwing, Herring Gull, Starling, Hooded Crow and Snow Bunting. The last-mentioned species has been involved in bird-strikes almost exclusively at one of our North-Norwegian aerodromes, where the Snow Buntings congregate during their spring migration. There are surprisingly

few bird-strikes involving Hooded Crows considering that they are present in large numbers at or near the majority of our aerodromes. Apparently, this sky creature is also particularly clever in avading the aircraft.

C. Table 4 shows the distribution of species in the bird-strike reports. More than 60 % of the reports giving species or family groups, mention that the bird-strike involved sea-birds (gulls, terns etc.). The next largest group is the Passerines (sparrows, warblers, starlings and crows). In those reports that omit species, there is probably a large percentage of passerines, as these are less easy to identify and trace evidence of, compared to the larger birds.

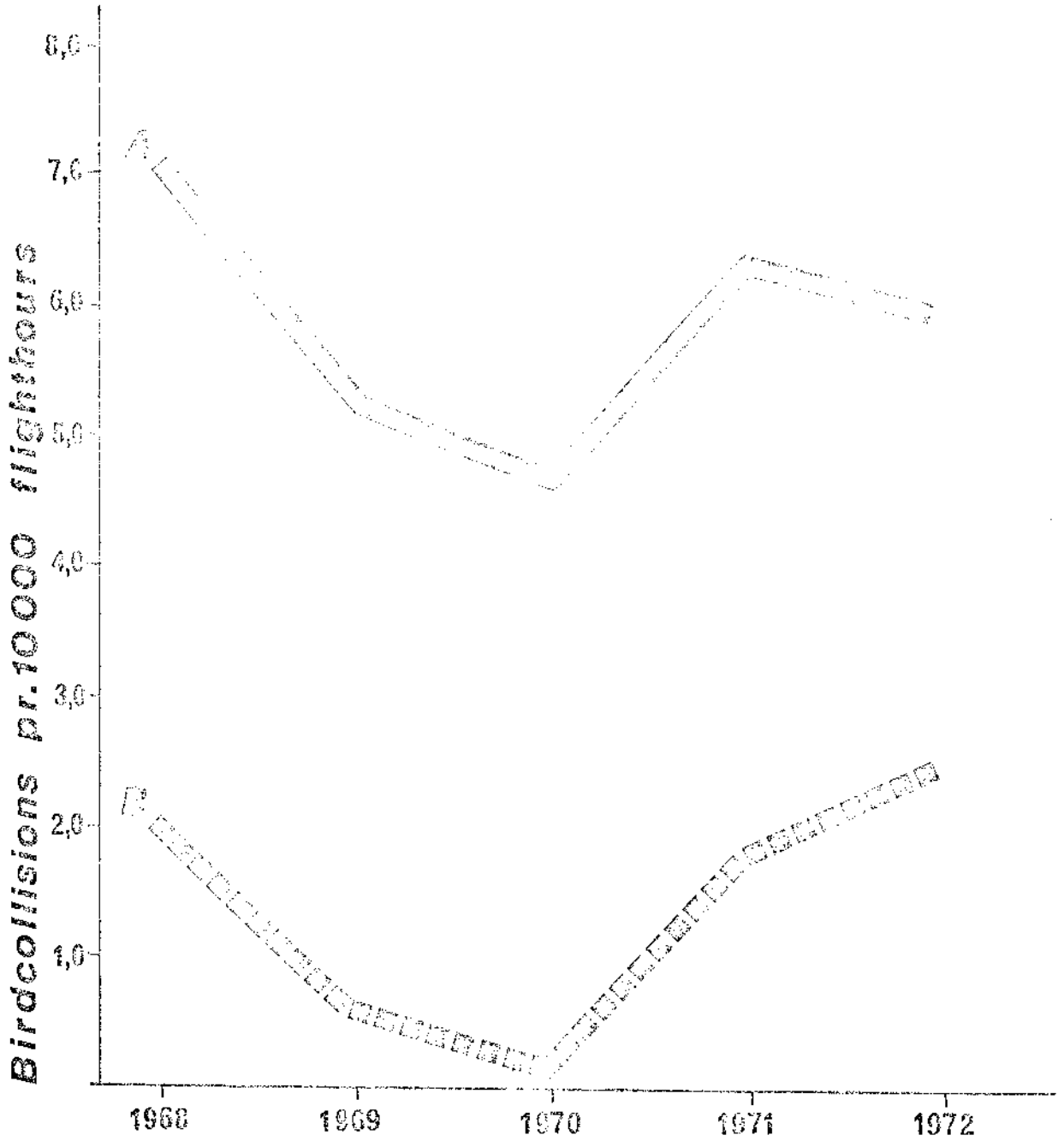

Fig. 1. A: Bird strike rate per 10 000 hrs.
B: Bird strike Accident/Incident rate per 10 000 hrs.

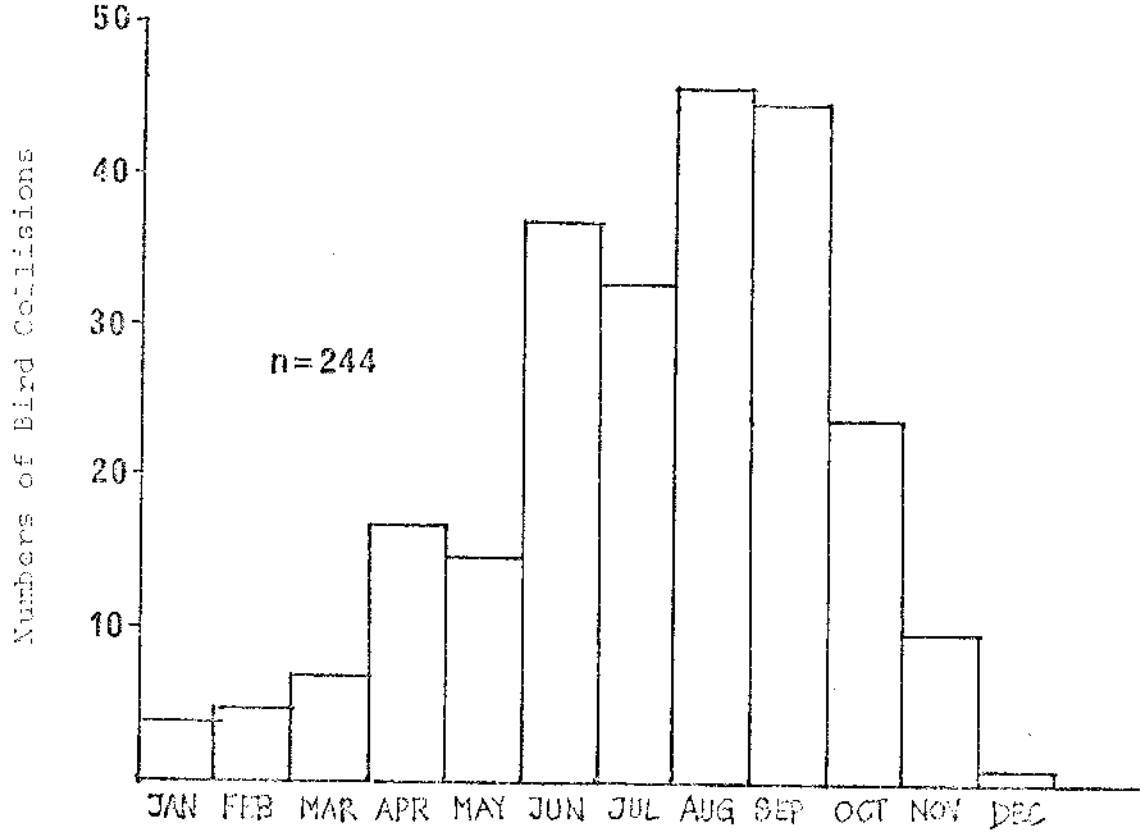

Fig. 2. Month of bird strikes by military aircraft in Norway 1961-1972.

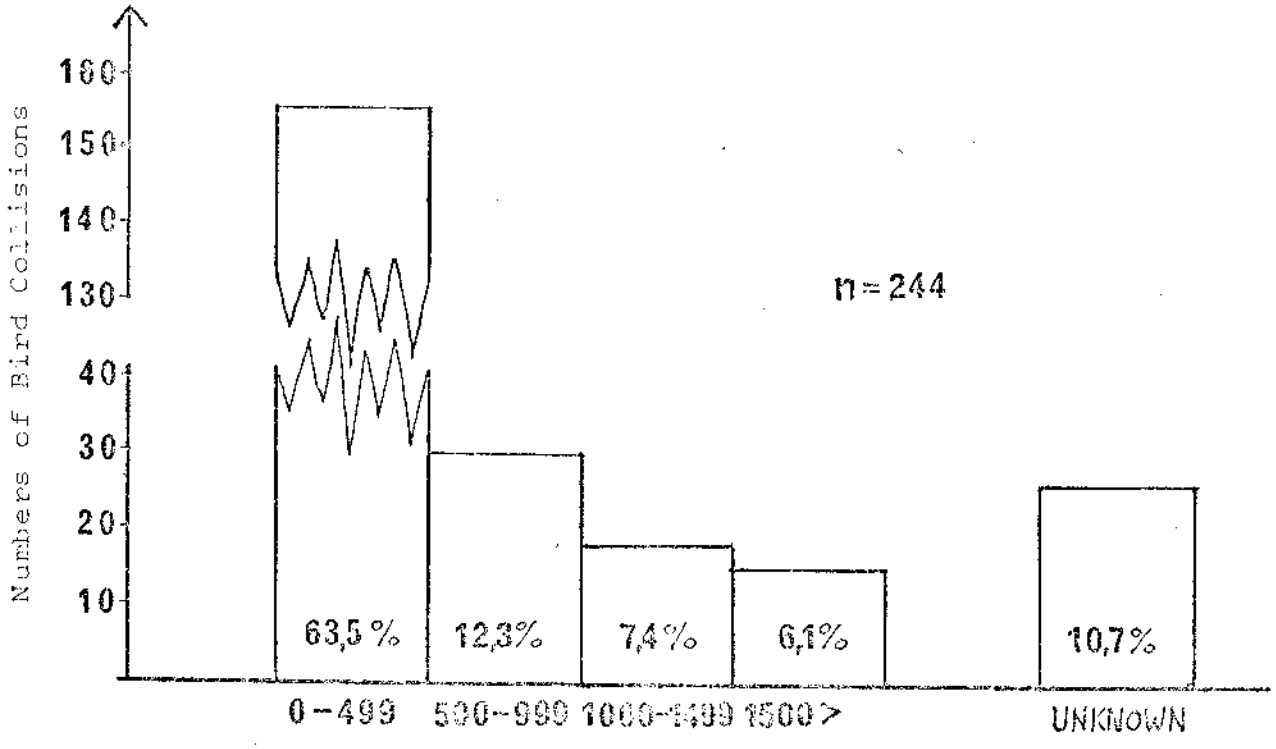

Fig. 3. Heights of bird strikes by military aircraft in Norway 1961-1972.

Table 1. Specification of phase of flight 1961-1972.

(Military aircraft only)

	Number of collisions	%	
Take off	61	30.3%	54.2%
Landing	48	23.9%	
In flight	92	45.8%	
Sum	201	100%	

Table 2. Classification of bird strikes by different types of aircraft (military only) in Norway 1961-1972.

Aircraft (Jet)	Major accidents	Minor accidents	Incidents	Sum
F5	5	31	73	109
F104	1	3	21	25
F86 k and F	1	11	15	27
RF-84 F	1	-	4	5
T-33	1	4	2	7
				173

Aircraft (Prop.)				
P3		6	19	25
HU 16			5	5
Otter		1	1	2
C47			2	2
C 130		1		1
Saab Safir			2	2
L 18			1	1
Nortrop			1	1
UH 1			1	1
				40

Table 3. Birds and mammals positively identified as involved in collisions with aircraft in Norway 1961-1972.

Group 1: Frequent in collisions
Group 2: Relatively common in collisions
Group 3: Sporadic in collisions
Group 4: Rare in collisions

Species within each group are listed according to zoological systematics, not according to their collision risk potential.

BIRDS:

Group 1.

Common Gull (Larus canus)

Group 2.

Lapwing (Vanellus vanellus)
Herring Gull (Larus argentatus)
Starling (Sturnus vulgaris)
Hooded Crow (Corvus corone)
Snow Bunting (Plectrophenas nivalis)

Group 3.

Willow Grouse (Lagopus lagopus)
Oystercatcher (Haematopus ostralegus)
Ringed Plower (Charadrius hiaticula)
Golden Plower (Pluvialis apricaria)
Ruff (Philomachus pugnax)
Curlew (Numenius arquata)
Black-headed Gull (Larus ridibundus)
Lesser Black-backed Gull (Larus fuscus)
Great Black-backed Gull (Larus marinus)
Wood Pigeon (Columba palumbus)
Swallow (Hirundo rustica)
Skylark (Alauda arvensis)

Group 4.

Grey Heron (Ardea cinerea)
Mallard (Anas platyrhynchos)
Eider (Somateria mollissima)
Pheasant (Phasianus colchicus)
Crane (Grus grus)
Dunlin (Calidris alpina)
Woodcock (Scolopax rusticola)
Snipe (Gallinago gallinago)
Arctic Skua (Stercorarius parasiticus)
Long-eared Owl (Asio otus)
Short-eared Owl (Asio flammeus)
Swift (Apus apus)
Sand Martin (Riparia riparia)
House Martin (Delichon urbica)
Pipit indet (Anthus sp.)
Jackdaw (Corvus monedula)
Fieldfare (Turdus pilaris)
Redwing (Turdus iliacus)
Song Thrush (Turdus philomelos)
House Sparrow (Passer domesticus
Redpoll (Acanthis flammea)
Crossbill (Loxia curvirostra)

MAMMALS:

Hare (Lepus timidus)
Red Fox (Vulpes vulpes)

Table 4. Distribution of species in the bird strike reports.

Military aircraft 1967-1972.
Civil aircraft 1967-1971.

Altogether 202 bird strike reports list birds according to species or groups. They are distributed as follows:

	Numbers	Percent
Gulls	124	61.4%
Passerines except Starling	40	19.8%
Starling	5	2.4%
Waders except Lapwing	13	6.4%
Lapwing	6	3.0%
Crows	6	3.0%
Other species	8	4.0%
	202	100.0%

38.6 %

PUBLIC RELATION IN NORWAY IN CONNECTION WITH THE BIRD STRIKE PROBLEM

As in all other countries, we have tried in Norway to spread as much information as possible about the bird strike problem, and affiliated problems. This applies both to information for the part of the public directly concerned with air traffic, and information for the general public.

The former kind of information is channelled trough my regular reports for the Directorate of Civil Aviation and the Norwegian Air Force. The latter, more general information is produced in cooperation with rather good contacts in the radio and newspapers and the Norwegian Press Agency. My background as working ornithologist and bird ringer has been of some importance because the press and the radio has been interested for years in my reports on bird populations and bird migration etc. and in the last few years the copy on the bird strike problem has been willingly accepted. There is, I'm sure, also in Norway a genuine and eager interest in the specific problem of bird strikes. This is not due to any particular large number of spectacular accidents in Norway, but mainly, I think, due to the general interest in nature and bird life among Norwegians. They know their birds and how they fly about in all directions, - a great many people are well aware of the possibility of a general danger of collisions between aircraft and birds. Nevertheless, this has in no way led to a scare among users of airtransport in Norway.

It is important in this supply of information that all relevant facts are given out to the reproters, and to explain the details as clearly and plainly as possible. My experience is that we have nothing to fear from the detailed reporting in this field, as long as the honest facts are stated without reservation. Usually, it is considered good copy by the reporters. Typically, the Norwegian radio has accepted altogether 4 major programmes on the bird strike problem in the last few years, there will also be a report in this conference, and a 30 minutes TV-film is being prepared for this autumn.

Attatched to this report is a reproduction of a front page article in Aftenposten, the largest newspaper in Norway of the 9th of May, last year (see the front page). This particular article, on the migration of Spitsbergen geese over Norway, produced about 145 reports on sightings of geese in South Norway during the middle of May 1972. A translated excerpt of the article is also attached. Finally I've mounted some of the headings of articles on the bird strike problem

in the Norwegian press on one sheet of paper, to indicate the press coverage during the period 1971-1972.

RADAR AGAINST BIRDS

(Translation of the front page).

Radar experts from the Norwegian Air Force, ornithologists and flight safety officers have been alerted from today (9.5.1972) to investigate a massive migration of birds from West Germany to Spitsbergen via the Norwegian coast. Predominantly, it is a question of the spring migration of the pink-footed geese. About 10.000 of them are expected to move from West Jutland in Danmark to their breeding grounds in Spitsbergen during the next few days.

Observations of this migration will be gratefully acknowledged by the Zoological Museum in Oslo, either by letter or by telephone. This investigation is of great interest to the air traffic control in Norway, as well as to the ornithologists. All details are of importance, the mapping of the migration routes of the pink-feet, flight speed, altitude in relation to military and civil aircraft movements, since very little is known as yet about the migration to the Spitsbergen geese and their possible resting places in Norway.

For the first time, radar equipment is brought into use in order to catch the flocks of geese on their move from Denmark to Norway and further northwards. The first steps towards this investigation were taken last year, and the whole project aims primarily at an early warning system in conjunction with the bird strike problem. The investigation is directed by Gunnar Lid of the Oslo Zoological Museum, scientific advicer to the Norwegian Air Force with particular emphasis on possible solutions of the bird strike problem in Norway.

The radar personell and the bird specialists will all set up their head quarters during the coming days in the Air Force Radar Centre at the Graakallen mountain near Trondheim, Central Norway. There will be a 24 hours watch and the radar screen will be photographed by means of a 16 mm film camera operating on the time-lapse principle. In addition polaroid pictures will be taken of the radar screen at 3 hour intervals, in order to secure situation pictures throughout the day and night. The film sequences will allow for a tracking of practically speaking every flock of birds within the range of the

radar station, and the stills will indicate the intensity of migration to the air traffic control of nearby aerodromes.

Part translation of an article in Aftenposten (Norway's largest newspaper) which produced about 145 reports on the spring migration of pink-footed geese over South-Norway, May 1972.

The investigation was fully reported on by the Norwegian Radio.

Fig. 4. Some of the press coverage in Norway 1971/72 of the Bird Strike Problem.