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BEACHED BIRD DENSITY TRENDS IN LITHUANIA DURING 1991-1994

Gedas VAITKUS, Algimantas PETRAITIS, Ramūnas ŽYDELIS

Institute of Ecology, Akademijos 2, 2600 Vilnius, Lithuania

Abstract

Results of national Beached Bird Surveys (BBS) of the severe winter 1994 are reported comparing beached bird densities with those of previous mild winters 1991-1993 reported earlier. The overall beached bird density was very high in late winter 1994, the stock of corpses being formed mainly by sea-ducks, while densities of beached gulls decreased considerably. The overall proportion of oiled corpses decreased as well during the severe winter 1994.

Introduction

The International Beached Bird Surveys (IBBS) were commenced in Lithuania in winter 1991/92 aimed at estimation of the natural sea-bird mortality level before any oil developments were started in the Eastern Baltic. Practically nothing was known about sea-bird mortality in Lithuanian sector of the Eastern Baltic, until the first study on winter-period beached bird densities at the Lithuanian sea coast was issued (Vaitkus et al., 1993), summarising results of the first Lithuanian BBS group efforts.

The first study contained comparatively scanty data which were gathered episodically and did not allow to make any kind of more or less serious statistical assumptions, but nevertheless produced a preliminary picture of winter-period beached birds species composition and densities; steps were undertaken to evaluate the oil-contamination level of corpses washed ashore. Klaipėda sector of the Lithuanian seacoast was pointed out as the area with highest level of sea-bird mortality and oil-contamination.

The present study was performed under the conditions of severe winter thus adding much to the whole picture of sea-bird mortality over the Eastern Baltic. Even though high and very high beached bird densities were detected, the overall mortality level should be treated as natural phenomenon rather than human-induced disaster.

Study area and coverage

In winter 1994 the Lithuanian group continued beached bird surveys (BBS) within the European beached bird survey (EBBS) scheme basing on the traditional BBS methodology (Camphuysen, 1989; Camphuysen, Franeker, 1992). The selected control sectors which were suggested for the initial stage of BBS in Lithuania (Vaitkus et al., 1993) and approbated by the EBBS working group (Camphuysen, Franeker, 1992) were slightly modified in order to improve the coverage of the three most important economical/ecological regions of the Lithuanian coastline. The following sectors have been extensively examined during the national BBS in January - March 1994 (Tab.1):

- sector Li1 (Palanga area): Lithuanian/Latvian border - Nemirseta settlement (21.0 km);
- sector Li2 (Klaipėda area): Karklininkai settlement - Smiltynė site in Kuršių Spit (12.5 km);
- sector Li3 (Kuršių Spit): Juodkrantė settlement - Nida town (26.5 km).

Total length of control sectors along the Lithuanian coastline made 60 km (the overall coverage being about 60%), thus, the previous study area network with the total coverage of 47% being significantly enhanced. Some changes were made in the division of sectors into stretches as well (Tab.1). The standard questionnaire, its coding system and structure of the National BBS Database (Vaitkus et al., 1993) were also slightly modified, based on the practical experience of the working group, but the basic items did not suffer any principle changes.

The overall amount of survey effort during January - March 1994 (in December 1993 national BBS were not performed) is estimated at 169 km of the total survey length (Lithuanian coastline is about 104 km). Unfortunately, the successful surveys (performed in favourable conditions with at least 1 corpse detected) total at mere 67 km (Tab.2). Complicated climatic situation forced us to postpone large-scale national BBS until the

end of March when snow and ice almost entirely disappear from the beaches. Thus about 61% of all the 1994 winter BBS effort falls to March, 16% and 23% represent January and February samples, respectively.

Table 1. Sectors and stretches of national BBS in Lithuania in winter 1994.

Sector/stretch	Length (km)	Start point	Finish point	Beach
Li1	21	Lithuanian/Latvian border 55 04 05 N, 21 03 55 E	Nemirseta settlement 55 52 50 N, 21 03 25 E	sand 100%
Li1A	4.5	Lithuanian/Latvian border 55 04 05 N, 21 03 55 E	Šventoji River 56 0145 N, 21 04 20 E	sand 100%
Li1B	5.5	Šventoji River 56 0145 N, 21 04 20 E	Kunigiškės settlement 55 58 40 N, 21 04 20 E	sand 100%
Li1C	6	Kunigiškės settlement 55 58 40 N, 21 04 20 E	Palanga town 55 55 30 N, 21 03 20 E	sand 100%
Li1D	5	Palanga town 55 55 30 N, 21 03 20 E	Nemirseta settlement 55 52 50 N, 21 03 25 E	sand 100%
Li2	12.5	Karklininkai settlement 55 47 50 N, 21 04 10 E	Smiltynė site 55 40 40 N, 21 06 20 E	sand 80% gravel 15% stones 5%
Li2A	3.5	Karklininkai settlement 55 47 50 N, 21 04 10 E	Giruliai settlement 55 46 00 N, 21 04 50 E	sand 50% gravel 30% stones 20%
Li2B	4.5	Giruliai settlement 55 46 00 N, 21 04 50 E	Klaipėda harbour 55 43 15 N, 21 05 40	sand 100%
Li2C	4.5	Klaipėda harbour 55 43 15 N, 21 05 40	Smiltynė site 55 40 40 N, 21 06 20 E	sand 100%
Li3	26.5	Juodkrantė settlement 55 32 51 N, 21 06 10	Nida town 55 18 55 N, 20 59 10 E	sand 100%
Li3A	14	Juodkrantė settlement 55 32 51 N, 21 06 10	Pervalka settlement 55 25 20 N, 21 03 30 E	sand 100%
Li3B	5	Pervalka settlement 55 25 20 N, 21 03 30 E	Preila settlement 55 22 39 N, 21 02 00 E	sand 100%
Li3C	7.5	Preila settlement 55 22 39 N, 21 02 00 E	Nida town 55 18 55 N, 20 59 10 E	sand 100%

Table 2. Lithuanian BBS efforts in winter 1993/94.

Unit	Length (km)	January			February			March			Total 1994	
		Survey dates	Total (km)	Fit (km)	Survey dates	Total (km)	Fit (km)	Survey dates	Total (km)	Fit (km)	Total (km)	Fit (km)
Li1A	4.5	I.17*	4.5	0	n.s.	0	0	III.29	4.5	4.5	9.0	4.5
Li1B	5.5	I.16*	5.5	0	n.s.	0	0	III.4*;29	11.0	5.5	16.5	5.5
Li1C	6.0	I.16*;18	12.0	6.0	n.s.	0	0	III.4*;17; 26; 29	12.0	6.0	24.0	12.0
Li1D	5.0	I.18	5.0	5.0	n.s.	0	0	III.29	5.0	5.0	10.0	10.0
Sect Li1	21.0		27.0	11.0		0	0		32.5	21.0	59.5	32.0
Li2A	3.5	n.s.	0	0	II.22*	3.5	0	III.13*;29	7.0	7.5	10.5	7.5
Li2B	4.5	n.s.	0	0	II.22*	4.5	0	III.13*;29	9.0	4.5	13.5	4.5
Li2C	4.5	n.s.	0	0	II.22*	4.5	0	III.13*;29	9.0	4.5	13.5	4.5
Sect Li2	12.5		0	0		12.5	0		25.0	16.5	37.5	16.5
Li3A	14.0	n.s.	0	0	II.23*	14.0	0	III.14*;30	28.0	14.0	42.0	14.0
Li3B	5.0	n.s.	0	0	II.23*	5.0	0	III.14*;30	10.0	5.0	15.0	5.0
Li3C	7.5	n.s.	0	0	II.23*	7.5	0	III.14*;	7.5	0	15.0	0
Sect Li3	26.5		0	0		26.5	0		45.5	19.0	72.0	19.0
Total	60.0		27.0	11.0		39.0	0		103.0	56.5	169.0	67.5

* - unsuccessful surveys; n.s. - no surveys performed.

As mentioned above, only about 40% of all the survey effort was successful. Practically no data is available from unsuccessful February BBS, although 39 km of the coastline was examined (the overall coverage 37.5%). About 55% of March, but only 41% of January survey effort were successful. The overall successful BBS coverage made about 11% in January and 54% in March. National BBS successfully covered about 65% of the Lithuanian coastline in winter 1994.

The overall coverage of stretches was almost equal and 2-3 times exceeded their length (Tab.2). However, a significant part of the survey effort was unsuccessful, hence drastically reducing the representativeness of data samples. Sector Li1 (Palanga area; 21.0 km) was not surveyed in February. All stretches were surveyed at least once in January and March, the total length making 59.5 km (54% - successful). Stretches Li1B and Li1C were covered best. Sector Li2 (Klaipėda area; 12.5 km) was not surveyed in January. February and March samples were obtained from the total 37.5 km survey (44% successful). All the stretches were covered almost equally (33-71% of the survey effort being successful). Sector Li3 (Kuršių Spit; 26.5 km) was not covered in January either. The total February-March BBS effort in this sector is estimated at 72.0 km (only 26% successful). The proportion of February-March coverage was equal for all the Li3 stretches.

Climatic conditions

Average day temperature (Fig.1) during the study period (January - March, 1994) indicates a violent cold spell during I and II decades of February (up to - 10-15°C) which was interrupted by a short pause of comparatively higher average temperature (which was below 0°C) during II 5-day of the month. Another decline in temperature was recorded during VI 5-day of February, but the average temperature did not drop below -5°C during that period (0°C level was reached by the end of I 5-day of March).

Normal course of winter which was observed during January, in February was replaced by unexpectedly severe and lasting cold spell which resulted in a complete freezing of the major resorts of wintering waterfowl in the NE Baltic (Gulf of Riga and Irbe Strait, Estonian and Latvian inshore shallows) as well as in SE region of the Baltic (including Lithuanian coastal waters). In mid-February, ice formations (floating ice-formations or even completely fixed ice fields) were detected up to 15-25 km off the coast along the Kuršių Spit and even up to 35-40 km off the coast in Klaipėda sector.

Beaches were completely covered with snow in January. In February, after the ice-formations had occurred in the off-shore and coastal waters, they were driven into the open Baltic by E-SE winds within the 10-14-day period, still quite large pieces of ice were washed onto the beaches and stayed there till the end of March making any kind of beached bird survey practically impossible.

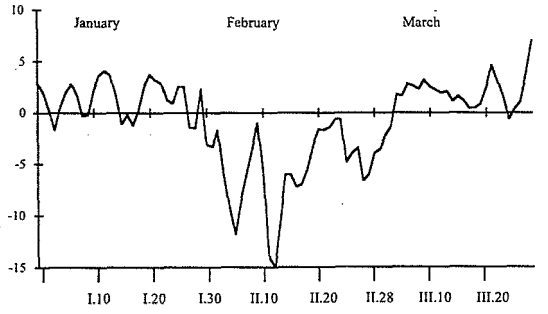

Fig.1. Average day temperature during January - March, 1994. Data from Klaipėda hydrometeorological observatory.

Sea-bird concentrations

Ship transect survey in Lithuanian and Kaliningrad Region off-shore areas was performed in February 1994, 5-7 days after the Gulf of Riga was totally covered with ice. Sampling was performed using the standard (300 m width; 90° scan) ship transect survey method. The near-shore ice-field formation was in progress all over the Eastern Baltic, causing the influx of huge numbers of sea-ducks, normally wintering in the Gulf of Riga and Irbe Strait, into the marine waters further south along the eastern coast of the Eastern Baltic.

The Long-tailed Duck (600-650 ind./km^2) and Velvet Scoter (270-300 ind./km^2) aggregation along Kuršių Spit (55°00′N - 55°40′ N) was detected outside the near-shore ice formations ranging from 15 to 50-55 km off the coast (25-50 m depth) with 300000-325000 Long-tailed Ducks and 135000-150000 Velvet Scoters, respectively. The Long-tailed Duck concentration area (up to 100 ind./km^2; 30000-40000 birds) was also detected 30-40 km off the coast in 35-50 m depth zone in Klaipėda sector, whereas in February 1993 this area held the Long-tailed Duck densities of up to 35-40 ind./km^2, the main concentrations being located along the coastline in 10-20 m depth (Vaitkus, Vinskas, 1993). Most probably, those huge sea-duck concentrations stayed in the Lithuanian sector for at least 2 weeks.

Results from national BBS of winter 1994

Data sample

80 corpses of 22 bird species were recorded along the Lithuanian seacoast during the BBS of winter 1994 (Tab.3). The main stock - up to 80% - was obtained in Palanga and Klaipėda areas (sectors Li1 and Li2; 54% and 37.5% of the total stock, respectively) and only about 8% - in Kuršių Spit (sector Li3). Up to 60% of the whole stock consisted of 4 dominant species: Long-tailed Duck (21.3%), Herring Gull (18.8%), Common Gull (17.5%) and Velvet Scoter (5.0%).

Palanga area (Li1) makes 43 corpses of 15 bird species (Tab.3). 60.5% of the stock was formed by 3 dominant species: Herring Gull (25.6%), Long-tailed Duck (20.9%) and Common Gull (14.0%). Other 4 species (4.7% each) made up 19% of the stock: Mallard, Great Crested Grebe, Black-throated Diver and Whooper Swan. Some findings of typical inland species were recorded in this sector. Those were Sparrow Hawk and Common Rook.

Table 3. Lithuanian BBS data sample of late winter 1994.

Species	Palanga Li1	%	Klaipėda Li2	%	Kuršių Spit Li3	%	Total	%
Clangula hyemalis	9	20.9	6	20.0	2	28.6	17	21.3
Larus argentatus	11	25.6	4	13.0			15	18.8
Larus canus	5	11.6	7	23.3	1	14.3	14	17.5
Melanitta fusca	2	4.7	2	6.7	1	14.3	4	5.0
Anas platyrhynchos	2	4.7			1	14.3	3	3.8
Corvus frugilegus	1	2.3	1	3.3	1	14.3	3	3.8
Larus marinus	1	2.3	2	6.7			3	3.8
Podiceps cristatus	2	4.7	1	3.3			3	3.8
Accipiter nisus	2	4.7					2	2.5
Alca torda	1	2.3	1	3.3			2	2.5
Cygnus olor	2	4.7					2	2.5
Gavia arctica	2	4.7					2	2.5
Aegolius funereus			1	3.3			1	1.3
Anas crecca	1	2.3					1	1.3
Columba sp.			1	3.3			1	1.3
Cygnus sp.			1	3.3			1	1.3
Larus minutus			1	3.3			1	1.3
Larus ridibundus	1	2.3					1	1.3
Larus sp.					1	14.3	1	1.3
Mergus merganser	1	2.3					1	1.3
Tachybaptus ruficollis			1	3.3			1	1.3
Uria aalge			1	3.3			1	1.3
Total	43		30		7		80	

The Klaipėda area (Li2) sample makes 30 corpses of 14 bird species. 56.6% of this stock were formed by 3 dominant species: Common Gull (23.3%), Long-tailed Duck (20.0%) and Herring Gull (13.3%). Velvet Scoter and Great Black-backed Gull (*Larus marinus*) made 13.4% of the Li2 total (6.7% each). Other 9 beached bird species are known from single records (Tab.3). Common Rook, Tengmalm's Owl and unidentified dove (*Columba* sp.) were typical inland birds washed ashore in this sector.

A small Kuršių Spit (sector Li3) sample makes 7 corpses of 6 bird species. The Long-tailed Duck made 28.6% of the total, other 5 species being single records. Common Rook was detected in this sector, too.

Beached bird densities

Basing on the results of BBS performed during January - March 1994, beached bird densities were calculated as number of corpses detected per 1 km of the coastline surveyed (Camphuysen, 1989). Unsuccessful surveys (performed in unfavourable conditions without any reliable data sample obtained) were excluded from the further analyses. Beached bird densities for each stretch and/or sector surveyed as well as overall average densities for the whole region were calculated basing on the amount of surveillance effort put into the unit during the study period (Tab.4). The calculated beached bird densities were classified according to the suggested scheme (Camphuysen, 1989):

0.01-0.10/km - low density;
0.11-0.25/km - rather low density;
0.26-0.50/km - rather high density;
0.51-1.00/km - high density;
> 1.00/km - very high density.

Table 4. Beached bird densities (average and maximum numbers) in the selected sectors of Lithuanian coastline in late winter 1994.

Species	Li1		Li2		Li3		Average
	Average	Maximum	Average	Maximum	Average	Maximum	
Clangula hyemalis	0.38	0.67	0.36	0.67	0.11	0.4	0.25
Larus argentatus	0.52	1	0.24	0.4			0.22
Larus canus	0.24	0.67	0.42	0.42	0.05	0.07	0.21
Melanitta fusca	0.1	0.2	0.12	0.27	0.05	0.2	0.06
Anas platyrhynchos	0.1	0.2			0.05	0.07	0.04
Corvus frugilegus	0.05	0.2	0.06	0.22	0.05	0.2	0.04
Larus marinus	0.05	0.18	0.12	0.22			0.04
Podiceps cristatus	0.05	0.17	0.06	0.13			0.04
Accipiter nisus	0.1	0.33					0.03
Alca torda	0.05	0.2	0.06	0.22			0.03
Cygnus olor	0.1	0.4					0.03
Gavia arctica	0.1	0.2					0.03
Aegolius funereus			0.06	0.22			0.01
Anas crecca	0.05	0.2					0.01
Columba sp.			0.06	0.13			0.01
Cygnus sp.							0.01
Larus minutus			0.06	0.13			0.01
Larus ridibundus	0.05	0.17	0.06	0.22			0.01
Larus sp.					0.05	0.07	0.01
Mergus merganser	0.05	0.2					0.01
Tachybaptus ruficollis			0.06	0.22			0.01
Uria aalge			0.06	0.13			0.01
Total	1.95	3.17	0.82	2.22	0.37	0.8	1.19

The overall average beached bird density along the whole study area was very high and levelled at 1.19/km (calculated basing mostly on the late March national BBS; n=80, total coverage - 60%; Tab.4). The highest average beached bird density was registered in Klaipėda area (Li2) where it reached 1.82/km. In Palanga area (Li1) the average beached bird density levelled at 1.34/km. As in the previous mild winters, Kuršių Spit area (Li3) demonstrated the lowest average density of 0.37/km, though according to C. Camphuysen's (1989) scheme it is in "rather high density" category.

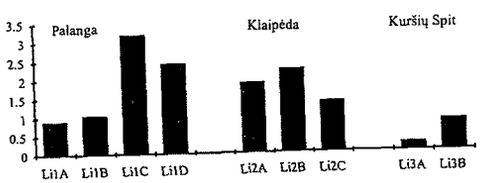

Fig.2. Beached bird densities in separate stretches of Lithuanian coastline in late winter 1994

In Palanga area (Li1) maximum (very high) beached bird densities were recorded in sectors Li1C and Li1D, i.e. along Palanga town. At the end of March they reached 3.17 and 2.40/km, respectively. Those two stretches, together with Li2B (north of Klaipėda, 2.22/km) had the highest (i.e. exceeding 2.0/km level) beached bird densities along all the study area this winter. The lowest beached bird densities were recorded along Kuršių Spit (Li3) both average density of the sector (rather high 0.37/km) and in its stretches (high 0.8/km and rather low 0.21/km in stretches Li3B and Li3A, respectively) being less than 0.5/km (Tab.4; Fig.2).

The highest densities of separate species washed ashore (Tab.4) were recorded for the Herring Gull (high 1.0/km in Palanga area and rather high 0.4/km in Klaipėda area), Long-tailed Duck (high 0.67/km both in Palanga and Klaipėda areas, rather high 0.4/km in Kuršių Spit) and Velvet Scoter (rather high 0.27/km in Klaipėda area, rather low 0.2/km in Palanga area). Basing on the late-March national BBS, average beached bird densities in the control sectors were considerably lower than maximum densities in separate stretches (Tab.4). The Herring Gull reached high (0.52/km) average density in Palanga area (Li1), but rather low (0.24/km) in Klaipėda area (Li2) this species being not recorded on the beach in Kuršių Spit. The Long-tailed Duck showed almost equal rather high average densities in Palanga (Li1) and Klaipėda (Li2) areas (0.38 and 0.36/km, respectively), corpses of this species dominating in Kuršių Spit sample, too (0.11/km). The Common Gull has been detected within the highest average density in Klaipėda area (rather high 0.42/km) being less dense in Palanga area (rather low 0.24/km) and scarce (low 0.05/km) in Kuršių Spit. Other species with average densities within control sectors being high or very high are Velvet Scoter, Mallard, Whooper Swan, Black-throated Diver and Sparrow Hawk (average densities of all those species being 0.1/km) in Palanga area (Tab.4) and Velvet Scoter and Great Black-backed Gull (both 0.12/km) in Klaipėda sector.

Contamination with oil

The overall proportion of oiled corpses in the whole stock of 1994 winter BBS material was about 27% (14 oiled; 51 fit for analysis). 9 seabird/waterfowl species were found contaminated with oil (Tab.5). 4 dominant species: Long-tailed Duck (21% of corpses were oiled), Common Gull (15%), Razorbill (50%) and Velvet Scoter (100%) together made up to 64% of the total. 76.5% of corpses analysed seemed to be free from oil products, 9.8% were slightly oil-contaminated (only the surface of the plumage was oiled), and 13.7% were heavily oil-contaminated (the whole plumage was oiled down to skin).

Practically no oil-contaminated corpses were detected along Kuršių Spit (Li3). 64% of oiled corpses (7 species) was found in Klaipėda area (Li2), other 36% (5 species) - in Palanga area (Li1). Average density of oiled birds was 0.55/km in Klaipėda area (Li1) and 0.16/km - in Palanga area (Li1). The overall average oiled beached birds density recorded along the Lithuanian coastline in winter 1994 was 0.21/km (Tab.5).

Table 5. Contamination with oil in the beached bird stock (Lithuania, winter 1994).

Species	Analysed	Oiled (n)	Oiled (%)	Oiled (ind./km)	Heavy contamination	Light contamination
Clangula hyemalis	14	3	21.4	0.04	1	2
Larus canus	13	2	15.4	0.03	1	1
Alca torda	4	2	50.0	0.03	2	
Melanitta fusca	2	2	100.0	0.03		1
Cygnus olor	3	1	33.1	0.01		
Larus marinus	5	1	20.0	0.01	1	
Larus minutus	2	1	50.0	0.01		1
Podiceps cristatus	5	1	20.0	0.01	1	
Uria aalge	3	1	33.3	0.01	1	
Total	51	14		0.21	7	5

The Long-tailed Duck oil-contaminated corpses were detected both in Palanga (9.1% of corpses were oiled) and Klaipėda (66.7%) areas forming respectively 20% and 22% of oil-contaminated bird totals in those sectors during the study period. Densities of oiled Long-tailed Duck corpses were 0.12/km in Klaipėda area and 0.2/km in Palanga area. Common Gull gave the same average oiled corpse density in Klaipėda area and Razorbill, Velvet Scoter, Great Crested Grebe and Whooper Swan - in Palanga area. In Klaipėda area oiled corpses of some other seabird species were recorded, each of them being found with 0.06/km average density: Great Black-backed Gull, Little Gull, Velvet Scoter, Razorbill and Guillemot.

Great Crested Grebe (25% oiled), Whooper Swan (33%), Common Gull (40%), Great Black-backed Gull (50%) and Velvet Scoter (50%) in separate sectors of the study area were oiled by the proportion of up to 50%, whereas in Klaipėda area all (100%) the Black Guillemot and Razorbill corpses were oil-contaminated (the latter being oiled only by 33% in Palanga area). The Long-tailed Duck was oiled only by 9% in Palanga area, but 67% in Klaipėda.

Mild and cold winter trends

As the first study on beached bird densities along the Lithuanian seacoast (Vaitkus et al., 1993) has analysed the BBS data sample obtained during relatively mild winters (1991/92 and 1992/93) and data sample analysed in the present study was obtained practically in the same study area, it was possible to perform a preliminary evaluation of beached bird density trends during mild and cold winters.

The overall average beached bird density recorded in cold winter was about 2 times higher than in mild winter (averages of February - March samples compared), i.e. it has increased from high 0.64/km to very high 1.19/km (Fig.3). Respectively, in Palanga area (Li1) average density increased about 3.6 times (from high 0.54/km to very high 1.59/km), in Kuršių Spit (Li3) - 2.3 times (from rather low 0.16/km to rather high 0.37/km) and in Klaipėda area (Li2) - 1.2 times (from 1.82 to 2.17/km, both very high).

In cold winter 1994 Herring Gull overall average mortality level was even lower than in mild 1991-1993 (rather low 0.22/km and rather high 0.34/km, respectively). This was caused by a drastic (about 8.3 times from 2.0 to 0.24/km, both very high densities) decrease of beached Herring Gull density in Klaipėda area (Li2) during a severe winter. The same tendency was characteristic to Kuršių Spit area (Li3) where Herring Gull corpses were not detected in late winter 1994 (mild winter density was low - 0.04/km). Only in Palanga area numbers of Herring Gull washed ashore increased about 3 times (from rather low 0.17/km to high 0.52/km).

Beached Common Gull density did not increase significantly during a severe winter 1994 in Klaipėda (0.43/km in mild and 0.42/km - in severe winter, both rather high densities) and Kuršių Spit (low densities: 0.04/km in mild and 0.05/km in severe winter) areas, whereas it increased about 3 times in Palanga area (from low 0.08/km to rather low 0.24/km). The overall increase of Common Gull mortality was about 2 times (from 0.11 to 0.21/km, both rather low densities).

A serious increase of the Long-tailed Duck mortality was recorded in a severe winter of 1994. During mild winters 1991-1993 this species was not dominating in the whole stock of beached corpses (the only record from December - January sample was made in Palanga area, low average density mere 0.07/km). During a severe winter 1994 this species was recorded all over the study area (in all stretches) high densities reaching 0.67/km. Rather low overall average density of the Long-tailed Duck in winter 1994 was estimated at 0.25/km, this species dominating in the total stock of severe winter corpses.

Velvet Scoter with low overall average corpse density of 0.06/km entered the category of dominating species as well being detected in all sectors of the study area during a severe winter 1994. Maximum densities of this species were recorded in Klaipėda and Palanga areas (0.27/km and 0.2/km, respectively). During mild winters corpses of this species were detected only in Palanga area with low average density of mere 0.07/km.

Number of species washed ashore increased almost twice after a severe winter as against the mild winter corpse stock (14 species in mild and 22 in severe winter). The first findings of seabird/waterfowl species: Black-throated Diver, Razorbill, Guillemot, Little Grebe and Goosander as well as some inland bird species: Sparrow Hawk, Tengmalm's Owl, Common Rook occurred after a severe winter of 1994. On the other hand, corpses of some gull species: Kittiwake, Lesser Black-backed Gull were not detected in the study area after a severe winter 1994.

The overall analysis of beached bird stock indicates the decrease of oil-contamination level under the conditions of a severe winter. In the sample of mild winters 1991-1993, about 35.2% of corpses fit for the analysis were slightly or heavily oiled (Vaitkus et al., 1993), whereas in a severe winter 1994 the proportion of oiled corpses decreased to 23.5%. Proportion of slightly oiled corpses decreased about 3.4 times (34.2% in mild and 9.8% in severe winter) but that of heavily oiled corpses increased about 5.3 times (2.6% in mild and 13.7% in severe winter).

During a severe winter (1994) oil-contaminated corpses of 9 seabird/waterfowl species were recorded, whereas during mild winters corpses of only 4 species were found contaminated with oil. The overall average density of oiled corpses has also increased from 0.13/km to 0.21/km. The overall density of oiled Long-tailed Duck corpses has increased 4 times (from 0.01 to 0.04/km), Common Gull - about 1.5 times (from 0.02 to 0.03/km), Great Crested Grebe indicated almost the same overall average density of oiled corpses (0.01/km), whereas oil-contaminated corpses of the Herring Gull were not detected during a severe winter (this species makes up to 70% of the whole stock of oiled corpses during mild winters).

Discussion

Results of the present study are in harmony with the general tendencies of seabird distribution and mortality under severe winter conditions. Generally, grebes, dabbling ducks, other sea-duck, waders and, occasionally, gulls have been found significantly more frequently during severe winters and even during short cold spells which may occur during mild winters. On the other hand, some pelagic species, such as Kittiwake, Razorbill, Guillemot have not been found in larger numbers during severe winters (Camphuysen, 1989).

Low average temperature and occurrence of ice fields in coastal and sometimes even off-shore waters of the Eastern Baltic in February 1994 caused mass weather-induced sea-duck and waterfowl escape movements from northern to southern part of the Eastern Baltic, resulting in occurrence of huge concentrations of the Long-tailed Duck, Velvet Scoter, Razorbill, divers and other highly vulnerable seaduck/seabird species in far off-shore SE Baltic waters, namely, along Kuršių Spit and in Klaipėda sector (Vaitkus, 1994). It is normal that large seabird concentrations, suffering low temperatures and being removed from their natural feeding grounds by ice fields, produced high beached bird density level. On the other hand, drastic decrease of beached Herring Gull densities in Klaipėda sector and along Kuršių Spit as well as disappearance of Kittiwake and Lesser Black-backed Gull which have been recorded there during mild winters 1991-1993 once more support the regularity pointed out by the other authors (Camphuysen, 1989).

Much higher number of species detected washed ashore and contaminated with oil could be explained by higher numbers of seabirds accumulated in the area during the period of unfavourable weather conditions and ice situation. On the other hand, findings of typical inland birds (Tengmalm's Owl, Sparrow Hawk) as well as of some waterfowl species (Swans, Mallard, Little Grebe) washed ashore indicate that all wintering populations were suffering from the lack of food, especially raptors and surface-foraging waterfowl, i.e. groups less flexible in foraging strategies.

Palanga area (Li1) has demonstrated the highest scale of variation in seabird mortality depending on winter climatic conditions (Fig.3). Most probably this happened because large sea-duck concentrations wintering in Palanga area (Švažas, et al., 1992; Švažas, 1993) suffered considerably under severe winter conditions, on the other hand, ice-field fragmentation was much higher there (surface current entering the Eastern Baltic from Kuršių Lagoon continuously transported pieces of ice thus forming almost entire ice-field in Klaipėda sector), making the shallow area accessible for seabird concentrations even during extreme winter conditions.

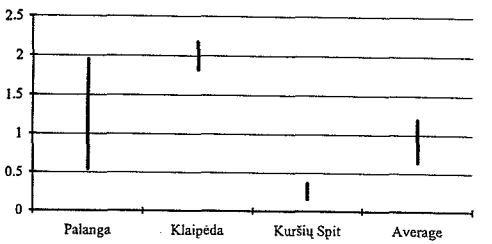

Fig.3. Trends of beached bird densities at the Lithuanian coastline .

The decrease of oil-contamination level under severe winter conditions most probably was caused firstly by the decrease of oil transportation and shipping as navigation was considerably reduced in Klaipėda sector in February 1994. Ice formations played an important role in utilising oil discharges. Seabird concentrations, even though much larger than in mild winters (during the period of at least 2 weeks in February 1994), were located far off-shore (Vaitkus, 1994) oil-contaminated corpses, thus, being less expected to be able to reach the beaches.

The overall proportion of oil-contaminated corpses found in the Lithuanian seacoast so far is significantly lower than in other European countries. A very big sample from the Netherlands (a country with probably the highest level of beached bird densities and oil contamination in all Europe) indicated the overall proportion of about 68% oiled birds whereas (small and probably not 100% reliable yet) Lithuanian sample indicated the overall oil-contamination level of up to 35% in mild and only 24% in severe winters. Proportions of oiled corpses of separate species were much lower as well (Long-tailed Duck: 21.4% oiled in Lithuania and 88.9% in the Netherlands; Common Gull: 15.4% and 59.6%; Razorbill: 50% and 89.3%, respectively).

Results of this study added much to the overall picture of late winter - early spring seabird mortality in the Lithuanian sector of the Eastern Baltic before any oil-development works have started. The winter of 1994 provided probably the last opportunity to evaluate the natural beached bird density level in the area because off-shore oil drilling has been already started in the continental shelf along Kuršių Spit in Kaliningrad Region of Russia in winter 1993/94 (Vaitkus, 1994) and construction of oil terminal in Būtingė (on the border of Lithuania and Latvia) is planned to be started in the near future. With the development of those projects beached bird density level is expected to increase considerably.

References

Camphuysen C. 1989. Beached Bird surveys in the Netherlands 1915-1988. Techn. Rapport Vogelbescherming 1, Amsterdam, 322 p.

Camphuysen C.J., Franeker J.A. 1992. The value of beached bird surveys in monitoring marine oil pollution. Vogelbescherming Techn. Rapp., vol.10, 193 p.

Švažas S., Vaitkus G. 1992. Numbers and distribution of wintering sea-ducks in Lithuanian coastal areas in 1987-1992. IWRB Sea-duck Bulletin, No.2, p.10-19.

Švažas S. 1993. Sea-bird numbers and distribution in the Lithuanian marine waters. Acta Ornit. Lit., vol.7-8, p.44-56.

Vaitkus G., Dagys M., Žydelis R., Kolesinskas T. 1993. Preliminary report on winter-period beached bird densities in the Lithuanian coastal areas. Acta Ornit. Lit., vol.7-8, p.68-73.

Vaitkus G., Vinskas D. 1993. Preliminary mapping of the non-breeding period vulnerable sea-bird distribution in the Klaipėda sector. Acta Ornit. Lit., vol.7-8, p.57-67.

Vaitkus G. 1994. Rough estimates of vulnerable sea-bird concentrations in the planned off-shore oil drilling area along the Kuršių Spit. Acta Ornit. Lit., vol.9-10.

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BIRD STRIKE ANALYSIS IN LITHUANIA

Mečislovas ŽALAKEVIČIUS

Institute of Ecology, Akademijos 2, 2600 Vilnius, Lithuania

Abstract

The paper contains results of analysis of bird strikes for the periods 1958-1978 and 1987-1991. 55 cases of collisions in civil aviation are investigated. Species composition of birds involved in incidents is presented. Annual, seasonal and 24-hour periods of bird strikes have been distinguished. Aircraft types, collision frequency in various flight phases and damages incurred on aviation have been indicated. The present state of affairs in Lithuania is given.

Introduction

Scientific investigation of bird strikes in Lithuania has been executed since 1971 to order of the former Ministry of Civil Aviation of USSR. The basic executor of the work is Laboratory of Ornithology, Institute of Ecology. Later the work had been cut short due to lack of financing and renewed in 1992 to order of Lithuanian Agency for Higher Education, Research and Development. The work is carried out by the above-mentioned Laboratory of Ornithology, Institute of Ecology. Statistical bird strike analysis as a basis for all further studies was one of the first steps we had undertaken.

Material and methods

For the given study, the material officially registered in flight inspection of Lithuanian Civil Aviation Board as well as that from separate Lithuanian airdromes have been used. In reality there were more collisions between aircraft and birds in Lithuanian Civil aviation but if not registered they were not included into this analysis. Ornithologists were not always asked to participate in the identification of a dead bird or its remains or in species identification what, of course, told upon the quality of the work.

Results

Bird strikes in Lithuania in 1958 to 1978.

There have been registered 40 bird strikes during the given period with 14 bird species identified. The group of Corvidae (Jackdaw, Rook, Hooded Crow, Raven) were noted to collide with aircraft most often - 9 incidents have been registered. The greatest number of bird strikes fall to June - August. In July, 1968 in Vilnius airport an aircraft AN-24 collided with a flock of Rook in the altitude of 300 m on its take-off, an aircraft TU-124 - with a flock of Jackdaw in the altitude of 10 m. In August, 1975 in Palanga airport AN-24 collided with a Hooded Crow. In Kaunas airport in July the collisions between aircraft AN-24 and TU-124 on take-off and flocks of Rook and Jackdaw in the altitude 10-20 m were registered (Table 1).

Table 1. Species composition of birds involved in bird strikes.

Species	Number of incidents	%
Corvidae (Rook, Jackdaw, Hooded Crow, Raven)	9	27.3
Rock Dove	7	21.3
Black-headed and Herring Gulls	6	18.2
Birds of prey	2	6.0
Partridge	2	6.0
Duck	1	3.1
Swift	2	6.0
Starling	2	6.0
Swallow	2	6.0
Total:	33	99.9