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The present status of **seabirds** by-catch in Latvian coastal fishery of the Baltic Sea.

E. Urtans and J. Priednieks

Latvian Fisheries Research institute, 8 Daugavgrivas str., Riga LV- 1007 Latvia (tel. + 371 7 610766, mob.tel. + 371 9 268311, fax + 371 7 616946, e-mail: evalds@latfri.lv)

University of Latvia, Faculty of Biology, Dept. of Zoology, 4 Kronvalda bulv., Riga LV-1010 (tel. + 371 7 325593, mob.tel. + 371 9 365593, fax i-371 7 830291, e-mail: jpriedn@lanet.lv)

Abstract

The impact of different fishing gears on migrating and wintering bird populations was studied in the coastal fishery. The data on different passive fishing gears were collected from fishermen –“observers” on basis of voluntary logbook system. During the period 1995-1999 observations were carried out along the Latvian coast of the Baltic Sea. The species composition and number of drowned **seabirds** in different coastal fishing gears was investigated. The variation of seabirds’ by-catch by seasons and different coastal areas was analysed. The main periods of seabirds’ mortality in Latvian coastal fishery were March – May and October – November during their migrations. The highest number of waterfowl was observed in shallow water depth zone from 2.5 to 5 m, which is the main area of coastal **gillnet** (50 – 60 mm mesh size) fishery. Although the impact of Latvian coastal fishery on migrating and wintering **seabirds** was estimated as comparatively low, the possible consequences of increasing coastal fishery pressure and using of new net materials in nearest future can cause higher **seabird** mortality.

Keywords: Baltic Sea, coastal fishery, passive fishing gears, **seabirds** by-catch, species composition, season, area.

Introduction

Latvian coastline is approximately 500 km long. Coastal waters of Baltic Sea and Gulf of Riga are very important **seabirds** migrating and wintering areas. 1.5 million wintering **seabirds** inhabit the Western part of Gulf of Riga, Irbe Strait and Baltic Sea coastal zone (Durinck et al. 1994).

Coastal fish resources and fishery in Latvia are very important for local fishermen. The fishing pressure in period 1990 – 2000 increased several times. It had effect on fish populations and “by-catch” – on **seabirds** and mammals. Incidental take of **seabirds** in commercial fisheries is widespread and is serious problem in all world.

Direct impact on seabirds' populations is caused by world-wide long-line and **gillnet** fishery (Tasker et al. 2000). The using of new types of nets and growing fishing activity caused higher number of waterfowl mortality during the last decades (Atkins, Heneman, 1987, Robins, 1991).

As result of salmon drift-net fishery in 1990 in North Pacific ‘was estimated about 500.000 drowned **seabirds** (Ogi, 1993). In coastal waters of Western Greenland 50 fishermen boats in 1988 in the **gillnet** fishery caught 3.000 Brunnich's guillemots *Uria lomvia* (Falk, Durinck, 1991). Investigations carried out in Kattegat and Baltic Sea showed that each year many thousands of diving **seabirds** as long-tailed ducks, razorbills, divers, sawbills, goldeneyes are dying in fishing gears (Olden et al., 1988, Christensen, 1991). 16.000 long-tailed ducks and velvet **scoters** drowned annually in cod and **flatfish** fishery in Gulf of Gdansk (Stempniewicz, 1994).

Several big projects had been carried out with the aim to evaluate the impact of fishery on seabird's populations. **Seabird** By-catch Project, Project “Incidental take of **Seabirds** in Commercial Fisheries in the Arctic Nations”, WWF **seabirds** by-catch project in North Sea and other estimated interactions between commercial fishery and **seabird** populations. Results of projects showed the necessity of measures to reduce **seabirds** mortality in fishery. The analysis of situation and recommendations, for example, of Point Reyes Birds Observation, USA were taken into account in federal legislation of nature protection and local restrictions of fishery (Salzman, 1989).

Several **seabirds** protection acts were signed: International Union for the Conservation of Nature (IUCN) Resolution of Incidental Mortality of **Seabirds** in Long-line Fisheries and Resolution on Fisheries By-Catch in 1996, the Migratory Bird Treaty Act, the mitigation measures to reduce **seabirds** by-catch by Commission for the Conservation of Antarctic Marine Living Resources, the Food and Agriculture Organisation's (FAO) Code of Conduct for Responsible Fisheries, the HELCOM recommendations concerning investigations of by-catch and monitoring. The United Nations has adopted a resolution for a global moratorium on drift – net **fishing**.

Latvian coastal fishery today is intensive. More than 1500 fishermen are involved in this business. Each year 2900 **gillnets** (each up to 100 m long), 3 10 fish traps and herring pond-nets are used in shallow waters (0.5 – 20 m depth zone). First investigations of seabird's by-catch in Latvian commercial fishery started in 1995 (Urtans, Priednieks, 1999) and the aim of this article is to estimate the present status of coastal fishery impact on seabirds.

Material and methods

The regular system of data collecting concerning seabirds' by-catch in coastal fishing gears was established at 29 fishing sites along the Latvian coast in Baltic Sea and Gulf of Riga (**Figure 1**).

33 coastal fishermen as "observers" regularly during the year registered

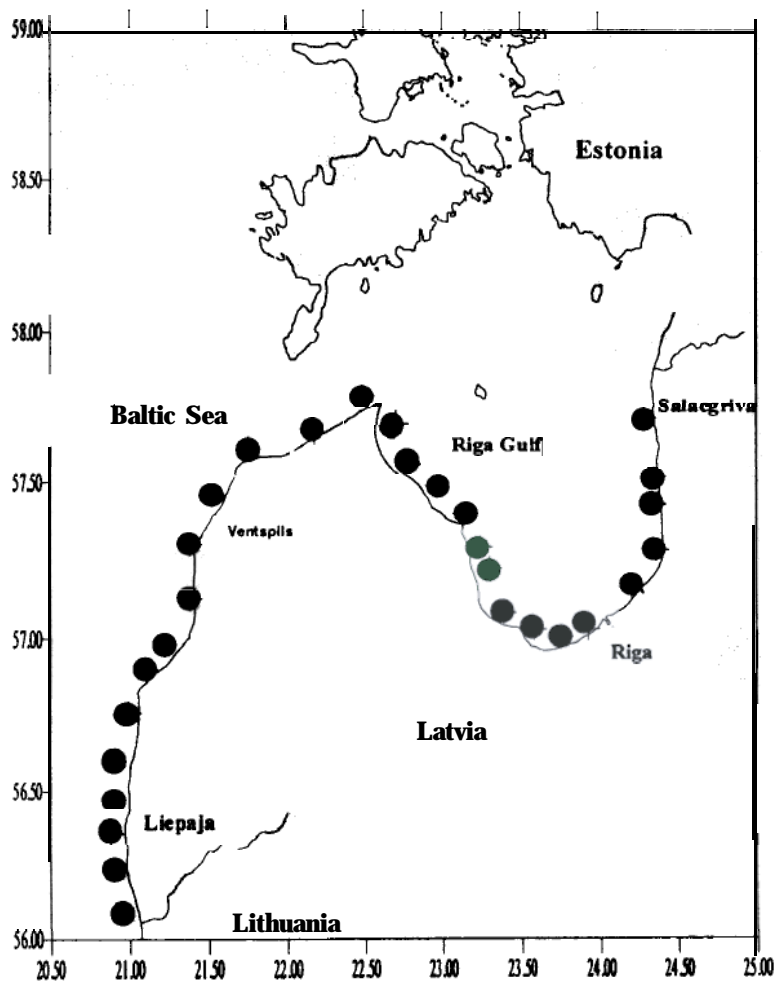


Figure 1. Seabirds by-catch survey sites in coastal waters of Latvia.

in voluntary logbooks the drowned or alive **seabirds** caught in fishing gears. Logbooks included such information as fishing area, place, month, date, fishing gear and its mesh size, duration of fishery, depth zone, catch by fish species and weight, by-catch – seabirds, mammals, crabs by species and number.

Each "observer" received informative materials with description and pictures of main seabirds' species that occur in Latvian coastal waters. In cases if the bird was dead and unknown, some parts of body (head, legs or fragments of wings) were kept and thereafter specialist detected the species.

Although fishermen “observers” were professional and they all got sufficient informative materials, the part of data were applied only on a level of family or genus. Fishermen notes showed that rather often jargon names were used as “diving duck”, “duck”, “gull” etc. Such shortcomings before analysis of by-catch were additionally estimated.

First data concerning **seabird** by-catch in Latvian coastal fishery were obtained in 1994 but more detailed analysis was possible since 1995.

Seabirds’ by-catch data in different fishing gears were systematised in electronic data basis. The mortality of different seabird’s species was analysed by areas, seasons and gears. The total estimated seabirds’ mortality was extrapolated using total number of different fishing gears and differences of by-catch by years, areas and seasons.

Results

According to logbook data the total number of **seabirds** caught in coastal fishing gears was 576 in period 1995 -1999. More than 95% of **seabirds** were drowned. The number of caught **seabirds** varied by years. 54 **seabirds** were noted in 1995, 59 in 1996, 175 in 1997, 81 in 1998 and 153 in 1999. These differences by years mainly were connected with meteorological conditions in period from autumn to spring. Due to Baltic Sea open coastline and strong influence of main western winds Latvian coastal fishery often was limited.

More than 98% of waterfowl were found in **gillnets** with different mesh size (18-100mm).

38% of drowned **seabird** were long-tailed ducks *Clangula hyemalis* and 29% not identified “diving ducks” (**Table 1**) biggest part of them is supposed be the

Table 1. Species composition of waterfowl by-catch in Latvian **gillnet** coastal fishery in 1995-1999 (observers data)

Seabird species	Gulf of Riga		Baltic Sea		Total	
	% by number	number	% by number	number	% by number	number
Long-tailed duck	35.4	128	42.5	88	38	216
Diving ducks	22.9	83	39.6	82	29	165
Divers	20.2	73	8.2	17	15.8	90
Sawbills	3.6	13	1.9	4	3	17
Cormorants	3.3	12			2.1	12
Auks	5.2	19			3.3	19
Gulls	0.8	3	3.9	8	1.9	11
Others	8.6	31	3.9	8	6.9	39
Total	100	362	100	207	100	569

same long-tailed ducks. Red-throated divers *Gavia stellata* and black-throated divers *Gavia arctica* also often got tangled in fishermen nets (15.8% by number). Auks *Alca torda* were mostly found in nets during autumn migrations along the Gulf of Riga eastern coast but cormorants *Phalacrocorax carbo* – in southern part of Gulf near nestling areas. During the period of observations from 1995 several other bird species drowned in fishing gears were found as **sawbills** *Mergus spp.*, goldeneyes *Bucephala*

clangula, velvet scoters *Melanitta fusca*, great crested grebes *Podiceps cristatus*, “gulls” and others.

The number of drowned **seabirds** in Gulf of **Riga** from net hauls in coastal areas was 1.3 times higher than in Baltic Sea. Also **seabird** by-catch species diversity here was higher. Net fishery in Latvian coastal waters of Gulf of **Riga** was more active as compare with open sea areas. The total **gillnet** limit in 1999 in Gulf of **Riga** was 1740 nets each up to 100 m long but in shallow waters of Latvian Baltic sea – 900 nets. At the same time the total number of days without storms and suitable for fishing at Baltic coast was 1 S-2 times less than in Gulf of **Riga**.

Obtained data from voluntary logbooks showed that in all Latvian coastal areas 2 maximum periods were observed, when waterfowl by-catch sharply increased (**Figure 2**). The longest period was from March until the end of May but in autumn –

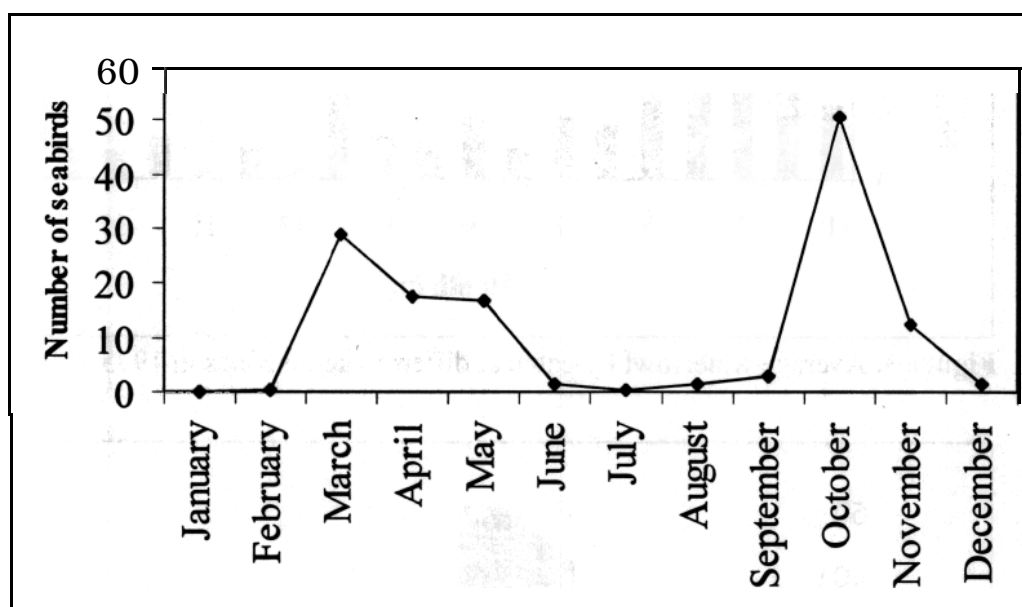


Figure 2. Average monthly changes of waterfowl by-catch in **gillnet** fishery during 1995-1999.

in October and November. These maximums coincided with annual migrations of different species of birds. The spring period of by-catch increase differed by years dependent to severity of winter or temperature regime of spring.

Waterfowl mortality in **gillnet** fishery was lower in December and January and in the middle of summer from June to August. Although there are very important wintering areas of long-tailed ducks, velvet scoters and goldeneyes in Western part Gulf of **Riga**, Irbe Strait and in Baltic Sea near port Ventspils, only several drowned birds were registered during 5 years long period. It was connected with shortening of coastal fishery in winter due to bad meteorological conditions or presence of static or drifting ice. The main part of wintering birds in this period stayed far from the coast where the sea depth reached 20-30 meters (Durinck et al., 1994). The fishing intensity by nets, traps and **fykes** in the middle of summer was rather high, but **seabirds** by-catch was low because main part of them in this time were at their breeding areas in northern Scandinavia or Russia.

The most intensive coastal fishery in Latvia was located in shallow areas up to 10-m depth. The highest waterfowl by-catch in nets was observed in depth zone from

2.5 to 5 m (Figure 3). Coastal fishermen usually all time set big number of fixed **gillnets** early spring or late autumn at very shallow water (1-3 m) for salmon, sea trout, whitefish and other cold-water fish. At this time big number of **seabirds** are entangling in gillnets, mostly in the night or early morning. Although some part of **seabirds** entangled in nets near surface are surviving, after releasing they could become easy prey for predators due to energy loose. Some part (15% by number)

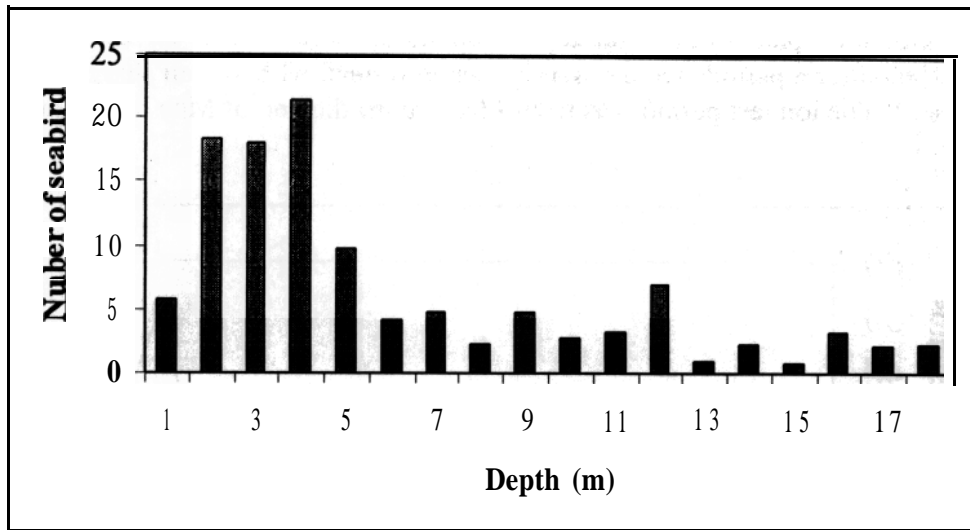


Figure 3. Average waterfowl by-catch at different depth zones in 1995- 1999.

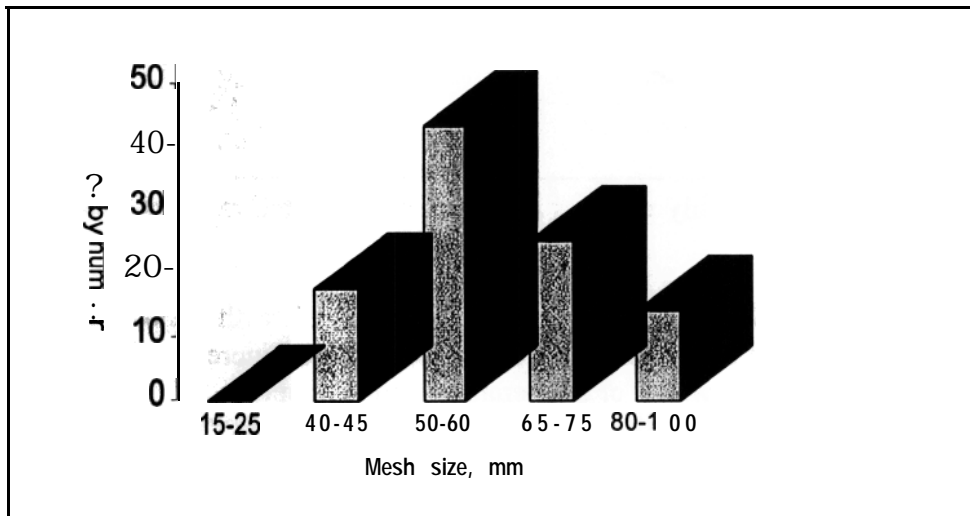


Figure 4. Waterfowl by-catch mortality (% of birds found) in relation to mesh size (mm) in 1995 -1999.

of registered drowned **seabirds** that were found in fixed pelagic salmon **gillnets** with mesh size **80- 100 mm** at 10-15 m depth zone. Salmon **gillnets** are set usually at 5 -10 m depth and birds mainly were found in upper part of net sets.

43% of entangled **seabirds** were registered in **gillnets** with mesh size **50-60 mm** (Figure 4). This mesh size frequently used by coastal fishermen constituting more than 50% by number.

Discussion

At the end of 20th century net materials have improved. Thin 0.15 – 0.2 diameter monofilament **gillnets** were introduced instead of thick **capron** nets. Invisibility and disposal of net sets increased entangling and drowning of **diving** seabirds.

In the English Channel inshore monofilament **gillnets** had high by-catch of seabirds. Robin (1991) showed that in 8 fishing days in 1988 about 900 auks were removed from these nets. Olden et al. (1988) estimated that 25000 **diving seabirds** were killed by drowning in herring and cod gill nets in the Southeast Kattegat between 1982 and 1988. The use of monofilament **gillnets** in several European countries, for example, in Scotland and Norway is strictly limited or forbidden.

The use of monofilament **gillnets** in Latvian coastal fishery in the period 1992 – 2000 sharply increased and their part today is estimated to be 50 – 70% by number. The impact of coastal fishery on migrating or wintering seabird's populations in Latvia would increase in nearest future.

The data from voluntary logbooks showed that the maximum of entangled **seabirds** in **gillnets** was observed in October (**Figure 2**). According to Latvian fishery rules there are 2 closed periods for coastal fishery. Fish trap and net fishery (excluding herring gillnets) is not allowed in Gulf of **Riga** from 1st to 31st of May and along whole Latvian coast – from 1st of October to 15th of November. During these periods fishing intensity and **seabirds** mortality are rather low.

The estimation of seabird's mortality in Latvian coastal fishery like as in other countries was rather difficult task. Usually, the fishermen do not report in logbooks on birds and mammals, caught in gears. Local fishermen who registered by-catch in voluntary logbooks constituted only about 5% of total number of coastal fishermen.

The intensity of coastal fishery is especially high in Southern part Gulf of **Riga**. The estimated seabird's mortality in **gillnets** in the period 1995 -1999 fluctuated between 2.500 – 6.500 birds per year.

The main victims of **gillnet** fishery were long-tailed ducks or “diving ducks” – more than 50% of total number. In 1996-1997's drowned auks were only 1%, but in 1998 their part in by-catch reached 7%. 6 auks from Southern part of Gulf of **Riga** were ringed in Sweden and Finland. The increase of auks' by-catch would be connected with changes of their population size in Baltic (Hilden, Pahtamaa, 1992).

The impact of Latvian coastal fishery on migrating or wintering seabird's populations is not comparatively high. At the same time fishing pressure is increasing, net materials and their catchability – improving.

Gillnet fishery in Southern areas of Latvian Baltic Sea coast potentially the rare species as Steller's Eider *Polysticta stelleri*.

The data concerning **seabirds** by-catch in Eastern Baltic coastal and open sea **gillnets** fishery is matter of further regional project.

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