

Population Development of Baltic Bird Species: Southern Dunlin (*Calidris alpina schinzii* L., 1758)

Authors:

Christof Herrmann, Agency for Environment, Nature Conservation, and Geology of Mecklenburg-Western Pomerania, DE-18273 Güstrow

Ole Thorup, V. Vedsted Byvej 32, DK-6760 Ribe

Key message

The southern subspecies of the Dunlin (*Calidris alpina schinzii*) was once an abundant and widespread breeding bird of the Baltic Sea area. However, during the 20th century the population declined rapidly and counts currently not more than 500-640 bp. From many parts of its former Baltic range the Dunlin has disappeared. An extinction of the species in the Baltic region during the next few decades cannot be excluded.

The reasons for the rapid decline in both numbers and range in the Baltic Sea area are not well understood, but habitat loss and habitat changes due to changes in land use are likely to play a key role. Increased predation by both mammalian and avian predators represents another significant factor.

The Dunlin is an indicator for habitat changes, which not only affect this species, but also other wader species which live in the same or similar habitats, such as Ruff (*Philomachus pugnax*), Black-tailed Godwit (*Limosa limosa*), Redshank (*Tringa totanus*), Avocet (*Recurvirostra avosetta*), and Lapwing (*Vanellus vanellus*).

Results and assessments

Relevance of the indicator for describing developments in the environment

The Southern Dunlin (*Calidris alpina schinzii*) is a characteristic bird of grazed coastal meadows, but small numbers also breed on peat bogs. Nowadays, the breeding sites are almost exclusively found in coastal areas, whereas in the past the species was also common in the inland.

The Dunlin is a species, which has suffered dramatic long-term declines in the Baltic. During the 19th and at the beginning of the 20th century still a widespread and common breeding bird in most parts of the Baltic, it is nowadays one of the most threatened species with a total Baltic population far below 1,000 bp. It is an indicator for long-term changes of the environment, which are not fully understood. However, habitat changes are obviously a significant factor.

As a breeding bird of coastal, grazed meadows which are exposed to regular flooding the Dunlin maybe considered as an indicator for the quality of this habitat type. Since several other waders (e.g., Ruff, Black-tailed Godwit, Redshank, Avocet, Lapwing) are breeding in the same or similar habitats, the Dunlin is an indicator for the habitat availability and quality for this group of coastal birds. The coastal waders are a bird group of special conservation concern in the Baltic Sea area, since several species meet the criteria for a threat category according to the HELCOM Red List of Baltic breeding birds (HELCOM, in prep.).

Policy relevance and policy references

The Dunlin is protected by the provisions of the EU Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of

wild birds; this is the codified version of Directive 79/409/EEC), which are implemented by the Member States into national law. This means, the legal protection status of the species is similar in all Baltic Sea states, which are members of the European Union. It is listed in Annex I of the Bird Directive, *i.e.*, EU Member States are obliged to establish Special Protected Areas (SPA). In Russia, the Dunlin is also protected.

Conservation target

The population decline of the Dunlin in the Baltic Sea area should be stopped or, if possible, even reversed by an appropriate management (habitat management / management of predators) of the still existing breeding sites and other appropriate sites, especially those where the species has disappeared recently.

Assessment

Population development of the Dunlin in the Baltic Sea area

The southern sub-species of the Dunlin, *Calidris alpina schinzii*, colonises south-eastern Greenland, Iceland, the Faeroe Islands, Great Britain and Ireland, southern Norway, and the Baltic. In the southern North Sea (Belgium, Netherlands and Germany), the Dunlin has been a breeding bird in the past, but in recent times breeding records have been few and irregular.

At the beginning of the 20th century, the Dunlin was still a widespread and common bird in most parts of the Baltic (Boie 1822, Fromholz 1913, Thorup 1997). However, already at the end of the 19th /beginning of the 20th century it has been declining in the southern Baltic (Wüstnei & Clodius 1900), and this decline has continued during the whole 20th century. Since the mid-1990s, the negative trend has even accelerated.

The **Danish** breeding population at the beginning of the 20th century was estimated at 50,000-100,000 bp (Thorup 1997). It plummeted down to less than 1,000 bp at the beginning of the 1960s, but was about stable between 1970 and 1990. Starting at the beginning of the 1990s, the population showed a rapid decline to 170-180 bp currently, perhaps showing a slight recovery 2008-2011. The population development during the last 5 decades is shown in Table 1 (Thorup *et al.*, in prep.).

Table 1: The development of the population of the Dunlin in Denmark 1964-2011.

	1964	1970	1990	2011
Baltic¹	596	504	379	88
North Sea	243	240	359	86
Denmark total	839	744	738	174

At the Baltic coast of **Schleswig-Holstein, Germany**, the Dunlin has been a widespread breeder in the past (*e.g.*, Boie 1822), but disappeared during the 1990s. However, at the North Sea coast it re-established as a breeding bird in 2007 in the Rickelsbüller Koog close to the Danish border. In this area (Rickelsbüller Koog and the adjacent Margrethe Kog), the Dunlin had already disappeared in 1996. The number of breeding pairs were 1 bp in 2007, 2 bp in 2008, 5 bp in 2009 and 4 bp in 2010. The return of the Dunlin to the Rickelsbüller Koog is probably related to dispersal or interchange of birds from the Danish breeding sites on Rømø (distance *c.* 25 km).

In **Mecklenburg-Western Pomerania**, the development was quite similar to that observed in Denmark. There are many references confirming the high abundance of the species in coastal areas at the beginning of the 20th century (*e.g.*, Fromholz 1913). In the mid-1960s the

¹ Includes the Helsinki Convention area, *i.e.* the Limfjord and adjacent waters (Venø Bugt, Kås Bredning, but not Nissum Bredning).

population was still estimated at about 250 bp. Probably as a direct consequence of considerable habitat losses due to land reclamation projects in coastal areas at the end of the 1960s, the Dunlin declined to about 90-120 bp at the beginning of the 1970s (Nehls 1987). It maintained a level of 70-80 bp until the beginning of the 1990s, but then the population started to decline rapidly and is nowadays with only 7-9 bp close to extinction (figure 1). However, during the last years (2005-2011) the population remained stable on this low level.

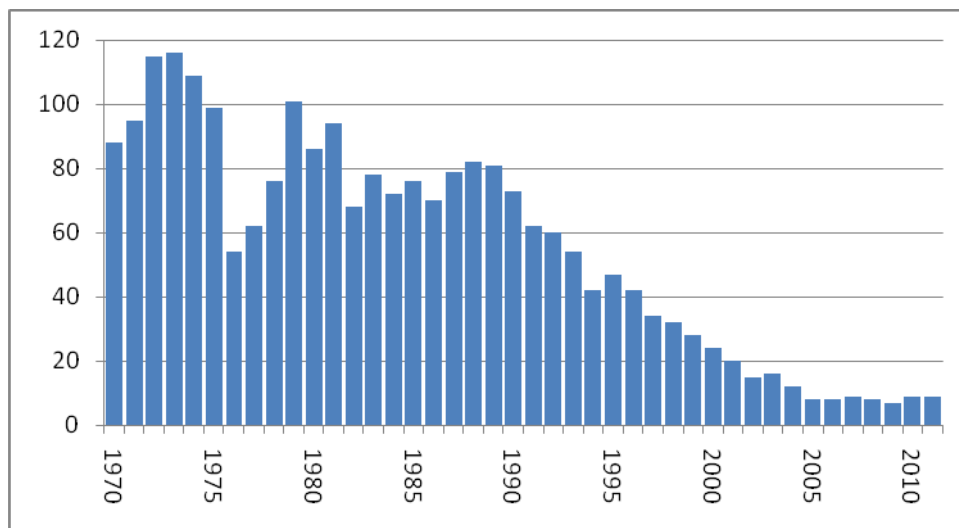


Figure 1: The breeding population of the Southern Dunlin in Mecklenburg-Western Pomerania 1970-2011.

In **Poland**, the population was about 80-100 bp in the mid-1980s, but plummeted down to about 20 bp around 2000 (Tomiałojć & Stawarczyk 2003). Between 1986 and 1993, breeding was confirmed at 3 sites, and suspected for another 8-10 sites. In 1996-1998, the Dunlin bred in the delta of the Świna River, at Lake Łebsko, at the mouth of the Reda River and in the Biebrza marshes. After 2000, only 2 breeding sites remained: Świna Delta and Reda River mouth (Sikora *et al.* 2007). In 2007, nine former breeding sites along the sea shore and the Biebrza marshes have been monitored without any breeding record (Sikora *et al.* 2008). However, some birds have been observed in May 2007 at the Świna Delta, and in May 2008 in the Beka Nature Reserve, suggesting that breeding of the species might still be possible.

The **Lithuanian** population has never been very large; the maximum number reported was 25-30 pairs in 1996-1998 (Thorup 2006). In 2011, the former coastal breeding sites have been surveyed. No breeding was recorded, and most of the sites were abandoned and overgrown (Thorup *et al.*, submitted).

There are no confirmed breeding records of the Dunlin in **Latvia** from recent times. During the elaboration of the second Latvian Breeding Bird Atlas 2000-2004 (in preparation, results are available online: http://www.lob.lv/lv/atlants/sugu_kartes.php?kods=caalp) breeding of Dunlins has been suspected for 3 sites: Ainazi and Randu plavas, Teich bog and Daugavgrīva. The population is estimated at 0-7 bp.

Estonia holds 200-250 pairs, with a decreasing trend prevailing since the 1970s and accelerating since the 1990s (Elts *et al.* 2009). However, like in Denmark and Germany there are signs of a halt in the decline in recent years (H. Pehlak, unpubl.)

In the **St Petersburg** region of **Russia** the Dunlin is obviously still a rare or sporadic breeder. In 2008, a nest was found on the shore of Kurgalsky peninsula (Fedorov 2009). In 2010, an adult bird with typical breeding behaviour was seen on a small islet near Sescar Island (Fedorov, pers. comm.). In the **Kaliningrad** region the Dunlin was known as a breeding bird until 2001 (1989-93: 4-5 bp; 1996-99: 3 pairs; 2001: 2 pairs). After that year, no further breeding could be confirmed (Grishanov & Lykov 2008).

In **Finland**, the Southern Dunlin has never been numerous. The first documented breedings date back to the 1880s. In the 1960s, the Dunlin was still considered increasing, with a country total of 150-200 bp (Soikkeli 1964; Perttula 1998). New breeding sites were still found in the mid-1980s when the population peaked at 200 pairs. However, until the early 1990s the population had declined to 100 bp. In 1999 the number of confirmed breeding pairs was 71, and in recent years (2003-2009) the number was about constant between 50 and 60 bp.

The only area with a continuous monitoring was in the Pori region (SW Finland), where the breeding pair numbers were 4-5 in 1947, 14 in 1955, and 60-70 in 1963. After the 1960s the population in this area started to decrease, and until the late 1980s it had dropped down to 26 bp. In the Vaasa region (Kvarken), also many breeding sites have been abandoned in the 1980s and early 1990s. In the northernmost breeding area in the Oulu region the breeding pair numbers still increased until the 1990s. After 2000 some more sites in Finland have been abandoned. The only sites with stable populations or even slight increases are situated in North Ostrobothnia (Oulu region). After the 1990s, the total number of Dunlins in the Oulu region has been unchanged, but the number of breeding sites has decreased.

The **Swedish** population has also been declining rapidly. In the southern Swedish province of Scania, the population amounted still to 425 pairs in 1930, but dropped down to only 100 in 1994, and 55 in 2004 (Tjernberg & Svensson 2007). The population decline in Sweden reached the magnitude of 50-60% during the period 2000-2010. The total number of breeding pairs in 2010 was estimated at 75-125 bp.

The total Baltic population was estimated at about 1,360-1,560 bp for the period 1994-1998 (HELCOM 2002), 1,110-1,360 bp in 2002 (Thorup 2006), and 500-640 bp in 2007-2011 (table 2). Figure 2 shows the current breeding distribution of the species in the Baltic Sea area.

Table 2: Population numbers of the Dunlin in the Baltic Sea area 1994-1998 and 2007-2011. Data for 1994-1998 according to HELCOM (2002). For Denmark and Schleswig-Holstein, the numbers include the breeding pairs at the North Sea coast.

Country	Breeding pairs		Short-term population trend (10 years)	Long-term population trend (50 years)
	1994-1998	2007-2011		
Denmark	450 ²	170-180 (2011)	-	--
Estonia	400-500	200-250	--	-
Finland	100	50-55	0	-
Germany - SH	12-15	1-5	-	--
Germany - MV	32-47	7-9	--	--
Latvia	2-5	0-7 (2000-2004)	?	--
Lithuania	5-50	0-3 (2011)	--	--
Poland	30-40	0	--	--
Russia, KAL	5-8	0		--
Russia, PET	20-30	1-5 (2008)	--	--
Sweden	325-410	75-125 (2010)	--	--
Baltic Sea	1,380-1,660	500-640		

² According to Grell (1998)

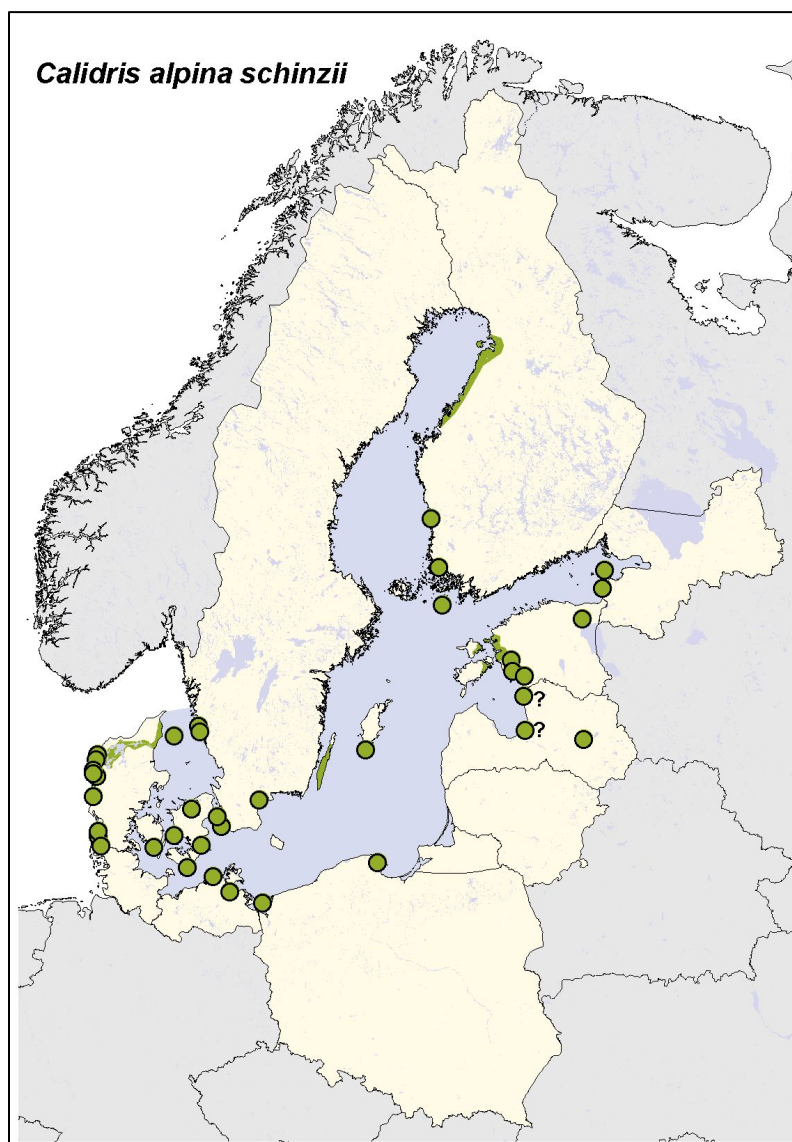


Figure 2: The distribution of the Southern Dunlin (*Calidris alpina schinzii*) in the Baltic Sea area 2000-2010 (including the North Sea coast of Denmark and Schleswig-Holstein).

Habitat loss due to land reclamation, drainage and conversion to arable land have been considered as reasons for the population decline in the past. However, habitat loss cannot explain the full scope of decline (Blomquist *et al.* 2010). Changes of the characteristics of the remaining habitats (e.g., due to changes in management / grazing practices; changes in hydrology; abandonment of meadows) seem to be the key factor of the most recent declines. Although a too low grazing pressure on coastal meadows is apparently the main problem, overgrazing by cattle may also play a role (Beintema & Müskens 1987, Baines 1990). On Gotland (Sweden), high numbers of grazing Barnacle Geese may have a negative impact on otherwise suitable habitats.

Predation, especially by predatory mammals (Red Fox *Vulpes vulpes*, Raccoon Dog *Nyctereutes procyonoides*, and American Mink *Mustela vison*), is another important factor (Ottvall 2005). In Germany, rabies has been eliminated during the mid-1990s, with the consequence that the population of Red Foxes increased considerably; in some regions, a tenfold increase of Fox numbers has been observed (Bellebaum 2003). Invasive species, such as the feral American Mink and the Raccoon Dog, have spread all over the Baltic Sea area. Especially the feral Mink seems to cause severe problems for ground-breeding coastal birds (Andersson 1992; Nordström *et al.* 2003). The increase of predatory mammals and the

invasion of introduced species is currently considered to be one of the most severe problems for coastal bird conservation (Langgemach & Bellebaum 2005; Kube *et al.* 2005). In Germany, since the mid-1990s coastal birds have largely declined in all areas with free access for predatory mammals (Herrmann 2010), and the Dunlin even has completely disappeared from these areas. The last stable breeding site is the island Kirr, where predatory mammals are controlled.

Beside the mammalian predators, also some avian predators have increased considerably in recent times. The Marsh Harrier (*Circus aeruginosus*) has increased since the 1970s in much of its European range (Hagemeijer & Blair 1997). Within the distribution area of the Baltic Dunlin, 5-10 fold increases have been observed. At some breeding sites (e.g., Tipperne, DK), the Marsh Harrier is probably the single most important predator for breeding Dunlins. Another predator with strong population increase in recent times is the Peregrine Falcon (*Falco peregrinus*).

However, the factors affecting the breeding success and recruitment rate are obviously quite complex. Field studies in southwest Sweden (Pauliny *et al.* 2008) showed that protection measures against predators increased the hatching success, but not the fledgling success and recruitment rate. Weather conditions, food availability, chick predation and genetic effects are other factors affecting hatching and survival after hatching.

According to recent research results, genetic effects (inbreeding depressions) pose a threat to small and isolated populations of the Dunlin. Blomquist *et al.* (2010) combined long-term population and fitness data of a metapopulation of southern Dunlins breeding on coastal pastures in SW Sweden with two types of molecular markers. The decline of the population was associated with increased inbreeding and loss of genetic diversity (assessed as loss of allelic heterozygosity at 7 microsatellite loci). The loss of genetic diversity resulted in a reduced embryonic survival and probably also a reduced fitness and survival after hatching. However, it has to be emphasized that these results have been derived from a small and isolated population; they probably only apply for such situations. Comprehensive investigations for larger populations in SW Sweden, on Öland, in Estonia and Finland are currently done by the Universities of Göteborg and Oulu, but the results have not yet been published. However, as a consequence of the general declining trend in the Baltic Sea area isolation of breeding populations is becoming an increasing phenomenon. For instance, there is currently not one single larger population along the entire southern coast of the Baltic Sea from Germany to Latvia! Hence, the genetic effects may gain increasing importance on the level of the whole Baltic population in the future, if the rate of decline of the last decade continues.

It is still poorly understood, how general weather patterns and climate change have contributed to the population development. A considerable population increase at the well managed sites in the 1980s and a very rapid decline between 1990 and 2005 in most populations may partly be attributed to climate factors. However, since most Dunlin breeding sites are managed, unfavourable climate effects at the presently seen scale can be counteracted by appropriate adjustments of management and land use (e.g., water retention, grazing intensity).

In many Danish sites improper habitat management is still a major issue with fragmentation, drainage and over- or undergrazing being crucial factors affecting the population. But there are probably also other problems. It is worth to mention that in the four most important Danish sites for the species where meadow management is directed particularly to the demands of Baltic Dunlins – Tipperne and Agger Tange in the North Sea part, Bygholm Vejle and Læsø in the Baltic part – the number of breeding dunlins was higher in 2010 than in 1970!

In Mecklenburg-Western Pomerania, the area of coastal meadows with a natural flood regime has increased after 1990 due to restoration projects. In Denmark, Sweden and Lithuania, *Life* projects with the aim to restore or improve habitats for Dunlin, Ruff and other waders have been implemented or are under implementation. Sweden has developed an

“Action programme for the Southern Dunlin for the period 2010-2014”, which includes habitat restoration and management of coastal meadows and removal of predators (Flodin *et al.* 2010). In Poland, a special project aiming on restoration of breeding habitats for the Dunlin is implemented by the Polish Society for the Protection of Birds at the Beka Nature Reserve. However, to become effective, restoration programmes need to be carried on for years, and even then their ability to re-establish populations seems controversial when immediate results are wanted. Yet, at sites still inhabited by the Dunlin, results have been encouraging. In Finland, the population decline has recently halted, commonly thought to be due to habitat restoration measures. However, on Öland, Sweden, the supply of suitable breeding habitats has not changed during the last two decades when the population was declining.

Since predation of nests and chicks may affect the breeding success and eventually the viability of a population, conservation measures for the remaining breeding sites should also include a management of predatory mammals. Since fragmentation of the landscape favours generalist predators, appropriate habitat management that avoids fragmentation is another element of conservation of the breeding sites.

The main wintering areas of the Baltic Dunlin are the estuaries of N and NW Africa (Mauritania, Tunisia, Morocco), which it shares with other Dunlin populations of the subspecies *C. alpina schinzii* and *C. alpina arctica* breeding in Greenland and Svalbard, Iceland, Faeroe Islands, Ireland and Great Britain. Furthermore, there are also mid-winter ringing recoveries from southern France (both Atlantic and Mediterranean coasts), indicating that a certain proportion of the population winters in south-west Europe (France, Iberian Peninsula). The autumn migration follows the Wadden Sea and the Atlantic coasts of southern Britain and France (especially the Channel and the Bay of Biscay). Also during spring migration the Bay of Biscay is the staging site with most recoveries. Ringing recoveries from the Mediterranean Sea mainly date from the period 21 February – April, indicating that the Mediterranean coast is mainly frequented during spring migration. Especially the Gulf of Lion is obviously an important staging area (Thorup *et al.* 2009). Factors affecting the birds in their staging and wintering areas may play a role for the development of the Baltic Dunlin population, but knowledge on this aspect is scarce.

Metadata

Technical information

Data source:

Denmark: annual surveys in a selected number of sites, Ole Thorup, Ribe.

Germany: annual surveys of coastal bird breeding sites; Staatliche Vogelschutzwarte Schleswig-Holstein; Agency for Environment, Nature Conservation and Geology Mecklenburg-Western Pomerania.

Estonia: Elts *et al.* (2003); Elts *et al.* (2009).

Finland: annual surveys, M. Hario, Finnish Game and Fisheries Research Institute, Helsinki.

Sweden: information by Martin Tjernberg, ArtDatabanken, Uppsala.

Poland: annual monitoring of breeding sites, Chief Inspectorate of Environmental Protection.

Geographical coverage: entire Baltic Sea area

Temporal coverage: 1994/98-2010

Methodology and frequency of data collection: counts of territorial pairs; the frequency and completeness is different in the Baltic Sea countries.

Quality of information

The reliability and quality of data is high.

Monitoring recommendations

The remaining breeding sites of the Dunlin should be surveyed annually.

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