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Population trends of the Dotterel *Charadrius morinellus* in Finland during the past 150 years

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The population trends of the Finnish Dotterel were studied for the past 150 years. A comprehensive study of Finnish ornithological literature was undertaken, the main bird archives were worked through and additional data were gathered through personal correspondence. Thus an almost complete coverage of the published observations was obtained, augmented by many previously unpublished records. The number of observations was fairly stable up to the mid-twentieth century, the slight apparent increase being mostly due to an increase in the numbers of bird-watchers. In reality the numbers probably decreased. The peak abundance was most likely in the 1880s. The main reason for the subsequent decline was obviously overhunting. In the 1950s the Dotterel was still fairly numerous; a decrease probably started sometimes during the 1950s–1960s, although little published information is available. At the main Finnish study area (Värriötunturi fells) the number of breeding pairs has dropped dramatically since the early 1970s. The main reason for the recent decline is probably the use of pesticides in the wintering area. During the Finnish ornithological history the number of Dotterel have decreased to 1–10% of the original, perhaps even more. As no exact data were available for the Dotterel it was not included in the "Red Data Book" of Finland. The data presented in this report suggests that it would belong at least to the category "in need of monitoring". The Dotterel is listed in the EC Directive on the Conservation of Wild Birds (Directive 79/409/EEC).

1. Introduction

The Dotterel *Charadrius morinellus* is a bird of the remote fells of northern Finland. It is seldomly observed during migration in the southern parts of the country, because in spring it probably flies directly from its wintering areas to the breeding grounds (see Maumary & Duflon 1989). Most of the Dotterel south of the Arctic Circle are observed during cold spells in late May (see von Haartman et al. 1963–1972, Saari 1992b). Because of the remoteness of its breeding grounds and the lack of sightings during migration, we do not have a profound knowledge of its past abundance. The past distribution of the Dotterel in Finland has been reviewed by von Wright & Palmén (1873) and Finnilä (1918). According to Finnilä it has never been abundant, with only one

or a few pairs on the same fell, however wide the alpine area. Later observations have been reviewed by e.g. Hortling (1929), Kivirikko (1948), Merikallio (1958), von Haartman et al. (1963–1972), and Hyytiä et al. (1983). The distribution has not changed much since Finnilä's time, and the Finnish handbooks only vaguely hint at a population decrease in Finland around the late nineteenth to early twentieth centuries. The reservation that the recollection of big flocks on the fields by local people may mostly be due to the big flocks staying at Muonio for two weeks in the exceptionally cold spring and early summer of 1867, documented by Palmén and Sahlberg (von Haartman et al. 1963–1972). In this report I try to reconstruct the population trends of the Finnish Dotterel from c. 1840 onwards, about the time this species begins to figure more often in the Finnish ornithological literature. These data are critically evaluated against what is known about the bird watching activities etc. during different periods of Finland's ornithological history. Also, an outline of the population trends is presented based on this material.

2. Material and methods

I made a thorough search for observations on the Dotterel in the old Finnish handbooks cited above, the main Finnish ornithological journals (Ornis Fennica, Lintumies), numerous local reports, and the Archives of Palmén (Zoological Museum, University of Helsinki) and that of Merikallio (Zoological Museum, University of Oulu) containing "all" the published old information and some unpublished observations.

Additional information was obtained from the files of Lågskär and Signilskär bird observatories, in the Åland archipelago (housed at the University of Helsinki). Furthermore, all regional bird societies of Finland were contacted and a few individual bird watchers as well. Most of these data have been published in local reports on a regional basis (Saari 1992a–f, 1993, Saari & Lampolahti 1992). The nest cards collected since 1954 by the Societatis Scientarum Fennicae, including the older "literature cards", were surveyed as were the data of the egg collections at the University of Helsinki (see von Haartman 1969). The annual ringing totals of the Dotterel since 1913 were obtained from the Ringing Centre of the Zoological Museum, Finnish Museum of Natural History, University of Helsinki. The Finnish line transect censuses performed from the 1940s onwards (see e.g. Väisänen 1983) were used as background information on population trends, although the line transect is not an ideal method for censusing the Dotterel (see Kålås & Byrkjedal 1984). The most reliable data set comes from the study area at the Värriötunturi fell where at least the northernmost summit (Värriö I) has been extensively surveyed since 1968 (see Pulliainen & Saari 1992).

3. Results

3.1. Observations outside the breeding area

In the nineteenth century the few ornithologists in Finland recorded the Dotterel at least 17 times south of Lapland comprising at least 43 individuals (Table 1). The actual number seen was somewhat higher, since, in general, only the number of birds shot was considered worth reporting. The largest flock comprised 25–30 birds

Table 1. The number of Dotterel recorded on migration outside the breeding area between 1841 and 1960 (the minimum number of individuals and the number of specified observations), and the number of nests or broods found in Finland during these decades according to the sources mentioned in the text.

Years	Birds	Observations	Nests or broods
1841–1850	1	1	–
1851–1860	2	2	1
1861–1870	7	6	1
1871–1880	1	1	4
1881–1890	28	4	16
1891–1900	4	3	7
1901–1910	20	8	6
1911–1920	2	2	8
1921–1930	7	4	–
1931–1940	13	9	c. 6
1941–1950	91	7	8
1951–1960	59	28	14
Total	235	75	71

(at Pudasjärvi 23 May 1886). In addition to these observations, the Dotterel was recorded a few times in the autumn at Käkisalmi (now Russian territory) and once at Vaasa (von Wright & Palmén 1873). A few other old records had to be omitted, since not even the century was known. The records of the Dotterel being "obtained" a few times in the autumn in the Helsinki area (M. von Wright/Merikallio Arch.), and being seldomly "obtained" at Kuopio and seen there in early April 1845 (a doubtful date!) (Enwald/ Palmén Arch.), however, refer to the nineteenth century. As there are nineteenth century records published from both Helsinki and Kuopio it is not certain how many additional birds are involved in these data. Of a very doubtful value is the undated note of the Dotterel occurring in flocks around Pori in spring (Palmén Arch.). Thus from the 1840s onwards the Dotterel was recorded 2.8 times/decade (specified observations only).

Thirty specified observations, between 1901 and 1950, totalling at least 133 birds seen on migration have come to my knowledge (75 birds on five occasions in 1950). To this could be added the 35–40 Dotterel observed at Signilskär between 1900 and 1934 (Snellman/Merikallio Arch.) and a flock of about 30 birds flying there southwest on 17 September 1932 (Merikallio Arch., not known whether included in the above figure). This observation was, however, doubted by von Haartman et al. (1963–1972). Although that observation may well be correct, the observation in the Merikallio Archives of c. 80 Dotterel observed for three weeks near Pori (dated 30 May 1944) seems doubtful. Outside our present borders, Dotterel were recorded at Äyräpää in May 1925 (Merikallio Arch.) and one Dotterel was injured by a mowing machine in July 1943 (Palmén Arch.), possibly a doubtful observation. During the Second World War, in 1941, Dotterel were also observed twice on the eastern coast of Lake Ladoga by Finnish troups. Although the number of observations increased to 6.0/decade, this may only be a reflection of increased ornithological activity in Finland. Two summer observations at Kuusamo during the first part of the century have been omitted, since these may refer to breeding birds.

A dramatic increase of Dotterel observations south of the breeding areas occurred in the 1950s.

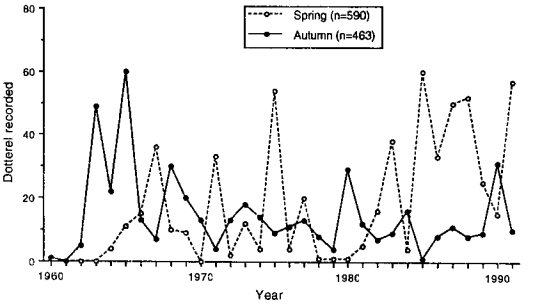

Fig. 1. Number of Dotterel recorded in the spring and autumn in Finland outside the breeding area between 1960–1991.

A minimum of 59 birds were recorded on at least 28 occasions, most of the observations coming from the island of Signilskär (at least 31 Dotterel on 18 occasions). The figures for this decade probably reflect an increasing interest in birds by young boys living in south Finnish cities.

Since the 1960s the bird watching activity has steadily increased, and thus the absolute number of Dotterel seen cannot be compared with those of earlier decades. Omitting the observation of 15 Dotterel observed in May 1961 at Hausjärvi, doubted by von Haartman et al. (1963–1972), Dotterel have been observed annually outside the breeding areas since 1962. The most significant single factor, which increased the number of birds recorded, was the foundation of the Jurmo bird observatory in the southwestern Finnish archipelago in 1962. The annual number of Dotterel recorded on migration in spring and autumn are shown in Fig. 1. Of the 590 Dotterel seen in the springs of 1962–1991 (only those birds included for which the observation year is reported), 312 (53%) have been reported since 1985. This trend indicates an increasing efficiency of finding the birds (new, quite regular resting sites on the Finnish mainland have been found in the 1980s: Rastunsuo in Rautalampi, and particularly Söderfjärden in Vaasa) rather than an increase in our breeding population.

On the other hand, the number of Dotterel seen in the autumn seems to have declined despite the increase in the number of bird watchers. At Jurmo with a fairly constant study effort during the last three decades, the decrease is very pronounced: 176 Dotterel were recorded in the au-

tumns of 1962–1971, 35 were recorded in 1972–1981, and only five birds in 1982–1991! During the same period the totals observed in the Åland archipelago were 16, 14 and 2, respectively.

3.2. Nest records

The number of nests or newly hatched broods found in the files of the Societatis Scientarum Fennicae, the egg collections, the Palmén and the Merikallio Archives, and those listed by Iso-Iivari (1986), up to the 1950s are shown per decade in Table 1. The earliest records were made in 1853 and 1867. An abrupt increase took place between 1880 and 1882 with a total of 18 nest records. The numbers remained fairly high up to the 1910s (the highest annual total was five nests in 1891, a figure surpassed for the first time since then in 1951). This period may be called the pioneer period of Finnish ornithology, with many reports of local bird fauna being published all over the country, which also contained data on the breeding biology of the Dotterel. No nests were reported in the 1920s (no major publications on the birds of Lapland) and only a few in the 1930s and 1940s, despite a growing interest in the biology of birds in the 1930s, and because of the war in the early 1940s. In the 1950s a new interest in the birds of Lapland arose, resulting in several nest records. The first mention of Dotterel recorded on the fell Ailigas, in Utsjoki, is from July 1948 (Merikallio Arch.); the first published observations are from 1950, and the Dotterel has been quite common there since then (see Iso-Iivari 1986). The number of nest records reported to the Societatis Scientarum Fennicae was 13 in the 1960s, three in the 1970s, one in 1981–1985, and three between 1986 and 1988 (Väisänen & Stjernberg 1989). Iso-Iivari (1986) mentions 12 additional nest records in the 1960s, but no later ones. These figures also suggest a population decline.

As a summary of the nest record data, a probable peak in the abundance occurred around 1880, perhaps showing a slow decline during the next decades. Although the number of students in Lapland was comparatively high in the early twentieth century, only a few nests were reported. In the 1920s Lapland was poorly studied with some increase occurring in the 1930s. A small recovery in the population may have taken place around the middle of the twentieth century, although one must note that excursions to Lapland also increased markedly in the 1950s. During the last three decades a decline of nest records seems evident. Compare e.g. the 20 nest records reported to the Societatis Scientarum Fennicae between 1962 and 1988 (only nine since 1965) with the 18 records reported between 1880 and 1882.

3.3. Ringing totals

Birds have been ringed in Finland since 1913, but only two Dotterel were ringed between 1913 and 1951 (except seven with Rossitten rings in the 1930s, Fiedler 1938): one between 1916 and 1921, and one in 1934. This may indicate a limited interest in ringing Dotterel during the first part of the century, or simply that the Dotterel breeding grounds were practically inaccessible. The ringing totals from 1952–1991 are shown in Table 2 in eight-year periods. The numbers were fairly stable in the 1950s, and early 1960s, increasing dramatically from 1968 (coinciding with the Dotterel studies at Värriö), dropped drastically in the late 1970s, with a small recovery in the 1980s. In the last two periods the low number of ringed Dotterel (mainly chicks) indicate low Dotterel populations in Finland. Very few Dotterel have been ringed outside their breeding areas. Altogether 814 Dotterel have been ringed in Finland so far, with more than half of the total between 1968 and 1975, which was the main study period at Värriö (see Pulliainen & Saari 1992).

Table 2. Number of Dotterel ringed during 8-year periods in Finland between 1952–1991. The mean annual number (± SD) are given.

	Ringed Dotterel	
Period	Annual means	Totals
1952–1959	13/13.8 ± 11.5	110
1960–1967	16.6 ± 13.7	133
1968–1975	53.1 ± 37.8	425
1976–1983	5.5 ± 6.7	44
1984–1991	12.5 ± 12.7	100

3.4. Line-transects

According to Väisänen (1983), the line-transects performed in northern Finland give the following population indices for the Dotterel (n = 16 pairs): 500 between 1941 and 1949, 2 700 between 1952 and 1963, and 100 between 1973 and 1977. As the habitat requirements of the Dotterel are quite specific, stochastic factors probably also affect the results, i.e. how well the breeding fells of the Dotterel are represented in the material. Although the decline was statistically significant, the proof was not very reliable, because the high index value of the 1950s was probably caused by random effects in small data (Väisänen 1983).

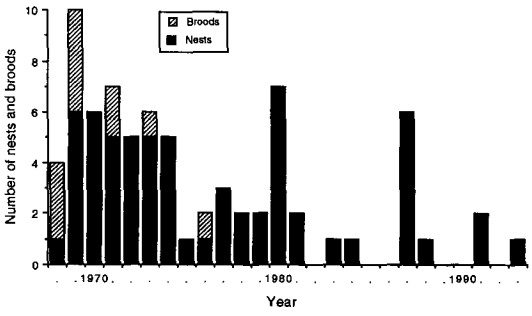

Fig. 2. Numbers of nests and broods in the main study area at Värriö I between 1968–1993. (Note: one nest in 1986 not assigned to any specific summit of the Värriötunturi chain in Pulliainen & Saari (1992) is omitted, since ringing data indicates that the brood was ringed outside Värriö I).

3.5. Dotterel monitoring project at Värriö

The number of nest and brood records on the northernmost summit of the Värriötunturi fell has been studied since 1968 (Pulliainen & Saari 1992). Fig. 2 shows the data up to 1993. The peak years were in the late 1960s–early 1970s, with only occasional peaks thereafter. As the Värriö study area is at the southern limit of the species' range in Finland the results, however, may not be applicable for the whole of northern Fennoscandia.

4. Discussion

The scattered data on the Dotterel in Finland does not allow us to reach conclusions based on only the absolute numbers of birds or nests recorded. It is also difficult to quantify the study effort of the nineteenth century ornithologists. The number of birds recorded outside the breeding area obviously strongly correlates with the number of active bird-watchers, but also with the weather, particularly in spring. As the Dotterel tends to use the same traditional stop-over sites during its migratory period (e.g. Sterbetz 1971, Østergaard 1982, Cramp & Simmons 1983), an increasing knowledge of these sites tends to increase the chances of observing the few birds that rest during their migration.

The following short summary of the development of ornithology in Finland is based on Hildén (1984). Up to about the 1870s ornithology in Finland was rather in its infancy, scientific ornithology is said to have started in Finland in 1874 with J.A. Palmén's doctors' thesis on bird migration. Later, as a professor of zoology at the University of Helsinki (from 1883), he inspired many of his students and several amateurs to collect faunistic data on birds from all over the country. The boom of Dotterel nest records in Finland in the 1880s should be viewed against this background. The golden age of Finnish faunistic literature was at the turn of the nineteenth and twentieth centuries with many papers published on the bird fauna of Lapland, too. This explains the many Dotterel nest records at that time. The Finnish Ornithological Society was founded in 1924, with only a "handful" of ornithologists in the whole country. After the Second World War ornithology grew rapidly and a new milestone in Finnish ornithology was the foundation of several local bird societies during the 1960s and 1970s. Today, Finland is covered by these local bird societies, most of which publish their own journals. In the middle of the 1980s these societies had c. 8 500 members.

With better optic equipment (and not the gun as in earlier times), better field guides, better vehicles (from bikes to cars since the 1950s), and an enormous increase in forest roads (from nil in 1950 to 60 000 km in the early 1980s, Lindén & Raijas 1986), the chances of finding Dotterel must have increased greatly. With all this in mind,

the Dotterel has still probably seriously declined in Finland during the last century, at least outside the breeding grounds.

The number of birds ringed in Finland has also increased greatly. Starting in 1913 (and a total of 776 ringed birds) and reaching an annual total of 10 000–12 000 birds in the 1930s, a big increase took place (after the low during the Second World War and immediately after it) in the 1950s, to about 30 000–50 000 individuals ringed annually at the end of the decade. Around 1970 the annual ringing totals reached c. 200 000 birds and have remained at that level (Hildén 1984).

Considering the annual totals of birds ringed in Finland, the Dotterel seems to have declined. If the ringing effort would be constant for the different bird species, the figures for the 1950s should be multiplied by a factor of at least 4 when comparing them with those of the late 1970s. The corrected value would then be at least tenfold. All these methods of estimating past Dotterel numbers are rather crude, but they indicate that the present population of Dotterel in Finland is only 1–10%, or even less compared with that of the late nineteenth century.

The line-transects and the nest records also indicate a decline from the 1950s onwards. The autumn data from the Jurmo bird observatory indicate a decline to 3% from the first to the third decade of observation (smaller decline in the spring, Saari 1992a). The Värriö data also show a sharp decline in numbers from the early 1970s onwards.

When all the available data from Finland show a more or less steady decrease for the last 100 years or so (at least when the number of bird watchers and their activities are corrected for), it seems safe to conclude that the population has decreased dramatically.

Similar trends have been recorded abroad. Nethersole-Thompson (1973) gives much evidence of the former abundance of the Dotterel in different parts of its range. Recently published data confirm these conclusions. In Denmark 5 200 Dotterel were shot at only three sites in Ringkøping Amt in the spring of 1884. Today at the best known stop overs the numbers only occasionally exceed 100 birds (Meltofte 1993). In Estonia 95% of the birds (n = 134) accepted by the local Rarities Committee have been recorded before 1920 (Lilleleht & Leibak 1991). In Austria the Dotterel was rediscovered in the late 1940s. From 1953 the Austrian population was about 12 pairs, reached a maximum in 1971 with 22 pairs after which a sharp decline took place: 9–11 pairs in 1986 and only 2–3 pairs in 1991 (Brunner 1992). The population trends at the Austrian Zirbitzkogel and our Värriötunturi have been very similar since about 1970 (Hable & Präsent 1990, Pulliainen & Saari 1992). The data from the Kola Peninsula show only a moderate decrease. The annual number of birds recorded per observer was 4.5 in the 1930s, 8.2 in the 1960s, 6.0 in the 1970s, and 5.6 in the 1980s (n = 320 birds; Semyonov-Tyan-Shansky & Guylyazov 1991). The only conflicting evidence comes from Great Britain where the number of breeding Dotterel have recently increased. This was partly attributed to a more intensive survey effort, and partly to a genuine increase as more birds passing through Britain may stop off to breed, and climatic change in Norway may influence more settlements in Britain (Galbraith et al. 1993).

The decline in the nineteenth and early twentieth centuries was probably due to severe overhunting, this being not very difficult as this species is very confident. The recent sharp decline, for instance, of the Austrian and Finnish populations (in the latter from at least about the 1950s) coincides with the use of pesticides in the wintering areas. Hable and Präsent (1990) stress the use of pesticides against locusts as a mortality factor in the Dotterel's North African winter quarters where the species is still hunted. The situation with the Dotterel somewhat resembles that of the Stock Dove *Columba oenas,* a species that greatly suffered from the use of pesticides, but which in contrast to the Dotterel has shown a considerable recent increase (see Mead & O'Connor 1984).

The status of the Dotterel was considered by the Committee for the Monitoring of Threatened Animals and Plants in Finland (Rassi et al. 1992). According to the information available to the Committee, the Finnish range of the species had not changed and they did not recognize any new threats. While it is true that the known range of the Dotterel in Finland does not seem to have changed during our ornithological history, its

density apparently has. Had the information presented in this report been available, the species would probably have been classified at least as "in need of monitoring". Besides hunting and pesticides in the wintering area a possible, but still not verified, threat is overgrazing by domestic Reindeer *Rangifer tarandus* on its breeding grounds. The Dotterel is listed in the Council of European Communities Directive 79/409/EEC on the Conservation of Wild Birds.

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Selostus: **Keräkurmitsan kannankehitys Suomessa 150 vuoden aikana**

Kirjoituksessa tarkastellaan keräkurmitsan kannankehitystä maassamme noin 1840-luvulta lähtien käymällä läpi sekä julkaistut että eri arkistoihin kerätyt havainnot. Suurin osa aineistosta on käsitelty seikkaperäisesti paikallisten lintulehtien palstoilla. Havaittujen lintujen määriä verrataan havainnointitehoon. On ilmeistä, että maamme keräkurmitsakannat ovat jyrkästi taantuneet. 1880-luvun kannat vaikuttivat silloiseen havainnointitehoon verrattuna hyvin runsailta. Vielä 1950-luvulla keräkurmitsat olivat verrattain yleisiä, mutta erityisen jyrkkä taantuma todettiin 1970-luvulla. Suuntaus vaikuttaa yleismaailmalliselta. Viime vuosisadalla ja tämän vuosisadan alkupuolella liiallinen metsästys lienee aiheuttamat taantuman. Tämän vuosisadan puolessavälissä tapahtunut romahdus saattaa olla ympäristömyrkkyjen syytä, sillä niitä syydetään edelleenkin luontoon lajin talvehtimisalueilla Pohjois-Afrikassa. Suomen ornitologisen historian aikana keräkurmitsakantamme lienevät romahtaneet kymmenes- tai sadasosaan alkuperäisestä tai vielä tätäkin alemmaksi. Tämän perusteella keräkurmitsa tulisi luokitella maassamme vähintäänkin silmälläpidettäväksi taantuneeksi lajiksi.

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