

BREEDING PRODUCTIVITY OF CURLEW SANDPIPERS, 1990-1994

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The breeding productivity of Curlew Sandpipers *Calidris ferruginea* on the tundras of northern Siberia is related to levels of predation. The most important predator influencing the outcome of breeding is the Arctic Fox *Alopex lagopus*. In general terms, foxes are abundant in the breeding seasons a year after peak numbers of lemmings. The predation pressure is further increased because lemming numbers usually decline precipitously after a peak. The peaks in lemming abundance in the Taimyr Peninsula, where most Curlew Sandpipers breed, occur at three-year intervals. This interaction between lemmings, foxes and Curlew Sandpipers (and other ground-nesting species on the Siberian tundra) was first established by correlational analyses (e.g. Summers & Underhill 1987), but it has been confirmed by observational studies (Underhill *et al.* 1993).

In earlier papers, the breeding productivity of Curlew Sandpipers was estimated annually using the percentage of first-year birds in samples caught for ringing: northern breeding seasons 1969-1984 (Underhill 1987a), 1985 (Underhill 1986), 1986 (Underhill 1987b), 1987-1989 (Underhill 1990). This paper covers the five breeding seasons 1990-1994.

The numbers of Curlew Sandpipers ringed and aged by SAFRING ringers between mid October (when first-year birds arrive) and mid April (when adults depart) in each southern summer was calculated from ringing schedules (Table 1). As in Summers & Underhill (1987), we classified the previous northern summer as being a good breeding year if the percentage of first-year birds exceeded 20%. 1991 and 1994 were therefore years of good breeding success, and 1990, 1992 and 1993 were years of poor breeding success. However, results over the period 1969-1989 have shown percentages of first-year Curlew Sandpipers between 13% and 30% to be unusual, and the value of 17% for 1990 can perhaps best be described as intermediate. Given that the previous lemming peak had been in 1988, and the three-year lemming cycles, 1991 and 1994 were the expected years of good breeding success.

Conditions on the Siberian breeding grounds are described for each of these five years by papers in the *Wader Study Group Bulletin*. In 1990, both lemming and fox numbers were low on the Taimyr Peninsula, and wader breeding success at most localities was described as good to very good, "though nowhere were maximal levels achieved" because at many localities in the Taimyr there was predation on eggs and chicks by Longtailed Skuas *Stercorarius longicaudus* and Herring Gulls *Larus argentatus* (Yuvlov 1993). The intermediate breeding success of 17% is perhaps slightly lower than might be anticipated given the Russian description.

Table 1. Percentages of first-year Curlew Sandpipers in ringing samples between mid-October of the given year and mid-April of the following year.

Year	Sample size	Number of first-year Curlew Sandpipers	Percentage of first-year Curlew Sandpipers
1990	347	60	17%
1991	141	62	44%
1992	241	11	5%
1993	86	9	10%
1994	102	31	30%

In 1991, the lemming population on the Taimyr Peninsula was high, and the breeding success was moderate to high at most localities, but one locality in western Taimyr experienced a midsummer decline in lemming abundance which led to high fox predation on clutches (Ryabitshev 1993). This phenomenon could not have been widespread, otherwise the overall breeding success of 44% (the fifth highest recorded between 1969 and 1994) would not have been achieved.

In 1992, the thaw on the Taimyr Peninsula was late and the summer was cold with frequent snowfalls, lemming populations were decreasing and fox predation was high, with "estimates of breeding success in waders ranging from 0% to 10%" (Tomkovich 1994a). The observed percentage of first-year Curlew Sandpipers, namely 5%, was consistent with these observations.

In 1993, the timing of spring was average and weather conditions were good. Lemming numbers were minimal and both foxes and avian predators were absent or scarce; estimates of breeding success of waders ranged from "average to high" (Tomkovich 1994b). It is therefore surprising that the proportion of first-year Curlew Sandpipers was as low as 10%.

In 1994, lemmings were at peak levels, but declined in many areas early in the breeding season, predators switched from lemmings to eggs and chicks, leading "to a lower breeding success of waders than was expected" (Tomkovich 1995). The observed proportion of first-year Curlew Sandpipers, namely 30%, was amongst the lowest in good breeding years.

In general, the breeding success of Curlew Sandpipers, as described by the percentage of first-year birds in ringing samples in South Africa, were in agreement with the Russian assessments of conditions on the breeding grounds on the tundra of the Taimyr Peninsula.

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