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FOOT LOSSES OF METAL BANDED SNOWY PLOVERS

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Abstract.—During a 7-yr study on Snowy Plovers (*Charadrius alexandrinus*) in southern Spain, I banded 1072 birds. Of these, 0.6% had natural leg injuries when first captured. Of 412 plovers that were recaptured or resighted in years following banding, 1.9% had injuries caused by the metal band, the most common of which was foot loss. All these birds had the metal band on the tarsus, and no plover with metal band on the tibia was recaptured with injuries. Though foot losses did not prevent breeding, and leg injuries probably had little effects on population dynamics, it is recommended that metal banding of shorebirds on the tarsus should be avoided.

PÉRDIDAS DE PIES EN CHORLITEJOS PATINEGROS (*CHARADRIUS ALEXANDRINUS*) CON ANILLAS METÁLICAS

Sinopsis.—Durante un estudio de siete años sobre Chorlitejos Patinegros (*Charadrius alexandrinus*) en el sur de España anillé 1072 aves. De éstas, el 0.6% tenía lesiones naturales en las patas. De 412 chorlitejos recapturados u observados en años posteriores al anillamiento, el 1.9% tenía lesiones causadas por la anilla metálica, la más corriente de las cuales fue la pérdida del pie. Todas estas aves tenían la anilla metálica en el tarso y ninguna de las aves a las que se les colocó la anilla metálica en la tibia fue recapturada con lesiones. Aunque las pérdidas de pie no impidieron la nidificación y dichas lesiones probablemente tuvieron pocos efectos sobre la dinámica de la población, se recomienda que se evite el anillamiento en el tarso de aves limícolas con metal.

The recognition of individual birds is essential in studies of their population dynamics, migration, and behavioral ecology. There are several types of marks, the most commonly used being leg bands. These bands may cause some injuries to the legs of birds, the most severe being foot losses, and in some cases even reduced survival (Calvo and Furness 1992, Reed and Oring 1993, Sedgwick and Klus 1997).

The Wader Study Group Marking Scheme is coordinating the use of colored leg bands on shorebirds in Europe. The main aim of this coordination is to avoid repetition of the same color schemes in different studies of the same species. In this paper I report on some injuries caused by leg bands on the feet of Snowy Plovers (*Charadrius alexandrinus*). I conducted the study at Fuente de Piedra Lake (37°06′N, 4°45′W) in southern Spain during 1991–1997. This is an inland saline shallow lake covering 1354 ha. The water level experiences dramatic fluctuations, not only between years, but also within seasons. During my study, the lake dried up before the end of the nesting season of the plovers in 1992–1995. However, during these seasons, the lake partially flooded again following rainfall, and then dried up again within a few weeks.

I captured Snowy Plovers at nests using walk-in traps. Following suggestions of the Wader Study Group Marking Scheme (scheme reference no. CM/262), I initially (1991–May 1995) put one metal band on a tarsus,

a color band on the same tarsus above the metal band, two color bands on the other tarsus, and another color band indicative of the study population on a tibia. Any captured chick was similarly banded. After recapturing some plovers with leg injuries caused by the metal band (see below), I always put the metal band on the tibia (May 1995 onwards). From then onwards, I also removed the metal band of any recaptured individual from its tarsus and put it on the corresponding tibia. To assess the effects of leg injuries on survival, I compared recapture rates (up to 1998) of birds with injuries vs. those of the same sex with no injuries and captured the same or the previous day as the injured bird.

During my study I banded 1072 plovers. When first captured, six (0.56%) of these plovers had some natural leg injury, including healed broken leg, toe loss, and swollen leg. A total of 412 plovers were recaptured or resighted at least once in years following banding, and of these eight (1.94%) had injuries in the leg on which the metal band was placed. All these birds had the metal band on the tarsus, and I did not recapture or resight any of the birds that had the metal band on the tibia with leg injuries. The most common leg injury in the metal-banded plovers was the loss of a foot (7/8); in one case a plover had a swollen tarsus. I removed the metal band of this last plover from the tarsus and placed it on a tibia, and in a subsequent recapture it had recovered. In neither case did I record the darvic bands causing leg injuries to the birds.

A characteristic of all eight plovers leg-injured by the metal band was that mud had accumulated between the leg and the band, and this caused the leg to swell and the loss of foot if the band was not removed in due time. The mud between leg band and tarsus probably accumulated when the lake was dry and it rained heavily. Likely, the impact of falling rain against ground determined that the mud could adhere to the legs after water drops bounced on the ground. In fact, three of the eight plovers (37.5%) injured by the metal band were first captured with injury in 1995, which was the year with lowest water levels.

The number of days elapsing between the date on which the injuries, both natural and caused by the metal band, were first detected and the date of last recapture of such injured plovers (405.6 ± 499.3 SD, $n = 14$) was similar to the corresponding number of days for control, non-injured birds (448.4 ± 457.7, $n = 14$) (Student's paired t-test, $t = 0.22$, $P = 0.83$). A similar result was obtained when only birds with injuries caused by the metal band were included in the comparison (paired $t = 0.85$, df = 8, $P = 0.42$).

The percentage of Snowy Plovers captured with natural leg injuries is within the range reported by Gratto-Trevor (1994) for seven North American shorebird species. In a long-term study on Spotted Sandpipers (*Actitis macularia*), Reed and Oring (1993) found that only 2.6% of metal-banded birds suffered foot losses, a percentage similar to the one I found during my seven year study on Snowy Plovers.

As in Reed and Oring's (1993) study, I also found that foot loss did not prevent breeding, and that leg injuries probably had little effect on pop-

ulation dynamics. Probably, all cases of leg injuries associated with metal bands that I detected should have been avoided by not having placed the metal band on tarsus. Although environmental conditions that led to leg injuries at my study site may not be found in other sites where shorebirds are marked, banding on the tarsus of shorebirds should be avoided, as such conditions may be found in sites along migration routes.

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