

DOES USE OF A TAPE LURE BIAS SAMPLES OF CURLEW SANDPIPERS CAPTURED WITH MIST NETS?

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Abstract.—Bias produced by the use of conspecific tape recordings (tape lures) to attract migrating Curlew Sandpipers (*Calidris ferruginea*) to mist nets was assessed. Samples netted with and without tape lures did not differ in age, sex composition, body size or estimated staging time. Tape-lured birds, however, weighed less than those captured without tape lures, although the difference was only significant for females. Potential sources of bias should be considered when analyzing samples obtained in different ways.

¿AFECTA EL USO DE GRABACIONES SONORAS LA COMPOSICIÓN DE LAS MUESTRAS DE *CALIDRIS FERRUGINEA* CAPTURADAS CON REDES VERTICALES?

Sinopsis.—Se analiza el sesgo que el uso de grabaciones puede introducir en la captura de individuos de *Calidris ferruginea* con redes. No se detectó ningún efecto en la composición de edades y sexos en las muestras. Tampoco se halló ningún efecto en diversas medidas del tamaño corporal ni en el estimado del período de estancia. Sin embargo, las aves capturadas con la ayuda de grabaciones pesaban menos que las demás, aunque las diferencias mayores se detectaron en hembras. Este sesgo producido por el uso de grabaciones debe ser tomado en cuenta al analizar información procedente de muestras obtenidas con diferentes métodos.

Decoys are widely used to attract birds (Bub 1991). Use of decoys has been shown to bias sampling in several species, however, with individuals of one sex (Herremans 1989, Kneutgen 1969), age group (Weatherhead and Greenwood 1981), residence status (Furness and Baillie 1981, Senar 1988, Senar and Metcalfe 1988) or body condition (Weatherhead and Greenwood 1981) being more likely to be trapped than other individuals. Tape lures are also a suitable method to attract shorebirds (McClure 1984), although their use is not usually documented and to our knowledge, no one has studied whether tape lures attract a biased sample. In this paper we assess the effect of tape lures by comparing mist-netted samples of Curlew Sandpipers (*Calidris ferruginea*) trapped with and without tape lures.

METHODS

Birds were trapped from July to September 1993 in Les Salines de la Trinitat, in the Ebro Delta (40°37'N, 0°35'E). The study area is located in an area of marginal mud and sandflats within a comercial saltpan (see Maldonado 1977 for a detailed description).

Mist nets were usually operated from approximately 1 h before sunset

to 2300 hours. For 33 nights an endless recording of a Curlew Sandpiper breeding pair was played near one or two randomly chosen mist nets. On the same nights, 6–8 mist nest were also operated without tape lures. The distances between mist nets were enough to ensure that the tape lure used at one mist net did not affect neighboring mist nets. Once trapped, birds were color banded, measured and weighed. For each bird we noted whether or not the tape lure was playing by the mist net in which it was captured. Birds were aged according to Prater et al. (1977) and individuals older than 1 yr were sexed according to Wymenga et al. (1990). The sex of individuals less than 1 yr old was not identified, as their bills could not have attained definitive length. Body mass was corrected for mass loss between capture and banding (Zwarts et al. 1990), at a loss rate of 0.84% per hour. Only data for Curlew Sandpipers captured with mist nets on days when tape lures were used were included in the data analysis.

We performed a total of 22 census in the study area and as many individuals as possible were checked for color bands. These sightings and others obtained during partial surveys were used to estimate a minimum staging time for each individual resighted at least once (see Keijl et al. 1992).

Prior to statistical analysis, staging times were square-root transformed to attain normality (Sokal and Rohlf 1981). Body mass was log-transformed to attain normality, and differences in body mass tested using ANCOVA with wing length as a covariate to correct for the effect of body size. Means and standard errors are reported for non-transformed body mass. The non-parametric Mann-Whitney U -test was used to test differences in wing length, as we could not transform these data into a normally distributed variable.

RESULTS

A total of 423 captures was included in data analysis; 147 individuals (34.7%) were tape lured and 276 (65.3%) were not. Mist-net with tape lures were on average twice as effective as nets without tape lures.

We found no significant differences in age and sex composition of the two samples (age: $\chi^2 = 0.42$, 1 df, $P = 0.51$; sex: $\chi^2 = 0.48$, 1 df, $P = 0.48$). Differences in wing and culmen lengths were also not significant (wing: U -test $z = 0.29$, $P = 0.77$; culmen: ANOVA, $F_{1,417} = 0.033$, $P = 0.85$). Tape-lured birds weighed significantly less than those not tape lured (63.75 ± 0.79 vs. 65.50 ± 0.51 g; $F_{1,403} = 4.275$, $P < 0.04$). A nearly significant interaction between sex and tape-lure status was detected ($F_{1,354} = 3.340$, $P < 0.07$), with great differences in body mass occurring between tape-lured and not tape-lured females (63.50 ± 1.13 vs. 66.50 ± 0.87 g, $t = -2.06$, $P = 0.04$). No differences were found, however, in the body masses of tape-lured and not tape-lured males (64.25 ± 0.73 vs. 64.75 ± 1.03 g, $t = 0.22$, $P = 0.82$). Staging time did not differ significantly between the two groups ($F_{1,85} = 0.171$, $P = 0.68$), nor was there a significant difference in the number of birds banded but not resighted later ($\chi^2 = 0.0367$, 1 df, $P = 0.99$).

DISCUSSION

The use of tape lures with mist nets can produce some biases. We have shown that for Curlew Sandpipers the use of decoys does not affect the sex, age or biometry of a captured sample. The absence of biometric differences is, in part, a result of the absence of a sex bias, as the Curlew Sandpiper is sexually dimorphic, with culmens of males 10% smaller than those of females (Portenko 1959). In contrast, birds of lower mass were disproportionately attracted to tape-lured mist nets, although the difference was significant for female body mass only. Tape-lured birds might have lower masses because they are newly arrived and in lower body condition. Such birds might be easier to attract than those already arrived, which have better knowledge of the area (see Glück 1980, Senar and Metcalfe 1988). The very similar staging time of the two groups seems to rule out this explanation, however. The observed bias could also be related to the fact that hungry birds (i.e., in poor body condition) can be more readily attracted to a stimulus of conspecific activity (see Greenwood et al. 1986, Hepp et al. 1986, Weatherhead and Greenwood 1981). Sexual differences in flock integration behavior (Shevree 1980) could explain the biasing effect of tape lures on the body mass of females. Borrás and Senar (1986) found a similar pattern in a European finch, but in their study the differences in body condition only occurred in males. As the Curlew Sandpiper shows a reversed pattern of sexual dimorphism (Portenko 1959), the mechanism that produces the sex-bias effect of tape lures could be similar to that depicted by Borrás and Senar (1986) for a species with typical dimorphism in size. Curlew Sandpiper females could be more integrated in a flock, and not respond so strongly to the tape lures. Females in poor body condition, however, will try to join a successful foraging group (the tape lure). The observed differences could occur if males were looking for a flock and indirectly for food, whereas females were searching for food and indirectly for a flock (see Borrás and Senar 1986). Nevertheless, we do not have enough information to ascertain the origin of the sex-biased results reported in this paper.

Tape lures are a good decoying method for Curlew Sandpipers (and possibly for other species of shorebirds). Caution must be used, however, when comparing body masses or other indicators of body condition between samples obtained in different ways. In this paper we have reported the effects of using calls of a breeding pair as a decoy during autumn migration, but different effects could be expected at different times or using different vocalizations.

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