ABSTRACT.—To estimate annual apparent local survival, we collected capture–resighting data on 256 individually marked male Western Sandpipers (*Calidris mauri*) wintering at Estero de Punta Banda, Mexico, between 1994–1997. A hierarchical modeling approach was used to address the effect of age class and year on survivorship rates. The best-fit model included a constant apparent survival probability ($\phi = 0.489$; 95% CI = 0.410–0.569), but several models fit nearly as well, and averaging among the top five, to account for model uncertainty, suggested that adults had somewhat higher values than juveniles ($\phi = 0.490 \pm 0.051$ vs. 0.450 ± 0.067).

MIGRATORY BIRDS MAKE repeated annual deci-

In this study, we estimate apparent survival rates of male Western Sandpipers (*Calidris mauri*) wintering at an isolated estuary in northwestern Baja California, Mexico. Western

Sandpipers are one of the most common western hemisphere shorebirds (Morrison et al. 2000), with a global population on order of 3–3.5 million birds (Bishop et al. 2000). The species breeds primarily in the western subarctic of Alaska, and winters primarily along the Pacific

To estimate apparent annual survival rates, we further reduced the data to a bird's presence or absence each year. Apparent survival rate (ϕ, also termed "local" survival) is the probability that a bird alive in winter i remained available for resighting until winter of next year $i + 1$ (i.e. survived through that interval and did not permanently emigrate from the study area). Detection rate (p) is the probability that a bird alive and associated with the study area in year i was detected in year i. We estimated apparent survival and detection rates using the program MARK (White and Burnham 1999) following the information-theoretic approach discussed by Burnham and Anderson (1998).

A global model that included age and annual variation in ϕ and p was developed. For the models that considered age effect, apparent survival was calculated for (1) the first winter to the second winter season of life, for birds first captured as juveniles, and (2) subsequent winter-to-winter years of life, using post-first-year data for juveniles merged with data for birds caught as adults. Goodness-of-fit to that global

arrival at nonbreeding locations. However, the nonbreeding season performance differences in foraging ability and susceptibility to predation between adults and juveniles listed above make that unlikely to be a complete explanation.

The second interesting aspect of our data is that the ϕ values of 0.47–0.49 found for the Punta Banda birds are lower than other estimates for Western Sandpipers. Those include 0.62 and 0.57 for males, and 0.59 and 0.55 for females, for birds breeding at Nome, Alaska, in 1993 and 1994, respectively (Sandercock et al. 2000); return rates, which underestimate ϕ, of 0.58 for males and 0.49 for females breeding in the northern Yukon–Kuskokwin Delta, Alaska, in 1966–1969; 0.56 and 0.61 for mixed sex samples of adults and juveniles, respectively, overwintering at Cabo Rojo, Puerto Rico (Rice 1995); and 0.54 for males and 0.62 for females overwintering at Chitré, Panama (O'Hara

with a low overall local survival rate, that result also implies that Punta Banda is a below average nonbreeding site for older male Western Sandpipers.

From a comparative study of sparrows, Sandercock and Jaramillo (2002) suggested that rates of site-fidelity on the breeding grounds were likely to be lower than that on nonbreeding grounds, due to compromises attributable to mate, nesting, and additional ecological considerations associated with reproduction. We

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