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European Starlings nesting in southern Baja California, Mexico.—The European Starling (*Sturnus vulgaris*) has become abundant across North America since its introduction in New York in 1890. Starlings have been recorded breeding in Baja California as far south as Cataviña (Fig. 1) (Wilbur 1987) and now occupy virtually all the suitable habitat in the northern portion of the peninsula (Short and Crossin 1967). Some incidental winter records have also been reported in southern Baja California (Wilbur 1987, Howell and Webb 1992). Until recently, Southern Baja may be one of the least disturbed areas in the world. The desert is dry and hot (average annual precipitation, 150.6 mm; mean annual temperature, 22.1°C to 23.4°C, maximum 44°C) with a dense sarcocaulescent scrub vegetation dominated by cardon cactus (*Pachycereus pringlei*), dagger cactus (*Stenocereus gummosus*), mesquite (*Prosopis articulata*), palo verde (*Cercidium microphyllum*), Adam's tree (*Fouquieria diguetii*), plum tree (*Cyrtocarpa edulis*), copal (*Bursera* spp.), lomboy (*Jatropha cinerea*), and cholla (*Opuntia cholla*) (Wiggins 1980). Cardons are giant columnar cacti with a principal trunk and generally 4–12 branches starting 3–4 m from the ground. Almost every 6–8 m cardon contains a cavity in one of the branches, cavities that generally were excavated by woodpeckers. These holes are extensively used by both primary and secondary cavity-nesting birds (Rodríguez-Estrella, unpubl. data).

Human activity in the desert of Baja California was still minimal a decade ago. In the 1950s, the Federal government strongly promoted human colonization and increased agricultural activity in the nearly uninhabitated peninsula of Baja California. Subsequently, agriculture and livestock activities have increased along the peninsula. Agriculture was only progressing slowly until the end of the 1980s (Gobierno del Estado 1992). An increase in areas dedicated to agriculture has been recently detected (RR-E pers. obs.). The increase has been concentrated mainly in the Ciudad Insurgentes-Ciudad Constitución, Centenario-Chametla, Los Planes, Santiago-La Ribera, and El Carrizal regions (Fig. 1). These changes may have benefited starlings for colonization.

In this paper, we report the first nesting records of the European Starling in the Cape region, the southernmost record in Baja California, and discuss potential effects nesting starlings might have on the native cavity-nesting bird species in the area.

From May through July 1995, while doing breeding bird censuses in Baja California Sur, we found a European Starling nest with nestlings and observed several other instances of starling breeding activity. We recorded starlings in 16% of the 117 two-hour observational points from Loreto to Cabo San Lucas (Fig. 1). Records were significantly more frequent in human-transformed areas with field crops and rural settlements (14 of 39 points) than in remote areas with natural vegetation (5 of 78 points) ($\chi^2 = 13.9$; 1 df; $P < 0.001$). The mean number of starlings counted was 2.6 ± 2.6 (range 1–10; N = 19 observations). Record sites are shown in Fig. 1.

The starling nest was found on 26 May at the edge of a field crop in a cultivated area containing some scattered trees (Fig. 1). Grazing pastures and corn fields were located within 100 m of the nest area, and some relictual patches of natural vegetation, including cardon and dagger cactus, mesquite, palo verde, Adam's tree, lomboy, and cholla bordered the area. The nest was in an old woodpecker hole in a 4.7 m cardon cactus. The nest cavity was 4.2

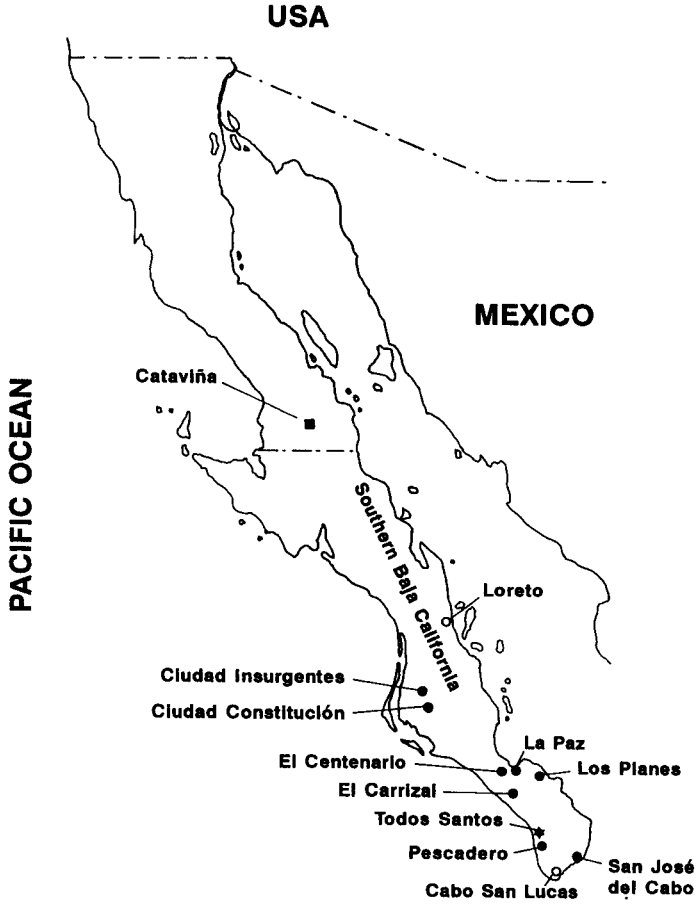

FIG. 1. Localities where starlings have been recorded in southern Baja California (Mexico). The square represents the previous southernmost breeding record. The star indicates our finding of one nest. Solid circles are localities where starlings were observed. Open circles are other localities mentioned in text.

m above the ground, and the cavity entrance was oriented in a NNW direction. Two apparently healthy nestlings, almost fully feathered (ca 15 days old), were in the cavity.

Two other possible nests were found in cardon cavities on 29 May in Los Planes and 1 June in Ciudad Constitución (Fig. 1). Although we did not climb to these cavities, breeding was likely because adults had the yellow-orange color in the bill (see Howell and Webb 1995) and entered both holes. A third adult bird was observed several times carrying food towards a cardon patch in Ciudad Insurgentes. These records clearly show that the European Starling has continued to expand its breeding range into southern Baja California. It has moved more than 800 km to the south of the last breeding record (Howell and Webb 1992). Previous studies (1989 to 1994) had not detected starlings during the breeding season or

nesting birds in southern Baja (Howell and Webb 1992; Rodríguez-Estrella et al., unpubl. data; J. Guzmán, pers. comm.).

The increased incidence of starlings in southern Baja California may be correlated with an increase in agricultural and cattle-raising activities during the last decade in this area (see Gobierno del Estado 1992). That their distribution is significantly associated with human-transformed areas suggests the increase in these practices in the region may have promoted a range expansion of the European Starling in Baja California as has recently happened with other bird species, including the White-tailed Kite (*Elanus leucurus*), Brown-headed Cowbird (*Molothrus ater*) and Western Meadowlark (*Sturnella neglecta*) (see Howell and Webb 1992, Rodríguez-Estrella et al. 1995).

The European Starling has been considered to be the cause of declines of some bird species in North America because of competition for nest sites (Weitzel 1988, Kerpez and Smith 1990, Ingold 1994). Interference competition imposed by starlings on native cavity-nesting species seems to be more intense in habitats where nest sites are limited (Weitzel 1988) and where an overlap in nesting phenologies exists (Ingold 1994). In Baja California, there are eight cavity-nesting bird species, all of which can nest in cardon holes. These include American Kestrel (*Falco sparyerius*), Gila Woodpecker (*Melanerpes uropygialis*), Northern Flicker (*Colaptes auratus*), Ladder-backed Woodpecker (*Picoides scalaris*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Cactus Wren (*Campylorhynchus brunneicapillus*), House Finch (*Carpodacus mexicanus*), and Violet-green Swallow (*Tachycineta thalassina*). At present, all of these species are common in areas both with and without starlings. Although nest sites are not likely to be limited (density of cardons with holes is high), the nesting phenology of starlings overlaps that of most native cavity-nesting birds. Thus, all these bird species could be adversely affected in the future by starling competition as several studies in other areas have shown (especially for woodpeckers and flycatchers; Weitzel 1988, Kerpez and Smith 1990, Ingold 1994, Rendell and Robertson 1994).

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Stomach flushing: sampling the diet of Red-cockaded Woodpeckers.—Stomach flushing is one of several non-destructive methods recommended by Rosenberg and Cooper (1990) to ascertain diets of wild birds. Brensing (1977) and Jenni et al. (1990) described the method and documented its lack of effects on the short term survival of passerines. Moody (1970) reported some mortality during use of the procedure on nestlings. He did not study the effects of the procedure on subsequent survival. Here I describe a similar technique I used on adult Red-cockaded Woodpeckers (*Picoides borealis*) in the Apalachicola National Forest in northern Florida. I also describe tests of whether flushing affected the fledging rates and survival of nestlings.

Methods.—To flush the stomach and esophagus of a Red-cockaded Woodpecker, I used a plastic tube of 4 mm outside diameter attached to a 12 cc syringe filled with sterile 0.9% solution of sodium chloride. The tube was moistened with the saline solution for lubrication and inserted into the bird approximately 9 cm. No force was required. Special care must be taken to align the tube properly at the point where the esophagus enters the body cavity to insure easy insertion. Once the tube entered the stomach it slid to the bottom, stopping just above the entrance to the gizzard. The bird was then inverted over a plastic cup so that, as fluid was forced into its stomach, the excess fluid plus the stomach contents flowed into the cup. The process was completed in less than two minutes.

Thirty adult woodpeckers were flushed between August 1993 and May 1994. An additional 21 adult birds were flushed between June 1994 and December 1994. Approximately four birds were flushed per month. Each bird was captured as it went to roost for the night. To avoid stress-related mortality, flushing was not attempted on nights when the dry-bulb temperature was expected to fall below 4°C. Although no birds appeared to be harmed by the process, the first ten were checked for evidence of weakness or mortality in the first days after they were flushed. In each case the flushed bird was still present one week later. Because adult Red-cockaded Woodpeckers are highly territorial and often remain in the same territory for their adult lives, mortality rates of flushed and non-flushed individuals could be estimated by subsequent monitoring. Direct calculation of adult mortality rates is difficult because some movement among sites occurs. The criterion I used was a comparison of the rates at which flushed and non-flushed birds disappeared from their social groups, as measured by an annual census of banded birds. This census was conducted at the end of the nesting season in a sample population of 160 of the approximately 500 social groups on the Apalachicola Ranger District of the Apalachicola National Forest.