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NATAL PHILOPATRY, SITE TENACITY, AND AGE OF FIRST BREEDING OF THE BLACK-NECKED STILT

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Abstract.—Three definite instances of breeding by 1-yr-old Black-necked Stilts (*Himantopus mexicanus*), are reported. Such breeding has not been previously documented in the literature. Observations of natal philopatry and site tenacity are also reported for the species. These data add to the life history knowledge for the Black-necked Stilt. Observations are discussed in terms of hypotheses regarding delayed reproduction and population dynamics in avian species.

FILOPATRÍA DE NACIMIENTO: TENACIDAD POR EL LUGAR Y EDAD A QUE SE REPRODUCE POR PRIMERA VEZ *HIMANTOPUS MEXICANUS*

Sinopsis.—Se doumenta que *Himantopus mexicanus* se reproduce por primera vez a la edad de un año. Se informa que la especie regresa a reproducirse en el área en que nació (filopatría de nacimiento) y exhibe tenacidad por su lugar natal.

The tendency for individual birds to return to areas where they were hatched and/or have previously bred has been reported in a variety of avian species (reviewed in Welty and Baptista 1988), including Charadriiformes (Boyd 1962, Gratto 1988, Lenington and Mace 1975, Oring and Lank 1984, Sordahl 1984, Thompson and Hale 1989). The return of a bird to breed on or near the site at which it was hatched is termed as natal philopatry, whereas the persistence of a bird at the site through time is termed site tenacity. Natal philopatry, site tenacity, and the age at which a bird first breeds are important considerations in hypotheses regarding delayed reproduction and population dynamics in avian species (Burger and Gochfeld 1986, Lack 1967).

The Black-necked Stilt (*Himantopus mexicanus*, Charadriiformes: Recurvirostridae) is a monogamous species that commonly occurs in fresh and brackish wetlands throughout much of North and South America as a resident or migrant breeding species (American Ornithologists' Union 1983, Hamilton 1975). Bent (1927), Hamilton (1975) and Sordahl (1980, 1984, 1990) extensively documented the natural history of the species. Bent (1927) and Hamilton (1975) did not work with banded birds, however, and thus were not able to observe some aspects of Black-necked Stilt biology.

Sordahl (1984) color-banded a portion of a migratory population in Utah during two seasons and reported that out of a total of 51 chicks banded, a 2-yr-old male banded at its natal site in 1977 bred there in 1979. He also documented two instances of site tenacity.

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In this paper I report additional observations of natal philopatry, site tenacity, and at least three instances of breeding by 1-yr-old Black-necked Stilts. These observations are discussed in terms of hypotheses regarding delayed reproduction and population dynamics in avian species.

STUDY AREA AND METHODS

As part of a larger study of their sex roles in parental care (James 1991), I observed Black-necked Stilts from 1988 to 1993 at the Bolsa Chica Ecological Reserve in Huntington Beach, California (33°30′N, 118°W). Bolsa Chica is a diked, degraded estuarine wetland of approximately 360 ha. The predominant emergent plants are pickleweed (*Salicornia subterminalis, S. virginica,* and *S. bigelovii*), saltwort (*Batis maritima*), cordgrass (*Spartina foliosa*) and frankenia (*Frankenia grandifolia*). Black-necked Stilts occur throughout the year at Bolsa Chica and commonly nest from late March to June (James 1991). A maximum number of 291 Black-necked Stilts was observed on 1 Apr. 1989. Other birds at Bolsa Chica that share breeding habitat with Black-necked Stilts include the American Avocet (*Recurvirostra americana*), Killdeer (*Charadrius vociferus*), Snowy Plover (*Charadrius alexandrinus*), and Savannah Sparrow (*Passerculus sandwichensis*).

Adult Black-necked Stilts (n = 12) were trapped on the nest using a remotely controlled wiremesh cage and each was color-banded with a unique three-color combination on one tarsus, and a U.S. Fish and Wildlife Service (USFWS) aluminum band on the other. Chicks (n = 107) were captured by foot pursuit and given a USFWS band on one tarsus and a cohort color band on the other (yellow in 1988, blue in 1989). In addition, a total of approximately 50 chicks and an unknown smaller number of adults were color banded in 1986 and 1987 at Bolsa Chica by a previous researcher. The chicks were banded in the same manner as in this study, using red in 1986 and white in 1987. During the breeding season, adult Black-necked Stilts can be sexed by plumage differences (Hamilton 1975).

I defined an instance of site tenacity at the study site as an observation of a banded bird that was either observed in the non-breeding season or banded during the previous year. In the latter case, multiple observations per breeding season were counted as one instance. The age of first breeding was considered to be the age that a bird was first found with a nest (Gratto 1988). Study site visits were concentrated in 1988 and 1989.

RESULTS

There were at least three observed instances of birds hatched at Bolsa Chica returning to breed. In 1988, a pair consisting of a male hatched in 1987 (S/W) and a female (GK/WS) banded as an adult in 1986 or 1987 successfully hatched chicks. In 1989, a male and a female (S/Y) banded as chicks in 1988 were observed performing breeding activities. The female was observed incubating eggs. The male was observed in the pres-

ence of three approximately 3-wk-old chicks and an unbanded female, so it is very unlikely that the banded adults were of the same pair.

There were 27 observations of site fidelity during both the breeding and non-breeding seasons. Eight were of females, nine of males, and 10 of unknown sex. One of the females (GK/WS) was observed successfully nesting in 1988 and one of the males banded in 1988 (S/YBY) was observed nesting in 1989 (unsuccessfully due to abandonment).

There were three instances of 1-yr-old birds breeding as described above. These three instances are also examples of natal philopatry and site tenacity. Additionally, in 1989, two birds with USFWS bands only (S/X) were observed nesting. These individuals may have been from Bolsa Chica (having lost their color bands), but are also potentially from other sites.

DISCUSSION

My observations of natal site fidelity and site tenacity by the Black-necked Stilt are consistent with reports of numerous other avian species. Sex biased site tenacity has commonly been observed in birds and related to population dynamics. Observations of age of first breeding have also been correlated with age-related foraging differences.

Regarding possible sex bias in Charadriiformes, Lenington and Mace (1975) documented male-biased site tenacity in Killdeer, though natal site fidelity was not recorded for either sex. Gratto (1988) recorded 35 instances, over six breeding seasons, of Semipalmated Sandpipers (*Calidris pusilla*) returning to breed at their natal sites, 17 by females and 18 by males. Of the 17 instances of site tenacity for which I could identify the sexes in Black-necked Stilts (eight by females, nine by males), there appeared to be no sex bias. Greenwood (1980) predicted male-biased natal philopatry in monogamous birds due to a need for site familiarity in territory acquisition. It is possible in my population of Black-necked Stilts that the independent sex-biased effects of mortality (and site tenacity or natal site fidelity) may cancel, thus showing no overall sex bias in philopatry.

Juvenile birds of species that exhibit delayed reproduction have often been found to have poorer foraging success than adults. Examples studied include the Brown Pelican (*Pelecanus occidentalis*: Carl 1987, Orians 1969), gulls (*Larus* spp.: Burger and Gochfeld 1981, 1983; Ingolfsson and Estrella 1978), terns (*Sterna* spp.: Buckley and Buckley 1974, Dunn 1972), Ruddy Turnstone (*Arenaria interpres*: Groves 1978), and American Avocet (*Recurvirostra americana*: Burger and Gochfeld 1986). Both Black-winged (*Himantopus himantopus*) (Espin et al. 1982) and Black-necked Stilt (Burger 1980) juveniles have been found to have poorer foraging success than adults.

Boyd (1962) reported the age of first breeding in 13 species of Charadriiformes. Nine first bred at 1 yr, three at 2 yr, and one 3 yr. The earliest Eurasian Avocet (*Recurvirosta avosetta*) breeding was at 2 yr (Cadbury and Olney 1978). Gratto (1988) observed some Semipalmated Sandpipers

(*Calidris pusilla*) starting to breed at the age of 1 yr. Assuming that younger birds of first-year-breeding species have poorer foraging success, other factors may be selecting for early breeding.

Lack (1967) concluded that age-related foraging differences in juveniles were insufficient to result in delayed reproduction. For American Avocets, however, Burger and Gochfeld (1986) stated that it may at least be a contributing factor. Alternative hypotheses to account for delayed reproduction in juvenile birds include insufficient physiological maturation and/or lack of success in territorial competition (Burger and Gochfeld 1983).

My observations of breeding 1-yr-old Black-necked Stilts lower the age of earliest breeding below that documented by Sordahl (1984) and confirm suspicions by others that it was occurring (in Burger 1980; R. B. Hamilton, pers. comm.). Interestingly, the Black-winged Stilt is considered by some authorities to be conspecific with the Black-necked Stilt (e.g., Hayman et al. 1986) and has been noted to breed first at 2 yrs of age (cited in Cramp and Simmons 1983).

Whether or not yearling Black-necked Stilt breeders are as successful as older birds or how commonly they breed is not yet known. Only eight of 35 Semipalmated Sandpipers observed breeding for the first time were 1 yr old (Gratto 1988). A possible implication is that the Black-necked Stilt may not be as long-lived as the Eurasian Avocet, a species that does not breed until 2 yr old and may live to 13 yr (Cadbury and Olney 1978). Therefore, if the Black-necked Stilt is not as long-lived, earlier breeding may be selected. Another factor that could select for earlier breeding is that some Stilt breeding populations (or portions of them), such as the one I studied at Bolsa Chica, may not be migratory. Given the difficulty of distinguishing mortality from dispersal when birds disappear during studies of population dynamics, a large-scale banding effort coupled with inexpensive, long-range telemetry is needed to answer better these questions in the Black-necked Stilt and other species.

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