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BREEDING AVIFAUNA OF THE SOUTH SAN FRANCISCO BAY ESTUARY

ROBERT GILL, JR., California Department of Fish and Game, Sacramento, California 95814 (present address: U.S. Fish and Wildlife Service—Biological Services, Anchorage, Alaska 99501)

San Francisco Bay represents one of the largest estuarine areas on the Pacific Coast of North America. Its open waters, tidal flats, tidal marshes and solar evaporation ponds provide critical foraging, resting and breeding habitat for migratory and resident birds. The avifauna of San Francisco Bay has received considerable attention; however, little of it has been directed toward assessing the overall importance of the Bay as a nesting area. Works by Grinnell and Wythe (1927), Grinnell and Miller (1944) and Sibley (1952) are the only comprehensive studies of San Francisco Bay avifauna. These studies, while major contributions, are broad in scope as they relate to the breeding avifauna of the Bay's estuarine areas. Several studies by Johnston (1955, 1956a, b), Marshall (1948a, b), DeGroot (1927, 1931) and Zucca (1954) have concentrated on the breeding biology of individual species; however, much of the marsh reclamation and Bay fill has occurred since. The present breeding status of many resident and migratory birds is poorly known for San Francisco Bay. Included among these are three rare or endangered forms: California Black Rail, California Clapper Rail and California Least Tern. In addition, some species now found in the area represent recent breeding range extensions. This study, undertaken from March to September 1971 and including a few more recent data, presents a quantitative assessment of the present breeding bird populations in the South San Francisco Bay area.

STUDY AREA AND METHODS

The study was conducted on approximately 19,389 ha (47,900 acres) of the South San Francisco Bay estuary (Figure 1). Seven habitat types were delineated: solar evaporation ponds, 8,850 ha (46%); tidal flats, 5,506 ha (29%); open water, 2,645 ha (14%); salt marsh, 1,829 ha (9%); grassland, 285 ha (1%); freshwater marsh, 81 ha (<1%); and dikes and levees, 193 ha (<1%), about 320 km in length.

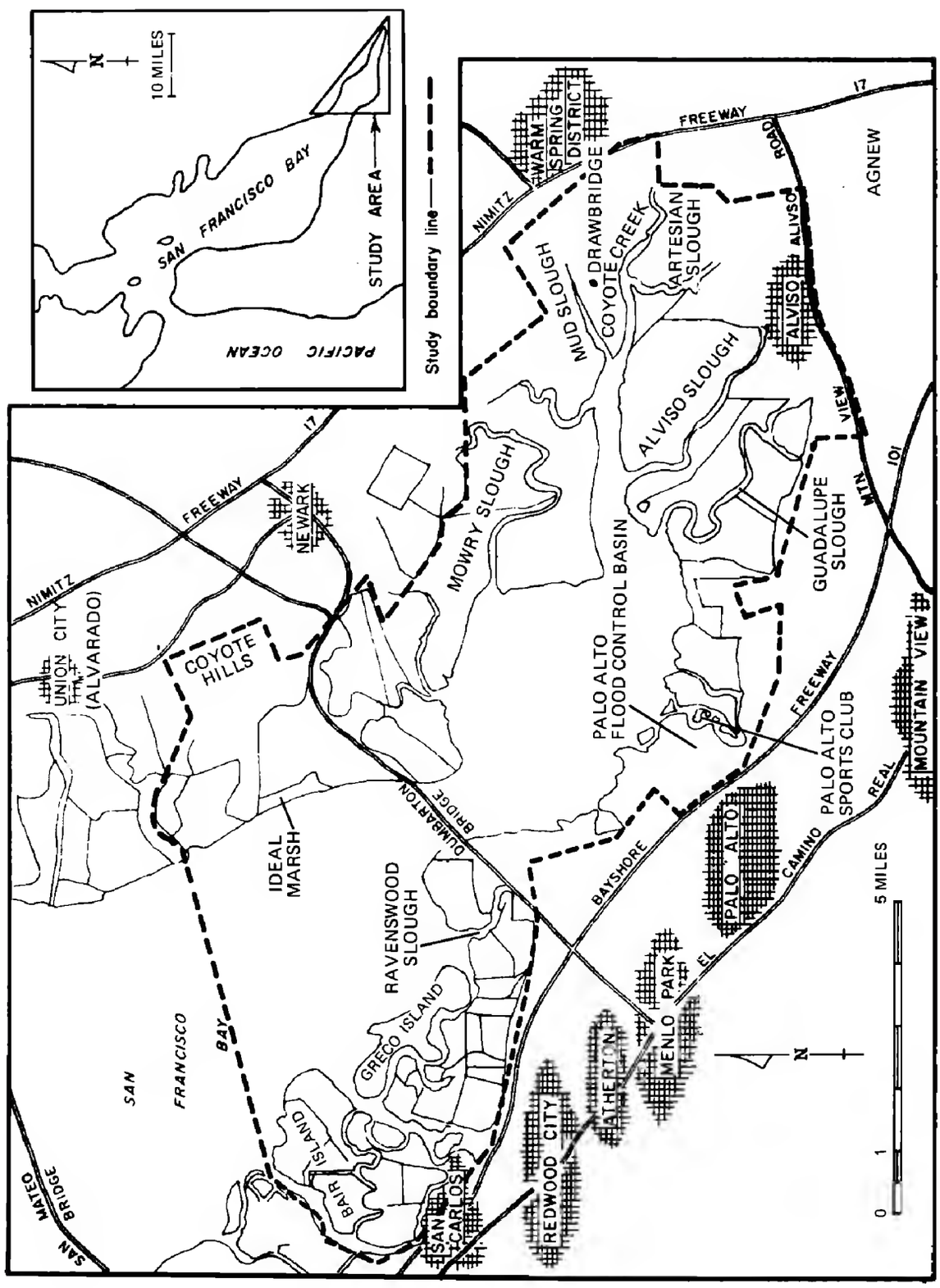

Figure 1. South San Francisco Bay study area.

Most of the nesting activity was located by direct field observation. Aerial surveys aided in locating large or isolated nesting species. Numerous nesting areas were located from historical information. Most colonies of terns, herons and egrets, as well as assemblages of avocets and stilts, were visited. A total of 2,561 young birds was banded in conjunction with nesting studies.

The following annotated list presents recent and historical data regarding habitat utilization, breeding populations, nesting requirements, laying dates, clutch sizes and, in several instances, hatching and fledging rates. Estimates of the amount of suitable nesting habitat and of the size of nesting populations are limited to the study area unless otherwise noted. Discussions on behavior, feeding habits, exact nesting locations, methods of population projections and management recommendations have been presented elsewhere (Gill 1972, 1973).

SPECIES ACCOUNTS

GREAT BLUE HERON *(Ardea herodias)*. Historically a widespread breeding species in the South Bay. The only active rookery located in 1971 was on Bair Island, San Mateo County. This colony (49 pairs) is thought to represent a bayward extension of a former tree nesting colony near Redwood City (Carriger and Pemberton 1908, Moffitt 1939). Anderson (pers. comm.) reported 30 nesting pairs at the Bair Island site in both 1967 and 1969. Nests are now placed in the tops of Coyote Bushes *(Baccharis pilularis)* 1 to 2 m tall growing on dredge spoils deposited on former salt marsh. First eggs were laid during the last week of February 1971. Mean clutch size for 49 active nests was 3.63. Hatching began on 1 April and peaked during the second week of May. Forty-nine clutches, totaling 178 eggs, produced 124 hatchlings (69.7%). Fledging began the second week of June and continued through August. Of eggs hatched, 105 fledged (84.7%). Only 30 active nests were counted during the 1973 season (Mattish pers. comm.).

BLACK-CROWNED NIGHT HERON *(Nycticorax nycticorax)*. First breeding record for the South Bay was in 1898 (Cohen 1900). Finley (1906) reported a large colony (700 pairs) near Alvarado, Alameda County in 1906. As of 1952, no active rookeries were known for the South Bay (Sibley 1952). Nesting has been restricted since 1967 to Bair Island, San Mateo County. This colony is one of the few known ground nesting colonies of this species. During 1971 nests were placed in gumplant *(Grindelia humilis)* and pickleweed *(Salicornia pacifica)*. Nesting was in progress on 4 March and peaked in mid-May 1971. Mean clutch size based on a sample of 684 nests taken on 4 May was 2.89. No data were taken on hatching or fledging success. During the 1973 season, 609 pairs nested on Bair Island (Mattish pers. comm.). Of these, 182 pairs were nesting in association with Great Blue Herons.

SNOWY EGRET *(Egretta thula)*. Nesting in South San Francisco Bay was first reported in 1969 (Anderson 1969). The 150 pairs on Bair Island in 1969 had increased to approximately 340 pairs by 1971. During 1971 Snowy Egrets nested in association with night herons and utilized similar vegetation for nest platforms; however, the egrets tended to restrict nesting to a few sites, whereas the night herons nested throughout the rookery. First nesting was found on 1 April. Peak nesting occurred around 1 June (340 active nests). Mean clutch size was 3.20. No

data were taken on hatching or fledging success. Mattish (pers. comm.) found 362 active nests on 24 May 1973. Like *Nycticorax*, a small number (86 pairs) of *E. thula* had abandoned the 1971 nesting site and moved within the Great Blue heron rookery. Nests at the new site were placed in Coyote Bushes. During the 1975 season, almost the entire colony of Snowy Egrets had moved within the heron rookery.

GREAT EGRET *(Casmerodius albus)*. Formerly nested near Agnew in Santa Clara County (Sibley 1952). Seventy-five active nests were found on Bair Island in 1967 (Anderson pers. comm.). Nesting was in association with Great Blue Herons. No nesting by this species in the South Bay has been reported since.

AMERICAN BITTERN *(Botaurus lentiginosus)*. This species was not found nesting during 1971. Grinnell and Wythe (1927) cite two nesting records for the San Francisco Bay area. Between March and June 1971 bitterns were flushed from suitable habitat near Palo Alto and Alviso; however, no nests were found and no birds were observed with white nuptial patches. Loss of a freshwater marsh fringe around the Bay is thought to be the cause of reduction in breeding numbers of this species.

WATERFOWL. Six waterfowl species nested in 1971: Pintail *(Anas acuta)*, 21 nests and/or broods; Gadwall *(A. strepera)*, 19; Mallard *(A. platyrhynchos)*, 8; Ruddy Duck *(Oxyura jamaicensis)*, 5; Cinnamon Teal *(A. cyanoptera)*, 4; Northern Shoveler *(A. clypeata)*, 1. Availability of freshwater appears to be the limiting factor in successful waterfowl nesting in the South Bay. Within the study

Bair Island, San Mateo County, California, 31 July 1973.

Photo by J. C. Fraser

area, freshwater marsh suitable for waterfowl nesting was limited to less than 100 ha. The majority of observed nesting, however, was found in salt marsh. Of 41 nesting attempts found in salt marsh, none was successful. Total estimated nesting populations for the six species of waterfowl during 1971 were: Pintail, 50-100 pairs; Gadwall, 100-150 pairs; Mallard, 100-150 pairs; Ruddy Duck, 50-100 pairs; Cinnamon Teal, 75-100 pairs; and Northern Shoveler, 1-5 pairs.

WHITE-TAILED KITE *(Elanus leucurus)*. Resident in the South Bay and Santa Clara County. Populations have fluctuated greatly over the past 75 years (Sibley 1952, Pickwell 1932, Martin 1939, Waian and Stendall 1970). Seven kite nests were located within the study area during 1971. Nesting dates ranged from 14 April to 18 August. The latter date is unusually late for this species. Nesting site preference was shown for Bair Island, San Mateo County and Coyote Hills Regional Park, Alameda County. Clutch size averaged 3.50. The two nests followed to fledging produced 5 and 3 fledglings, respectively. Coyote Bushes were used as nesting platforms on Bair Island while *Eucalyptus* sp. were utilized at Coyote Hills. Three pairs of kites successfully nested on Bair Island in 1972 and 1975.

MARSH HARRIER *(Circus cyaneus)*. This species is generally considered a winter visitor to the Bay Area; however, several nesting records do exist (Barlow 1900, Grinnell and Miller 1944, Sibley 1952). Five nests were located during 1971. Three nests were constructed in pickleweed, one in cordgrass *(Spartina foliosa)* and one on dredge spoils grown to annual grasses. Eggs were first located on 18 April 1971. Three nests contained 6 eggs, one contained 5 and one contained 4. Eighteen young (78%) fledged. Population projections for nesting Marsh Harriers were between 26 and 32 birds in 1971.

RING-NECKED PHEASANT *(Phasianus colchicus)*. Nesting in 1971 was restricted to fields, adjoining levees and agricultural lands bordering marshlands in the extreme South Bay. Active nesting was recorded for the Palo Alto Flood Control Basin and northeast of Alviso, Santa Clara County. Nesting was first encountered on 12 April. Suitable nesting habitat was limited to approximately 161 ha. Nesting populations were projected at between 40 and 50 individuals.

CALIFORNIA CLAPPER RAIL *(Rallus longirostris obsoletus)*. Studies of this endemic Bay Area race date back to the early 1890s (Taylor 1894, Adams 1900). Other nesting studies have been reported by Bryant (1915), DeGroot (1927), Applegarth (1938) and Zucca (1954). Rail investigations during 1971 were restricted to 1,829 ha of tidally influenced salt marsh. Nesting and population data were derived from visual counts during high tides, call counts, nest counts and ropedrags in appropriate habitats. A total of 87 nesting attempts was located in 1971. Active nesting was recorded from the middle of April to the end of July. Peak nesting occurred during the first two weeks of May. In 58 nests classified as active, clutch size ranged from 3 to 11 eggs. Mean clutch size was 6.83. Sixty-nine of 87 nesting attempts (79%) were located in cordgrass, 10 at the base of gumplant, 6 in pickleweed and 2 in mixed cordgrass-pickleweed. All nests were constructed from dried cordgrass stalks. Breeding populations varied according to habitat type and tide conditions during the census periods. Highest densities (2.51 rails/ha) were found in almost pure stands of cordgrass when censuses were conducted during medium-high tides (+5.0′ mllw). Population densities derived from visual counts during flood tide conditions (+6.5′ mllw) averaged 3.3 rails/ha for cordgrass marsh. Zucca (1954), using similar methods, reported a density of 3.01 rails/ha for cordgrass marsh. Population projections for 1971 were between 2,400 and 2,900 individuals. Follow-up investigations from 1972 to 1975 have revealed fluctuating rail populations (Gill MS) similar to those described by Ferrigno (1966) and Widjeskog (1974) for *R. l. crepitans* of New Jersey salt marshes.

VIRGINIA RAIL *(Rallus limicola).* This species exhibits a seasonal distribution in the San Francisco Bay area. Winter populations are commonly found on salt marshes, whereas nesting is confined to freshwater marsh areas. Previous nesting records for Virginia Rails in the South Bay were not found. No evidence of nesting was found during 1971. Breeding is suspect within the fresh and brackish water marshes of Coyote Hills Regional Park and the upper reaches of Coyote Creek and Artesian Slough in Santa Clara County.

SORA *(Porzana carolina).* This rail is considered a resident of Bay Area marshes with nesting restricted to freshwater marshes. No nesting was found during 1971. Nesting most likely occurred within the Coyote Hills area and the upper reaches of several sloughs in the extreme South Bay.

BLACK RAIL *(Laterallus jamaicensis coturniculus).* No nests or eggs of this species have been reported from the San Francisco Bay area; however, adults have been reported in April and birds of the year have been found in August (Orr 1947). More recently, Black Rails have been reported calling from the Olema Marsh, Marin County, in May and at Benicia State Park, Solano County, also in May (Robinson 1975). The latter two areas have been major wintering areas for Black Rails in the Bay Area. Considering this, and the recent confirmation of their occurrence in the Bay Area during what is generally considered the breeding season for this species, it seems likely that a limited number do breed in the area or remain as non-breeders through the summer.

AMERICAN COOT *(Fulica americana).* Four broods of young coots were found during 1971. First nesting evidence was encountered on 5 June near Coyote Hills. All broods were located in areas with strong freshwater influence. Additional sightings of 40 adults within the study area between April and August indicated that the minimum 1971 breeding population was probably between 50 and 75 pairs.

SNOWY PLOVER *(Charadrius alexandrinus).* Nesting records for this species in the Bay Area date from 1911 (Grinnell et al. 1918). South Bay records exist from Palo Alto (Martin 1939) and Alviso (Sibley 1952). Preferred nesting habitat was found to be salt pond levees accompanied by loose shell or small pebble deposits. Fifteen nesting attempts were recorded during 1971. First nesting was found on 8 May near Alviso. Nesting continued through July. Clutch sizes ranged from 1 to 3 eggs with the following distribution: 1 with 1 egg, 6 with 2 eggs and 8 with 3 eggs. Major nesting areas were located 0.3 km northwest of Alviso, Santa Clara County, and west of Coyote Hills, Alameda County. Observations of adults, in addition to those observed nesting, indicated a 1971 breeding population of about 150 pairs.

KILLDEER *(C. vociferus).* Only one nest, containing 3 eggs, was found. A second successful attempt was recorded on 11 June when 3 young were observed north of Alviso. Adult birds were seen throughout the breeding season and in association with every habitat type. Breeding population projections during 1971 were figured at between 350 and 400 pairs.

AMERICAN AVOCET *(Recurvirostra americana).* Status as a breeding species in the Bay Area was still in question in 1927 (Grinnell and Wythe 1927). There is, however, a record of a downy young (MVZ 2165) taken near Alvarado on 11 May 1926. By the early 1940s there were several reports of nesting in the South Bay (Parmenter 1937, Martin 1939, Kelly 1941). Sibley (1952) reported an assemblage of 26 pairs near Alviso in April 1950. A total of 160 avocet scrapes was located during 1971. Of these, 141 were considered active when found. All

scrapes were constructed on salt pond levees. The larger assemblages were located on levee fragments within salt ponds. Nesting was first observed on 23 April and continued through July. The mean clutch size was 3.52 (n=141 scrapes). Breeding density was determined for each type of levee and then projected to the available habitat type within the study area. The number of breeding pairs during 1971 was thus estimated at 1,800.

BLACK-NECKED STILT *(Himantopus mexicanus).* Sibley (1952) lists the stilt as an uncommon summer resident and rare winter visitor to the South Bay. Nesting reports and winter sightings prior to 1952 refer to only small numbers, usually single pairs. The stilt has adapted readily to the salt pond environment of the South Bay, and numbers have increased steadily during the last twenty years. Fourteen nesting attempts were found in 1971. First nesting was found on 3 May when nine active scrapes were found near Alviso. Three additional nests were found on 9 June. Clutch sizes ranged from 1 to 4 eggs with the following distribution: 1 with 1 egg, 2 with 2, 6 with 3 and 3 with 4 eggs. Like avocets, stilts restricted nesting to salt pond levees. The total nesting population for 1971 was estimated at between 400 and 500 pairs.

LEAST TERN *(Sterna albifrons browni).* Prior to 1943, the northernmost nesting colony of the California Least Tern was reported at Moss Landing, Monterey County (Grinnell and Miller 1944). Chandik and Baldridge (1967) reported three Least Tern nests at Alameda, Alameda County, in June 1967. Least Terns were also observed in South San Francisco Bay during August and September 1968. Sixty were counted on 1 September 1968. A breeding colony of 30 pairs was established on Bay Farm Island, Alameda County, in 1969. A smaller colony of 15 pairs was also reported from Bair Island, San Mateo County, that same year (Anderson 1970a). No nesting was found within the study area during 1971. The Bay Area population outside the study area during 1971 was estimated at between 85 and 105 pairs. Least Terns have since nested within the study area on Bair Island (1972-1975). A minimum of 14 active scrapes was found on Bair Island on 2 July 1975.

FORSTER'S TERN *(S. forsteri).* Grinnell and Miller (1944) list this species as a migrant and winter visitor to San Francisco Bay. Forster's Terns were first reported nesting in the Bay Area in 1948, when 100 active scrapes were found near the eastern approach to the San Mateo Bridge, Alameda County, immediately north of the study area (Sibley 1952). Numbers have steadily increased. Six colonies, totaling 935 nesting pairs, were located during 1971. All colonies occupied small islands or discontinued dikes within salt ponds. Nesting was first observed on 23 April when 100 pairs were seen in various stages of courtship and nest building near the mouth of Alviso Slough. Egg laying in most colonies commenced during the last week of May. Mean clutch size for all scrapes was 2.60. Peak laying occurred between the first and second weeks of June. Volant young were seen on 21 June. The 1971 population was estimated at 1,200 pairs. Nesting was also found outside the study area during 1971. Mansfield (pers. comm.) found 10 colonies, totaling an estimated 2,000 pairs, within the study area in 1972.

CASPIAN TERN *(S. caspia).* The first San Francisco Bay breeding record is for 1916 (Grinnell and Miller 1944). DeGroot (1931) reported a colony near the eastern approach to the Dumbarton Bridge, Alameda County, in 1922. This colony remained intact until 1966 (Chaniot 1970), but was abandoned sometime between 1966 and 1969. The two colonies studied in 1971 were probably offshoots of the original 1916 colony since neither of the present colonies had a history prior to 1967 (Anderson pers. comm.). Both colonies studied in 1971

occupied salt pond levees free from vegetation. The two colonies, located near Drawbridge, Alameda County, and on Bair Island, San Mateo County, had 200 and 350 pairs, respectively, in 1971. Active scrapes were first observed on 9 April. Peak nesting occurred on 6 June at Drawbridge and on 12 June on Bair Island. Mean clutch size for the Drawbridge and Bair Island colonies was 1.98 (n=176 scrapes) and 2.01 (n=304 scrapes), respectively. Chicks were first observed between 7-9 May at both colonies. No hatching or fledging success data were recorded. An estimated 500-600 pairs were found at the Bair Island site on 7 July 1975. This increase in colony size is attributed to the abandonment and absorption, at the Bair Island site, of a smaller colony outside but adjacent to the study area. The only other known Caspian Tern colony in the Bay Area is located on a salt pond levee in Napa County.

SHORT-EARED OWL *(Asio flammeus).* References to nesting in the Bay Area are limited (Grinnell and Wythe 1927, Grinnell and Miller 1944). Johnston (1956) states that this species may breed in the marshes bordering the Bay, but none have been reported doing so in recent years. During 1971, they were frequently flushed from Bair Island and the Palo Alto Flood Control Basin, but nesting was unconfirmed until 1972, when two nests were found within the flood basin. The first nest, containing two volant young and one about one week pre-fledging, was found on 15 April approximately 50 m from the first. During 1973, nesting was also confirmed for Bair Island; a nest with five eggs was found on 24 April at the base of a Coyote Bush near the northeast corner of the island.

BURROWING OWL *(Athene cunicularia).* Nesting was found at Alviso, Santa Clara County (3 pairs), and near Durham Road, Alameda County (10 pairs). Suitable nesting habitat was limited to approximately 170 ha. The nesting population was figured at between 12 and 16 pairs.

BARN OWL *(Tyto alba).* No nesting was found during 1971. A nest containing 4 eggs was located in 1972 in a dense stand of bulrush *(Scirpus acutus)* along the upper reaches of Artesian Slough, Santa Clara County.

BARN SWALLOW *(Hirundo rustica).* First nesting was observed on 8 April 1971. Peak nesting occurred during the second week of May. A total of 148 nests was located during 1971. The abandoned town of Drawbridge, Alameda County, represented the major nesting site within the study area. Other nesting areas included abandoned and active waterfowl hunting shacks, the underside of catwalks and other dwellings. The 1971 South Bay population was figured at between 300 and 500 pairs. No data were recorded on clutch sizes or hatching and fledging success.

CLIFF SWALLOW *(Petrochelidon pyrrhonota).* Nesting was first observed on 22 April 1971. A total of 850 nests was located. Nesting was in association with *H. rustica,* but in much greater densities. South Bay populations were projected at between 1,100 and 1,400 pairs during 1971.

LONG-BILLED MARSH WREN *(Cistothorus palustris).* Six active nests were found during 1971. An additional 32 nests were located, but were classified as dummy nests (Bent 1948) or nests from previous seasons. Of the active nests, 4 were placed in cordgrass and 2 were constructed in cattails *(Typha* sp.). Nesting was first observed on 5 May and continued through 5 June. Though most of the active nests were found in cordgrass, the greatest nesting densities were found in freshwater marsh areas, especially Coyote Hills. Other major nesting areas included the upper reaches of Alviso and Guadalupe sloughs, Coyote Creek and Mud Slough, and the Palo Alto Flood Control Basin. The projected breeding population for 1971 was between 1,000 and 1,200 pairs.

LOGGERHEAD SHRIKE *(Lanius ludovicianus).* A single nest, containing four eggs, was located in a Coyote Bush on Bair Island on 18 April 1971. Several other adult shrikes were sighted throughout the study area from April through July. Atkinson (1901) listed several nesting dates and locations for the Santa Clara Valley. Nesting populations for 1971 were projected at between 10 and 15 pairs.

SALT MARSH YELLOWTHROAT *(Geothlypis trichas sinuosa).* Nesting of this race is generally restricted to freshwater marsh areas with winter populations spreading into salt marsh (Grinnell and Miller 1944). Grinnell (1901) and Schussler (1918) have reported on early nesting studies of *G. t. sinuosa.* A single nest was located on 7 June 1971 at Coyote Hills. Several singing males were also observed at this site during the breeding season. A minimum breeding population for 1971 was estimated at between 25 and 30 pairs.

WESTERN MEADOWLARK *(Sturnella neglecta).* A single nest containing 3 eggs was found on 4 May 1971 on Bair Island, San Mateo County. Suitable nesting habitat within the study area was limited to approximately 330 ha. Bair Island, Palo Alto Flood Basin and a field northwest of Drawbridge, Alameda County, accounted for most grassland habitat within the study area. The 1971 breeding population was estimated at between 100 and 150 pairs.

RED-WINGED BLACKBIRD *(Agelaius phoeniceus).* Nesting was found in salt marsh, freshwater marsh and grassland habitats during 1971. Seventeen of 22 nests were found in salt marsh. Nesting was first encountered on 11 April and continued through 8 June. Populations for salt marsh, freshwater marsh and grassland were figured at 500, 350 and 300 pairs, respectively, during 1971.

TRICOLORED BLACKBIRD *(A. tricolor).* Nesting in 1971 was restricted to a colony of approximately 400 pairs at Coyote Hills Regional Park, Alameda County.

BREWER'S BLACKBIRD *(Euphagus cyanocephalus).* Nesting was recorded on three occasions within the study area during 1971. The preferred nesting habitat of this species was limited within the study area. Within the Coyote Hills area, stands of Monterey Pine *(Pinus radiata), Eucalyptus,* willow *(Salix* sp.) and Box Elder *(Acer negundo)* provided the majority of nesting cover. Additional nesting areas were afforded by man-made structures, including duck hunting blinds and pump houses associated with salt production. The 1971 breeding population approximated 700 pairs.

HOUSE FINCH *(Carpodacus mexicanus).* Thirty-one active nests were located during 1971. First nesting was found on 4 May. Nesting continued through July. Twenty-six of 31 nests were located during May. Almost all nests were found in association with man-made structures. Between 400 and 500 pairs were estimated to have nested during 1971.

SAVANNAH SPARROW *(Passerculus sandwichensis).* Eight nests were found during 1971. Dates ranged from 1 April to 22 June. Clutch size averaged 3.60. Preferred nesting habitat was levee tops grown to annual grasses and high pickleweed growing on levee banks. The 1971 nesting population was estimated at between 800 and 1,000 pairs.

SALT MARSH SONG SPARROW *(Melospiza melodia pusillula).* One of three races of Song Sparrows endemic to San Francisco Bay salt marshes, *M. m. pusillula* is restricted to the South San Francisco Bay. Major breeding and population works have been reported by Grinnell (1913), Grinnell and Miller (1944), Marshall (1948a, b), and Johnston (1955, 1956a, b). Seventeen nests were found be-

tween 12 March and 7 May 1971. Clutch sizes were distributed as follows: 1 nest with 1 egg, 1 with 2, 2 with 3, 4 with 4, 2 with 1 egg and 1 young, 2 with 3 young and 1 with 4 young. The projected population during 1971 was 1,800 pairs. This includes 960 pairs showing a nesting preference for pickleweed marsh and 840 pairs showing a preference for cordgrass marsh.

SUMMARY

The breeding biology, habitat requirements and relative abundance of 41 avian species nesting in the estuarine influence of South San Francisco Bay are discussed. Over 4,000 nesting attempts were recorded from March to August 1971. A few additional data from 1972 to 1975 are also included. Forster's Terns accounted for over 15% of all nesting attempts, followed by Cliff Swallows (850), Black-crowned Night Herons (684), Caspian Terns (500) and Snowy Egrets (340). The Salt Marsh Song Sparrow and American Avocet, with an estimated 1,800 pairs each, represented the most abundant breeding species within the study area. Song Sparrows were found to be the earliest nesting species (March), whereas the White-tailed Kite nested into August. Seven species are relatively recent additions to the recorded nesting avifauna of the South Bay area: California Least Tern (1967), Snowy Egret (1969), Black-necked Stilt (1952), Forster's Tern (1948), Snowy Plover (1911), American Avocet (1926) and Caspian Tern (1916). The conversion of tidal marsh to solar evaporation ponds and the creation of high ground with dredging spoils on former salt marsh habitat are responsible for these breeding range extensions. Conversely, populations of the California Clapper Rail, Salt Marsh Song Sparrow and Long-billed Marsh Wren have declined. The substantial reduction in fresh and brackish water marshes on the fringe of the Bay has severely reduced nesting of several species, including the American Bittern, Virginia Rail, Sora, Salt Marsh Yellowthroat and several species of waterfowl.

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FORAGING RELATIONSHIPS OF MOUNTAIN CHICKADEES AND PYGMY NUTHATCHES

TIM MANOLIS, 4409 44th Avenue, Sacramento, California 95824

The Pygmy Nuthatch *(Sitta pygmaea)* and Mountain Chickadee *(Parus gambeli)* are two of the most abundant resident birds in yellow pine *(Pinus ponderosa, P. jeffreyi)* forests of western North America. Although nuthatches and chickadees usually forage in different ways, *pygmaea* has been characterized as "remarkably titlike in many of its foraging actions" (Norris 1958). In yellow pine woods, these two birds occupy what Sturman (1968) has called the "titmouse niche," which might be more appropriately referred to as the titmouse "guild" *(sensu* Root 1967). This guild has been intensively studied in many parts of the northern hemisphere, primarily because its members are common, conspicuous and potentially important insect predators in temperate zone woodlands (Sturman 1968). In this paper, I focus on resource use patterns in relation to environmental structure, seasonal changes in resource distribution and interspecific flocking of the Pygmy Nuthatch and Mountain Chickadee.

STUDY AREA AND METHODS

The foraging habits and intra- and interspecific associations of *pygmaea* and *gambeli* were studied during June and July 1973 and January and February 1974 on 42 ha of Jeffrey Pine *(Pinus jeffreyi)* and Western Juniper *(Juniperus occidentalis)* woodland, including the field station of California State University, Chico, and adjoining private land, along the western shore of Eagle Lake, Lassen County, California. Roughly the western third of the plot is flat and dominated by *J. occidentalis,* with scattered clumps of *P. jeffreyi* and mountain-mahogany *(Cercocarpus ledifolius).* Sagebrush *(Artemisia tridentata)* and rabbitbrush *(Chrysothamnus nauseosus)* are common shrubs. The eastern two-thirds of the plot rises on a slope from north to south, being higher than the western third and separated from it by a lava dike. The predominant tree in this area is *P. jeffreyi.* This area contains a number of large (1-5 ha) piles of jumbled volcanic rocks, barren of vegetation except for lichens and bordered by thickets of *C. ledifolius, Ribes* spp. and Desert Sweet *(Chamaebatiaria millefolium).* The private section has been logged within the last half century. Except in open areas of the woods, brush is largely absent.

Foraging height data were obtained by noting the heights at which foraging birds were first seen. Foraging site data were gathered by recording, on cassette tapes, foraging time spent on different sites for birds encountered on random walks through the plot at various times

of day. Foraging sites were divided into the following five classes: trunk, large branches (greater than 3 cm diameter), small branches (less than 3 cm diameter), needle clusters and ground (including objects on the ground). These site classes correspond roughly to similar categories defined by Ligon (1973) and Bock (1969) in their studies of birds foraging in yellow pines, and hopefully, with the categories defined by the birds themselves. Foraging overlap was determined by calculating percent overlap values, i.e., adding percent values shared between two species for all foraging height or site categories (Holmes and Pitelka 1968).

Vegetational analysis followed the methods of Balda (1969). The point-quarter method was used to sample trees on the plot, with each tree's foliage volume considered either a cone or a cylinder, and its dimensions measured with the aid of a 2 m stick and compass. A computer program calculated the percent of the total sample volume in any desired height interval. Only pine foliage was considered, as virtually all foraging data were collected in pines.

Foraging height observations for each species in each season were sorted into 3 m intervals from the ground up, the number of observations within each interval was plotted as a percent of the total number of sightings, and these foraging height profiles were compared to the profile of foliage volume (Figure 1). Three meter intervals were chosen because of the small sample sizes, and because of the chance of error in estimation, particularly at higher levels. Percent overlap values were determined for the foraging height profile of one species versus the other, for the foraging profiles of each species versus the foliage volume profile and for the overlap of time spent foraging on different sites by the two species (Figure 2) in both seasons (Table 2).

Population sizes in summer were estimated by combining knowledge of some nest sites, the foraging ranges of birds that were either color-banded or observed carrying food to a particular nest, and the distribution of family groups after the young had fledged. Winter population sizes were estimated from seven morning censuses during the period 17-26 January. These censuses involved plotting observations of all species on grid maps of the study area.

RESULTS

More individuals of both species appear to have been present in winter than in summer (Table 1). Summer estimates are of breeding adults present before young had fledged. The structures of the populations were also different in the two seasons. In summer, pairs of both species occupied foraging areas that did not appear to overlap intraspecifically, but exhibited considerable interspecific overlap. Adults of the two species were often observed foraging in the same or nearby trees, but interspecific aggression was never noted. In winter, both species exhibited a tendency to forage in flocks (Table 1).

Although the extremely close fit of the summer foraging height data for *pygmaea* to the foliage profile (Figure 1) must be viewed, in part, as an artifact of the graphical methods employed, it agrees with the observation that Pygmy Nuthatches foraged most of the time on small branches and needle clusters in summer (Figure 2). There was a slight increase in foraging height overlap between the two species in the winter versus summer (Table 2). The greater overlap appears to be the result of 1) increases in the ranges of foraging heights of the chickadee and the nuthatch in winter and 2) the tendency of both species to forage at nearby heights in mixed flocks. These two factors may be interdependent. The order of values for the percent overlap of foraging height with the foliage profile for the two species is the reverse, in winter, of the summer order (Table 2). The chickadee foraged almost exclusively on small branches and needle clusters in winter, whereas the nuthatch spent about half of its time on these substrates in that season (Figure 2). The seasonal change in overlap values for feeding sites is almost directly proportional to the seasonal differences in the time spent foraging on small branches and needle clusters by Pygmy Nuthatches.

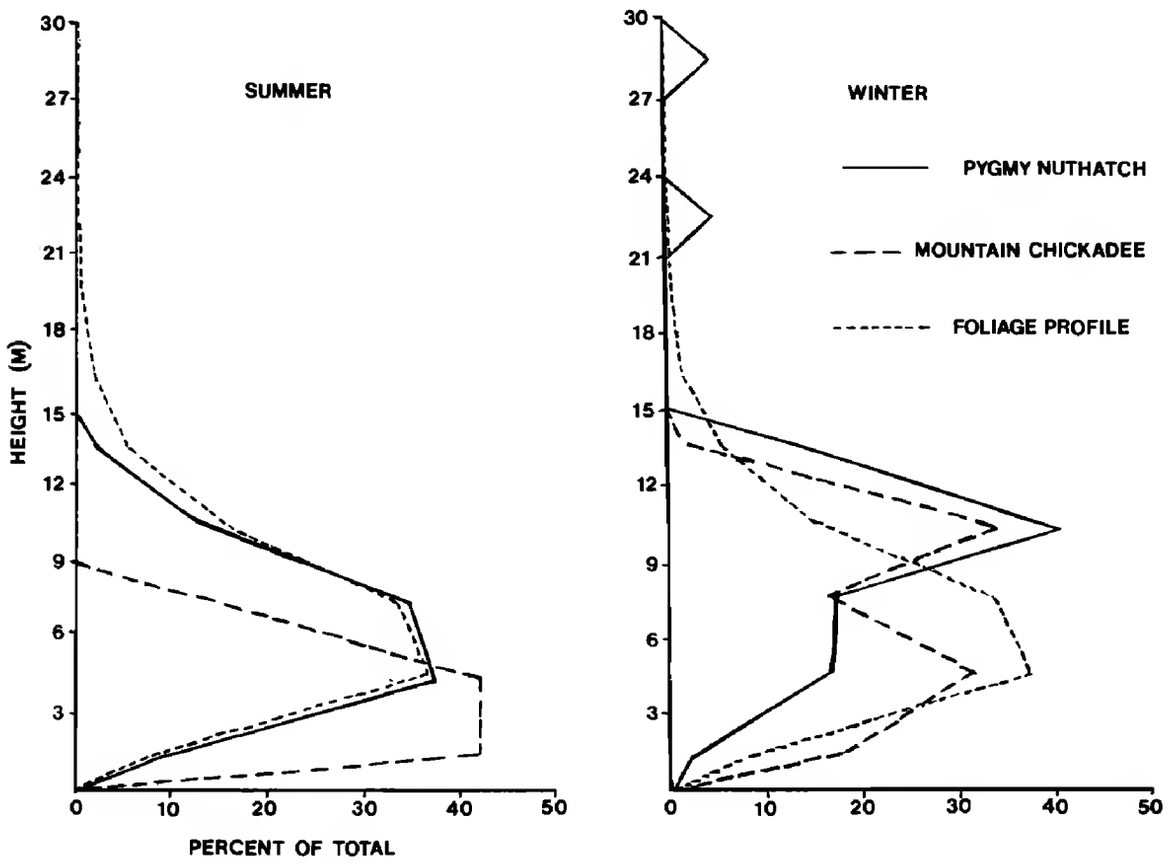

Figure 1. Foraging height profiles for Mountain Chickadee and Pygmy Nuthatch in winter and summer and the foliage volume profile for Jeffrey Pine on the Eagle Lake study plot. Sample sizes equal 29 winter and 31 summer observations of nuthatches, 45 winter and 28 summer observations of chickadees and 125 pine trees. The vertical axis is divided into discrete 3 m intervals.

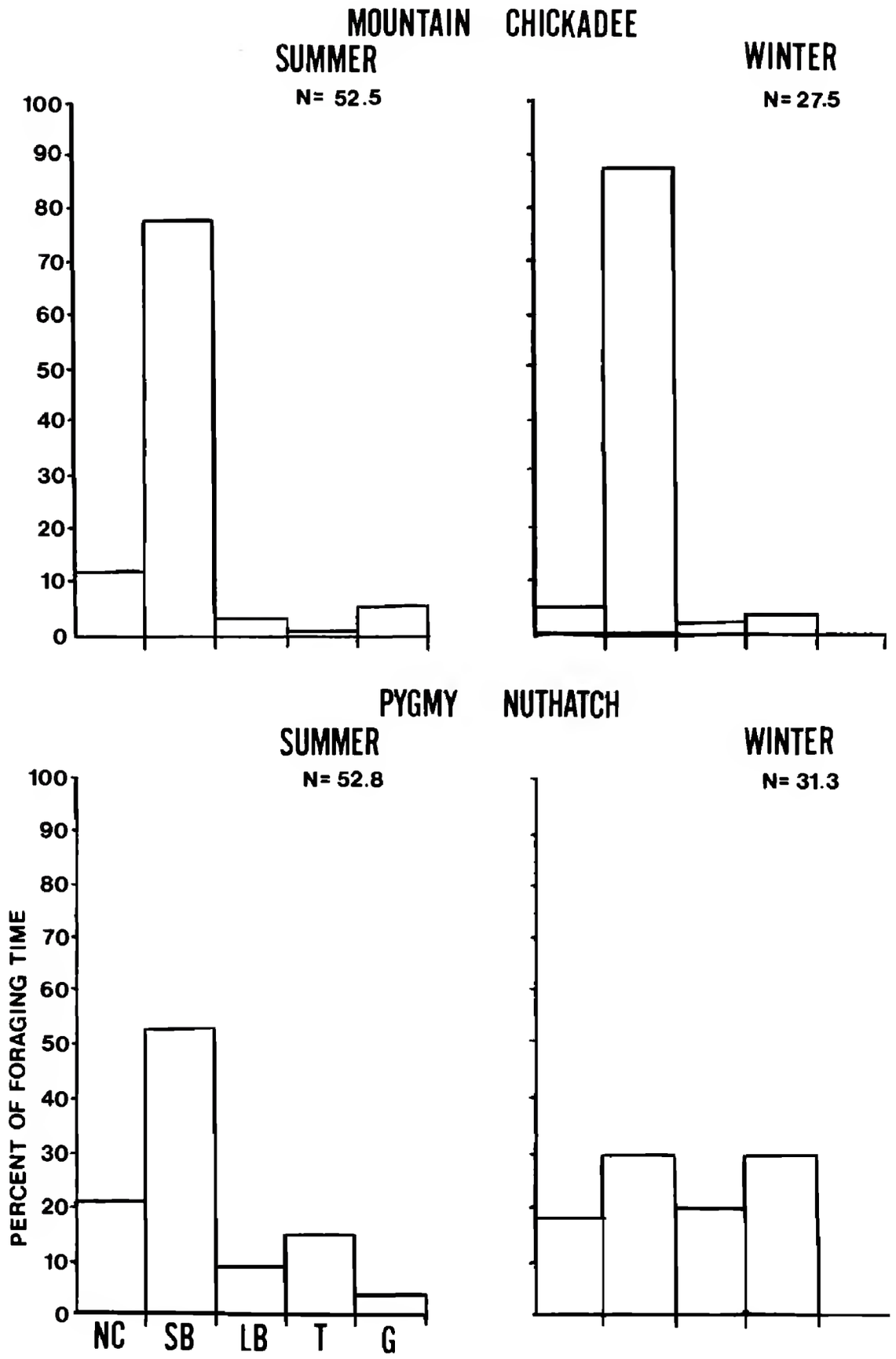

Figure 2. Percent of time spent foraging by Mountain Chickadees and Pygmy Nuthatches in five different habitat zones in winter and summer. Zones include: NC=needle clusters; SB=small branches; LB=large branches; T=trunk; G=ground. Total sample sizes (N) are in minutes of taped time.

Table 1. Estimated population sizes in winter and summer and the numbers of different types of associations, observed in winter, of Mountain Chickadees and Pygmy Nuthatches on the 42 ha Eagle Lake study plot.

SPECIES	POPULATION SIZE		NO. OBSERVATIONS IN WINTER		
	Summer	Winter	Alone	In conspecific groups	In mixed flocks
Mountain Chickadee	12-14	15†(32*)	10	6	21
Pygmy Nuthatch	10	21†(32*)	11	22	21

† Average of seven censuses
* Highest single census tally

DISCUSSION

A current approach to the study of resource utilization patterns of organisms in general (Schoener 1971) and insectivorous birds in particular (Morse 1971) has been to view them as adaptive strategies designed by natural selection to use available resources most efficiently. This perspective can provide a framework in which observed patterns of resource exploitation may take shape as well-integrated systems. It is in this context that the foraging patterns of the species studied are discussed.

Qualitative sampling of pine branches in the summer study revealed an abundance of surface arthropods. Anderson (1976) found that three species of nuthatches *(Sitta pygmaea, S. canadensis* and *S. carolinensis)* in Ponderosa Pine woods in Oregon overlapped considerably in the kinds of foods taken in summer, the bulk of their diets being insects associated with the twigs and foliage. Ligon (1973) noted that the "flush" of insects in Ponderosa Pine foliage in summer, coupled perhaps with the structural simplicity of pine forests, may make intersexual habitat partitioning by White-headed Woodpeckers *(Picoides albolarvatus)* at that season unnecessary. That the foraging overlap of Pygmy Nuthatches and Mountain Chickadees was greatest in summer, and primarily involved intensive use of the foliage and twigs by both species, may reflect a similar phenomenon. The close association of foraging by *pygmaea* to the foliage volume in summer (Figure 1) supports Balda's (1969) impression that foliage distribution in Arizona pine forests seemed to be an important determinant of foraging for Pygmy Nuthatches. The poorer fit of the chickadee's summer foraging height profile to the foliage profile possibly reflects its preference for foraging on small branches, including dead twigs below the needle-bearing branches included in our sampling of foliage volume. Laudenslayer and Balda (1976) found a similar relationship between the foraging height profile of Mountain Chickadees and the foliage profile of pine-juniper woodland in Arizona, and suggested that the requirements of breeding birds may be met by resources available in the lower foliage layers.

Table 2. Matrix of percent overlap values for Mountain Chickadee and Pygmy Nuthatch foraging data and Jeffrey Pine foliage volume. Percent overlap equals sum of percent values shared for all categories for the two species compared (Holmes and Pitelka 1968).

	Foliage Profile	Mountain Chickadee Foraging Height Profile		Mountain Chickadee Foraging Site Use	
		Winter	Summer	Winter	Summer
Foliage Profile	–	71.6	59.5	–	–
Pygmy Nuthatch Foraging Height Profile					
Winter	53.2	69.7	–	–	–
Summer	94.8	–	62.7	–	–
Pygmy Nuthatch Foraging Site Use					
Winter	–	–	–	42.7	–
Summer	–	–	–	–	72.7

There are other ways these two species might be avoiding consumption of identical resources in summer. The different foraging tactics of the chickadee and nuthatch (see discussion of tactics below), which seemed to hold in all seasons, may expose them to different items in winter, but it is hard to see how the surface prey upon which they both seemed to concentrate in the summer should be more obvious from any particular angle versus another; however, such may be the case. The longer-billed nuthatch may take insects at the bases of needle clusters and fascicles more effectively than the chickadee, thereby reducing apparent foraging overlap.

Fretwell (1972) hypothesized that species with seasonal shifts in feeding patterns might show the greatest degree of correlation between morphological adaptations for foraging and preferred foraging zones during the season of greatest stress (i.e., winter for resident temperate zone birds). The chickadee and nuthatch appear to occupy winter roles as small branch forager and trunk, large branch and needle cluster forager, respectively. The locomotor aspects of morphology of each species seem best adapted to their preferred winter substrates and integrally related to their different tactics used when "attacking" a pine tree for insects (Richardson 1942). Chickadees typically spiral around a tree, hopping from branch to branch, while nuthatches usually hitch their way in or out along a branch, often moving across the trunk from branch to branch. These different foraging patterns no doubt provide each species with a different perspective on the same objects, and may result in different foods being taken. In addition, their bills seem best adapted to their winter roles, the longer bill of the nuthatch enabling it to probe deep fissures in the bark, whereas the shorter bill of the chickadee is probably more efficient at chipping bark from the small branches.

Morse (1967, 1970) and Austin and Smith (1972) presented evidence that the different species in mixed flocks accomodate each other's presence by foraging in different zones of the habitat. Morse (1971) felt that such flocks might provide the most efficient means for each individual to exploit the resources present with a minimal degree of interspecific contact. Hartley (1953), Morse (1967) and Bock (1969) all observed an increase in the number of aggressive interactions between species in mixed groups when food became abundant in a particular part of the environment (e.g., feeders and good cone crops). During this study, only one aggressive encounter between a chickadee and a nuthatch was observed in the winter, despite their constant association in mixed flocks. Unless food is made readily available in a small part of the total habitat, the structure of such flocks may be important in reducing the potential for aggressive encounters which offer no advantage to either party.

Krebs (1973), in experiments with mixed-species flocks of chickadees, found that differences in learned foraging height preferences of two species *(Parus atricapillus* and *P. rufescens)* tended to disappear in mixed groups, and that individuals of one species would alter their foraging patterns (i.e., search the site of discovery) in response to food-finding by an individual of the other species. He hypothesized that if food was clumped in the environment, each species could effectively increase its range of exploitable feeding sites by feeding in groups of species adapted for foraging in a variety of sites. This theory is particularly attractive, at least in reference to the chickadee-nuthatch-creeper-kinglet flocks observed in the northern hemisphere, in that it simultaneously provides a reason for the formation of these flocks while it explains the integration of foraging patterns of species within them, such as observed in this study. Additional species observed flocking with *pygmaea* and *gambeli* in winter were Bushtit *(Psaltriparus minimus),* Golden-crowned Kinglet *(Regulus satrapa),* Brown Creeper *(Certhia familiaris)* and White-breasted Nuthatch *(Sitta carolinensis),* but for these species, insufficient data were obtained to discuss their impact on flock structure.

SUMMARY

Seasonal changes in foraging habits of Mountain Chickadees and Pygmy Nuthatches are discussed in relationship to the different time and energy demands they face in different seasons. Both species foraged extensively on foliage and small branches in summer, but at different heights. Nuthatches foraged higher than chickadees in both seasons. Both species commonly occurred in mixed-species flocks in winter, and the observed differences in preferred foraging zones in winter may serve to reduce the number of undesirable interactions between species and/or to increase the range of foraging sites exploited by the flock as a whole.

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GROUP SIZE, SEX RATIO, REPRODUCTIVE SUCCESS AND TERRITORY SIZE IN ACORN WOODPECKERS

ELIZABETH M. SWEARINGEN, 44 Murray Avenue, Annapolis, Maryland 21401

Published information regarding group size and composition, territories and reproductive success of the Acorn Woodpecker *(Melanerpes formicivorus)*, a group-living bird, is limited. Scattered data concerning these characteristics have been found in a few references (Ritter 1938, Bent 1939, Skutch 1969). To collect more specific information about these aspects of Acorn Woodpecker ecology, I observed nine groups of these birds on the Stanford University campus, Stanford, California from 1973 through 1975.

The habitat of these groups included campus buildings, tree-lined streets and sidewalks, and large areas of woodland and grassland. The most common source of acorns, a primary food during much of the year, was the Coast Live Oak *(Quercus agrifolia)*, but Valley and Blue oaks *(Q. lobata, Q. douglasii)* were also present. Most of the group roosted, nested and stored acorns in palm trees (mainly *Phoenix canariensis)*. However, one group used Monterey Pines *(Pinus radiata)* for all three activities, while telephone poles and Blue Gums *(Eucalyptus globulus)* were used by others for storing and at least roosting. Wood shingles and roof tiles were also used for storing.

Group surveys of the unmarked Stanford birds were based on the largest number of individuals observed simultaneously. Males, females, and juveniles (before the molt) were readily distinguishable. This technique was supplemented by the recognition of some individuals by peculiarities of plumage. Surveys were done by observing the central gathering points in each group's territory to minimize the possibility of counting stray birds from neighboring groups. The central gathering points were acorn granaries, nesting and roosting sites and trees serving as anvil sites for opening acorns. Because the birds were not marked, seasonal group counts were repeated for several sittings to minimize the number of individuals omitted from the totals.

Estimates of territory size were made from observations of the same central gathering points of each group as in the group surveys. Birds could easily be observed flying back and forth from these places to other areas. All frequently traveled flight paths and destinations from the central points were charted. From these, approximate territorial boundaries were then mapped out.

Because of the proximity of many of the Stanford groups, it was sometimes possible to observe as many as three groups simultaneously. Flight paths and destinations from the central territorial points were

rarely seen to overlap between groups. On occasion birds originating in one charted territory were seen entering a neighboring territorial region. These were usually chased out by the residents.

Observations totaled approximately 175 hours. Table 1 summarizes the findings on group size, sex ratio, reproductive success and territory size.

In a recent study by MacRoberts and MacRoberts of Acorn Woodpeckers in Monterey County, California (1976), a mean group size of 5.6 for 20 groups of banded birds observed over three years was found. The male:female ratio was 1.2:1. The reproductive rate ranged between 0.20 and 0.28 young fledged per adult. Territory sizes ranged between 3.5-9.0 ha (mean 6.2).

Another recent California study done by Chad Roberts (pers. comm.) revealed a mean group size of 3.1 for 65 groups in the Central Valley and a mean size of 3.0 for 14 groups of birds in Yolo County. As in Monterey County, the number of males per female was 1.2. Territory sizes ranged between 1.5-8.0 ha (mean 4.6 ha).

Although group size was similar to that found in Monterey County, territory sizes at Stanford were much smaller. This disparity may be due at least in part to the suitability of the terrain for woodpecker habitation. The area surveyed at Stanford was for the most part an unbroken stretch of woodpecker habitat, with many suitable storage and nesting sites (mainly palms) and a large number of oaks throughout the area. In Monterey County, islands of suitable woodpecker habitat (containing nesting, storing and foraging sites) were surrounded by often much larger expanses of land suitable for foraging but not for full-time habitation by another group (Koenig pers. comm.). Homogeneity of terrain suitable for habitation may therefore be a reason for the smaller size and proximity of the Stanford territories. This factor may also cause more territorial boundaries at Stanford to be imposed on a group by neighboring groups than in Monterey County.

The differences in breeding success between the Stanford and Monterey groups may be compared with the available supply of acorns at each location. In the former, acorns were observed to be an important part of the woodpecker diet for adults throughout the year, and for nestlings and fledglings. During the study period, the supply of stored acorns appeared to be plentiful in almost all territories at all seasons.

In the three years of the MacRoberts and MacRoberts study, the stored acorn supplies did not last throughout the summer due to poor acorn crops. The breeding success was only half that of the Stanford birds (MacRoberts and MacRoberts 1976). The following year, after a good acorn crop, acorns were available throughout the summer to feed nestlings and fledglings and the breeding success was several times that of the three previous years (Koenig pers. comm.).

Table 1. Group size, sex ratio, numbers of fledged young and territory size.

YEAR/MONTH SPAN	GROUP 1	2	3	4	5	6	7	8	9	MEAN GROUP SIZE	SEX RATIO M/F	FLEDGED YOUNG Mean/ Group	Mean/ Adult
1973 July-September										6.7 (4.9)**	2.1***	1.9	0.38
Adult males	4	3	3	4	4	3	2	NS*	NS				
Adult females	1	2	3	1	2	1	1						
Young	4	1	3-4	2	1-2	1	0						
Total	9	6	9-10	7	7-8	5	3						
1974 April-September										7.4 (5.2)**	1.9***	2.3	0.44
Adult males	3	3	4	4	4-5	3	2	4	3				
Adult females	2	2	2	2	1	1	1	2	3				
Young	3	2-3	2	2	1	2	2	3	3				
Total	8	7-8	8	8	6-7	6	5	9	9				
1974-75 October-January										6.9	1.5****		
Males****	4	6	4	4	6	3	2	4	4				
Females****	2	2	3	3	2	3	5	2	3				
Total	6	8	7	7	8	6	7	6	7				
TERRITORY SIZE (ha)	2.9	2.5	0.9	2.6	4.3	2.2	1.7	3.1	1.8	MEAN: 2.4 ha			

* Not surveyed
** Figures in parentheses are mean group sizes excluding young
*** Only adults included
**** Numbers of males and females include immatures as this survey followed the post-juvenile molt

Given the abundance of acorns and the suitability of the land for woodpecker habitation at Stanford, limiting factors must have been working to keep the group numbers from increasing and/or territory sizes from decreasing to make room for more groups. One new group (No. 7) was established in 1973, where no previous group existed. However, the rest of the territorial boundaries changed little in the two years and group sizes remained approximately the same.

In at least four of the territories, potential granary sites were limited, perhaps providing an upper limit to the number of birds the territory could support. In the other five territories, several unused or underused granary sites were apparent. In these territories, the granary sites nearest the tree or trees used as anvil locations tended to be the sites used as granaries. Proximity to suitable anvil sites could possibly be a limiting factor in the use of granaries.

Buildings provided boundaries for several of the territories. These may have limited the number of possible territories in the study area.

The mean number of males per female in the Stanford groups varied from survey to survey between 1.48 and 2.09. Significantly high male: female ratios (1.2:1) were also found in MacRoberts and MacRoberts' and Roberts' studies. Sex ratios biased in favor of males have also been found in many other group-living birds (Brown 1974, Fry 1972).

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NOTES

FIRST NORTH AMERICAN NEST AND EGGS OF THE RUFF

DANIEL D. GIBSON, University Museum, University of Alaska, Fairbanks, Alaska 99701

The nest of a Ruff *(Philomachus pugnax),* containing four eggs, was discovered at Point Lay (69°44'N 163°00'W), on Alaska's arctic coastal plain, on 21 June 1976. It was a completely canopied cup at the edge of a dry hummock, 30 cm above a very wet, natural drainage. It was placed deep in a clump of sedge and was completely concealed from above and from 300° of the compass at a height of 30 cm above nest level. The four eggs were olive with dark brown splotches, most heavily marked about the large ends, and measured 45.4 x 30.5 mm, 43.5 x 30 mm, 44 x 30.3 mm, and 42.2 x 31 mm.

In late morning a large sandpiper that was clearly a Ruff flew across 15 m in front of me and 5 m up. My first impression was that the bird was a male, since it seemed large and quite dark about the head, neck, breast, and back (with orange feet projecting beyond the tail, large oval white tail-side patches extending from flank most of the length of the rectrices, and long pointed brown wings with a moderately prominent wing-stripe). It flew quickly across the 500 m of wet tundra between the DEW Line Site and the runway and landed, barely in view, in a very wet area next to the runway. I pursued to get a better look, but it was not to be seen when I reached the runway. After looking about for several minutes, I started back toward the Site, when the bird was all-of-a-sudden in fast-paced distraction display 10 m away. It shuffled very quickly, low, from one hiding place to another, wings fluttering akimbo, and I was not able to get a good look at it motionless and upright until it had moved off 50-70 m, at which point, by its lack of ruffs and wattles, it was identifiable as a female. It never uttered a vocalization. I returned to the area later and promptly flushed the bird, at a distance of 3-4 m, from the nest and full clutch, and it went into another fast-moving distraction display.

Stephen O. MacDonald and Brina Kessel arrived later in the month, and we continued to watch the bird, nest, and eggs. By this time, however, we were perplexed that there was not only no lek in the area, but we could not find a single male either. From then through 6 July we checked the nest regularly and observed the female incubating, and also feeding, alone, several times in a wet sedge runoff area 500-600 m from the nest. We had to leave Point Lay late on 6 July, and, knowing that we would be unable to return, we took one of the four eggs with us, hoping to hatch it ourselves. On 7 July it was accidentally broken and found to be infertile. The eggshell is on file at the University of Alaska Museum.

Ruffs breed north in the Old World to about 71° to 72°N on the Yamal and Gydan peninsulas, perhaps to these latitudes on the Taimyr Peninsula, on the coast of the Arctic Ocean farther east, and as close to Alaska as the Anadyr River

basin (Vaurie, The birds of the palearctic fauna, Non-Passeriformes, H. F. & G. Witherby, London, 1965:405). Apparently-breeding females have been collected at Uelen, on the Bering Strait coast of the Chukotski Peninsula, 17 and 30 June 1961 (Portenko, Ptitsi chukotskogo poluostrova i ostrova vrangelya [Birds of the Chukotski Peninsula and Wrangel Island], Vol. 1, Izdatel'stvo "Nauka", Leningrad, 1972:400). The species is a regular migrant in small numbers in western and southwestern Alaska (Kessel and Gibson, Recent status and distribution of some Alaska birds, Condor in prep.), but there is no previous northern Alaska record.

Species nesting in proximity to the Ruff at Point Lay included Semipalmated Sandpiper *(Calidris pusilla)*, Western Sandpiper *(C. mauri)*, Pectoral Sandpiper *(C. melanotos)*, Dunlin *(C. alpina)*, Long-billed Dowitcher *(Limnodromus scolopaceus)*, Savannah Sparrow *(Passerculus sandwichensis)*, and Lapland Longspur *(Calcarius lapponicus)*.

I thank Brina Kessel for critically reading an earlier draft of this note and acknowledge the support of the Outer Continental Shelf Environmental Assessment Program of the National Oceanic & Atmospheric Administration and the Bureau of Land Management.

Accepted 12 December 1976

Sketch by Tim Manolis

A LAYSAN ALBATROSS IN INTERIOR SOUTHERN CALIFORNIA

JON DUNN, 17437 Rancho Street, Encino, California 91316
PHILIP UNITT, 1710 39th Street, San Diego, California 92105

On 5 May 1976 while driving north on California State Highway 62, 9 km north of Interstate 10 at the intersection of Indian Avenue, we observed a Laysan Albatross *(Diomedea immutabilis)* flying over the desert. This locality is in Riverside County at the south base of Morongo Pass, Little San Bernardino Mountains, and is just east of San Gorgonio Pass between the San Bernardino and San Jacinto mountains. The bird was flying west-northwestward, parallel to the mountains, about 30 m above the ground. Very strong winds, perhaps 80 km per hour, were blowing from the west through the area at this time.

The following description was made: A very large black and white bird with extremely long, narrow, wings. The head, rump, and underparts appeared pure white. The back and upperwings were blackish, with a whitish flash in the primaries. The tail was rounded and very short in proportion to the rest of the body with black rectrices. The underwing pattern was thick prominent black edges to both the leading and trailing margins, extensive black tips, and two large black blotches in the middle of the underwing, leaving only a rather narrow white area through the center. The bill was very long and heavy with a distinct hooked tip. The bill was pale but the exact color was not noted.

We had the bird under observation for about three minutes as it was first seen at a considerable distance flying towards us. It flew almost directly overhead and continued parallel to the mountains until we lost sight of it over a distant hill.

There is to our knowledge but one other true interior record of any albatross in North America, a Yellow-nosed Albatross *(D. chlororhynchos)* captured "a few days previous" to 23 July 1934 at East Fryeburg, Oxford County, Maine (Norton 1934).

Although this is the first record of an albatross in the interior of the southwestern United States, other pelagic or salt water species have been found in that area. Of other Procellariiformes, there are two records of Sooty Shearwater *(Puffinus griseus)*: 6 June 1971, 36 miles east of Yuma on Interstate 8, Yuma County, Arizona (an "extremely fat" female collected, University of Arizona 10316; Quigley 1973) and one observed by Guy McCaskie on 14 August 1971 at Desert Shores, Salton Sea, Imperial County, California (McCaskie 1971). There is also one record of New Zealand Shearwater *(P. bulleri)*: a female with extremely little fat collected on 8 August 1966 at the Whitewater River Delta, north end of Salton Sea, Riverside County, California. The specimen is now number 3848 in the San Bernardino County Museum (McCaskie 1966, E. A. Cardiff pers. comm.). The occurrence in this area of Brown Pelican *(Pelecanus occidentalis)*, Blue-footed Booby *(Sula nebouxii)*, Brown Booby *(S. leucogaster)*, and Magnificent Frigatebird *(Fregata magnificens)* has been described by McCaskie (1970, 1972, 1975). There appears to be an effect in which birds moving northward out of the Gulf of California are funnelled through the Salton Sea, the Coachella Valley and San Gorgonio Pass. In the Coachella Valley, north of the Salton Sea, Magnificent Frigatebird has been observed once (24 June 1961 at Palm Springs, Small 1961) and five records of Blue-footed Booby have been obtained, including two at Whitewater, only about 10 km away from the locality of the Laysan Albatross. Two Brown Pelicans and several Blue-footed Boobies have been found in Riverside, San Bernardino, and interior Los Angeles counties to the west of San Gorgonio Pass. The concentration of these records in a band from the Coachella Valley, through

San Gorgonio Pass and the San Bernardino-Riverside area to the San Gabriel and San Fernando valleys indicates some pelagic species have from time to time followed that route north and west.

It thus appears that the Laysan Albatross had become "trapped" in the Gulf of California while moving northward. Continuing north from the north end of the Gulf, it would have moved through the vicinity of the Salton Sea, altering its course more westwardly when blocked by the Little San Bernardino Mountains. Although Laysan Albatross has not yet been found in the Gulf of California, two observations have been made recently to the southeast of its previously known range as indicated by Sanger (1974): one on 26 February 1976 at 18°59'N, 127°10'W in the eastern Pacific Ocean (Unitt pers. obs.), and ten on 29 February 1976 at the Alijos Rocks, 360 km west of southern Baja California (Robert L. Pitman pers. comm.). Although the locality of our observation at the south base of the Little San Bernardino Mountains is on the logical route of a bird flying north out of the Gulf, it is remarkable indeed that such a highly pelagic species should be motivated to leave its normal habitat and fly out over such desolate desert.

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Accepted 11 December 1976

NORTHERN GOSHAWK NESTING IN SOUTHERN NEW MEXICO

WILLIAM C. SHUSTER, U. S. Forest Service, 148 Remington, Fort Collins, Colorado 80521

There have been few verified records of the Northern Goshawk *(Accipiter gentilis)* nesting in New Mexico, with almost all of the nests being limited to the northern San Juan and Sangre de Cristo Mountains (Hubbard, Check-list of the birds of New Mexico, New Mexico Ornithol. Soc. Publ. No. 3, 1970:20-21). For the rest of New Mexico, only two nests have been reported: one near Silver City (Johnson and Harris, Condor 69:209, 1967) and the other in the San Mateo Range (Ligon, New Mexico birds and where to find them, New Mexico Dept. of Game and Fish, Santa Fe, 1961:60-61). Ligon also reported several sightings in the Sacramento Mountains, though no nests have ever been reported.

On 20 May 1975 I discovered a Northern Goshawk nest in the Sacramento Mountains. The nest was in a mature Ponderosa Pine *(Pinus ponderosa)*, approximately 30 m above the ground. The site was a very open stand of Ponderosa Pine, Piñon *(P. edulis)* and juniper *(Juniperus)*, with a sparse understory of oak *(Quercus)* and mahogany *(Cercocarpus)*. The nest tree was on a west-facing slope and about 0.5 km from a small stream.

When I visited the nest, the female left the nest and disappeared from view, revealing one young that was about 15 days old, judging from its feather development. The nestling was covered with down, and its primaries and secondaries were just beginning to show. The hatching date for this goshawk must have been in the first week in May. This date is significant, as it is one month earlier than the date found by Craighead and Craighead in Wyoming (Hawks, owls, and wildlife, Dover Publ., New York, 1969:205) and three weeks earlier than any of 59 nests I am studying in Colorado.

On 19 March 1976 I returned to the nest and found the remains of the female under a nearby tree. As there were numerous large pellets and "whitewash" under the tree, I believe the goshawk was eaten by a Great Horned Owl *(Bubo virginianus)*.

Accepted 22 January 1977.

WESTERN FIELD ORNITHOLOGISTS MONTEREY PELAGIC TRIPS, 1977

We are announcing three trips for 1977 out of Monterey. Because of the success of the June 1976 trip, we are rescheduling that trip, and, due to past demand, we are scheduling two fall migration trips: 27 August and 2 October. By scheduling two fall trips, we hope to provide spaces for all of our members who want to go out of Monterey in the fall and also provide data for a time of year that has been underbirded. It is well known that any season in Monterey Bay provides exciting birding and pelagic mammal watching.

Cost for each trip is $15/person for WFO members and their families, $22.50/person for non-members (you automatically become a member with this extra fee and will receive a year's subscription to *Western Birds).* Be sure to send in reservations for each trip on the date that is posted under each trip; requests for spaces postmarked prior to this date will be returned and no verbal reservations will be accepted. Reservations may be made by sending a check or money order payable to Western Field Ornithologists, c/o Susanne Luther, 7481 Woodrow, Oakland, CA 94611. The full name of all the persons for whom you are making a reservation and a SELF-ADDRESSED, STAMPED ENVELOPE must accompany your request. Be sure to include the full name and address of new members. Please send a separate check for each trip.

SATURDAY, 18 JUNE 1977. Leave 8 AM, return 3 PM. One boat, the Holiday (44 people). Reservations must be postmarked 18 May or later.

Pelagic waters at this time of year are generally very calm. This is an excellent time of year to see Black-footed Albatross; last year we saw over 300! Other species seen last year on this trip were: Northern Fulmar, Pink-footed Shearwater, Sooty Shearwater, Pigeon Guillemot, Xantus' Murrelet (1), Cassin's Auklet, Rhinoceros Auklet, Tufted Puffin (1), Horned Puffin (7—the unexpected highlight of the trip!)

Trip Leader: Dick Erickson

SATURDAY, 27 AUGUST 1977. Leave 8 AM, return 3 PM. Two boats, the Holiday (44 people) and the Holiday II (38). Reservations must be postmarked 18 May or later.

Fall migration of pelagic species is in full swing with the bonus of large numbers of Arctic Terns and larger numbers of jaegers than later in the fall. Species that have been seen at this time of year in the last two years are: Northern Fulmar, Pink-footed Shearwater, Flesh-footed Shearwater, Sooty Shearwater, New Zealand Shearwater, Black Storm-Petrel, Ashy Storm-Petrel, Fork-tailed Storm-Petrel (uncommon), Northern Phalarope, Red Phalarope, Skua, Pomarine Jaeger, Parasitic Jaeger, Long-tailed Jaeger (uncommon), Sabine's Gull, Elegant Tern, Arctic Tern, Cassin's Auklet, Xantus' Murrelet.

Trip Leaders: Ted Chandik, Joe Morlan.

SATURDAY, 1 OCTOBER 1977. Leave 8 AM, return 3 PM. Three boats, the Sea Wolf (38), the Randy II (40) and the New Roz (43). Reservations must be postmarked 18 May or later.

This is the traditional fall migration trip, at which time the huge flocks of storm-petrels can usually be located to look through for the more uncommon species. Pelagic waters at this time of year can be rough. At this time of year we have found Pink-footed Shearwater, Flesh-footed Shearwater, New Zealand Shearwater, Sooty Shearwater, Manx Shearwater (uncommon), Fork-tailed Storm-

Petrel (uncommon), Ashy Storm-Petrel, Black Storm-Petrel, Wilson's Storm-Petrel, Pomarine Jaeger, Parasitic Jaeger, Skua, Sabine's Gull, Thick-billed Murre (uncommon), Xantus' Murrelet, Cassin's Auklet, Rhinoceros Auklet, Tufted Puffin.

Leaders: John Luther, Mike Parmeter, Rich Stallcup.

For further information call Susanne Luther (415) 339-0986.

WESTERN FIELD ORNITHOLOGISTS SAN DIEGO PELAGIC TRIPS, 1977

Tentative destination is area around San Clemente Island.

$17.50 per person for WFO members and their families.
$25.00 per person for non-members (includes membership in WFO and subscription to *Western Birds)*

Reservations may be made by sending a check or money order made payable to Western Field Ornithologists, c/o Clifford Lyons, 321 South Rios, Solana Beach, CA 92075. A separate check must be sent for each trip. Please enclose a SELF-ADDRESSED STAMPED ENVELOPE, the names of ALL the people you are making reservations for and your phone number.

The boat will depart from Seaforth Sportfishing Landing, Mission Bay, San Diego. Please be at the landing 30 minutes prior to departure time. We leave promptly at 5:30 AM and will return at approximately 6:00 PM. This boat, the Seaforth, is a large fishing boat with a galley where short orders including breakfast, snacks and beverages are sold.

Trip Leader: Guy McCaskie

SATURDAY, 14 MAY 1977. Spring migration.

Reservations will be accepted postmarked 14 April 1977 or later by order of postmark. Requests for spaces prior to this date or verbal requests will not be accepted.

This time of year we have found Black-footed Albatross, Pink-footed Shearwater, Sooty Shearwater, Black Storm-Petrel, Leach's Storm-Petrel, Pomarine Jaeger, Sabine's Gull, Xantus' Murrelet, Cassin's Auklet and Rhinoceros Auklet. Rarities such as puffins, Red-billed Tropicbird and South Polar Skua have also been found this time of year.

SATURDAY, 10 SEPTEMBER 1977. Fall migration.
SUNDAY, 11 SEPTEMBER 1977.

Reservations will be accepted postmarked 10 August 1977 or later by order of postmark. Requests for spaces prior to this date or verbal requests will not be accepted. Because of the popularity of this trip we are having both a Saturday and Sunday trip. People traveling the farthest distance will be placed on the Saturday trip unless they otherwise indicate. The confirmation notice will indicate your scheduled reservation day.

This time of year we have found Black-footed Albatross, Pink-footed Shearwater, Sooty Shearwater, Manx Shearwater, Black Storm-Petrel, Leach's Storm-Petrel, Ashy Storm-Petrel, Least Storm-Petrel, Pomarine Jaeger, Parasitic Jaeger, Sabine's Gull, Arctic Tern, Craveri's Murrelet, Cassin's Auklet. Rarities such as Red-billed Tropicbird and Long-tailed Jaeger have also been seen on this trip.

Both trips also offer opportunities to see fish and marine mammals.

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Send rare bird reports for California to John S. Luther, College of Alameda, 555 Atlantic Avenue, Alameda, CA 94501; see Calif. Birds 2:109-110. For Arizona, send reports to Robert A. Witzeman, 4619 E. Arcadia Lane, Phoenix, AZ 85018. For Colorado, send reports to Jack Reddall, 4450 South Alton Street, Englewood, CO 80110.

Manuscripts should be sent to Alan M. Craig, 3532 Winston Way, Carmichael, CA 95608. For matters of style consult *Suggestions to Contributors to Western Birds* (6 pp. mimeo available at no cost from the Editor) and *CBE Style Manual*, 3rd ed., 1972 (available from American Institute of Biological Sciences, 3900 Wisconsin Ave., NW, Washington, DC 20016 for $6.00).

Papers are desired that are based upon field studies of birds, that are both understandable and useful to amateurs, and that make a significant contribution to scientific literature. Appropriate topics include distribution, migration, status, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for identifying, censusing, sound recording and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but particularly desired are papers dealing with studies accomplished in or bearing on Rocky Mountain states and provinces westward, including Alaska and Hawaii, adjacent portions of the Pacific Ocean and Mexico, and western Texas.

Authors are provided 50 free reprints of each paper. Additional reprints can be ordered at author's expense from the Editor when proof is returned or earlier.

Good photographs of rare and unusual birds, unaccompanied by an article but with caption including species, date, locality and other pertinent information, should be submitted to Arnold Small, 608 N. Camden Drive, Beverly Hills, CA 90210.