

THE BIRDS OF BALLONA

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### INTRODUCTION

In general, bird distribution of the United States, and California in particular, is well known (A.O.U., 1975; Robbins et al., 1966; Garrett and Dunn, 1981). However, the details of species distribution and population sizes along with habitat usage are poorly documented. Specific locations such as the Ballona Creek region are essentially unknown. While some sightings of birds of this region have been made over the years, no systematic survey has been carried out prior to 1979. The study reported here provides data on the bird populations of the Ballona region.

### METHODS

We conducted weekly censuses at each study unit from the first week of February 1979, through June 1981. Survey efforts on all areas were not begun at exactly the same time, as some initial reconnaissance was necessary to establish separate study sites and census routes. Work at Ballona Lagoon was not part of the original project and commenced later than studies of the other areas, beginning March 1979 and extending through February 1980. No formal surveys were conducted on Unit 3 or the Agricultural Fields during late summer 1980. We thought at the time that this phase of the project was at an end and would no longer be funded. We did make spot checks during this interval in an effort to detect any unusual species or concentrations

of individuals on the region as a whole.

Surveys consisted of counting birds along established transect routes (Fig. 1) on each unit, supplemented by additional non-systematic investigation of habitats not adequately sampled by the transect method. Transect routes were chosen to maximize coverage of the entire study site, rather than to intensively study a particular habitat type. In some cases, the choice of a transect route was influenced by consideration of potential damage to delicate habitat, disturbance of nesting birds or traversibility of habitat. Wet season counts on the Agricultural Fields were conducted from the periphery, as these areas were essentially impassable. The relatively simple nature of the habitat rendered this approach reasonably effective. We walked a transect route and recorded each individual bird detected, either visually or aurally. We recorded only birds detected in front of the observer to avoid counting individuals more than once. The transect route was traversed at a leisurely pace, with stops made only for purposes of identifying birds. Each transect survey required approximately one hour. With few exceptions, surveys were conducted between 0530 and 0930 PST. This time frame corresponds to the maximum activity period of birds and during the two and a half years of our study allowed adequate sampling of all species at all stages of the tide cycle. Spot surveys were conducted at other times of day for comparative purposes. All species identifications were made with the aid of 9 x 35 binoculars and/or a 10x -50x spotting telescope.

Supplementary observations were conducted in specific habitats of Units 1, 2 and 3, particularly during periods when migrant species that could potentially be missed by the transect method might be present. These specific habitats included the willow thicket at the west end of Unit 1, the copse of trees on Unit 2, and the scrubland on the north side of Unit 3. Additional observations were also made on the Agricultural Land during the winter rainy

season, when large numbers of waterbirds were present. The field was skirted in an attempt to record all birds present on the flats and temporary ponds. The expanse and inaccessibility of the Agricultural Fields made the complete elucidation of total bird numbers difficult. Totals for this area should be treated as minimum estimates (particularly for the smaller shorebirds). Numbers recorded in the Agricultural Fields in particular should be considered as measures of relative seasonal abundance and not as measures of absolute abundance.

Ballona Lagoon was censused from various points along the shoreline that allowed complete coverage of all surface waters. The Venice canals were surveyed from the sidewalk surrounding the canal system.

In the following sections the terms waterbird and shorebird are frequently used. Waterbird is used as a general term referring to any species whose presence is influenced by the availability of aquatic or semiaquatic habitats. Shorebird refers to members of the Order Charadriiformes that typically feed and roost along the water's edge.

Data summarized in the figures are means of the weekly censuses for each unit. While some detail is lost in this method of presentation, the seasonal and annual patterns became explicit. We present the mean number of birds per visit for each species in appendices.

Scientific names for all species are given in the Species Accounts.

## RESULTS AND DISCUSSION

### OVERALL REGION

All species recorded during this study and the units in which they were seen are listed in Appendix 1.

Seasonal patterns in bird utilization of the various sites are shown in figures 2 and 3. Numbers were greatest in mid-winter (January and February)

and lowest in late spring and early summer (May and June). These data reflect the regional pattern of bird use in lowland southern California, where winter numbers are predictably increased by an influx of species that breed at higher altitudes or latitudes. Most species found in the region in summer are year-round residents and breed in the general vicinity.

The most notable shifts in bird abundance occurred in Unit 1 and the Agricultural Fields during mid-winter, when numbers increased drastically. This period of peak abundance coincides with the winter rains characteristic of coastal southern California. Usually arid habitats are temporarily wet and were utilized by large numbers of wintering waterbirds. Numbers declined drastically in March and April as flats dry up and most of the species begin migration to summer breeding grounds. Another peak of abundance occurred on Unit 1 in late summer. This increase is due to a temporary influx of migrants (especially waterbirds) moving through to wintering grounds further south. Total bird numbers on Units 2, 3 and Ballona Lagoon were relatively stable in comparison with Unit 1 and the Agricultural Lands, although the previously mentioned general pattern of seasonal change is apparent.

Seasonal variance was great at Ballona Lagoon, where many waterfowl and shorebirds were found during the winter months, but virtually none were present in summer. A greater proportion of the total species inhabiting Units 2 and 3 were resident land birds. Those migrants and winter visitors that utilize these two sites did so in comparatively small numbers. In Unit 3 particularly, the number of species showed more striking seasonal variation than did the total number of individuals.

#### UNIT 1

More species of birds occurred in Unit 1 in late fall and winter than in other seasons (Fig. 4). The low point in species abundance occurred in



late spring and early summer. These seasonal differences were due primarily to changes in the number of shorebird species, as can be seen by examining the lower lines of figure 4. Most shorebirds are migratory and are on the northern breeding grounds in late spring and early summer. Most of the terrestrial bird species recorded on Unit 1 were residents, consequently species numbers did not fluctuate drastically with the seasons.

More species were observed in 1980 and 1981 than during the first year of the study. While some of this variation may be attributed to the increasing familiarity of the investigators with the complexities of the habitats, it certainly also reflects changing environmental conditions. The number of species present (and number of individuals) is strongly dependent upon the relative amounts of dry ground, standing water and moist mudflats. High percentages of standing water favor gulls, terns, ducks and certain wading birds, while large expanses of mudflats attract large numbers of many shorebirds. Dry ground obviously limits utilization by any of these groups.

The pattern of changes in total numbers of individuals (Fig. 5) was similar to that shown by species numbers, but the range of variation was considerably greater. Total numbers of individuals increased markedly during the rainy season in late winter and early spring. Primary differences in abundance of total individuals are attributable to changes in shorebird abundance (Fig. 6). Shorebird numbers were very high in mid-late winter, and dropped to essentially none in early summer. Numbers increased again in late summer as birds began to return from breeding. Shorebird numbers appear to be sensitive to the total amount of mudflat available, as mentioned previously. Numbers are greatest when mud/saltflats are partially flooded, providing softened substrate for foraging, as occurs in late winter.

The seasonal pattern in numbers of gulls and terns (Fig. 7) that emerged

was rather complex, with at least two and possibly three peaks of abundance. As in other waterbirds, numbers were generally lowest in late spring and early summer, but another low point occurred in fall. Numbers increased in late summer with an influx of migrant birds moving through the area. The fall decrease indicates the passage of this wave of migrants, before the bulk of wintering birds has arrived. Gulls and terns that overwinter here increase the census figures for mid-winter. Bonaparte's Gulls and Forster's Terns were particularly abundant at this time of year. The data suggest a late-winter decrease followed by another increase in numbers in early-spring. This possibly indicates migratory movements much like those mentioned above, with wintering birds moving out before spring migrants move through, but these results may be illusory (see 1981). The gas company was conducting maintenance operations on Unit 1 in late winter 1980. These operations inhibited censusing activities, and very likely also affected the number of gulls and terns present. Movement of birds out of Unit 1 may have contributed to the high numbers recorded in the Agricultural Fields at this time. Under normal circumstances, numbers may remain high on Unit 1 through early spring, and then decline as migrants move northward and inland.

Belding's Savannah Sparrows and California Least Terns, both endangered subspecies, nested in Unit 1. Belding's Savannah Sparrows are permanent residents of the region, while California Least Terns are a summer visitor. Belding's Sparrows were recorded on Unit 1 in varying numbers throughout the year. Least Terns were present for about four months, from late April to August or September, with most individuals leaving the area by late July (Fig. 8). Numbers of Belding's Sparrows appear to decline markedly in mid-summer, at the close of the breeding season (Fig. 9). These numbers reflect two phenomena. Belding's Sparrows are secretive at this time of year, singing

very little and remaining concealed in the low vegetation. Also, many birds disperse to semi-arid habitats of other sites, including Unit 2 and the Agricultural Fields. Birds become easier to census in fall, and more birds were recorded during this time period. Numbers of terns using Unit 1 appear to be lower in 1980 than in 1979. This difference is correlated with a change in water level on the mud/saltflats between the two years. In 1980 these flats, which have been used for breeding in the past, were largely flooded throughout the spring. Little or no reproduction appears to have occurred on the tern colony in 1980. Numbers of Least Terns were initially fairly high again in 1981, but declined following flooding of the breeding site. Some Least Terns that have used this breeding site in the past may have moved to the colony on the beach north of the Marina, although this is not certain (J. Atwater, pers. comm.).

A complete list of birds censused on Unit 1 is given in Appendix 2.

## UNIT 2

In Unit 2 species numbers were greatest in fall and lowest during summer, although the differences were rather small (Fig. 10). Changes in total species number are primarily due to the increased incidence of waterbirds during the fall.

Largest numbers of individuals were recorded in fall and the smallest numbers in summer (Fig. 11). Unlike species numbers, the greatest differences in numbers of individuals was attributable to changes in land bird populations, particularly in the number of House Finches recorded. House Finch flocks foraged over the area, after the breeding season, feeding on seeds of annual plants both along the canals and in the drier portions of the study site. A significant contribution to the fall increase in numbers was made by Belding's Savannah Sparrows that dispersed into the area after the breeding season (Fig. 9).

Belding's Sparrows fed regularly in the same portions of the habitat as the House Finches and probably also utilized the temporarily abundant seed resources. Terrestrial birds were the dominant components of the bird fauna in Unit 2. Particularly common species included the House Finch, Mourning Dove, Meadowlark and Song Sparrow. Song Sparrows were more abundant in this study site than any other unit within the region, and were particularly common in the stand of pampas grass bordering the south side of the tidal channel.

A complete list of birds censused in Unit 2 is given in Appendix 3.

### UNIT 3

In Unit 3 species diversity was greatest in spring and lowest in summer (Fig. 12). The peak of diversity corresponded with the time when part of the area was flooded. Lower portions of Unit 3 collected runoff from the winter rains and remained wet through April well after the heavy rains have ceased. This area retained standing water longer than Unit 2 or the Agricultural Fields, and as a consequence, was used by a larger number of waterfowl and wading birds later in the spring during 1979 and 1980.

The peak of waterbird abundance coincided with the peak in species number (Figs. 12 and 13). Total numbers of all birds, however, were as high or higher in the fall, as a notable influx of land birds on migration or, in some cases, dispersing in from surrounding areas occurred. These were primarily seed-eating species making use of the temporary abundance of weed and grass seed available in the drier portions of the habitat. The most abundant species on the area at this time are White-crowned Sparrows, Meadowlarks, Mourning Doves and House Finches.

Belding's Savannah Sparrows resided on this unit (Fig. 14). They primarily inhabited those portions of the study site covered by stands of pickleweed (Salicornia), but also used drier areas in the non-breeding season.

The number of sparrows using the study site declined markedly in mid-summer. They may regularly disperse entirely to other portions of the region as Unit 3 becomes particularly hot and dry. This point warrants further investigation. Numbers increased during the fall months, when seed-eating species in general became particularly abundant.

An apparent decrease in the number of Belding's Sparrows occurred on the site during the breeding seasons of 1980 and 1981, as compared to 1979. This may have been a random fluctuation in numbers more or less typical of small populations, or it may be a direct reflection of changing environmental conditions. Our subjective observations suggest that the "quality" of the Salicornia on Unit 3 declined during this study. This site is not subject to tidal flux, and the only source of water is fresh-water runoff. Salicornia is usually restricted to salt water or brackish water intertidal habitats. Its presence on Unit 3 is due to residual salt in dredge spoils left from the construction of the Marina. It appears this salt is gradually leaching from the soil, thus negatively impacting the Salicornia. Elimination of Salicornia would effectively eliminate the unit as a breeding site for Belding's Sparrows, although they might continue to be present outside the nesting season.

A complete list of birds censused on Unit 3 is given in Appendix 3.

#### AGRICULTURAL FIELDS

Data presented in this section are derived primarily from the region south of Jefferson Blvd. and west of Lincoln Blvd., bounded on the west side by the road leading to the gas company facility.

Species numbers were considerably greater from mid- to late winter than at any other time of the year (Fig. 15). At that time of year, the area is usually at least partially flooded with a fairly extensive temporary pond

formed along the western border of the study area. Another, smaller pond may form approximately 100 meters west of Lincoln Blvd. in wet years. During particularly heavy rains in January and February 1980, the entire study area was submerged. During most of January and February, extensive wet mud areas surrounded the temporary pond nearest to the gas company facility. These areas were used regularly by shorebirds for both feeding and loafing. Waterfowl (particularly Cinnamon Teal) utilize the standing water, as do several species of gulls. Waterfowl were concentrated on the temporary pond nearest the western border of the study site, while gulls used both of the ponds as resting areas. Early in the rainy season, Bonaparte's Gulls foraged extensively over the area, apparently feeding on insects trapped by the rising waters.

Plowed portions of Agricultural Fields away from the immediate vicinity of temporary ponds were used as foraging sites by shorebirds, as long as the soil remained wet and easily penetrable. These sites were used most extensively when the extent of available foraging sites on Unit 1 were reduced by high water levels.

Most of the Agricultural Area dried out rapidly after the winter rains, and waterbirds moved to other locations. The temporary pond near the gas company remained for some time after the remainder of the field was dry, and supported fairly large numbers of birds. In 1980 and 1981, this spot continued to be used by shorebirds into April.

The seasonal pattern in numbers of individuals was the same as shown by species numbers, but monthly differences were even more pronounced (Fig. 16). More than a hundred-fold difference in numbers was recorded between mid-summer and certain periods during the wet season. This difference was due entirely to the great influx of waterbirds (Figs. 15 and 16). Among

shorebird species, only small numbers of Killdeer were present during most of the year, but large numbers of several species were present in wet winters.

These differences in species and numbers are responses to environmental change and not simply to the obvious large-scale seasonal shifts in shorebird distribution, as can be seen by comparing 1979 with 1980 and 1981. The initial 1979 surveys were begun after the peak winter rains, when the area was relatively dry, and comparatively small numbers of birds were recorded. In the second year of the study, rains lasted somewhat longer, and the area remained wet much later. Considerably greater numbers of birds were observed during late February and March in this second year of study than were recorded in the first year, a result probably more representative of the typical winter situation as suggested by 1981 data. These data clearly illustrate the importance of and need for long-term environmental studies as basis for valid conclusions.

A complete list of birds censused on the Agricultural Lands is given in Appendix 5.

#### BALLONA LAGOON

Seasonal patterns in bird use of Ballona Lagoon generally mirrored those of the Ballona Region as a whole; numbers of species reached a maximum in mid-late winter and early spring, and minimum in summer (Fig. 17). Seasonal differences were due primarily to changes in the waterbird population. Very few shorebirds and virtually no migratory waterfowl were present during the summer months (figures do not include "domestic" ducks and geese which are resident on the canals). Throughout the summer, a few non-breeding Willets, Marbled Godwits and Black-bellied Plovers were present. Killdeer, which are resident in the region probably breed in higher elevation habitats surrounding the lagoon itself. Other species of migratory shorebirds moved into the area in fall, and many remained in the general vicinity throughout

the winter. Migratory waterfowl, such as Scaup and Red-breasted Mergansers, began moving onto the lagoon in late fall and remained through the winter. Several species of shorebirds (i.e. loons, grebes) occasionally used the protected waters of the lagoon for resting and feeding in winter. Virtually all terrestrial bird species recorded during this study were residents and were consequently observed in all seasons.

Numbers of individuals of all waterbirds largely paralleled the pattern shown by species numbers, in that maxima occurred in fall and winter and minima in summer (Fig. 18). The range of values was, however, considerably greater. This general pattern holds for both shorebirds and waterfowl (Fig. 19). Differences between the patterns of abundance of shorebirds and waterfowl did exist, however. Shorebirds showed peaks of abundance in late fall and late winter-early spring, corresponding to periods of migratory movement, when birds that winter elsewhere were passing through the region. While many birds probably remained in the vicinity throughout the winter, many spend mid-winter months further south. The waterfowl population peaked in mid-winter and remained at a maximum until early spring, suggesting that most of these are wintering birds, and not migrants passing through the lagoon site. The most abundant waterfowl species during the winter were scoters, Lesser Scaup and Red-breasted Mergansers. Virtually no waterfowl were present on the lagoon from late-April to November.

Numbers of individuals of terrestrial bird species using higher elevation habitats around the lagoon were not recorded.

A complete list of birds censused at Ballona Lagoon is given in Appendix 6.

#### REMARKS

The species accounts presented below deal only with birds observed during



the course of this study. A few birds that seemingly should occur in these types of habitat were not observed, and some of these will be discussed below. Few data are available for this region but Dial (1978) did find 3 species (Savannah and Song Sparrows and Western Meadowlarks) nesting in Unit 1 and noted winter bird species there. A notable lack of published information exists for the birds of similar marshland situations in southern California, but Kiff and Nakamura (1979) compiled bird sighting records at Malibu Lagoon, a smaller but somewhat similar coastal location 12 km northwest of the Ballona region. Malibu Lagoon and the Los Cerritos wetlands are the only other sites where remnants of a Salicornia marsh are found in southern Los Angeles County. The extent of pickleweed habitat at Malibu is extremely limited, and Malibu Lagoon differs from Ballona in significant ways, being situated directly on the coast and having riparian woodland and chaparral habitats immediately adjacent. Despite these differences, the bird species composition of the two locations is generally similar. The important differences in bird faunas of the two locations will be addressed below, along with additional remarks concerning the status of some birds recorded in this study.

Malibu Lagoon appears, superficially at least, to harbor a greater diversity of bird species than the Ballona region. Kiff and Nakamura (1979) report records of 262 species, versus 129 species recorded in this study. This is attributable in part to the occurrence of many species at Malibu that normally occur offshore, and probably rarely if ever come far enough inland to be recorded at Ballona. In addition, many more terrestrial birds were recorded at Malibu due to the close proximity of large areas of riparian and chaparral habitats. Most important, the Malibu study includes records of birds sighted over a span of several decades by avid "bird listers," and consequently includes a higher percentage of rare or uncommon species. These

factors withstanding, certain anomalies exist between the two studies.

The Common Loon, Gavia immer, Arctic Loon, Gavia arctica, Horned Grebe, Podiceps auritus and Hooded Merganser, Lophodytes cucullatus, are waterbird species which have been recorded on several occasions as migrants or winter visitors at Malibu Lagoon but were not observed at Ballona. All of these species might reasonably be expected occasionally at Ballona Lagoon, although its relatively protected location away from the coastline may lessen the chance of their occurrence. The Hooded Merganser also may be unlikely to frequent an area subject to such a high level of human activity.

Soras, Porzana carolina, are listed as fairly common migrants at Malibu but were never seen in the present study. This small rail frequents dense reed beds, which are scarce at Ballona, and this may account for their absence. Their secretive nature makes it possible that their occurrence may have been missed during this investigation.

The Glaucus-winged Gull, Larus glaucescens, Mew Gull, Larus canis and Black-legged Kittiwake, Rissa tridactyla, are at least fairly common wintering gull species at Malibu and occur offshore near Ballona. They apparently do not regularly venture inland, probably accounting for their virtual absence in this study, although their occasional occurrence should not be considered particularly exceptional.

Common Terns, Sterna hirundo, and Royal Terns, Sterna maxima, are listed as fairly common to common migrants in the area of Malibu Lagoon, while neither was recorded during this study at Ballona. Their absence is rather perplexing. The superficial similarity of Royal Terns to Caspian Terns may have led to errors in identification at a distance, but even Caspian Terns were rather uncommon at Ballona.

Most of the differences in occurrence of terrestrial bird species may be

accounted for by habitat differences between the two sites. Little habitat exists for migrant terrestrial species at Ballona, and in addition, the widely scattered habitats that do exist were not intensively investigated during this study. In general, terrestrial migrants are not currently major components of the avifauna of the region.

The status of many bird species has changed in recent decades with the continued degradation of the habitat in this region. The Light-footed Clapper Rail, Rallus longirostris levipes, was probably a breeding species here at one time. Clapper Rails were typically found in well-developed Salicornia marshes traversed by tidal sloughs, a situation represented at Ballona. Nesting was recorded in nearby marshland (Santa Monica) early in the century (Grinnell & Miller, 1944). It is probably totally absent at present, due to the continued degradation of salt marshes in the Los Angeles Basin. The same considerations probably also apply to the Black Rail, Laterallus jamaicensis, which normally occupies similar habitats (Grinnell, Bryant and Storer, 1918).

The Black-necked Stilt, Himantopus mexicanus, a fairly common migrant through the wetlands area, was formerly a regular breeding species. Willet (1933) lists Playa del Rey as a breeding site, and L. R. Howsley collected a number of nests with eggs in this general area in the 1930's (field notes). This species normally nests in open marshlands, especially along the margins of small bodies of standing water. Some suggestion exists that this species is again attempting to nest in the area. Several individuals remained through the summer of 1980 on Unit 1 and exhibited reproductive behavior, although no nests were found. The birds frequent the margins of the saltflats which have been allowed to experience tidal fluctuations.

The Long-billed Marsh Wren, Cistothorus palustris, another fairly common migrant and wintering species, also formerly bred in the vicinity (Grinnell

& Miller, 1944). This species is usually associated with stands of cattails, a habitat type now almost totally absent at Ballona because of "weed abatement" by the property owners. Wintering wrens are now largely associated with scattered stands of Pampas Grass which apparently provide some approximation of the vertical stratification of cattails.

A complete survey of the changes in bird species composition that have occurred through time is unmanageable, but the above offers a few examples of the effects of marshland degradation in southern California.

### ENDANGERED SPECIES

Two birds considered to be endangered subspecies are important components of the bird fauna of the Ballona region. These subspecies are Belding's Savannah Sparrow (Passerculus sandwichensis beldingi) and the California Least Tern (Sterna albifrons browni). Belding's Savannah Sparrows or Belding's Sparrows are year-round residents of the region, while California Least Terns are present only in spring and summer. Both birds bred in the region. The following briefly summarizes the status of these two subspecies in the study region. Their biology has been treated fairly extensively in the recent literature (Davis, 1968; Massey, 1974, 1977; Least Tern Recovery Team, 1977).

#### Belding's Savannah Sparrow

The Belding's Sparrow was recorded in all areas of the property at various times during the course of this investigation. During the breeding season, these birds were largely restricted to the salt marsh habitats of Units 1 and 3. In the non-breeding season (late summer through winter), Belding's Sparrows were recorded on unit 2 and the Agricultural Areas as well as Units 1 and 3.

Breeding populations of Belding's Sparrows are restricted almost entirely

to the upper littoral zone, dominated by dense stands of pickleweed (Salicornia spp.). Massey (1977) found only one population in California nesting outside of a Salicornia marsh, that being on Beacon Island in San Diego County. Even this site contained Salicornia, but not in typical dense homogeneous stands. Breeding at Ballona is restricted to those portions of Units 1 and 3 obviously dominated by pickleweed. Belding's Sparrows begin to exhibit territorial behavior by mid- to late winter at Ballona. Relatively small territories are defended by the breeding males. Massey (1977) found territories as small as 225 m<sup>2</sup>, with maximum territory sizes of roughly 4,000 m<sup>2</sup>. Territory sizes at Ballona appear quite variable but are definitely closer to the lower end of this range. Nests are placed on the ground among the Salicornia or on the lower branches of the plants themselves, always well concealed. The nesting season extends roughly from early April through June. Male singing declines through the spring, and by late June the birds are generally quiet, inconspicuous in most of their activities and difficult to census. Counts made early in the breeding season indicated a population on Unit 1 of approximately 21 pairs in 1979, 18 pairs in 1980, and 13 pairs in 1981. Estimates for Unit 3 were 18 pairs in 1979, 10 pairs in 1980 and 10-13 pairs in 1981. These estimates suggest a decline in sparrow numbers in the region. Habitat changes on Unit 3 have been mentioned previously as a possible explanation of these differences in sparrow numbers. If there was an actual decline in numbers on Unit 1, it may have been related to the increase in standing water on the area in 1980 and 1981. Increased amounts of standing water undoubtedly reduce the number of potential nest sites, at least to some degree.

Following the breeding season, sparrows do not actively defend territories, but may return to the general vicinity of the breeding territory to roost. During this time of the year, Belding's Sparrows are frequently observed foraging together in small flocks. Birds may be observed some distance from

the breeding grounds in fall and winter. It is during this period that Belding's Sparrows were regularly recorded in mixed Salicornia and semi-arid habitats of Unit 2 and along the margins of the agricultural site. The diet of Belding's Sparrows is quite varied, and it is probable that seeds are the most important component of their diet in fall and winter. The ready availability of seeds in these higher elevations is probably an important factor in this seasonal dispersal.

### California Least Tern

The Least Tern nested only on Unit 1. Least Terns were frequently observed in flight over other study sites but were never seen either on the ground or actively feeding.

Historically, the Least Tern nested on the upper portions of sandy beaches along the California coast. As this habitat has come under increasing pressure from human activities, the terns have tended to make use of alternative nesting sites, such as mudflats and landfills away from the immediate coastline. Within the study area, terns nest only on the saltflats of Unit 1, although another larger Least Tern colony exists on nearby Venice Beach.

Least Terns arrived on the study area during the first week of May in 1979, and during the last week of April in 1980 and 1981. Once the birds arrive on the breeding grounds, courtship and nesting commence very quickly. Least Terns nest in shallow depressions or scrapes in the ground. Birds may excavate their own scrapes where the substrate is soft, but at Ballona they tend to utilize ready-made depressions. On Unit 1 these depressions appear to be the hardened hoofprints of horses from the adjacent riding stables. The nesting cycle of Least Terns typically extends into early August (Bent, 1921), but at least in 1979, very few birds remained on the nesting grounds by late July. The terns do not remain in the vicinity for any length of

time once breeding has concluded. No birds were seen after mid-August.

No systematic effort was made to accurately census the actual number of breeding Least Terns, but simple counts suggest approximately 17 pairs nested on Unit 1 in 1979. Breeding activities were greatly reduced in 1980 and 1981, almost certainly due to flooding of the breeding colony. It is possible that no successful reproduction occurred in those years.

During the time the terns were on the breeding colony, they foraged in open waters nearby. The principal foraging area appeared to be the Ballona Creek Flood Control Channel, but birds were regularly observed feeding at Ballona Lagoon and in Marina del Rey. Terns were also observed foraging in the central channel of Unit 1. Least Terns may occasionally move offshore to feed in the open ocean, but apparently prefer shallow, quiet water.

#### AVIAN HABITAT

Habitats may be classified in a variety of ways, depending on the object of the classification. Most classifications are based on the composition or structure of vegetation and/or topographic features of a region. The following habitat classification is a hybrid of these approaches and is an attempt to reflect differences in the environment as perceived by birds.

The following habitat types are recognized in this study:

- 1) pickleweed (Salicornia)
- 2) Mixed pickleweed and herbaceous vegetation
- 3) Semi-arid habitat
- 4) Agricultural fields
- 5) Trees and shrubs
- 6) Mud and saltflats
- 7) Open water

At various points in this report, subhabitats within these categories are

mentioned (e.g. undergrowth--referring to low-growing plants sheltered by trees). It is hoped that any such terms will be self-explanatory and their relationship to the overall system clear.

### Pickleweed

The real heart of the region is the area covered by relatively homogeneous stands of pickleweed. This characteristic salt marsh plant contributes substantially to the high levels of biological productivity recorded for salt marsh and estuarine communities. Pickleweed occurs in the upper littoral zone, areas that are subject to regular wetting by high spring tides and are inundated by storm tides. Solid stands of Salicornia are characteristically low in avian diversity (see Dial, 1978). The vegetation structure and salinity of these habitats apparently make them unsuitable nesting sites for most species, and the density of the vegetation (and perhaps other factors) limits its use as foraging habitat. Pickleweed is, however, crucial habitat for Belding's Savannah Sparrows, Passerculus sandwichensis beldingi, since this endangered subspecies typically breeds only in relatively homogeneous stands of Salicornia. This bird's decline in numbers in recent decades can be correlated directly with the destruction of pickleweed habitat along the Pacific coast (Massey, 1977).

The most extensive stand of pickleweed in the Ballona region occurs in western Unit 1. Much of this section is virtually pure Salicornia, although some slightly higher elevation portions of the study area support mixed Salicornia and herbaceous vegetation. The eastern portion of Unit 1 supports substantial amounts of pickleweed, but the habitat is broken up into relatively small segments, separated by expanses of mudflats and saltflats. It is, however, used regularly by Belding's Savannah Sparrows, both for foraging and nesting.



Relatively narrow bands of Salicornia are found along the banks of tidal channels in Units 2 and 3. The main channel of Unit 1 extends on into and through Unit 2 and is bordered by thick stands of pickleweed, but these stands are not sufficiently extensive to support a breeding population of sparrows. Most of this site is at a slightly higher elevation and supports mixed Salicornia and herbaceous vegetation or grasses and herbs. Dense Salicornia occurs along the channel bordering the north side of Unit 3, but this vegetation is not sufficiently widespread to support Belding's Sparrows. Pickleweed also occurs along the banks of Ballona Lagoon, but the slopes along the lagoon are quite steep, and this greatly restricts the extent of Salicornia at that site. The only reasonably large stand of Salicornia occurs at the north end of the lagoon proper, where small islands are exposed at low tide. These islands are apparently insufficient in size or are subject to such extensive immersion as to preclude their use by Belding's Sparrows, as none were recorded during this study.

The stand of pickleweed in the east-central portion of Unit 3 is worth special note. This area is not subject to tidal flux, and the Salicornia apparently survives only due to a unique combination of periodic inundation following heavy rains and residual soil salinity from dredge spoils used as landfill when the adjacent marina was constructed in the late 1950s and early 1960s. As the area continues to dry out, we expect the Salicornia will continue to deteriorate and no longer provide suitable habitat for the sparrows.

#### Mixed Pickleweed and Herbaceous Vegetation

This habitat type occurs in areas that are covered by salt water only at especially high tide. This habitat is characterized by pickleweed interspersed with a variety of species of herbs and occasional patches of grasses.

This habitat generally occurs just above the pickleweed habitat and is found in some abundance on Units 1, 2 and to a lesser extent along the Agricultural Fields. Mixed pickleweed habitat is primarily important as foraging grounds for a variety of granivorous species that utilize seeds produced by the herbs and grasses. Some nesting may occur within this habitat type. Song Sparrow territories frequently encompassed large segments of mixed pickleweed vegetation in regions where large herbs provided singing perches. Yellowthroats possibly occasionally nest in locations supporting large herbs.

#### Old field Habitat

Old field habitat is distinguished from the previous category by the prevalence of grasses and herbs and the lack of pickleweed. Old field habitat occurs above areas that are periodically inundated and is usually quite dry. A variety of seed-producing plants, many of which are usually considered "weeds," is usually found in this habitat, which supports populations of small mammals and reptiles. Old field habitat is found on all study areas within the wetlands ecosystem, being most extensive on Unit 3 and least extensive on Unit 1. In Unit 1, old field habitat is largely restricted to the periphery, being prominent only in the transition zone between Unit 1 and the adjacent Agricultural Field. Old field habitat is used extensively by several of the common bird species of the region, including seed-eating forms such as House Finches, Mourning Doves, Meadowlarks and California Quail. Raptorial species such as the Red-tailed Hawk, American Kestrel and Burrowing Owl hunt above the open old field habitat. This is the principal nesting habitat for the Western Meadowlark, one of the most common and obvious birds of the region.

#### Agricultural Fields

The Agricultural Fields might be considered as special cases of the

above habitat type, but they cover such a large proportion of the area under consideration as to merit a separate category. Except for times immediately following plowing, or presumably when being actively cultivated, these Agricultural Fields support scattered grasses, with occasional herbs interspersed, particularly along the margins. Sizable portions of the Agricultural Fields between Lincoln Blvd. and the gas company facility apparently support characteristic salt marsh plants such as Saltgrass and Bulrush when they are not in active cultivation (P. Kelley & J. Schular, pers. comm.). During most of the year, these fields are used by birds in much the same manner as previously described for semi-arid habitat, although the lack of tall vegetation limits their use by some species (e.g. Loggerhead Shrikes, which require lookout perches). Killdeer apparently nest in the more open agricultural areas, while Meadowlarks nest on sites supporting a greater coverage of grasses. Some portions of the Agricultural Fields are inundated by runoff during the winter rains and change rather radically in character. These areas will be treated below.

### Trees and Shrubs

Trees and shrubs are rather widely scattered over old field habitats throughout the region. Unit 1 supports a stand of willows along its western margin, and scattered shrubs along the central canal. Unit 2 contains a fairly large eucalyptus copse, surrounded by a number of individual pampas grass plants. A small stand of Baccharis also occurs near the southwestern boundary of Unit 2. Unit 3 contains a sizable stand of Baccharis in the northcentral portion of the study site, scattered pampas grass throughout the semi-arid habitat and a number of large Rhus plants along the southern and eastern margins. Trees and shrubs are used as perch sites by a variety of bird species, including raptors, Loggerhead Shrikes and Mockingbirds.

They also provide nesting sites for several species, including Song Sparrows, Anna's Hummingbirds, House Finches, Shrikes, Mockingbirds and probably Mourning Doves. Their primary importance in the region is probably as resting and foraging habitat for migrating songbirds. A number of species recorded during this study were observed only in areas supporting trees and/or shrubs, as can be seen by an examination of the species accounts.

### Mudflats and Saltflats

For the purposes of this study, mudflats are considered to be any area generally devoid of vegetation that is periodically or regularly covered with water, providing a moist substrate. Saltflats differ from the above only in the notable saline nature of the soil. They are in many ways functionally equivalent from the standpoint of avian utilization, although it is probable that mudflats support a greater diversity of invertebrates and provide better foraging substrate for shorebirds. In general, saltflats are not as regularly flooded as mudflats. The saltflats of Unit 1 provide the only nesting habitat for the California Least Tern within the Ballona region, probably due in part to the fact that this spot is usually dry during the tern breeding season. Both mudflats and saltflats are found on the eastern half of Unit 1. Unit 2 contains only a small segment of habitat which could be called mudflats, along its northern boundary. Unit 3 has sizable areas of saltflat habitat near its center. For reasons that are not immediately apparent to us, this area has not been utilized by the California Least Tern. Small patches of mudflats are exposed at low tide along Ballona Lagoon. The most extensive mudflats at the lagoon are at the extreme north and south ends. During the winter rains, large portions of the agricultural study site become flooded and are used extensively by waterbirds and shorebirds.

Flats are the most important habitat type to the functioning of the

wetlands bird community. A large percentage of the total number of birds observed during this study were observed in this habitat. The mudflats and saltflats are used extensively by gulls and terns as roosting sites and by shorebirds for both roosting and feeding, during the winter months. Most of these species are limited to this habitat type and would be lost to the region if the mudflats and saltflats were eliminated.

#### Open Water

This habitat type is largely self descriptive. Important areas of open water occur at Ballona Lagoon and the central channel of Unit 1. Of lesser importance are the water channels of Units 2 and 3. During heavy rains or after particularly high tides, these areas are augmented by large temporary ponds on Units 1, 3 and the Agricultural Lands. Open water is used by several species of ducks for resting and feeding, gulls and terns for feeding and certain other waterbirds (e.g., grebes) for resting and feeding. Least Terns which nest on Unit 1 move to open water for foraging. While much of their activity centers around Ballona Channel, they were frequently observed feeding at Ballona Lagoon. The larger wading birds such as herons and egrets forage along the margins of open water areas, and kingfishers are restricted to this habitat type for feeding. The temporary ponds which are largely devoid of fish may be used as foraging sites by some species under certain circumstances. Large flocks of Bonaparte's Gulls and Forster's Terns were observed feeding at the large temporary pond on the Agricultural Site after the first heavy winter rains, where they were apparently picking insects off the water surface.

#### Ballona Lagoon and Venice Canals

Ballona Lagoon plays a dual role in the overall scheme of bird use in

the vicinity. It is frequently used by birds spending the bulk of their time on other portions of the wetland, but it is also frequented by some birds that do not otherwise occur in the region. At low tide, mudflats are exposed along the margins of the lagoon, with particularly sizable areas at the mouth and the northern end. During the fall and winter, these habitats are used by varying numbers of shorebirds as feeding and resting grounds, and by gulls as loafing areas. These are at least primarily birds that also utilize other habitats in the surrounding wetlands. Birds were frequently observed flying into the lagoon from across the marina channel on Unit 1. Some of these shorebirds were probably migrants moving north or south along the Pacific flyway. During the Least Tern breeding season, a few individual terns were commonly seen foraging in the lagoon. Terns would fly from one end of the lagoon to the other, periodically diving to capture fish. Some terns were definitely from the breeding colony on Unit 1, while others may have come from the Venice Beach nesting grounds. Forster's Terns, a common wintering species of the wetlands, also forage at the lagoon. A variety of waterbirds that normally occur offshore use the open water of the lagoon as a resting and/or feeding area. This group includes several species of waterfowl, grebes and others (see Appendix 6). The lagoon supports no major concentrations of these birds but may be important as a quiet refuge, particularly during inclement weather.

The Venice canals are primarily used by "domestic" waterfowl, Domestic Geese, Domestic Ducks and tame Mallards which frequently interbreed with the Domestic Ducks. Sizable numbers of American Coots are also found here, particularly in the winter. These birds primarily subsist on handouts from people living along the canals. Very few migrant and wintering birds move northward from the lagoon into the canals. A few gulls (usually ring-billed)

were regularly seen along the canals, and occasional small flocks of ducks (esp. scaup) were recorded, but other waterbirds and shorebirds were almost totally absent. The canals are apparently too confined by the surrounding residential area. There is no natural vegetation along the canals to provide protection from human disturbance. There also appears to be insufficient food to support significant numbers of wild birds. The canals lack any mudflats to provide invertebrate food and resting areas for shorebirds, nor do any rocky margins exist to provide habitat for species such as Willets that are frequently found in this type of area.

Any alterations of the canals should probably be undertaken for aesthetic rather than ornithological reasons. It is unlikely that any reasonable changes would significantly increase their use by wild birds. The Venice residents appear to generally enjoy the domestic birds that live on the canals, and they are likely to remain there unless actively removed. The lagoon, on the other hand provides useful habitat for a variety of wild bird species. It would be preferable to maintain access to the lagoon for migrant and wintering species. To this end, the mouth of the lagoon should be kept free of obstructions as much as possible, as most birds appear to enter the lagoon from the marina channel or Unit 1. Tall buildings immediately surrounding the mouth of the lagoon might well discourage entrance to the lagoon, just as large structures around the entrance to the Venice canal system appear to inhibit its use. The mudflats at either end of the lagoon should be maintained, and tidal flow should be largely unrestricted. This combination would insure the maintenance of foraging and resting grounds for shorebirds, and the survival of their invertebrate and vertebrate prey. Sufficient buffer zones should be maintained along the banks of the lagoon. The west bank is somewhat buffered already by the presence of Pacific Ave. An approximately

equal zone on the east bank would probably lessen the impact of further construction, although it is impossible to predict with certainty. Limiting the heights of buildings immediately adjacent to the lagoon would also be preferable. Tall buildings along the banks would create an artificial "canyon effect" and would be likely to discourage bird use, much as it appears to do in the canal system. Multi-story structures in the immediate vicinity are probably an important factor in limiting water and shorebird use of the Los Angeles County Bird Conservation Area, as was discussed elsewhere. The buffer zone along the lagoon could be landscaped in such a way to improve its aesthetic appeal and also provide some protection from human disturbance for the birds. Plantings of shrubs along the upper banks on both sides could achieve these desired effects. If consideration were taken as to the plant species chosen for this sort of project, an additional benefit might be to attract larger numbers of migrant song birds as well as providing additional habitat for those resident species recorded in this study.

It is uncertain that these measures would be completely effective in mitigating effects of further construction but would at the very least provide an invaluable experiment in wildlife conservation. Since data exist on the status of birds in the area prior to construction, it should be possible to evaluate the effects of these different conservation measures, providing invaluable information which could be used in future planning.

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## SPECIES ACCOUNTS

The status of individual species observed during this study is presented below. For each species, the general pattern of occurrence in southern California is given first, followed by a brief account of its status in the Ballona region based on observations made during the course of this investigation.

## ORDER GAVIIFORMES

## FAMILY GAVIIDAE

RED-THROATED LOON Gavia stellata. Fairly common winter visitor and migrant offshore. Less common in lagoons and inlets. Two individuals observed on Ballona Lagoon from late January to late February 1980.

## ORDER PODICIPEDIFORMES

## FAMILY PODICIPEDIDAE

EARED GREBE Podiceps nigricollis. Common migrant and winter visitor on protected coastal waters. Individuals observed at Ballona Lagoon and Unit 1 on several occasions in the winter, spring and early summer.

WESTERN GREBE Aechmophorus occidentalis. Common migrant and winter visitor offshore and occasionally on quiet inshore waters. Several individuals observed during winter and spring on Ballona Lagoon. Observed occasionally during this period on canals of Unit 1.

PIED-BILLED GREBE Podilymbus podiceps. Fairly common migrant and winter visitor to protected bodies of both fresh and salt water. Individuals may occasionally be observed in summer. Individual birds occasionally seen at Ballona Lagoon and on the major canal of Units 1 and 2 from late summer to early spring.

## ORDER PELECANIFORMES

## FAMILY PELECANIDAE

BROWN PELICAN Pelecanus occidentalis. Common resident in offshore waters but uncommonly seen inshore. Isolated individuals observed soaring above Unit 2 on two occasions during the summer months.

## FAMILY FRIGATIDAE

MAGNIFICENT FRIGATEBIRD Fregata magnificens. Occasionally observed as stragglers along the coast in late summer. Single individuals were observed above Unit 1 and Ballona Lagoon in early August 1979.

## FAMILY PHALACROCORACIDAE

DOUBLE-CRESTED CORMORANT Phalacrocorax auritus. Common offshore species in all seasons, but less numerous in summer. Most local adults breed on the Channel Islands. Occasional vagrants observed in the fall and winter, resting on open water at Ballona Lagoon.

## ORDER CICONIIFORMES

## FAMILY ARDEIDAE

GREAT BLUE HERON Ardea herodias. Commonly observed in all seasons in coastal marshes and along water courses. Observed regularly on Unit 1, with numbers increasing in fall and winter. Smaller numbers observed on Units 2 and 3 and Ballona Lagoon. Several individuals recorded in Agricultural Fields during particularly wet periods.

GREEN HERON Butorides striatus. Common resident around shallow water containing vertebrate and/or invertebrate prey. Breed in a variety of locations

in southern California. Individuals commonly observed in all seasons around Ballona Lagoon and along water courses on Units 1, 2 and 3. A few fall and winter records from Agricultural Fields.

GREAT EGRET Casmerodius albus. May be seen in all seasons on mudflats and in marshes along coast, but not a common bird in the Los Angeles area. Observed along water channels of Units 1 and 2 in November and March.

SNOWY EGRET Egretta thula. Common transient and winter visitor around fresh and salt water. Individuals regularly seen along water channels in all study sites. Observed from late summer through early spring, with numbers greatest in winter.

BLACK-CROWNED NIGHT HERON Nycticorax nycticorax. Uncommon transient and winter visitor in southern California and local resident in coastal district. Scattered observations along water courses of Units 1 and 2.

#### ORDER ANSERIFORMES

#### FAMILY ANATIDAE

BRANT Branta bernicla. Fairly common migrant and occasional winter visitor on offshore coastal waters. Less common inland. Single individuals observed in December 1979 and April 1980 on mudflats of Unit 1.

DOMESTIC GOOSE Anser anser. Birds on the area probably are intentionally released. Several birds are resident on the Venice canals.

MALLARD Anas platyrhynchos. Wild birds are common southern California residents, with numbers increasing in winter with influx of migrants. Common residents on Venice canals. Commonly hybridize with domestic ducks. Occasional wild birds seen on all study sites in winter.

GADWALL Anas strepera. Fairly common winter visitor on quieter coastal waters in southern California. Several individuals observed on Ballona Lagoon through winter 1979, but none seen in 1980. One flock observed on Unit 1 in winter 1981.

PINTAIL Anas acuta. Fairly common winter visitor in marshes and wet agricultural fields of southern California, but primarily inland. Flock of 15 birds seen on flooded agricultural fields in January 1980.

GREEN-WINGED TEAL Anas crecca. Fairly common migrant and winter visitor, especially in fresh water streams, ponds and marshes. Small flocks observed along canals of Unit 1 and in agricultural fields.

BLUE-WINGED TEAL Anas discors. Uncommon winter visitor, primarily in freshwater habitats. A male and two females were observed on several occasions during winter 1981 on Unit 1.

CINNAMON TEAL Anas cyanoptera. Common migrant and winter visitor in coastal southern California, particularly in fresh water and wet agricultural fields. Regularly observed along canals and in flooded portions of Units 1, 2, 3 and Agricultural Fields during winter months. The most commonly seen surface-feeding duck in the Ballona region.

AMERICAN WIDGEON Anas americana. Common migrant and winter visitor on protected fresh and saltwater situations in southern California. A few individuals observed in winter on Unit 1 and on wet agricultural fields.

NORTHERN SHOVELER Anas clypeata. Common winter visitor to freshwater and estuarine habitats. A single male was seen on Unit 1 in winter 1981.

GREATER SCAUP Aythya marila. Uncommon winter visitor in southern California. Small flocks observed on Ballona Lagoon in winter.

LESSER SCAUP Aythya affinis. Common winter visitor and migrant on quiet water. Small flocks observed regularly from December through March on Ballona Lagoon.

BUFFLEHEAD Bucephala albeola. Regularly seen in small numbers during winter in southern California. Single individuals observed in early December on Unit 1 and March and April at Ballona Lagoon.

OLDSQUAW Clangula hyemalis. Rare winter visitor to coastal waters of southern California. A single individual was observed on Ballona Lagoon in mid-March 1979.

WHITE-WINGED SCOTER Melanitta deglandi. Common winter visitor in some years, rare to absent in others. Usually observed offshore or in larger bays and estuaries. Small flocks observed regularly in winter and spring of 1979 on Ballona Lagoon, but absent in 1980. Single individuals seen on canals of Unit 1 in November and December 1979.

SURF SCOTER Melanitta perspicillata. Common migrant and winter visitor in coastal waters, primarily offshore. Commonly observed in small flocks from mid-November through early May on Ballona Lagoon and Marina del Rey channel. Numbers greatest from mid- to late winter. The most common diving duck in the area.

RUDDY DUCK Oxyura jamaicensis. Common migrant and winter visitor along coast and on fresh-water ponds. Small numbers observed on canals of Unit 1 in February 1979.

RED-BREASTED MERGANSER Mergus serrator. Common migrant and winter visitor on both coastal and inland waterways. Observed regularly from mid-November through April on Ballona Lagoon. Single individuals were seen in March, May and December 1980 on the canals of Unit 1.

DOMESTIC DUCK Anas platyrhynchos. Common "pets," also raised commercially. Common residents on Venice Canals.

ORDER FALCONIFORMES

FAMILY CATHARTIDAE

TURKEY VULTURE Cathartes aura. Fairly common migrant in spring and fall. Some individuals resident in mountains and foothills. Forages widely over open areas. Sporadically observed soaring above Units 1 and 3 and the Agricultural Fields.

FAMILY ACCIPITRIDAE

WHITE-TAILED KITE Elanus leucurus. Uncommon to locally fairly common resident. A single individual was observed foraging on Unit 1 in mid-December 1979. Regularly observed on all units in winter 1980-81.

SHARP-SHINNED HAWK Accipiter striatus. Uncommon migrant and winter visitor to wooded areas. One bird observed on Unit 2 in November 1979.

COOPER'S HAWK Accipiter cooperi. Fairly common resident and migrant in open or scattered woodland. Occasionally observed on Units 1 and 3.

RED-TAILED HAWK Buteo jamaicensis. Common resident in foothills of Los Angeles basin. Regularly forage over open areas. Single individuals observed irregularly throughout the year on all study units.

MARSH HAWK Circus cyaneus. Sporadic in occurrence in the Los Angeles basin but usually seen in winter around marshes or fields. Observed fairly regularly in open habitats of all study sites in winter 1980-81 but absent in other years.

#### FAMILY PANDIONIDAE

OSPREY Pandion haliaetus. Uncommon migrant, primarily in the fall. Single individuals observed soaring above Units 1, 3 and the Agricultural Fields in February, March and August 1979.

#### FAMILY FALCONIDAE

AMERICAN KESTREL Falco sparverius. Common resident in open areas with natural or man-made perch sites. Observed commonly on all units and in all seasons.

#### ORDER GALLIFORMES

##### FAMILY PHASIANIDAE

CALIFORNIA QUAIL Lophortyx californicus. Common resident in brushlands, agricultural edges and dense riparian woodland. Small covey observed regularly throughout year on Unit 3. Also recorded sporadically on Units 1 and 2.

#### ORDER GRUIFORMES

##### FAMILY RALLIDAE

VIRGINIA RAIL Rallus limicola. Uncommon migrant, but some individuals probably winter in the area. Found in both fresh- and saltwater marshes. The secretive nature of this species makes its status difficult to determine. Single individuals flushed from emergent vegetation along canals of Unit 2 in February 1979 and 1981 and the Agricultural Fields in September 1979.



AMERICAN COOT Fulica americana. Common resident in freshwater marshes, ponds and slower-moving streams and canals. Year-round resident on Venice canals, but numbers greatly increase in winter. Occasionally observed on standing water in other units.

ORDER CHARADRIIFORMES

FAMILY CHARADRIIDAE

SEMI-PALMATED PLOVER Charadrius semipalmatus. Common fall and spring transient and winter visitor to coastal mudflats. Observed regularly in small numbers from September through April, primarily on wet saltflats of Unit 1. Also observed occasionally along Ballona Lagoon and along flooded portions of the Agricultural Area.

SNOWY PLOVER Charadrius alexandrinus. Fairly common resident of sandy sea beaches. Much less common inland. Observed rarely on mudflats of Unit 1.

KILLDEER Charadrius vociferus. Common resident near fresh and salt water and in wet fields and meadows. Observed regularly in all seasons on all study units. Breed in Ballona area, at least in Agricultural Fields.

AMERICAN GOLDEN PLOVER Pluvialis dominica. Uncommon to rare transient and winter visitor to tidal flats and wet agricultural fields. Single individuals seen on wet saltflats of Unit 1 in winter 1979, 1980 and 1981.

BLACK-BELLIED PLOVER Pluvialis squatarola. Common winter visitor and migrant on mudflats along coast. Found in large numbers (several hundred) in mid-winter on wet saltflats of Unit 1 and on flooded Agricultural Fields. Numbers gradually diminish through spring, then build up again from mid-July on Unit 1. Smaller numbers also found on mudflats of Ballona Lagoon and flooded portions of Unit 3.

RUDDY TURNSTONE Arenaria interpres. Common migrant and winter visitor on mudflats, beaches and rocky shores. Found fairly regularly in small numbers on wet saltflats of Unit 1 from mid-summer through early spring. Also found along flooded portions of agricultural fields in mid-winter.

BLACK TURNSTONE Arenaria melanocephala. Common migrant and winter visitor on mudflats, beaches and rocky shores. Observed in small numbers on wet saltflats of Unit 1 from late July through early fall. Apparently not as common in the region as the Ruddy Turnstone.

#### FAMILY SCOLOPACIDAE

COMMON SNIPE Capella gallinago. Common migrant and uncommon winter visitor in fresh- and saltwater marshes and wet grassy areas. Several individuals observed sporadically in emergent vegetation of canals in Units 1, 2, 3 and the Agricultural Fields from mid-fall to mid-spring.

LONG-BILLED CURLEW Numenius americanus. Relatively uncommon transient and winter visitor to mudflats, marshes and wet fields. Within study area, observed on mudflats of Unit 1 in fall 1980.

WHIMBREL Numenius phaeopus. Common spring and fall transient and winter visitor to mudflats, beaches and wet fields. Observed in small numbers on saltflats, mudflats and along canals at all sites. Some individuals seen in all seasons except early summer. Numbers peak in fall and early winter.

SPOTTED SANDPIPER Aetitis macularia. Fairly common spring and fall transient and winter visitor, primarily around fresh water. Individuals observed sporadically from September to May, primarily along water's edge at Ballona Lagoon.

WILLET Catoptrophorus semipalmatus. Common visitor in all seasons on mudflats, beaches and marshes but does not breed in region. Observed commonly foraging and loafing along canals and on mud or saltflats of all study sites. Numbers greatest from late summer through the winter, and least in early summer.

GREATER YELLOWLEGS Tringa melanoleuca. Fairly common as migrant, less common as winter visitor at marshes, mudflats and shores of ponds. Observed irregularly on mudflats and wet saltflats of all sites. Most common on Unit 1 and most abundant in late winter.

LESSER YELLOWLEGS Tringa flavipes. Uncommon migrant through general area along marshes, mudflats and pond margins. Single individuals observed rarely on mudflats of Units 1, 3 and the Agricultural Fields in spring and late summer.

RED KNOT Calidris canutus. Rare fall migrant in salt marshes and mudflats. Observed twice in late July 1980 on mudflats of Unit 1.

BAIRD'S SANDPIPER Calidris bairdi. Rare fall migrant on upland portions of marshes and areas of scattered short grass. One individual observed on mudflats of Unit 1 on November 1, 1979.

LEAST SANDPIPER Calidris minutilla. Common migrant and fairly common winter visitor to marshes, mudflats and margins of ponds. Small flocks observed sporadically in fall and winter on mudflats of Unit 1. Also observed in late winter and spring on flooded Agricultural Fields and along Ballona Lagoon.

DUNLIN Calidris alpina. Fairly common migrant and winter visitor to mudflats and salt marshes along coast. Small numbers observed in winter on mudflats of Unit 1 and the Agricultural Fields.

SHORT-BILLED DOWITCHER Limnodromus griseus. Fairly common migrant along coast. Rarely seen in winter. Usually observed on mudflats and beaches near water. Scattered flocks seen around water on all sites from late summer through spring. Difficult to separate from the following species.

LONG-BILLED DOWITCHER Limnodromus scolopaceus. Fairly common migrant and occasional winter visitor in marshes, on beaches and mudflats along coast. Observed in small flocks at water margins on all sites from late summer to early spring. Numbers peak in late winter. Particularly common on Unit 1 and the Agricultural Fields when the latter are flooded. Most dowitchers observed in the region appear to be this species.

WESTERN SANDPIPER Calidris mauri. Common spring and fall transient and fairly common winter visitor on mudflats or moist shores of both fresh and salt water. Observed regularly on mudflats and wet saltflats of Unit 1 from late summer through mid-spring. Numbers greatest in late fall and late winter. Also fairly abundant on flooded areas of Agricultural Area in late winter. Observed sporadically on all other sites.

MARbled GODWIT Limosa fedoa. Common winter visitor and migrant on mudflats, beaches and marshland along coast. Occasionally seen in wet areas further inland. Observed regularly on mudflats and along canals from late summer to mid-spring, with numbers peaking in late fall and late winter. Individuals observed at all sites, but particularly abundant on Unit 1 and along Ballona Lagoon.

SANDERLING Calidris alba. Common migrant and winter visitor along beaches of coast. Somewhat less common on mudflats. Observed on mudflats of Unit 1 from late fall to early spring, with numbers greatest in mid-late winter. **Small flocks present on flooded agricultural fields in winter.**

## FAMILY RECURVIROSTRIDAE

AMERICAN AVOCET Recurvirostra americana. Fairly common transient on mudflats along coast. Small numbers observed sporadically on mudflats of Unit 1 in late summer and fall, and again in early spring. Also observed on wet agricultural fields.

BLACK-NECKED STILT Himantopus mexicanus. Fairly common migrant and winter visitor on mudflats along southern California coast. Observed commonly on wet mudflats of Unit 1 from late fall through early spring. Also seen occasionally on mudflats and temporary pools of Units 2 and 3 during the same period. Forage in standing water on agricultural fields during mid-winter.

## FAMILY PHALAROPODIDAE

RED PHALAROPE Phalaropus fulicarius. Uncommon spring and fall migrant and occasional winter visitor to beaches and mudflats in coastal southern California. Observed on flooded mudflats of Unit 1 in spring and summer 1980.

WILSON'S PHALAROPE Steganopus tricolor. Uncommon spring and fall migrant on mudflats and beaches along coast. Individuals observed on mudflats of Unit 1 and along canal of Unit 2 in spring and summer.

NORTHERN PHALAROPE Lobipes lobatus. Fairly common migrant along coast. Largely restricted to quiet bays and lagoons, but sometimes seen far at sea. Regularly seen in late summer and early fall 1980 on standing water of Unit 1, but absent in 1979.

## FAMILY STERCORARIIDAE

POMARINE JAEGER Stercorarius pomarinus. Unusual fall transient along coast

in southern California. One individual observed resting on mudflats of Unit 1 in early December 1979.

#### FAMILY LARIDAE

GLAUCOUS-WINGED GULL Larus glaucescens. Relatively uncommon winter visitor along coast of southern California. Seldom seen inland. One individual observed on Unit 1 in winter 1981.

WESTERN GULL Larus occidentalis. Common resident in coastal southern California, but restricted to offshore islands for breeding, south of San Luis Obispo County. Observed irregularly from early fall through spring loafing on mudflats of Unit 1 and Ballona Lagoon. One sighting in March on Unit 3.

CALIFORNIA GULL Larus californicus. Common spring and fall transient and winter visitor. May be found in virtually any open area with nearby water but more common along coast. Observed on all but Unit 2 but most common on Unit 1 and the flooded Agricultural Fields. Primarily observed in winter months.

RING-BILLED GULL Larus delawarensis. Common visitor in all seasons. Numbers diminish appreciably in summer. May be found in variety of habitats where some moist ground is available for foraging. This species may be observed in all seasons soaring over all study sites. Particularly utilize wet mudflats for loafing whenever available.

BONAPARTE'S GULL Larus philadelphia. Very common migrant and winter visitor around protected waters and wet agricultural fields along coast. Seen in large numbers on mudflats of Unit 1 from mid-fall to mid-spring. Observed

in smaller numbers on Ballona Lagoon, Unit 3 and overflying Unit 2. Very abundant on agricultural fields when these sites are flooded in winter.

HEERMAN'S GULL Larus heermanni. Primarily late summer and fall visitor. Some individuals present in all seasons. Restricted to coastal areas. Occasional vagrants observed loafing on mudflats of Units 1, 3 and Ballona Lagoon during fall and winter.

FORSTER'S TERN Sterna forsteri. Common migrant and winter visitor around bays, lagoons and other protected waters along coast. Commonly observed in varying numbers on mudflats of Units 1, 3, Ballona Lagoon and the Agricultural Fields from late summer through early spring. Most common in late fall and winter on Unit 1 and the Agricultural Area, when these habitats are wet. Some individuals seen even during late spring and summer.

LEAST TERN Sterna albifrons. Uncommon summer visitor, from late April to September or October along protected portion of coast. Formerly nested on upper beaches at a number of locations along California coast. Breeding now limited to a small number of managed sites in southern California and around San Francisco Bay. Least Terns nest and roost on the salt/mudflats of Unit 1 from late April to August. Terns feed in the marina, Ballona Creek, Ballona Lagoon and the large canal of Unit 1. Single individuals were observed on several occasions in spring 1980 foraging in the waters of the Los Angeles County Bird Conservation Area. Terns were observed in flight over all study sites within the wetlands. Breeding appeared to be inhibited on Unit 1 in 1980 and 1981, as most of the mud/saltflats were flooded.

ELEGANT TERN Sterna elegans. Fairly common fall migrant and occasional winter visitor along southern California coast. A few individuals observed on mudflats of Unit 1 in late summer.

CASPIAN TERN Sterna caspia. Common migrant along coastal southern California in both spring and fall. One to a few individuals observed in late summer on mudflats of Unit 1 and Ballona Lagoon and flying over Units 2 and 3.

ORDER COLUMBIFORMES

FAMILY COLUMBIDAE

ROCK DOVE Columba livia. Common resident in urban, suburban and agricultural areas. Resident in urban areas surrounding Ballona region. Regularly observed in open, grassy upland habitats in all study areas. Large flocks forage in the agricultural fields.

MOURNING DOVE Zenaida macroura. Common resident in open woodlands, agricultural areas, parks, residential areas. Numbers increase in winter. Regularly seen throughout the year in dry upland habitat everywhere in region. Roosts in trees and shrubs but forages on ground in open, grassy areas.

SPOTTED DOVE Streptopelia chinensis. Common resident in urban areas of coastal southern California, which comprises its entire North American range. Introduced. Resident in urban areas surrounding the region. Regularly observed in all seasons at Ballona Lagoon.

ORDER STRIGIFORMES

FAMILY STRIGIDAE

BURROWING OWL Athene cunicularia. Fairly common resident in dry agricultural lands and bare open areas with soft banks or bluffs for nest burrows. Two pairs apparently nest in banks adjacent to Ballona Creek on Unit 3. Owls were occasionally observed on Units 1 and 2 and along bluffs south of the agricultural area, where they probably nest.



LONG-EARED OWL Asio otus. Fairly common but widely scattered resident and transient. Usually found in riparian or oak woodland. One or two individuals flushed from trees along Unit 3 in fall 1980.

SHORT-EARED OWL Asio flammeus. Uncommon transient in fresh- and saltwater marshes and agricultural lands. Formerly bred at least occasionally in basin (Grinnell & Miller, 1944), but there apparently are not recent records. One bird was seen on Unit 3 in February of 1979.

#### ORDER APODIFORMES

##### FAMILY APODIDAE

VAUX'S SWIFT Chaetura vauxi. Fairly common spring and fall migrant along the southern California coastline. A single individual was observed soaring along the main canal of Unit 1 in early May 1980.

##### FAMILY TROCHILIDAE

ANNA'S HUMMINGBIRD Calypte anna. Common resident in open woodland, shrubland, parks and residential areas with appropriate vegetation. Observed in all seasons and in every study site within the Ballona region. Generally restricted to drier habitats with open shrubs providing perch sites.

#### ORDER CORACIIFORMES

##### FAMILY ALCEDINIDAE

BELTED KINGFISHER Megaceryle alcyon. Fairly common resident near waters containing fish. Observed regularly near water on all study sites within the region.

## ORDER PICIFORMES

## FAMILY PICIDAE

COMMON FLICKER Colaptes auratus. Common resident in open woodlands and parks throughout basin. Observed irregularly throughout the year in wooded portions of the Ballona region.

## ORDER PASSERIFORMES

## FAMILY TYRANNIDAE

WESTERN KINGBIRD Tyrannus verticalis. Fairly common migrant in open lowland habitats with scattered trees. Observed sporadically in grassy upland habitats of Units 2, 3 and the Agricultural Fields in the spring and fall.

ASH-THROATED FLYCATCHER Myiarchus cinerascens. Fairly common migrant and occasional summer resident in lowlands and foothills. Nests in mountain woodlands around basin. Single individuals were observed on several occasions foraging over upland habitats of Units 1, 2, 3 and the Agricultural Fields from late July through September. A single individual was observed in May 1980 on Unit 3.

BLACK PHOEBE Sayornis nigricans. Common permanent resident in agricultural areas, brushlands, woodlands and suburbs near water. Require moderately elevated perch sites. Single individuals observed along canals of Units 1, 2, 3 and the Agricultural Fields during the fall and winter.

SAY'S PHOEBE Sayornis saya. Fairly common migrant and occasional winter visitor to open, grassy habitats such as fallow agricultural fields. Scattered individuals observed in upland habitats of Units 1, 2, 3 and the Agricultural Fields from late summer to early spring. Numbers greatest in fall.

WESTERN WOOD PEWEE Contopus sordidulus. Common spring and fall migrant and transient in wooded areas, usually near water. Nests in riparian woodlands of nearby mountains. A single individual was observed foraging around trees on Unit 2 in May 1979.

FAMILY HIRUNDINIDAE

VIOLET-GREEN SWALLOW Tachycineta thalassina. Common spring and fall migrant in open habitats over or near water. Nests in mountains surrounding Los Angeles basin. Occasional flocks observed over open areas of Units 1, 2, 3 and the Agricultural Fields in late winter and early spring.

BANK SWALLOW Riparia riparia. Uncommon transient in open areas near water in lowland southern California. A small flock was observed over Unit 3 in September 1980.

ROUGH-WINGED SWALLOW Stelgidopteryx ruficollis. Fairly common migrant and summer resident near water. Require soft banks for nesting tunnels. Single flock observed over Unit 1 and Agricultural Fields in early spring 1979.

BARN SWALLOW Hirundo rustica. Fairly common migrant and occasional summer resident in open areas near water. Requires mud for nest construction. Small numbers observed foraging over open areas of Units 1, 2, 3, Ballona Lagoon and the Agricultural Fields from late winter through late summer.

CLIFF SWALLOW Petrochelidon pyrrhonota. Common summer resident in open habitats near water. Require natural or man-made cliffs (concrete bridges, etc.) for nesting. Large flocks regularly observed over Units 1 and 3 from early spring to late summer. Less commonly seen over Agricultural Fields and Unit 2 during same time period.

## FAMILY CORVIDAE

SCRUB JAY Aphelocoma coerulescens. Common resident in woodland, chaparral and urban areas with trees. A common resident of wooded urban areas surrounding the Ballona region. Observed commonly around trees of Unit 2 and in willow thicket of Unit 1.

COMMON RAVEN Corvus corax. Common resident in rocky areas of the foothills and mountains around the Los Angeles basin. Less common within the city than the Common Crow. Ravens were seen in April and June 1980 soaring above Unit 1, and in June 1980 over Unit 2.

## FAMILY PARIDAE

COMMON BUSHTIT Psaltriparus minimus. Common resident of chaparral and coastal sage habitats in basin foothills. Flocks disperse widely outside breeding season. Occasional flocks observed foraging in lower canopy of trees on Unit 2 in fall and winter.

## FAMILY TROGLODYTIDAE

LONG-BILLED MARSH WREN Cistothorus palustris. Fairly common migrant and winter visitor around fresh and brackish water marshes, with tall emergent vegetation. Probably formerly a breeding species in the Ballona region (Grinnell & Miller, 1944). Commonly recorded around clumps of pampas grass on Units 2 and 3 and in mixed stands of tall annuals and Salicornia on Unit 1 from mid-fall to early spring.

## FAMILY MIMIDAE

MOCKINGBIRD Mimus polyglottos. Common resident in urban areas and along edges of brushlands and woodlands. Resident in urban areas surrounding Ballona.

Commonly observed in trees and shrublands of upland habitats throughout region in every season.

FAMILY SYLVIIDAE

BLUE-GRAY GNATCATCHER Polioptila caerulea. Common resident and transient in brushland and wooded chaparral. Observed in fall in trees bordering Unit 3.

RUBY-CROWNED KINGLET Regulus calendula. Common winter visitor in riparian woodlands or brush thickets (esp. willow) near water. Recorded in mid-winter in willow thickets of Unit 1.

FAMILY MOTACILLIDAE

WATER PIPIT Anthus spinoletta. Fairly common winter visitor in agricultural areas, grasslands and sandy beaches. Observed in small flocks on wet, plowed portions of agricultural fields in late winter. Several spring records from Unit 3 in open moist habitat.

FAMILY LANIIDAE

LOGGERHEAD SHRIKE Lanius leudovicianus. Common resident in areas with lookout perches and open areas for foraging. Resident on all study sites within region. Forage over both wet and dry open habitats.

FAMILY STURNIDAE

STARLING Sturnus vulgaris. Common resident around human habitation. Regularly observed in open habitats throughout region in all seasons. Large flocks frequently forage in the agricultural fields.

## FAMILY PARULIDAE

YELLOW-RUMPED WARBLER Dendroica coronata. Common migrant and winter visitor; breed at higher elevations. Regularly observed in trees, shrubs and tall annuals throughout the region from October to early April.

COMMON YELLOWTHROAT Geothlypis trichas. Fairly common resident in wet habitats with reeds or cattails. Seen sporadically in all seasons among tall annuals and stands of pampas grass near canals on Units 2, 3 and the Agricultural Fields. Most common on Unit 2.

WILSON'S WARBLER Wilsonia pusilla. Common spring and fall migrant, most commonly in brushland (esp. willow thickets) near water. Surprisingly few individuals were recorded during the study.

## FAMILY PLOCEIDAE

HOUSE SPARROW Passer domesticus. Common resident around human habitation. Introduced. Small flocks may be observed foraging in dry habitats around periphery of study sites in all seasons. Nest in palms and man-made structures all around the Ballona vicinity.

## FAMILY ICTERIDAE

WESTERN MEADOWLARK Sturnella neglecta. Common resident in grasslands, agricultural areas and very open brushland habitat. Common resident of dry habitat throughout the wetlands. May forage over wetter portions of the study areas but return to drier marginal habitats for nesting and roosting.

YELLOW-HEADED BLACKBIRD Xanthocephalus xanthocephalus. Fairly unusual transient around marshes or wet agricultural fields. One to a few individuals

were recorded on several occasions in April and May 1979 flying above Units 1, 2 and 3.

RED-WINGED BLACKBIRD Agelaius phoeniceus. Common resident in marshes, along ponds and in wet fields with some taller reeds, grasses, etc., for nesting. Seen in all seasons around canals and wetter habitats of Units 1, 2, 3 and the Agricultural Fields.

BREWER'S BLACKBIRD Euphagus cyanocephalus. Common resident in parks, agricultural fields, suburbs and other open areas with nearby trees. Only one record in Ballona Lagoon in late August 1980.

#### FAMILY THRAUPIDAE

WESTERN TANAGER Piranga leudoviciana. Common spring and fall migrant. Breed in higher life zones. Single individual observed in April 1979 on Unit 3.

#### FAMILY FRINGILLIDAE

HOUSE FINCH Carpodacus mexicanus. Common resident in open woodland and shrubland, both inside and outside of urban areas. Flocks move around in non-breeding season. Regularly observed in all seasons on all study sites within the study area. Frequents trees, shrubs and tall annuals in drier habitats. Numbers peak in fall.

LESSER GOLDFINCH Carduelis psaltria. Common resident in areas with scattered trees and/or large shrubs. Transient in non-breeding season. Observed in small numbers in willow thickets of Unit 1 and around margins of Unit 3.

BROWN TOWHEE Pipilo fuscus. Common resident in drier upland habitats with a combination of dense brush cover and open areas with grasses and annuals

providing seeds. Apparently fairly common on hillsides above Unit 2 and the Agricultural Lands but rarely appear on study areas themselves. Recorded only from Units 2 and 3.

SAVANNAH SPARROW Passerculus sandwichensis. Uncommon local resident and fairly uncommon winter visitor in salt-water marshes and grassy habitats, usually near water. All of the Savannah Sparrows in the Ballona region are apparently resident members of the beldingi subspecies. Small breeding populations occur within Salicornia stands of Units 1 and 3. Sparrows were observed along canals bordered with Salicornia and in adjacent weedy habitats on Unit 2 and the Agricultural Fields from late summer through mid-winter but not during the breeding season. Basically homogeneous stands of Salicornia appear to be necessary for breeding of P. sandwichensis beldingi.

WHITE-CROWNED SPARROW Zonotrichia leucophrys. Resident within southern California area. Generally restricted to "natural" areas of variety of habitat types for breeding. Common winter visitor in brushy habitats of all study areas within the Ballona region. Present from early October to mid-April.

LINCOLN'S SPARROW Melospiza lincolni. Fairly common migrant and winter visitor, usually in wet areas or near streams with available brush cover. Single individuals were seen in September 1980 in Unit 1 and in November 1980 on Unit 2.

LARK SPARROW Chondestes grammacus. Uncommon to fairly common breeder in most of its winter range along coast, usually near agricultural lands with some nearby brush cover. A single individual was observed on Unit 1 in April 1980.

SONG SPARROW Melospiza melodia. Common resident in appropriate habitat. Numbers increase somewhat in fall and winter. Observed in all seasons along



canals, around clumps of pampas grass and areas with tall annuals providing singing perches. Resident in Units 1, 2, 3 and along canals in Agricultural Fields. Attain greatest density on Unit 2.

#### SOME CONCLUDING THOUGHTS

A total of 129 species of birds were recorded within the confines of our study areas during the course of this study. While this is an impressive number, it is not overwhelming, and as explained previously, is probably an underestimate of the total that use the region from time to time. Most of the species total is comprised of relatively uncommon species, which is typical of most biological communities. A relatively few species contributed heavily to the overall numbers of individuals recorded during our investigation.

The totals recorded here include two endangered subspecies, the California Least Tern and Belding's Savannah Sparrow, both of which breed at Ballona.

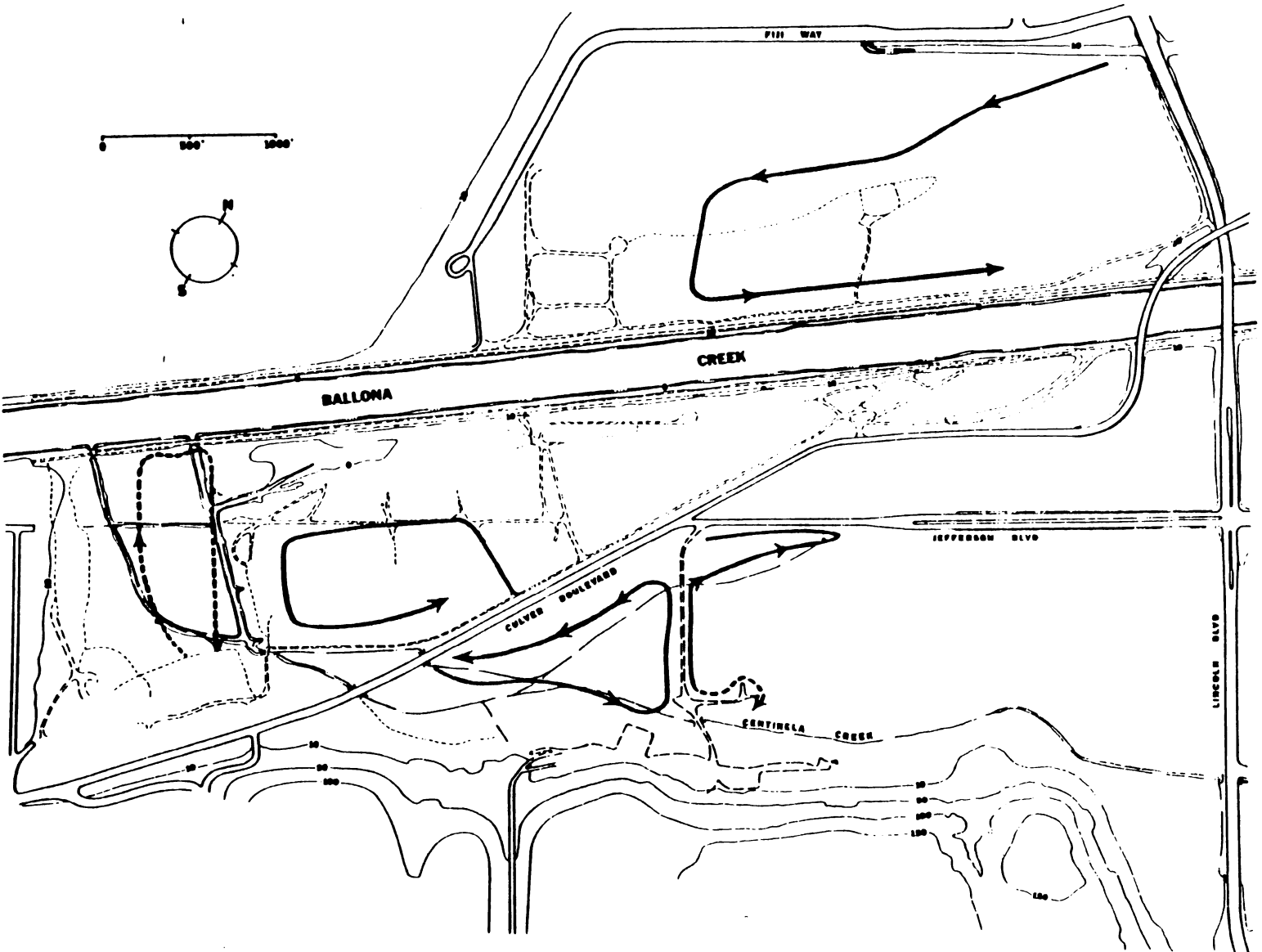
Most of the birds observed, both in terms of species and numbers, were migrants and wintering waterbirds. Relatively few birds utilize this area as a breeding ground. The reasons for this are diverse, and include various factors of human disturbance, but primarily relate to limited habitat diversity. Pickleweed, perhaps the most "dominant" habitat within the region, is never diverse in terms of birds it can support. Other habitats within the region are rather simple also, lacking vertical complexity, and frequently are of introduced plant species which support few birds. Increasing the littoral zone and management for native plants in areas of higher elevation might enhance the land bird population status of this region.

Since waterbirds make up the bulk of the total numbers of birds within the region, those units most heavily used by waterbirds show the greatest seasonal

variability in numbers. While the total birds present on those units are at times impressive, more individuals actually use the region than even the high numbers indicate: many of these birds are probably transients, indicating that the individuals observed one week are probably not the same ones seen previously. The Ballona area may provide a crucial "way station" in terms of foraging and resting space for many of these transients. Preservation and enhancement of these resting and foraging grounds is critical.

In our view, the principal management concerns for the avian populations in the region should relate to endangered species and waterbirds. Maximum effort should be made to preserve and enhance the habitat value of Unit 1 for the sparrow and tern that nest in the area. In addition, appropriate habitat for migrating and wintering waterbirds should not be compromised. A secondary, yet critical, consideration involves enhancement of habitat diversity to actually increase the number of species that are found within the region. This primarily involves increasing the diversity of native shrub and tree plants present surrounding the wetlands. These are the principal concerns that motivate our specific recommendations incorporated in the overview of this study.

Figure 1. Transect routes used to study bird populations. Solid lines indicate regular routes, broken lines indicate alternate routes.



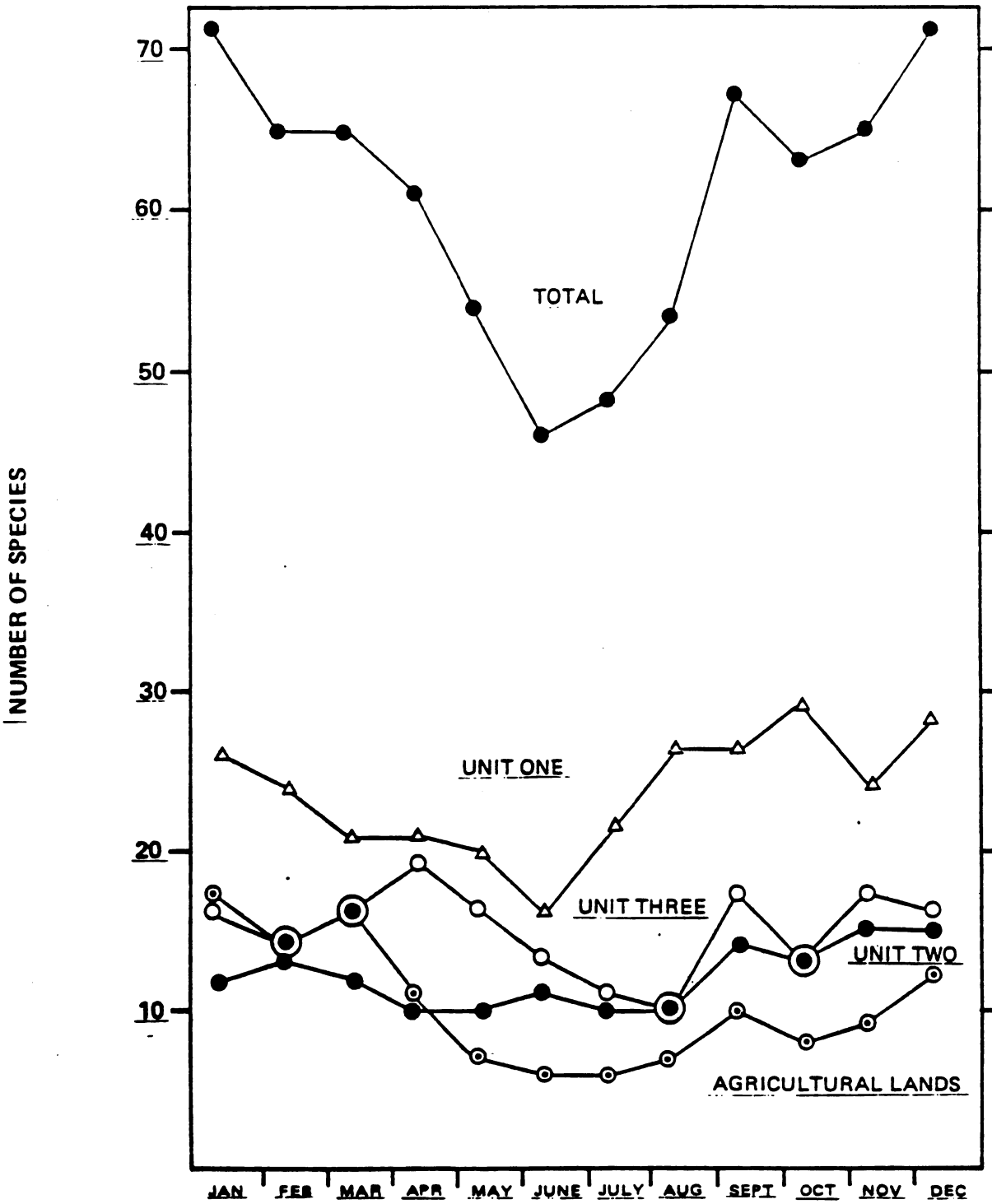


Figure 2. Numbers of species of birds by units and total region.

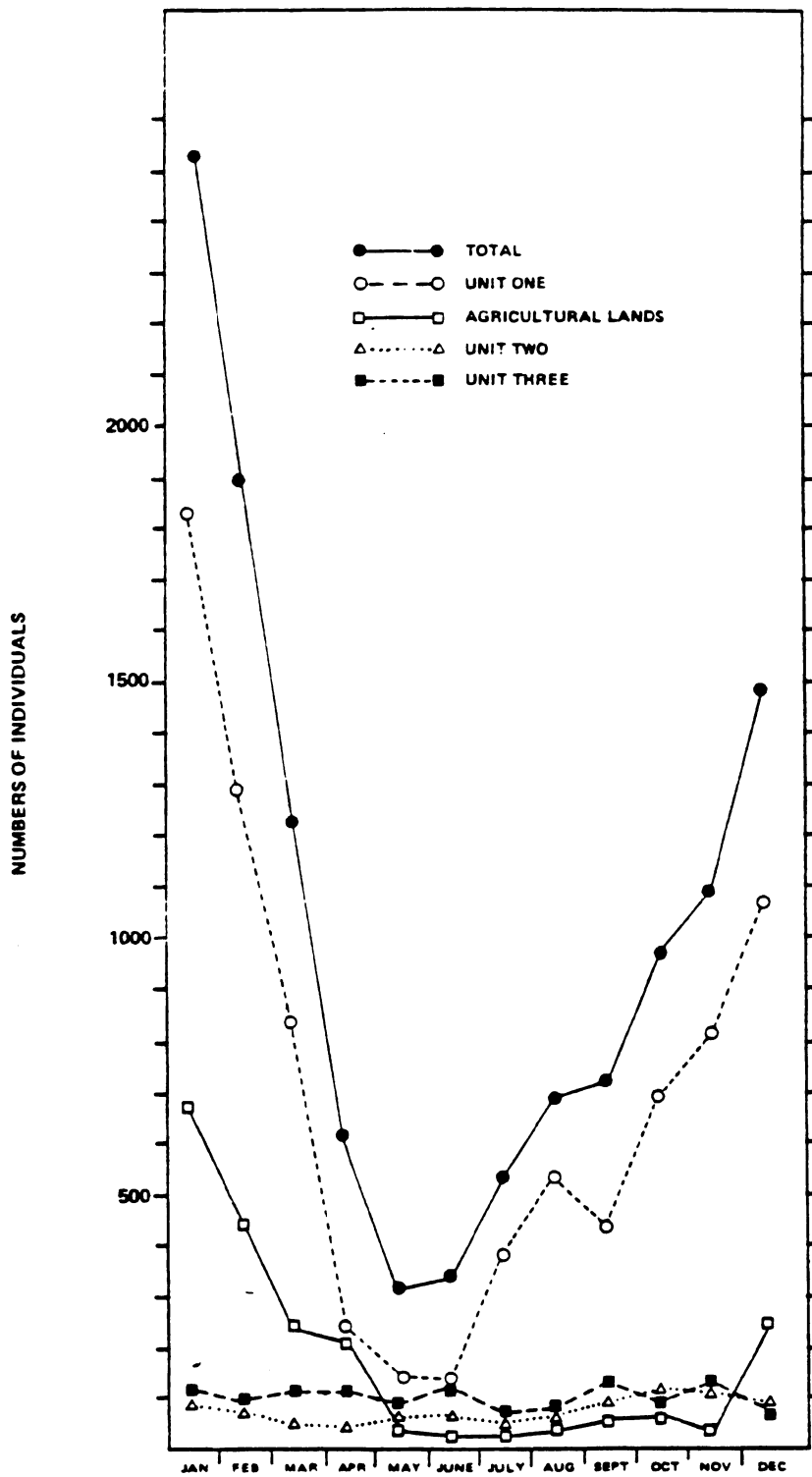


Figure 3. Numbers of individual birds by units and total region.

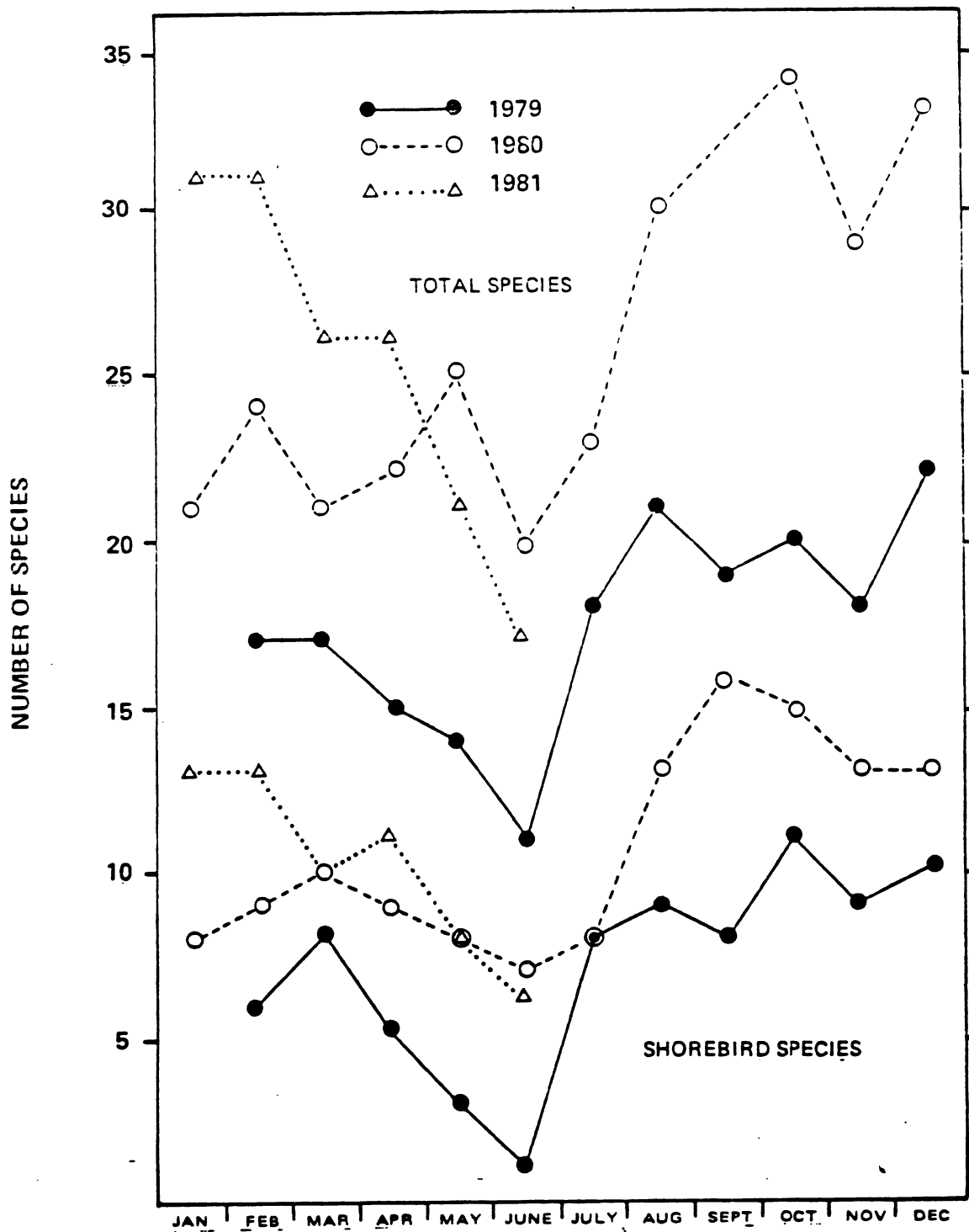


Figure 4. Total species of birds and shorebird species, Unit 1.

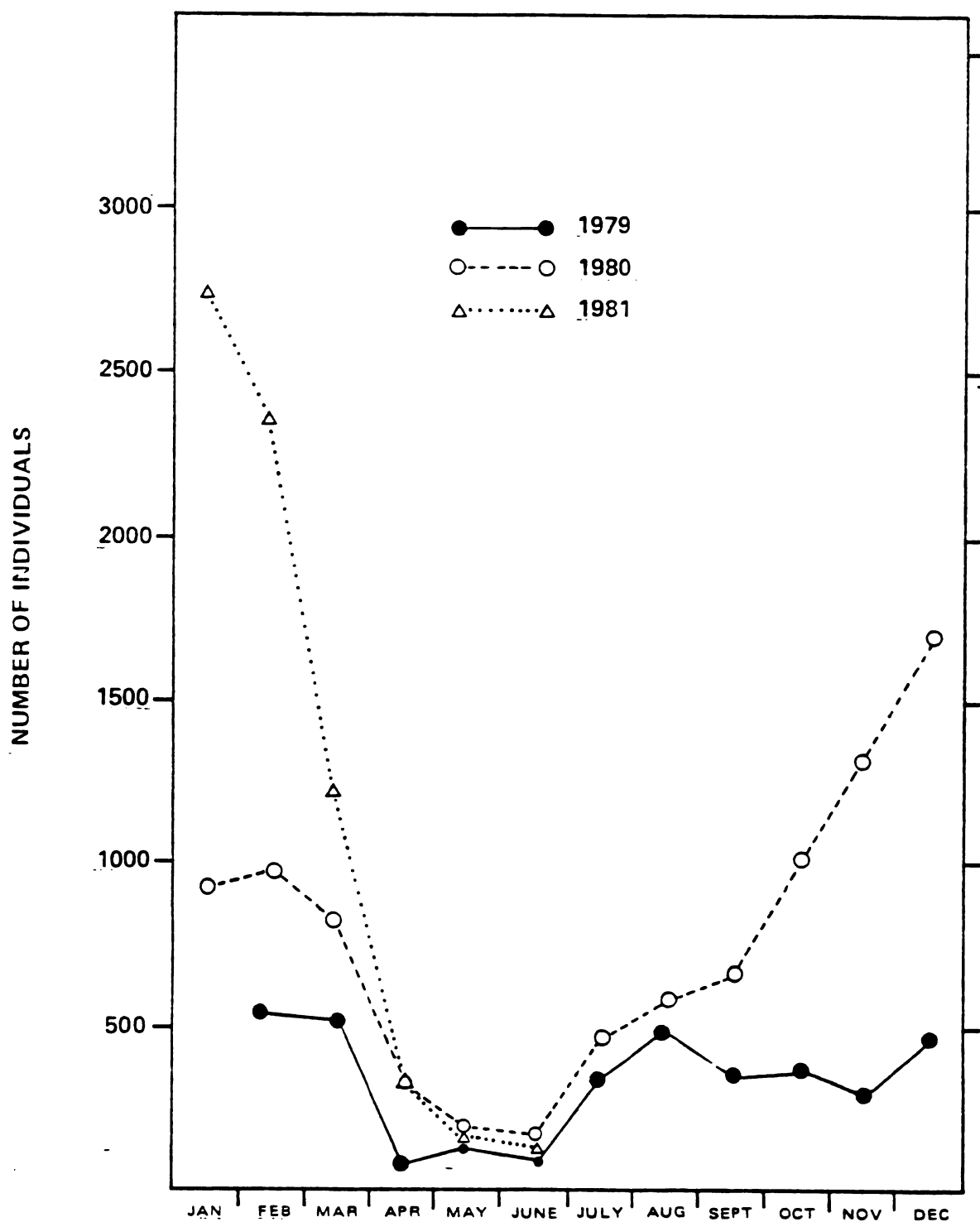


Figure 5. Numbers of individual birds, Unit 1.

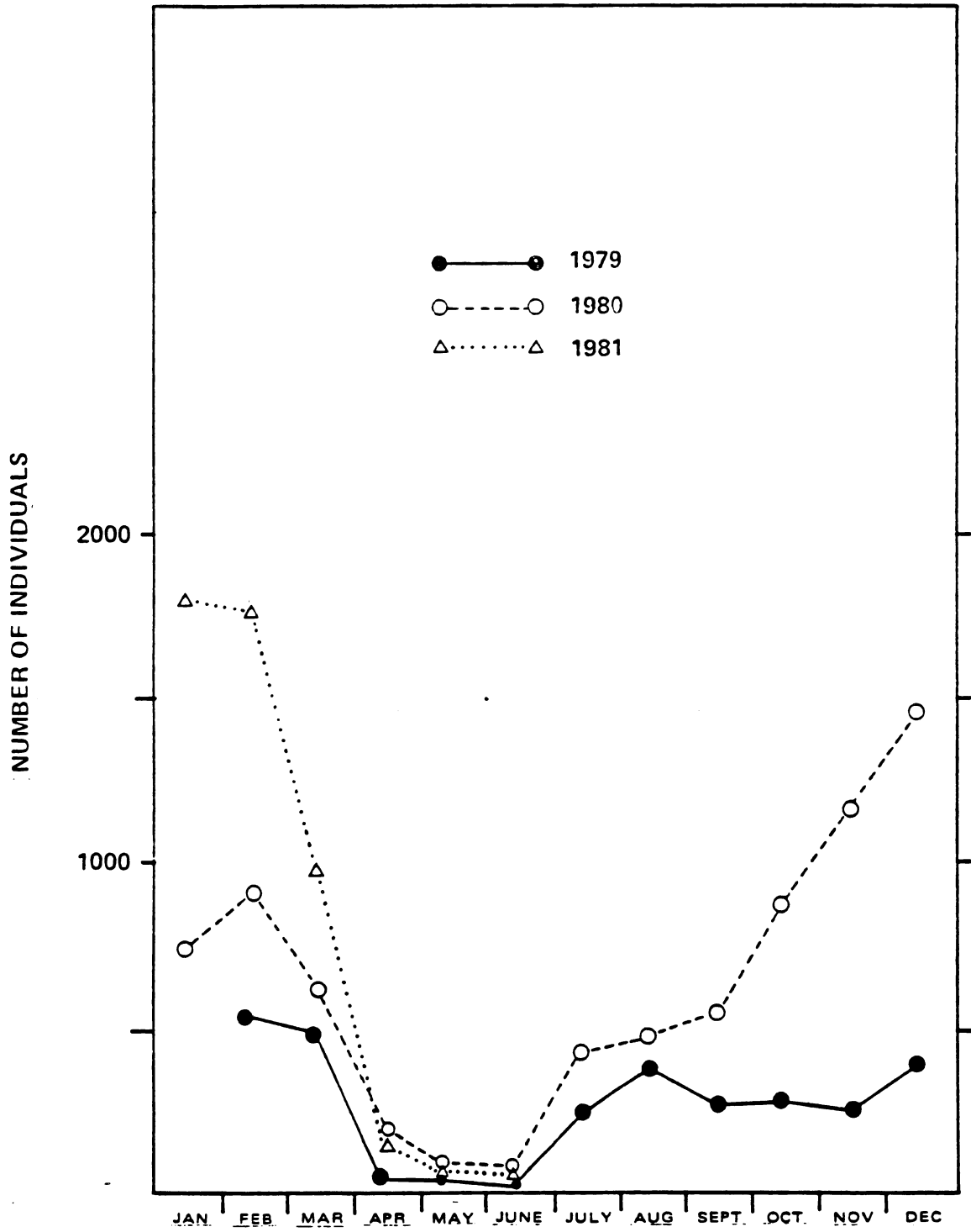


Figure 6. Numbers of shorebirds, Unit 1.



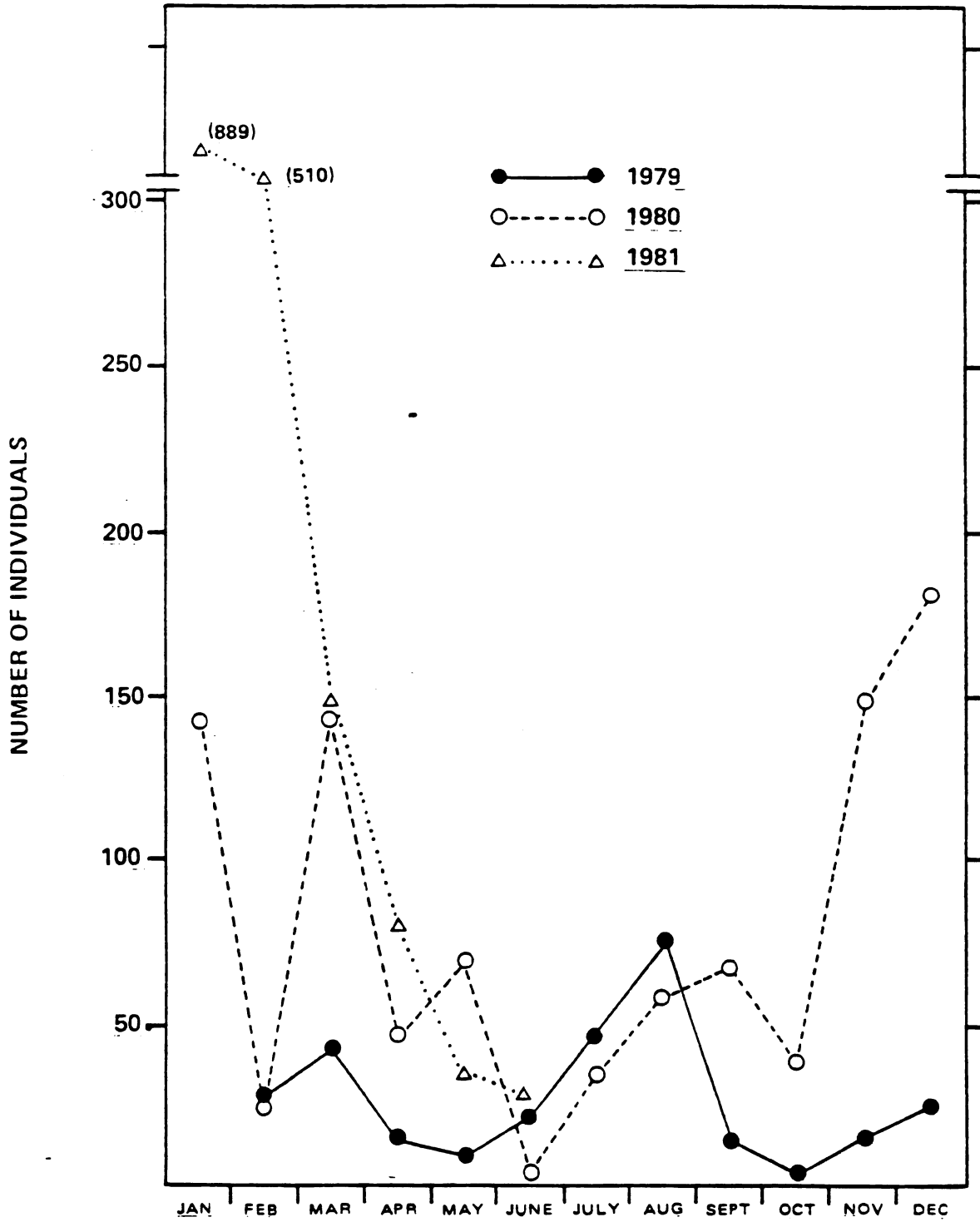


Figure 7. Numbers of gulls and terns, Unit 1.

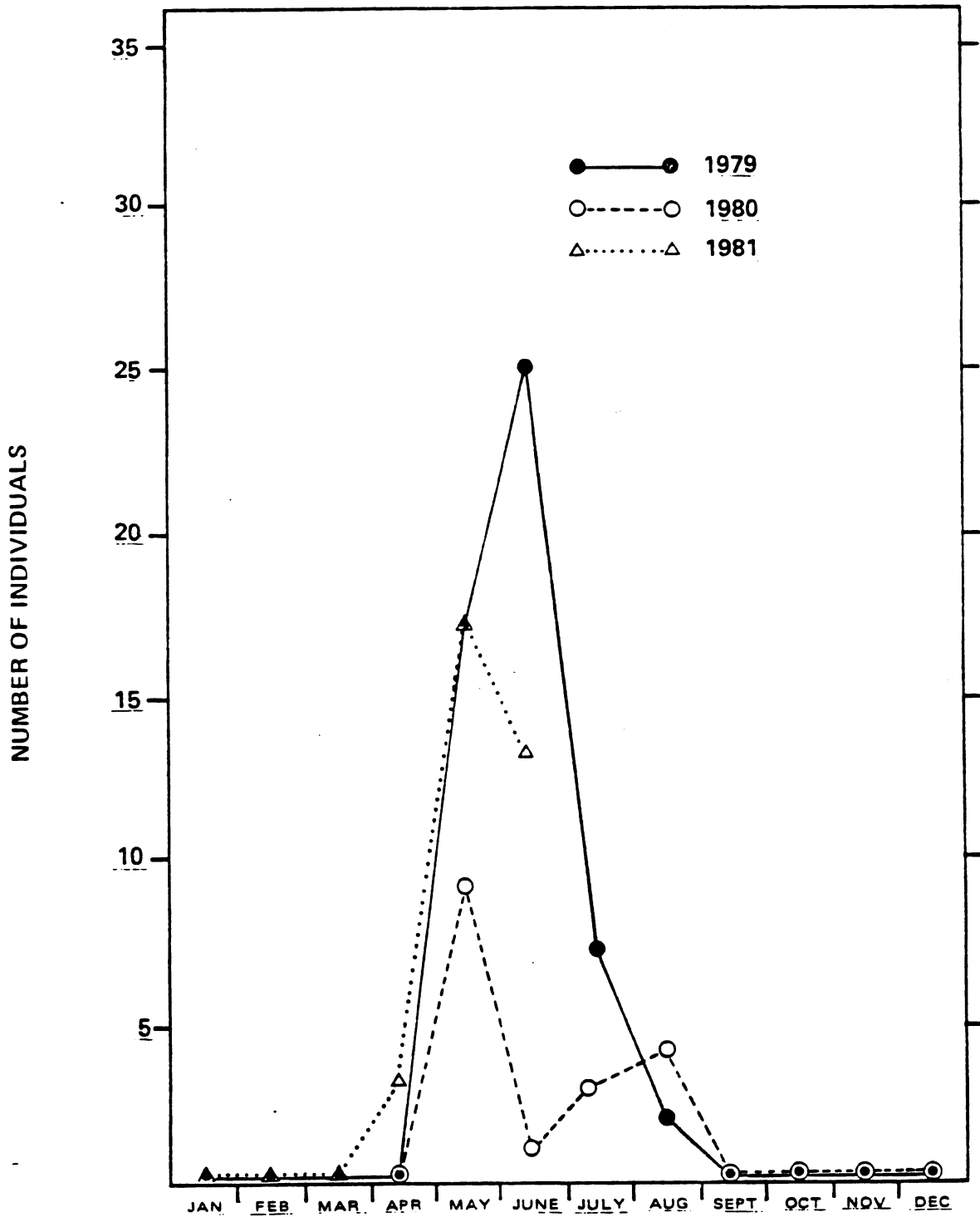


Figure 8. Numbers of Least Terns, Unit 1.

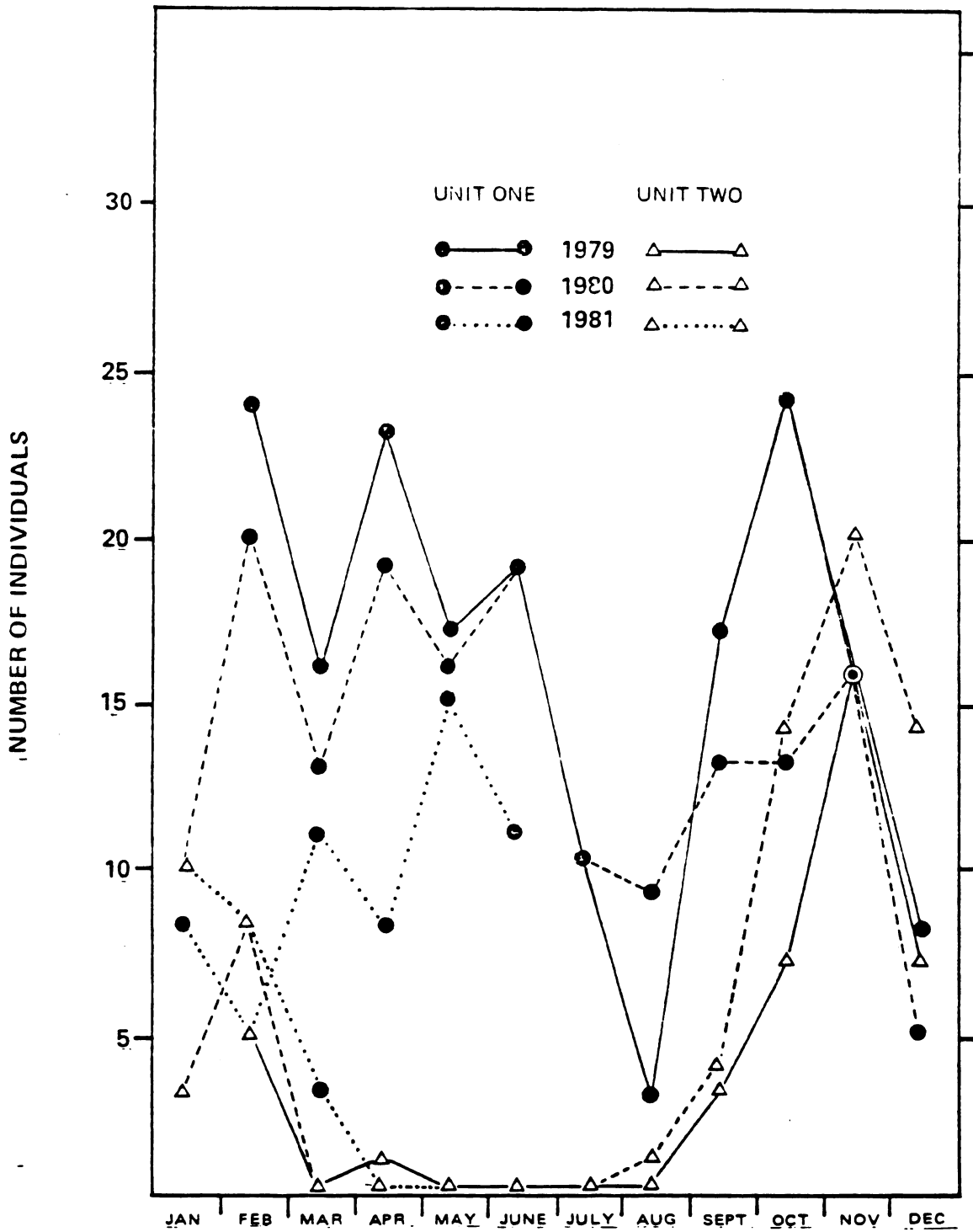


Figure 9. Numbers of Belding's Savannah Sparrows, Units 1 and 2.

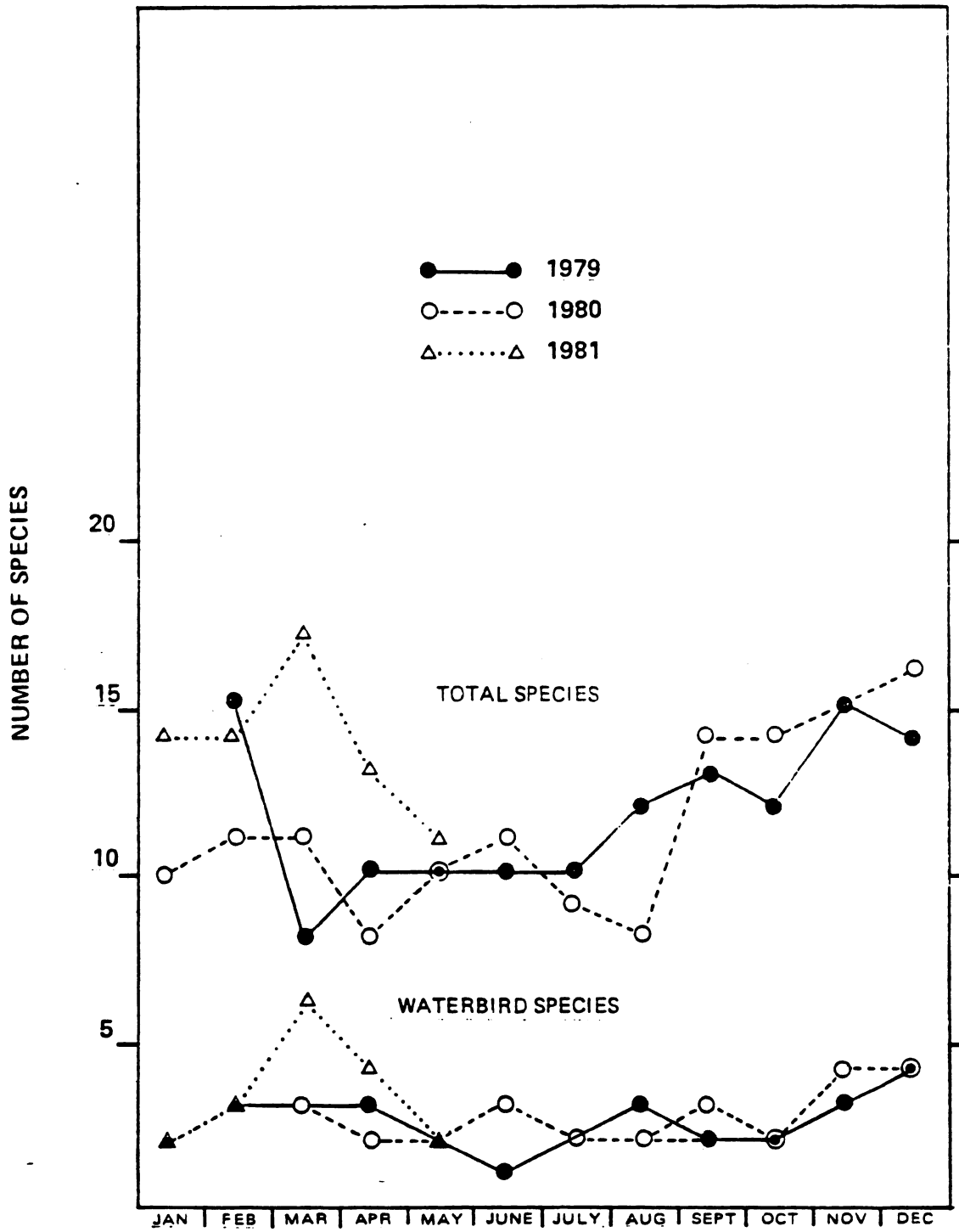


Figure 10. Numbers of species of birds and waterbird species, Unit 2.

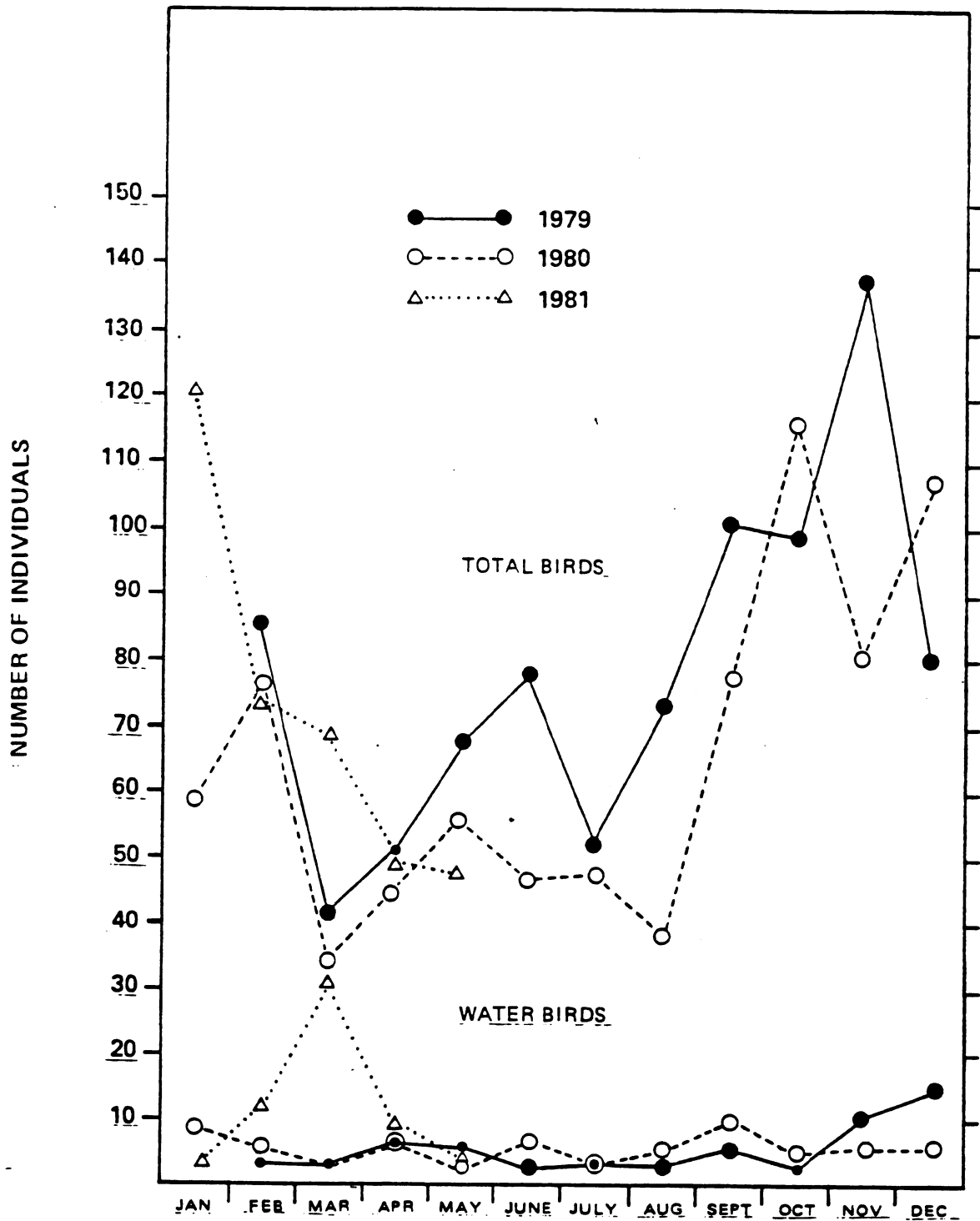


Figure 11. Numbers of individuals of all birds and waterbirds, Unit 2.

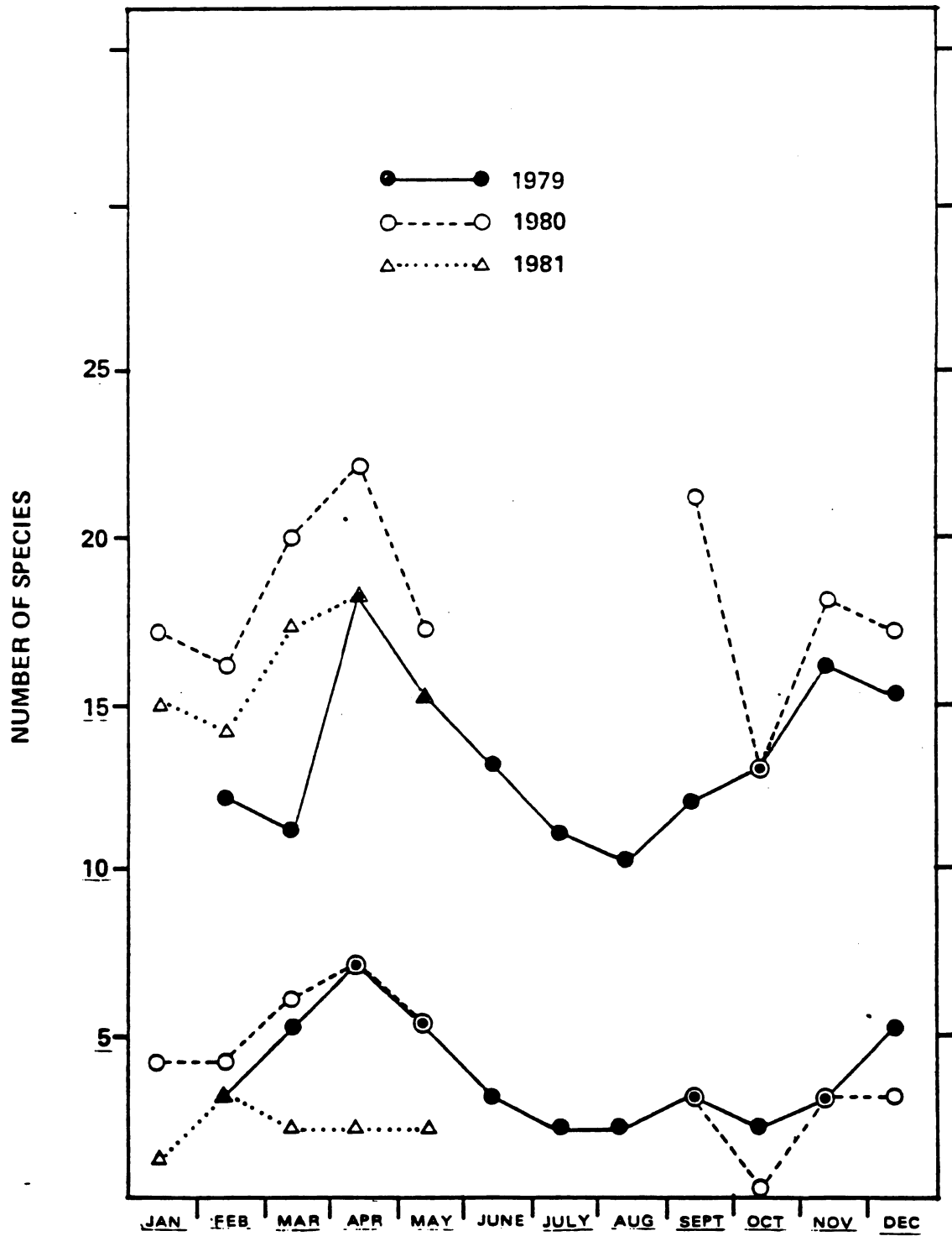


Figure 12. Numbers of bird species and waterbird species, Unit 3.

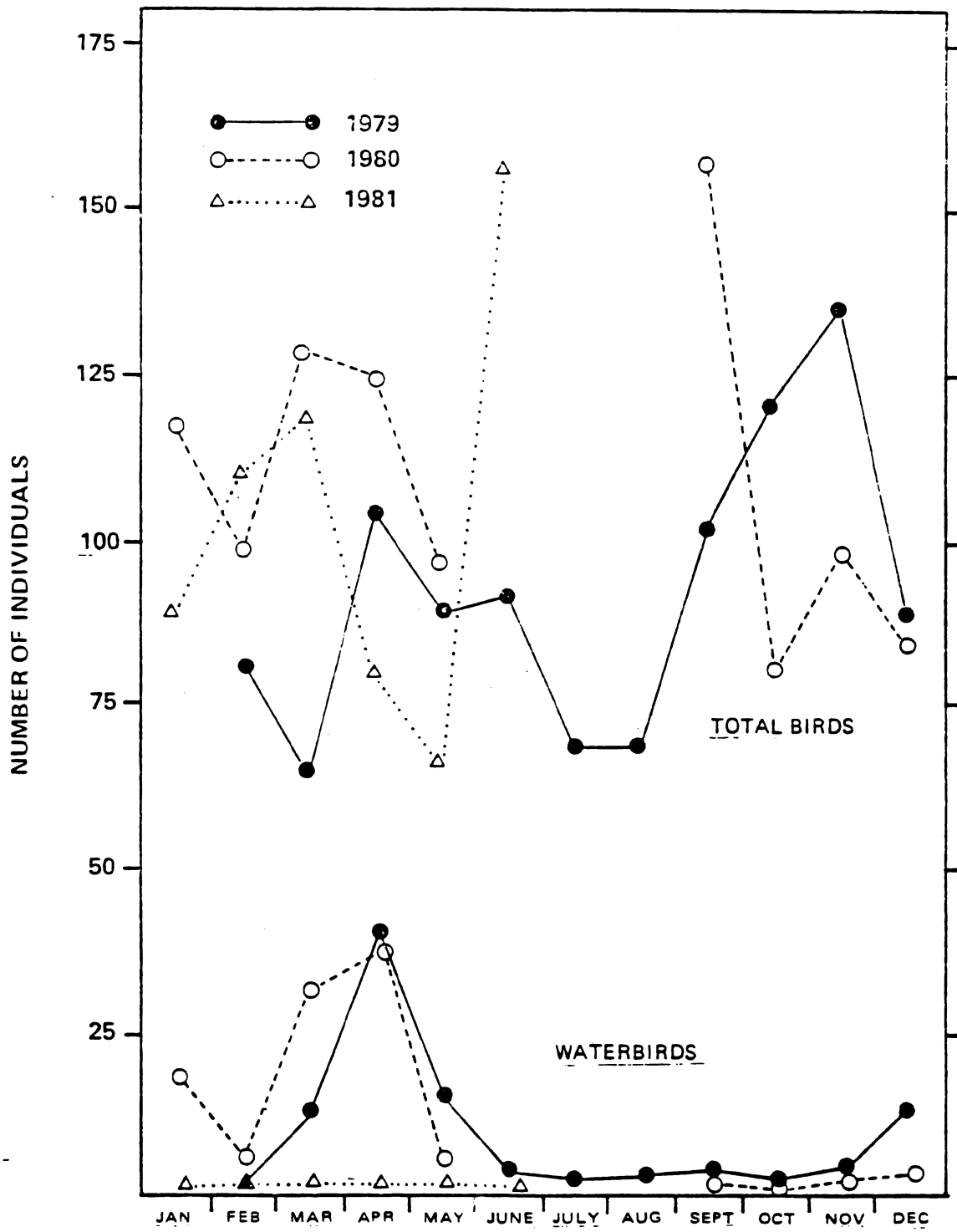


Figure 13. Numbers of individuals of all birds and waterbirds, Unit 3.

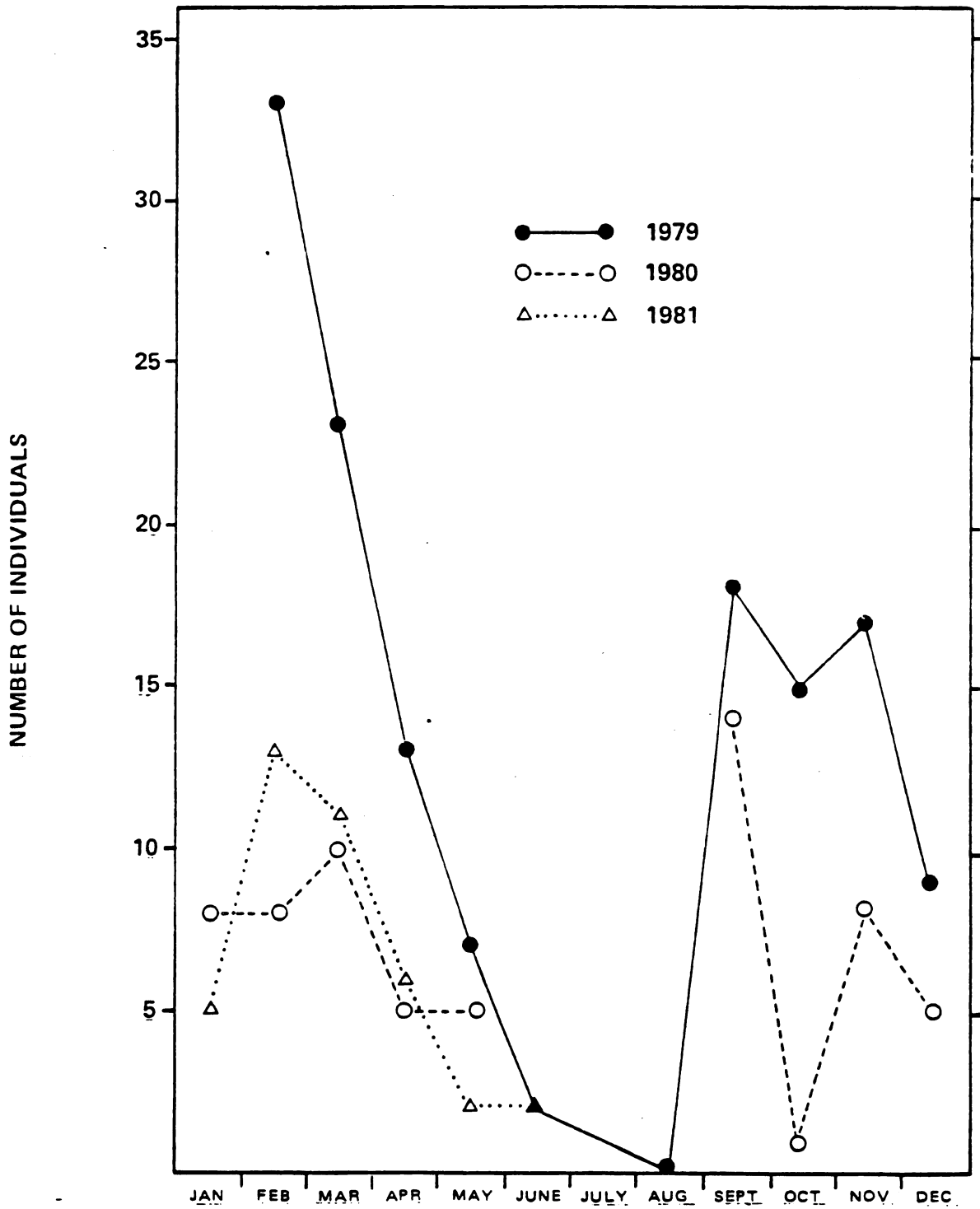


Figure 14. Numbers of Belding's Savannah Sparrows, Unit 3.



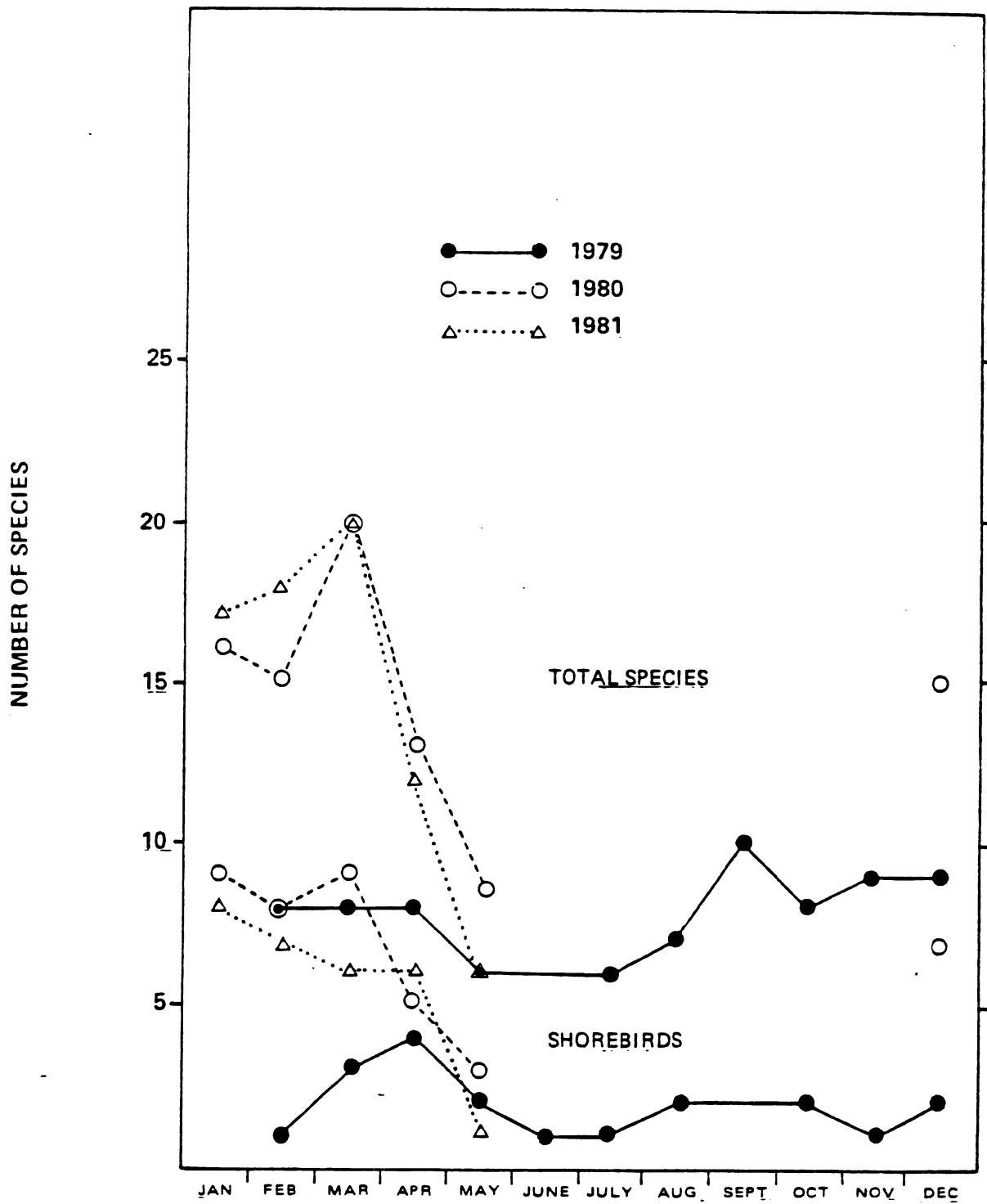


Figure 15. Numbers of species of birds and shorebirds, Agricultural Areas.

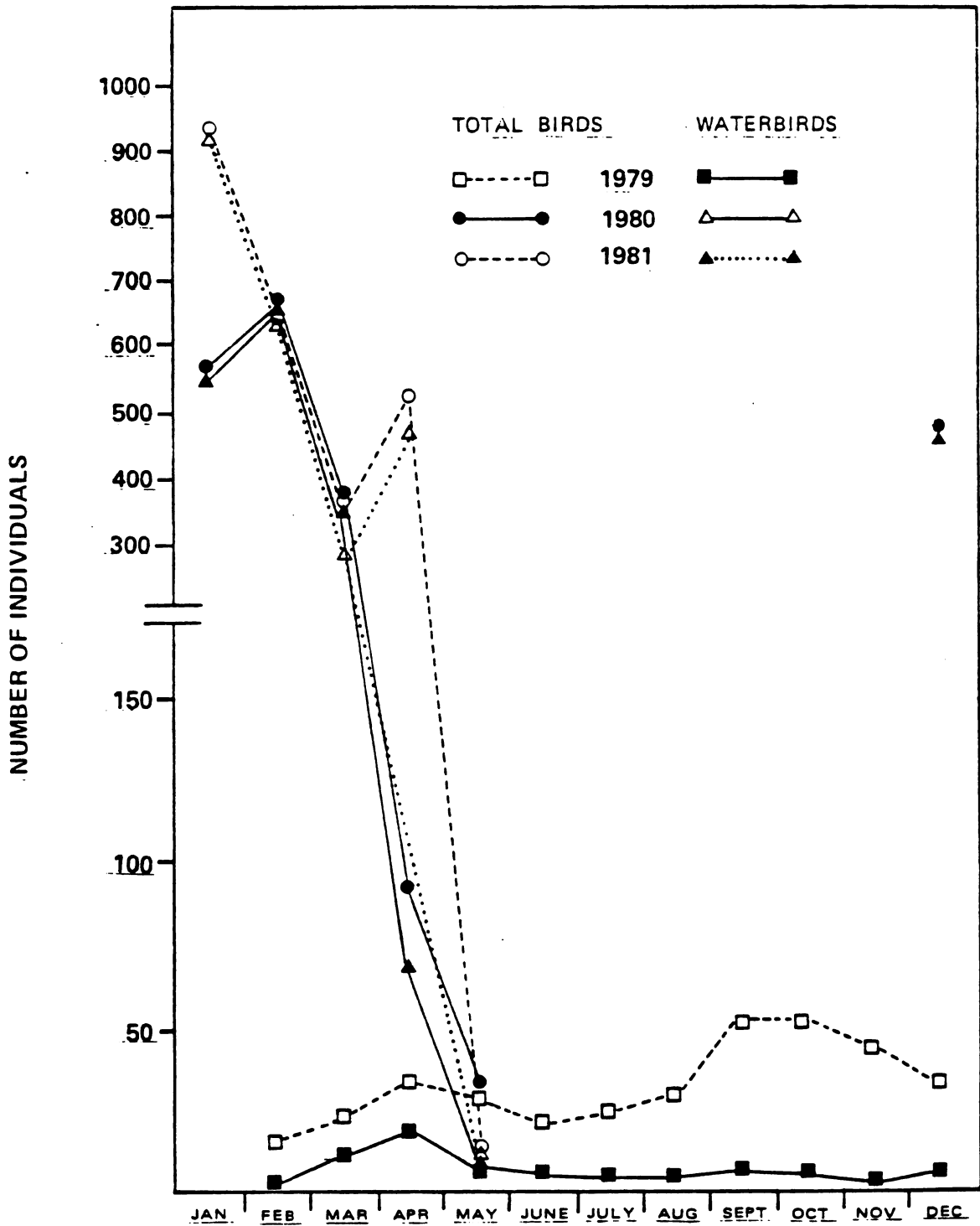


Figure 16. Numbers of individuals of all birds and waterbirds, Agricultural Areas.

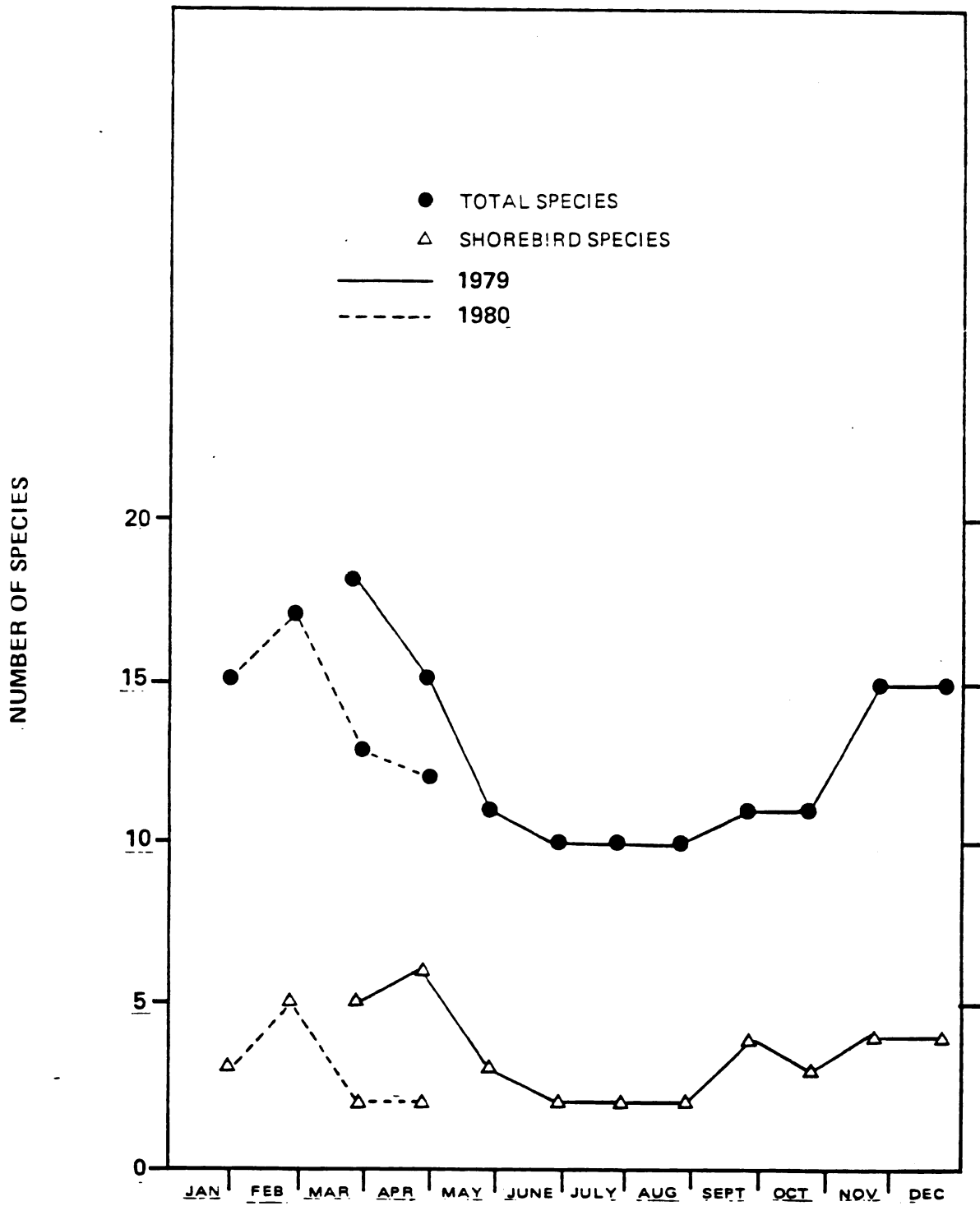


Figure 17. Numbers of species of birds and shorebird species, Ballona Lagoon.

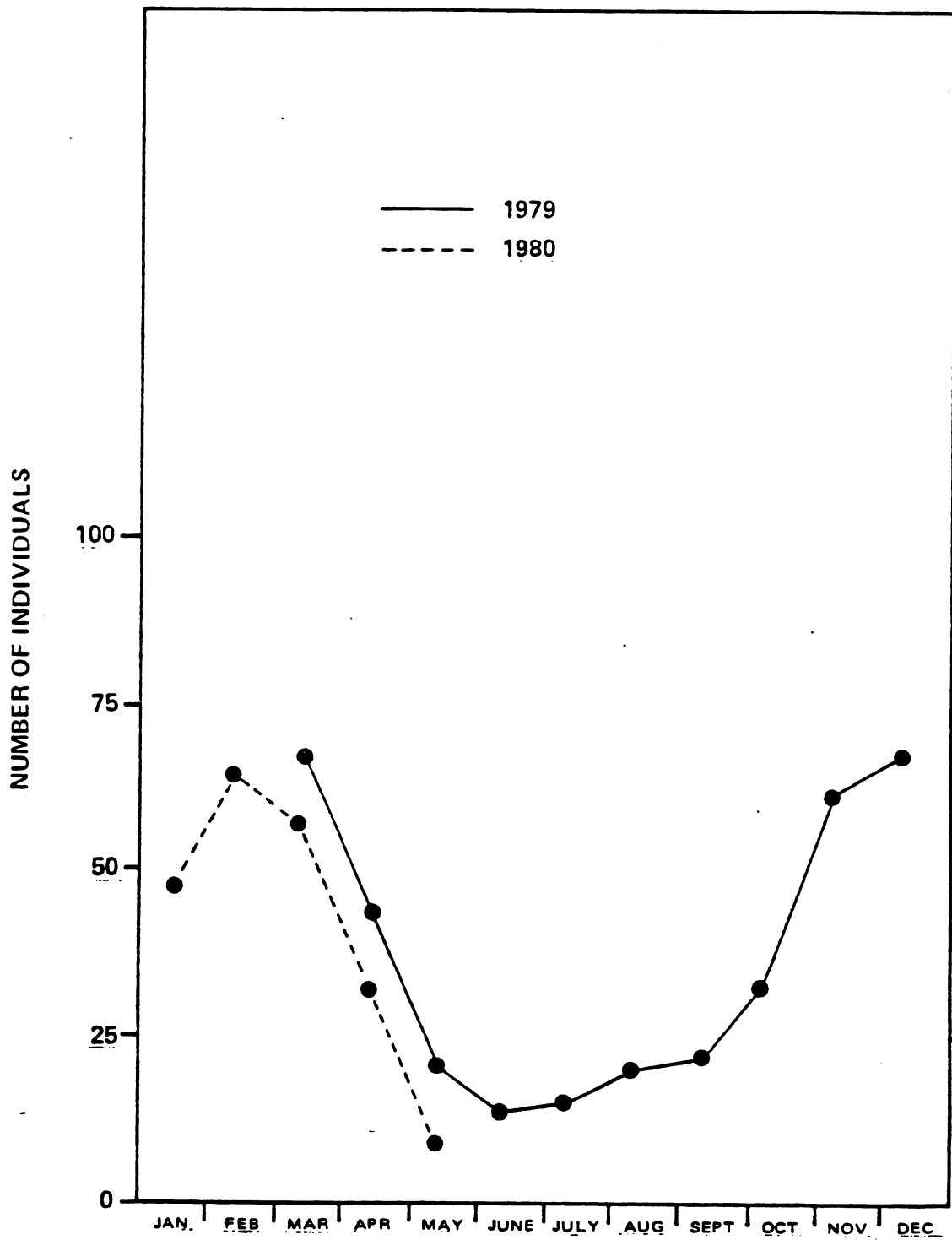


Figure 18. Numbers of individual waterbirds, Ballona Lagoon.

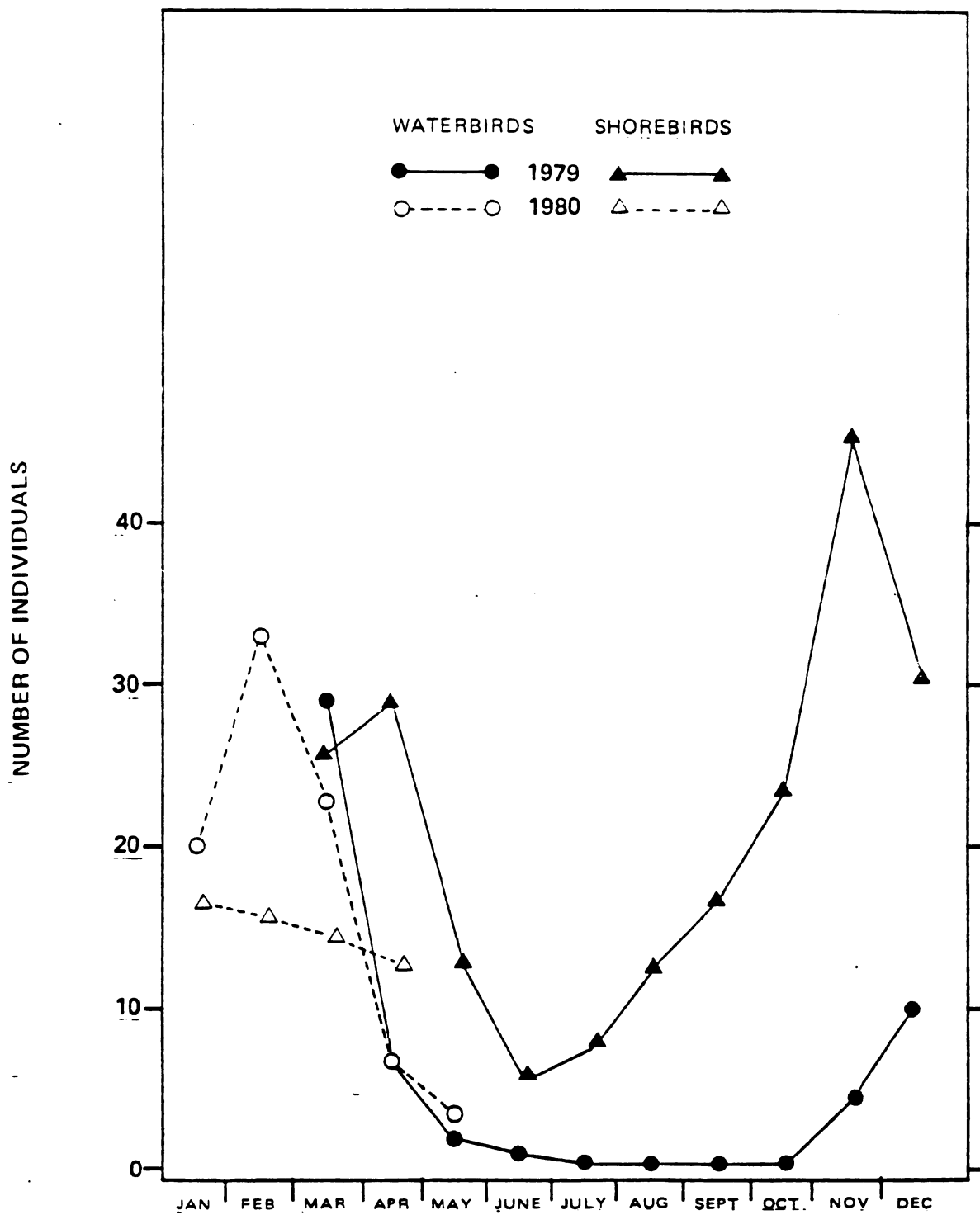


Figure 19. Numbers of individuals of shorebirds and waterfowl, Ballona Lagoon.

## APPENDIX ONE

## BIRD SPECIES OBSERVED AND STUDY AREAS OF OCCURRENCE

		1, 2, 3 = Units					Ag = Agricultural		L = Ballona Lagoon				
		1	2	3	Ag	L			1	2	3	Ag	L
<u>Gaviaformes</u>													
	Red-throated Loon					x							x
<u>Podicipediformes</u>													
	Eared Grebe	x				x							x
	Western Grebe	x				x				x			
	Pied-billed Grebe	x	x			x				x			x
	.									x			
<u>Pelecaniformes</u>													
	Brown Pelican	x											
	Double-crested Cormorant	x				x				x	x	x	
	Magnificent Frigatebird	x				x				x	x	x	
<u>Ciconiiformes</u>													
	Great Blue Heron	x	x	x	x	x				x	x		
	Green Heron	x	x	x	x	x				x	x	x	x
	Great Egret	x	x							x	x	x	
	Snowy Egret	x	x	x	x	x				x	x	x	x
	Black-crowned Night Heron	x	x							x	x	x	x
<u>Anseriformes</u>													
	Brandt	x											
	Domestic Goose					x							
	Mallard	x	x	x	x	x							
	Domestic Duck					x				x	x	x	x
	Gadwall	x				x							
	Pintail					x							
	Blue-winged Teal	x								x	x	x	x
	Green-winged Teal	x				x				x			
	Cinnamon Teal	x	x	x	x	x				x	x	x	x
	American Widgeon	x				x				x			
	Greater Scaup					x				x			
	Lesser Scaup					x				x			
<u>Falconiformes</u>													
	Turkey Vulture									x	x	x	
	White-tailed Kite									x	x	x	x
	Sharp-shinned Hawk									x			
	Cooper's Hawk									x	x		
	Red-tailed Hawk									x	x	x	x
	Marsh Hawk									x	x	x	x
	Osprey									x	x	x	
	American Kestrel									x	x	x	x
<u>Galliformes</u>													
	California Quail									x	x	x	
<u>Gruiformes</u>													
	Virginia Rail									x		x	
	American Coot									x	x	x	x
<u>Charadriiformes</u>													
	Semi-palmated Plover									x		x	x
	Killdeer									x	x	x	x
	American Golden Plover									x			
	Black-bellied Plover									x	x	x	x
	Snowy Plover									x			
	Ruddy Turnstone									x		x	
	Black Turnstone									x			

	1	2	3	Ag	L		1	2	3	Ag	L
Common Snipe	x	x	x	x		Spotted Dove					x
Long-billed Curlew	x					<u>Strigiformes</u>					
Whimbrel	x	x	x	x	x	Burrowing Owl	x	x	x	x	
Spotted Sandpiper	x	x			x	Short-eared Owl				x	
Willet	x	x	x	x	x	Long-eared Owl				x	
Greater Yellowlegs	x	x	x	x	x	<u>Apodiformes</u>					
Lesser Yellowlegs	x		x	x		Vaux's Swift				x	
Red Knot	x					Anna's Hummingbird	x	x	x	x	x
Baird's Sandpiper	x					<u>Coraciiformes</u>					
Least Sandpiper	x	x		x	x	Belted Kingfisher	x	x	x	x	x
UNID Sandpiper	x		x	x		<u>Piciformes</u>					
Dunlin	x			x		Common Flicker	x			x	
Dowitcher sp.	x	x	x	x	x	<u>Passeriformes</u>					
Western Sandpiper	x	x	x	x	x	Western Kingbird			x	x	x
Marbled Godwit	x	x	x	x	x	Ash-throated Flycatcher	x	x	x	x	
Sanderling	x				x	Black Phoebe	x	x	x	x	
American Avocet	x				x	Say's Phoebe	x	x	x	x	
Black-necked Stilt	x	x	x	x		Western Wood Pewee				x	
Red Phalarope	x					Violet-green Swallow	x	x	x	x	
Wilson's Phalarope	x	x				Bank Swallow				x	
Northern Phalarope	x					Rough-winged Swallow	x				
Pomarine Jaeger	x					Barn Swallow	x	x	x	x	x
Glaucous-winged Gull	x					Cliff Swallow	x	x	x	x	x
Western Gull	x		x		x	Scrub Jay	x	x	x		
California Gull	x		x	x	x	Common Raven	x	x			
Ring-billed Gull	x	x	x	x	x	Common Crow	x	x	x	x	x
Bonaparte's Gull	x	x	x	x	x	Bushtit				x	
Heermann's Gull	x		x		x	Long-billed Marsh Wren	x	x	x		
Ferster's Tern	x	x	x	x	x	Mockingbird	x	x	x		x
Least Tern	x	x	x	x	x	Blue-gray Gnatcatcher				x	
Elegant Tern	x					Ruby-crowned Kinglet	x				
Caspian Tern	x	x	x		x	Water Pipit				x	x
<u>Columbiformes</u>						Loggerhead Shrike	x	x	x	x	x
Rock Dove	x	x	x	x	x						
Mourning Dove	x	x	x	x	x						

	1	2	3	Ag	1		1	2	3	Ag	L
Starling	x	x	x	x	x	Western Tanager					x
Yellow-rumped Warbler	x	x	x		x	House Finch	x	x	x	x	x
Yellowthroat		x	x	x		Lesser Goldfinch	x		x		
Wilson's Warbler		x				Brown Towhee		x	x		
House Sparrow	x		x		x	Savannah Sparrow	x	x	x	x	
Western Meadowlark	x	x	x	x	x	Lark Sparrow	x				
Yellow-headed Blackbird	x	x	x			White-crowned Sparrow	x	x	x	x	
Red-winged Blackbird	x	x	x	x		Lincoln's Sparrow	x	x			
Brewer's Blackbird					x	Song Sparrow	x	x	x	x	



APPENDIX TWO

UNIT 1 - 1979-1981 MONTHLY OBSERVATIONS OF BIRDS (MEAN NUMBERS PER VISIT)

	<u>1979</u>												<u>1980</u>												<u>1981</u>					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Western Grebe																														
Eared Grebe																				1	1									
Pied-billed Grebe	1																					1	2	1		1				
Brown Pelican	1				1			1													1									
Double-crested Cormorant	1		1	1																	1		1			1				
Magnificent Frigatebird							1																							
Great Blue Heron	1	1	2	1		1	3	3	6	10	8	6	1	6	1	1		4	7	13	8	13	18	11	3	2				
Green Heron	1	1												1	1	1	1	1	1	1	1	1	1	1			1			
Great Egret										1				1					1	1			1				1			
Snowy Egret									1					1	1			1	7	1	2	2	2	2	3	2	3			
Black-crowned Night Heron																							1					1		
Brandt											1				1															
Mallard																1	1		1	1										
Gairdall																								1						
Green-winged Teal	1											2							1	2	1	10								
Blue-winged Teal																								1	1	1				
Cinnamon Teal	3							1			6			4				2	4	1		2		2	3	1	1			
American Widgeon	1																				1			1						
Bufflehead											1												1							
White-winged Scoter										1	1																			
Ruddy Duck	1																													

	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Red-breasted Noddy																														
Shoveler																				1										
Turkey Vulture																														
White-tailed Kite											1											1	1					1		
Copper's Hawk																								1						
Red-tailed Hawk									1	1	1		1									1	1		1	1				
Marsh Hawk																							1	1						
Osprey		1					1																							
American Osprey																														
American Kestrel	1					1	1	1	1	1	1											1	1			1	1			
California Quail																														
American Coot																														
Semi-palmated Plover																														
Killdeer	2	1	3	2	2	2	4	5	4	4	3	27	6	9	6	5	10	6	5	13	12	7	11	15	11	8	5	7	8	
American Golden Plover																														
Black-bellied Plover	333	350	29	3		105	210	142	203	81	173	550	708	192	27	16	45	109	148	250	381	497	616	814	994	428	25	12	37	
Snowy Plover																														
Ruddy Turnstone																														
Black Turnstone																														
Common Snipe																														
Long-billed Curlew																														
Whimbrel	1	1																												
Spotted Sandpiper																														
Willet	3	9	7	4	1	61	116	53	43	74	75	40	103	37	7	13	9	179	215	103	111	96	75	72	65	40	28	7	15	

	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Greater Yellowlegs	1										1	1																		
Lesser Yellowlegs		1																												
Red Knot																														
Sharp-tailed Sandpiper																														
Raird's Sandpiper																														
Least Sandpiper																														
Dunlin																														
Western Sandpiper																														
WILD Sandpiper	1	10																												
Sanderling	1	2	1																											
Dowitcher sp.																														
Marbled Godwit	3	2	2	1																										
American Avocet																														
Black-necked Stilt	1	1																												
Red Phalarope																														
Wilson's Phalarope																														
Northern Phalarope																														
Pomarine Jaeger																														
Glaucous-winged Gull																														
Western Gull																														
California Gull																														
Ring-billed Gull																														
Bonaparte's Gull																														
Herman's Gull																														

Appendix 2 (continued)

	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Forster's Tern	1	1	6			8	41	6				30	39	48	11	22	15	29	55	25	40	60	109	62	29	62	10	5		
Least Tern				13	16	8	2								9	1	3	4							3	17	11			
Royal Tern																														
Elegant Tern								1	1									1	2											
Caspian Tern								1	1									2	2			1	1		1	1				
Rock Dove	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mourning Dove	1	3	4	8	6	7	8	11	26	4	4	1	5	4	2	4	2	3	5	6	14	1	1	1	2	5	4	5	9	
Burrowing Owl																					1									
Vaux's Swift														1	1															
White-throated Swift																2														
Anna's Hummingbird	1		1	1				1	1	1	1	1	1	1	1			1	1	1	1	2		1	1	1	1	1		
Belted Kingfisher	1	1				1	1								1								1		1	1				
Common Flicker										1	1																			
Western Kingbird																		1									1	1		
Ash-throated Flycatcher						1	1																							
Black Phoebe							1													1		1	1							
Say's Phoebe								1	1	1	1	1	1						1	1	1	2		1	1					
Violet-green Swallow		1																			1									
Rough-winged Swallow																														
Barn Swallow				1	1			1	1		1				1	1	2	5	3	1							1	1	2	
Cliff Swallow			1	3	2	1		1							5	3	30	3	6	1						1	2	1	2	
Scrub Jay																														
Common Raven					1																			1						
Common Crow	1	1	1			1					1					1								1		1				

	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Long-billed Marsh Wren		1								1	2																			
Mockingbird	1	1	1									3	1																	
Ruby-crowned Kinglet											1																			
Ingerhead Shrike	1	1	1	1	2	3	4	2	2	2	2	1		1	1	1	1	2	2	2	1	1	2	2	1	2	2	1	1	
Starling	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	
Yellow-rumped Warbler		1									2			2	1							1								
Common Yellowthroat																														
House Sparrow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Western Meadowlark	1	1	6	7	4	4	8	6	8	4	2	4	9	8	3	4	3	1	1	4	5	2	3	8	6	4	6	4	1	
Yellow-headed Blackbird				1																										
Red-winged Blackbird		1	1						1	5				4	2	1	2			3								1	1	
House Finch	2	1	6	17	25	11	21	21	45	19	10	8	11	1	6	13	22	12	20	8	23	16	13	21	11	1	7	6	4	
Lesser Goldfinch																												1		
Savannah Sparrow	1	16	23	17	19	10	2	13	33	16	8	1	23	16	13	16	19	10	9	13	13	9	5	8	5	11	8	15	11	
Lark Sparrow										1																				
White-crowned Sparrow											2			1										1	1	2		1		
Lincoln's Sparrow							1																							
Song Sparrow		5	3	3	2			1	1			1	4	1	2	2							1			1	1	1	1	



	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Millet		1	6	1			1	2		5	1			1	1			2	2	2		1		1	4	3				
Least Sandpiper											1															1				
Western Sandpiper																										2				
Dowitcher sp.		1	1						1	7					2									9	18	2				
Black-necked stilt													1																	
Wilson's Phalarope																														
Ring-billed Gull	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Annapolis's Gull		1									7																			
Caspian Tern					1	1																								
Forsters Tern																										2				
Least Tern																1												1		
Mourning Dove	6	5	12	10	13	12	19	9	7	14	5	1	1	3	4	8	6	11	10	8	24	9	2	2	12	4	6	8		
Burrowing Owl																						1								
Anna's Hummingbird	1	1	2	2	1	1	2	1	3	3	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2		
Belted Kingfisher	1						1	1	1		1			1	1				1	1	1	1	1	1	1					
Western Kingbird							2																							
Ash-throated Flycatcher							1																							
Black Phoebe									3	1									1	1	1									
Say's Phoebe	2							2	1	1	2										1	1	2	1	1					
Western Wood Pewee				1																										
Violet-green Swallow		2																												
Barn Swallow							1								1		1		2											
Cliff Swallow				2	1										3	3		7								3				
Scrub Jay			1			1	1	1				1							1		1									

	1979												1980												1981					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Common Raven					1																									
Common Crow	1	1		1	1											1							1		1	3	1			
Bushtit											2										2									
Long-billed Marsh Wren								1	1	1											1	1	2							
Mockingbird						1				1						2	1				1			1		1	1			
Loggerhead Shrike	3	1	1	1	4	3	4	2	4	2	4	3	2	1	1	2	3	1	2	2	1		2	1	1	1	1			
Starling	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Yellow-rumped Warbler										3	1		1	2								1		2		3				
Common Yellowthroat				1		1			1	1	1			1	1					1	1	1	1							
Wilson's Warbler					1																									
Western Meadowlark	10	11	13	8	4	5	4	4	8	7	1	1	7	7	6	4	3	3	2	13	5	2		5	6	7	8			
Yellow-headed Blackbird			1																											
Red-winged Blackbird	2	1		1						1			1	4	1		1	1	1							3	4			
House Finch	29	1	11	19	43	20	26	49	96	56	33	15	37	8	12	25	20	17	9	16	43	25	49	73	17	4	11			
Brown Towhee										1						1														
Savannah Sparrow	5		1					2	10	16	7	3	8						1	4	14	20	14	11	8	3				
White-crowned Sparrow	1									9	2	3		1							3		15	13	5					
Lincoln's Sparrow										1													2							
Song Sparrow	18	16	22	18	11	6	7	6	11	11	9	1	7	13	7	5	2	1	4	5	7	9	5	8	7	9				

APPENDIX FOUR

UNIT 3 - 1979-1981 MONTHLY BIRD OBSERVATIONS (MEAN NUMBERS PER VISIT)

	<u>1979</u>												<u>1980</u>						<u>1981</u>									
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Great Blue Heron	1	1	1	1		1			1		1		2								1							
Green Heron				1						1	1	1		1					1		1							
Snowy Egret				1					1		1																	
Mallard													1															
Cinnamon Teal		6	2	1		1						1	10	11														
Turkey Vulture			1																	1	1	1		1		1		1
White-tailed Kite																			1	1	1	2					1	
Cooper's Hawk										1					1						2				1	1		1
Red-tailed Hawk																								1	1			
Marsh Hawk																						1	1		1	2	1	
Osprey							1																					
American Kestrel		1	1		1	1	1	1	1	1	1	1								1		1						
California Quail				1	2	3				3	2			3	4	1			6							3	2	
Killdeer	4	2	6	2	2	1		3	1	1		2	5	4	4	3								1	1	1	2	2
Black-bellied Plover	4														1						1							
Common Snipe		1								1		1	1										1					
Willet		1	1		1			1					2															
Willet	4	1	11	4	1		1		1	1	1	1	7	4					1						1		1	
Green Yellowlegs		1	1																									
Lesser Yellowlegs														1														
Dowitcher sp.		1	4	2									5	4														
Western Sandpiper			11																									
WWD Sandpiper														4														
Marbled Godwit		1												1														
Black-necked Stilt			1																									
Western Gull													1															

	1979												1980								1981								
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
California Gull											5	1																	
Ring-billed Gull	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•		•	•						
Ross's Gull		1									2	1		1															
Herring's Gull								1	1																				
Forster's Tern			2	4	1																								
Least Tern				1	1																								
Caspian Tern				1	1		1																						
Mourning Dove	•	3	14	15	12	12	23	40	49	27	29	15	21	9	13	24			52	36	18	3	8	4	8	7	13	9	
Ring-necked Pheasant										1		1				2			2										
Long-eared Owl																					1								
Short-eared Owl	1																			1	1	3	4	2	1	2	2		
Anna's Hummingbird	2	1	1	1		1	1	2	2	3	2	1	3	2	1	1			1	1	3	4	2	1	2	2			
Red-tailed Kingfisher	1						1		1				1								1				1				
Common Flicker	2	1								1	1	1		1								1				2	5		
Western Kingbird				1		1								1	3														
Ash-throated Flycatcher						1										1													
Black Phoebe										1	1	1	1						1		1	1	1	1	1				
Say's Phoebe	1								1	2		1		1					1	1	2	2	1	2					
Violet-green Swallow	•		•								1		1									1				2			
Pink Swallow								1	1																	1	4	2	2
Barn Swallow			1	2	3	2							1	5	3														
Cliff Swallow		2	2	5	5	1							7	11	5											1		2	
Scrub Jay																											1	3	
Common Crow	1	1	1	1	1	1	4	5	1	5		1	2			1			2							1	3		
Long-billed Marsh Wren										1		2	1									1							
Mockingbird			1	1	1	2	2	1				1			2	1				1						2	3	1	1
Blue-gray Flycatcher																				1									

	1979												1980								1981									
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Water Pipit																														
Loggerhead Shrike	2		1	1	3	4	3	1	2	2	1	2	3	2	1	2			1	3	2	2				19	8			
Starling	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	
Yellow-rumped Warbler									2	2	1	1	1									10	9	6	6	2				
Yellowthroat													1	1																
House Sparrow	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•													
Western Meadowlark	30	19	18	21	12	8	14	13	16	17	26	33	19	27	10	14			12	14	9	12			25	39	18	11	19	13
Yellow-headed Blackbird				2																										
Red-winged Blackbird		1	1	3	1		2	3				1	•	6	9	9											23	5		
Western Tanager			1																								1			
House Finch	•	•	2	13	46	20	15	12	19	19	11	9	17	14	6	10			54	17	29	19			22	19	17	10	8	119
Lesser Goldfinch																														
Brown Towhee																													2	
Savannah Sparrow	33	23	13	7	2	1		18	15	17	9	8	13	10	5	5			14	1	8	5			5	13	11	6	2	2
White-crowned Sparrow									5	29	•	12	13	8	1				1		12	20			9	15	5	1		
Song Sparrow		1	1	2	1			1	1	1	2	3	4	3	5	5			2		1	2			4	6	4	5	6	2

APPENDIX FIVE

AGRICULTURAL FIELDS - 1979-1981 MONTHLY BIRD OBSERVATIONS (MEAN NUMBERS PER VISIT)

	<u>1979</u>												<u>1980</u>												<u>1981</u>					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Great Blue Heron	1	1																												
Green Heron									1				4		1							1				6	1			
Snowy Egret																							1							
Mallard																								1		1	1			
Pintail													5													1				
Green-winged Teal																							4		10	6	2			
Cinnamon Teal			1										11	24	46	4										16	45	4		
American Wigeon															1									2	3					
Turkey Vulture																									1					
White-tailed Kite																									1					
Red-tailed Hawk	1								1		1												1		1	1				
Marsh Hawk																							1							
Osprey	1																						1							
American Kestrel	1							1	1	1	1					1														
Virginia Rail									1																1					
American Coot																														
Semipalmated Plover																							7		2					
Killdeer		3	4	7	4	2	1	3	7	1	2	4	1	1										1						
Black-bellied Plover		1	1	3								69	37	19	8	2							34		32	7	3	2		
Ruddy Turnstone												108	241	79	11	2							53		23					
Common Snipe		1										1													1					
Whimbrel			2	1						1	2	5	9	3											3	2	1			
Great Yellowlegs		1										2		2		2							1		1					
Lesser Yellowlegs														1	1															



	<u>1979</u>												<u>1980</u>												<u>1981</u>					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Millet	•	2	7	1			1	1	1	1	1	24	26	39	2	1							13	11	12	14	2			
Least Sandpiper												5	2	6																
Dunlin												2	2	2									13							
Western Sandpiper												63	31	98	24															
Marbled Godwit	•							1				18	2	7	1										1	2		5		
Sanderling												5	2	7	1															
Dowitcher sp.				3								4	18	39	3								10		1	2		5		
UNID Sandpiper		5		1								3	6	4								155		214	97	100	33			
American Avocet																														
Black-necked Stilt												2	1	1	1							4		2	3	17	2	1		
California Gull												31	47	8								18		5	8	15	3			
Ring-billed Gull	•	•						•		•		46	60	21	5	•						90		28	147	9	20			
Naparte's Gull												143	169	4								47		19	161	13	260			
Forster's Tern												23	1	1																
Least Tern		1														•	1													
Rock Dove	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•					•		•	•	•	•	•	•	
Mourning Dove	4	1	2	5	7	12	13	20	21	21	5	1	3	2	5	5						•		2	1	3	•			
Burrowing Owl																														
Anna's Hummingbird								1				1																		
Belted Kingfisher														1	1															
Western Kingbird				1	1																									
Ash-throated Flycatcher								1																						
Black Phoebe														1																
Say's Phoebe								1	1	1	1																			
Violet-green Swallow														3																
Barn Swallow								1						1		1									1					
Cliff Swallow				1			1								1	6										2	5			
Common Crow		•	•																									1	•	

	<u>1979</u>												<u>1980</u>												<u>1981</u>					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Water Pipit											1			2																
Loggerhead Shrike	1				1	1	2	1	1	1	1	1	1	1												1				
Starling	•				•	•		•				•	•	•	•	•									•					
Common Yellowthroat																•	1													
Western Meadowlark	•	•	•	•	•	•	•	•	1	2	1	1	1	5	5	7						•		1	7	4	•	•		
Red-winged Blackbird	1	3	2	4	3	4	1					2	1	7	9	17								3	12	28	32	•		
House Finch							1	4	17	6	3	6	1	1	4	1							2		5	1		•		
Savannah Sparrow								5	16	8	9		1	3	3										1	2				
White-crowned Sparrow											2																			
Song Sparrow	2	2	3	4	5	3	3	3	6	4	5	1	1	2	2	5							1		1	•	•	•		

Appendix 5 (continued)

APPENDIX SIX

BALLONA LAGOON & VENICE CANALS MONTHLY BIRD OBSERVATIONS (MEAN NUMBERS PER VISIT)

	3/79	4/79	5/79	6/79	7/79	8/79	9/79	10/79	11/79	12/79	1/80	2/80	3/80	4/80
Red-throated Loon											1	1		
Eared Grebe	1	1	1	1	1	1					1	1		
Western Grebe	1								1		1	2	5	1
Pied-billed Grebe								1	1	2	1	1	1	
Double-crested Cormorant	1													
Magnificent Frigatebird						1								
Great Blue Heron								1						
Green Heron	1	1	1	1					1		1	1		
Snowy Egret	1	1									1	1	1	
Domestic Goose	3	3	2	2	3	3	3	3	3	3	4	5	4	3
Mallard	149	153	168	155	160	145	143	148	150	153	127	197	155	151
Domestic Duck	53	48	46	49	55	53	50	45	48	58	44	70	48	50
Gadwall	+													
Cinnamon Teal												7		
Greater Scaup										2				
Lesser Scaup	1										5	4		
Bufflehead	1	1						1			1			
Oldsquaw	1													
White-winged Scoter	7	2	1	1										
Surf Scoter	10	4	1						2	3	13	18	18	6
Red-breasted Merganser	4	1							2	5	3	4	5	1
American Kestrel	+	+	+				+	+	+	+	+	+	+	+

	3/79	4/79	5/79	6/79	7/79	8/79	9/79	10/79	11/79	12/79	1/80	2/80	3/80	4/80
American Coot	18	15	5	3	1	1	3	4	9	20	18	30	20	14
Semi-palmated Plover													1	
Killdeer	1	2	2	1	1	1	1	10	16	4	1	3	1	1
Black-bellied Plover	+	1	1	2	1	2	1	1	3	4	1	1	1	1
Whimbrel	2	1	1		2	1	1	1						1
Spotted Sandpiper											1	1		
Willet	10	11	6	3	4	8	11	11	14	13	8	4	6	3
Greater Yellowlegs									1					
Least Sandpiper													5	
Dowitcher sp.		1								1	2		4	3
Western Sandpiper		3							1	4		2		1
Marbled Godwit	8	10	3			1	3	2	10	8	4	3	3	4
Western Gull									1				1	
California Gull										1	1	1	1	1
Ring-billed Gull	+	+	+	+	+	+	+	2	4	9	11	5	7	4
Bonaparte's Gull													1	
Heermann's Gull				1		1								
Forster's Tern	2	1				1			1	1	1	1	1	
Least Tern			2	3	2									
Caspian Tern							1							
Rock Dove	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mourning Dove	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Spotted Dove							+							
Anna's Hummingbird								+				+		
Belted Kingfisher	1				1	1	1	1	1	1	1	1	1	

	3/79	4/79	5/79	6/79	7/79	8/79	9/79	10/79	11/79	12/79	1/80	2/80	3/80	4/80
Barn Swallow		+	+											
Cliff Swallow			+		+									
Common Crow	+	+			+	+		+	+			+		+
Mockingbird		+	+	+	+	+	+	+		+		+		+
Loggerhead Shrike	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Starling	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Yellow-rumped Warbler										+				
House Sparrow	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Western Meadowlark	+	+	+	+				+	+	+	+	+	+	+
Brewer's Blackbird						+								
House Finch	+	+	+	+	+	+	+	+	+	+	+	+	+	+