

## RECOVERIES OF ROSEATE AND COMMON TERNS IN SOUTH AMERICA

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Abstract.—During February and early March of 1995, Great Gull Island Project researchers surveyed the coasts of northern Argentina, Uruguay, and Brazil for wintering Roseate (*Sterna dougallii*) and Common (*Sterna hirundo*) Terns. We sighted both species on 6 March in a small flock off Alcobaça (17°33'S, 39°4'W) near Porto Seguro. This sighting of Roseates and the report of the recovery of a Great-Gull-Island-banded Roseate Tern at 18°00'S, 39°30'W on 24 Jan. 1995 provide the southernmost wintering records of the species to date. At Punta Rasa, Argentina, we found an estimated 20,000 to 30,000 Common Terns in early February. Although the species known range includes Argentina, this is the first report of such a large wintering concentration at this latitude. All color-banded Common Terns we saw in Argentina and southern Brazil, as well as all recovered banded birds from these areas, were over one year old. This suggests that older Common Terns occupy the more southern parts of the wintering range. Recoveries of Great Gull Island Common Terns from southern Brazil and Argentina made in April and May, and subsequently trapped on Great Gull Island, show that some birds make the >8000 km trip in 3 wk or less.

**RECUBRO DE INDIVIDUOS DE *STERNA DOUGALLII* Y *S. HIRUNDO* EN SUR AMÉRICA**

Sinopsis.—Durante el mes de Febrero y los primeros días de Marzo de 1995, los investigadores del Proyecto Great Gull Island visitaron las costas de Argentina, Uruguay, y Brasil en busca de registros de invierno para el Gaviotín Rosado (*Sterna dougallii*) y el Gaviotín Común (*S. hirundo*). Ambas especies fueron observadas en pequeñas colonias en la costa de Alcobaça (17°33'S, 39°04'W), cerca de Porto Seguro el día 6 de Marzo. Los avistamientos de Gaviotín Rosado, junto con la captura de un individuo de Gaviotín Rosado anillado en la isla Great Gull el 24 de Enero de 1995, representan los registros invernales más australes para esta especie. Durante los primeros días de Febrero se calcula haber observado entre 20,000 a 30,000 individuos de Gaviotín Común en Punta Rasa, Argentina. Aún cuando las costas Argentinas han sido consideradas como parte de la distribución normal de *S. hirundo*, este es el primer reporte de la existencia de grandes colonias invernales en esta latitud. Todos los individuos de Gaviotín Común con bandas de colores observados en Argetina y sur de Brazil, así como todas las recapturas realizadas en estas áreas de aves anilladas en la isla Great Gull, fueron mayores de un año de edad. Esto sugiere, que las aves de mayor edad ocupan la parte más austral del rango invernal de distribución. Las recapturas hechas en Abril y Mayo de Gaviotín Común provenientes de la isla Great Gull en el sur de Brasil y Argentina, prueban que algunas de estas aves son capaces de realizar un viaje de 8000 km en tan solo tres semanas o menos.

The major wintering areas of Roseate Terns (*Sterna dougallii*) and Common Terns (*Sterna hirundo*) in the Western Hemisphere are poorly known. Murphy (1936) reported six Roseate Terns collected by Rollo Beck off Salvador, Bahia, Brazil on 28 Apr. 1916. Hays (1971) reported a recovery of a Roseate Tern from Gorgona Island off the Pacific Coast of Colombia on 27 Oct. 1969, 24 d after the bird was observed on the coast of Connecticut. Hamilton (1981) summarized wintering ground recoveries of Roseate Terns banded on Great Gull Island, New York ranging along the northern coast of South America to eastern Brazil. Lara-Resende and Leal (1982) report Roseate Tern recoveries along the Brazilian coast. Nisbet (1980, 1984), using United States National Biological Survey (USNBS) records from all banders, defined the wintering range of Roseate Terns as falling between 11°N and 13°S.

Common Terns have been reported to winter over a much wider range than Roseate Terns. On the Atlantic coast birds winter from the West Indies to Argentina and on the Pacific coast from southern California to Chile (American Ornithologists' Union 1983, Bull 1974). Austin's (1953) analysis of banding recoveries of Common Terns banded along the Atlantic coast of North America showed these terns wintered from the southern West Indies to southern Brazil, with most of the recoveries falling along the northeastern coast of South America north of the Amazon. Bull (1974) and DiCostanzo (1978) also reported records of Common Terns from Bolivia and the interior of Brazil.

Recovery data for Common Terns along the coast of Brazil show an increase in recoveries since the founding of Centro de Pesquisas para Conservação dos Aves Silvestres (CEMAVE), the Brazilian banding organization, in 1979 (Lara-Resende and Leal 1982). Their maps show recoveries of Common Terns from northern Brazil, just south of the mouth of the Amazon, to Lagoa do Peixe, Rio Grande do Sul in southern Brazil

where they report three recoveries of terns banded in the northeastern United States. Harrington et al. (1986) found two terns originally banded on the Atlantic coast of the United States among twenty-five birds netted at Lagoa do Peixe in 1984. In southern Brazil, Lara Resende (1988) reported approximate numbers in concentrations of Common Terns at Lagoa do Peixe, (between 31°26'S, 51°10'W and 31°14'S, 50°54'W) in 1986–1987: October 100, November 7000, December 10,000, January 13,000, February 8000, March 2000, April 500. In recognition of its importance to terns and shorebirds the Brazilian government declared Lagoa do Peixe a national park on 6 Nov. 1986 under the jurisdiction of Instituto Brasileiro do Meioambiente e dos Recursos Naturais Renováveis (IBAMA) (Lara Resende 1988). The Brazilian government has supported banding at Lagoa do Peixe from 1984 through 1995, first through CEMAVE and then through CEMAVE/IBAMA

Analysis of band recoveries has given us a good idea of which months Roseate and Common Terns spend on the wintering ground and which months they spend migrating (Austin 1953; Haymes and Blokpoel 1978; Nisbet 1980, 1984). Precisely where the majority of Roseate and Common terns spend the winter is a different question. There are no data in the literature that show where Roseate Terns spend the period January–March. There have been a few studies of Common Terns on the wintering ground (Blokpoel et al. 1982, 1984, 1987, 1989; Erwin et al. 1986; Harrington et al. 1986; Lara Resende 1988). These studies report groups of Common Terns ranging from 200–2600 in Trinidad, up to 13,000 at Lagoa do Peixe, and about 800 off the coast of Peru. In addition, A. Southworth read color combinations of six birds among 300 to 350 Common Terns on a beach about two hours north of Salvador, 18–21 Feb. 1987 (A. Southworth, pers. comm.).

Roseate Terns were declared endangered in North America in 1987, and their new status underlined the importance of both breeding and wintering ground studies. While searching for Roseate Terns in South America we hoped to see color-banded Common Terns as well as Roseates originally banded on Great Gull Island, New York to determine specifically where Great Gull Island birds wintered. In February and March 1995, members of the Great Gull Island Project conducted a survey of coastal and off-shore areas in Argentina, Brazil, and Uruguay looking for Roseate and Common Terns. This paper presents the results of that survey and an analysis of recoveries of banded birds.

#### STUDY AREA AND METHODS

Participants in the South American coastal survey were Helen Hays, Joseph DiCostanzo, Grace Cormons, Peter Cormons, and Mauricio Calvo. DiCostanzo and Hays were responsible for retrieval and analysis of banding recovery data. Through the USNBS Bird Banding Laboratory Paulo T. Z. Antas, João Luis X. do Nascimento, and Inês S. do Nascimento contributed banding information from Lagoa do Peixe in southern Brazil.

Esteban Bremer provided recovery data on terns he has netted at Punta Rasa since 1993.

The color-banded Common Terns we saw in South America were all birds banded on Great Gull Island, New York (41°12'N, 72°07'W). Each season since 1969 teams of students have made daily checks of Great Gull Island marking nests, banding chicks, and trapping adults (Cooper et al. 1970, Hays and Riseborough 1972). Adults of both species are given individual color-band combinations (DiCostanzo 1980). Over a third of the 3000 adult Roseate and 90% of the 16,000 adult Common Terns nesting on Great Gull Island have been banded.

Migration routes for both Common and Roseate terns have been traced through recoveries of banded birds reported to the USNBS Bird Banding Laboratory. We have included in Tables 2, 3, and 4 recoveries of birds banded under Hays's banding permit (1020 Common Tern, 163 Roseate Tern) as well as those banded by the late Gilbert Cant (2 Common), Donald Cooper (36 Common, 26 Roseate), Matthew Cormons (8 Common), David Duffy (21 Common, 2 Roseate), the late Thomas Davis (29 Common), Catherine Pessino (8 Common, 1 Roseate), the late Gilbert Raynor (68 Common), the late Walter Terry (48 Common) and the late Leroy Wilcox (213 Common, 2 Roseate). All birds were banded in New York and coastal Connecticut. Recoveries used in this paper fall into two main categories: those found along the migration routes or on the wintering ground by members of the public and those netted by researchers in a particular area as part of an organized study. The latter is a relatively recent phenomenon and has contributed a number of interesting recoveries. For the last ten years the Brazilian government has netted at Lagoa do Peixe, Rio Grande do Sul, and from 1993–1995 the Fundación Vida Silvestre Argentina has supported tern netting at Punta Rasa, Buenos Aires province, Argentina. A third category of recoveries are those by Balam Pertab, a Guyanese boy who caught terns for market between 1969 and 1977 (Hamilton 1981, Nisbet 1984). Pertab recovered birds in every month of the year and his recoveries comprise much of the data shown in this paper for both species recovered between 10°N and the equator.

*Survey planning.*—Ralph Andrews, Team Leader of the USNBS Roseate Recovery Team, estimates about 7000 Roseate Terns comprise the northeastern North American population (pers. comm.). Most recoveries from this population of Roseate Terns have been along the north coast of South America. Barbour (1993), however, did not see any Roseate Terns along the north coast of Brazil.

In a paper presented at a Colonial Waterbird Group meeting in Arles, France in October 1993, Adrian del Nevo pointed out European Roseate Terns are not found along the African coast after December and suggested the species may become pelagic, feeding in the mid-Atlantic during the winter months. With this in mind we decided to survey off shore at Necochea, Argentina as well as Fernando de Noronha and the Abrolhos Islands off Brazil.

It is also possible that Roseate Terns might concentrate in some of the

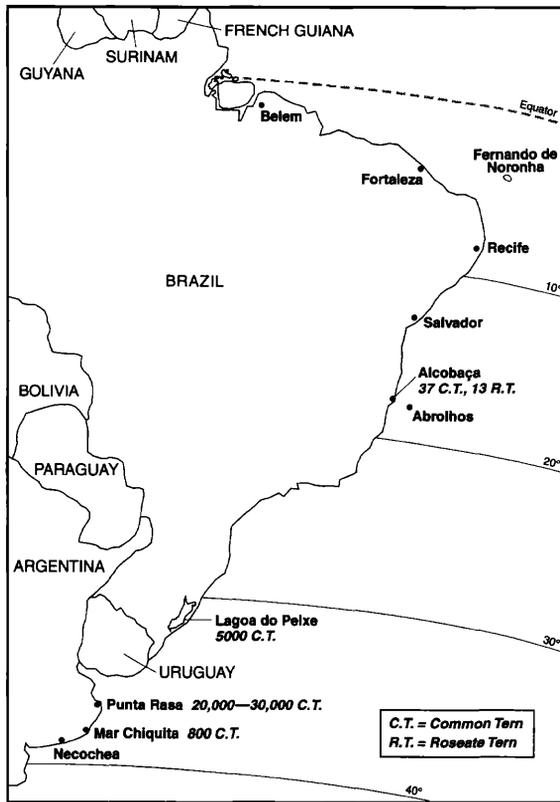


FIGURE 1. Localities visited while searching for Roseate and Common Terns and numbers seen, February–March 1995.

same areas used by Common Terns. Roseates could easily be overlooked in mixed flocks because of their similarity to Common Terns in winter plumage. Because food might be more abundant in the cooler waters off Argentina and southern Brazil than in the waters nearer the equator, we started the survey in Argentina. Departure points for coastal and offshore checks are shown in Figure 1. We looked for terns in these areas on the following dates: Argentina: Mar del Plata/Necochea 3–5 February, Punta Rasa 6–7 February and 11–13 March, and Mar Chiquita 9–10 March; Uruguay: 9–10 February; Brazil: Mostardos to São José do Norte 12–13 February, Fortaleza 24–27 February, Fernando de Noronha 1–2 March, Recife 3 March, Salvador 4 March and the Abrolhos Islands 6–7 March.

In Necochea two teams spent 16 h offshore on two commercial fishing boats. At Fernando de Noronha and the Abrolhos we circled the islands by boat. At Punta Rasa, Mar Chiquita, and Lagoa do Peixe we counted birds during the day and those coming in to roost at dusk. In southern Brazil we surveyed the beach by car between Mostardos and São José do

Norte stopping where possible to count birds and read band combinations. In Uruguay we surveyed the coast by car from Montevideo to near the Brazilian border. We visited coastal sites near the following Brazilian cities: Fortaleza, Recife, and Salvador.

#### RESULTS

*Survey.*—In Argentina we saw no Common or Roseate Terns along the coast between Mar del Plata and Necochea and none from the fishing boats offshore. In the last ten years we had received a few recoveries of Common Terns from Punta Rasa, but nothing that would have suggested the tremendous concentration of Common Terns we observed there. We estimated 20,000–30,000 birds came in to roost on the evenings of 6–7 February. We stopped at Punta Rasa again on 11 March and estimated there were about half as many terns gathered there as in February. In early March, at Mar Chiquita about 130 km southwest of Punta Rasa, we found 800 Common Terns sitting on a sandbar in the inlet of Mar Chiquita lagoon. There were color-banded terns from Great Gull Island in the group and a tern that had been yellow dyed at Punta Rasa by Bremer in February (Table 1).

We saw neither Roseate nor Common terns in Uruguay. On 12 February, on the beach between Mostardos and the inlet of Lagoa do Peixe, we saw about 7000 Common Terns in groups of 100–2000. We read the combinations of twelve color-banded birds with full or partial codes.

On 13 February we drove over 160 km on the beach from Mostardos to São José do Norte. There was a strong northeast wind. We saw fewer Common Terns (250) than the day before between Mostardos and the Lagoa do Peixe inlet. We saw no terns in the 80 km south of the inlet. In the next 65 km we saw about 6900 Common Terns. Most were in one group of about 6000 and the rest were in smaller groups ranging from 5–300 birds. When we reached hard sand about 16 km from São José do Norte we checked a group of 25 Common Terns and read the color bands of three in the group (Table 1).

Along the north coast of Brazil we did not see any Roseate or Common terns. We did not have time to do the extensive checks of the shore that might have been necessary to find either or both species.

We found no Roseate or Common terns on Fernando de Noronha.

We took a boat from Alcobaça to the Abrolhos Islands on 6 March. About 11 km from shore (17°33'S, 39°4'W) we approached a flock of about 50 terns and estimated about one third of the birds were Roseate Terns and the rest Common. With the engine off we drifted towards the birds and heard both species call.

*Band recoveries.*—All birds whose color combinations we read in Argentina and southern Brazil were over one-year-old at the time we saw them (Table 1). Table 2 summarizes the recoveries of Roseate Terns in ten degree blocks of latitude from 20°N to 20°S. We have relatively few recoveries for Roseate Terns except for the block 10°N to 0°. The recoveries in this block suggest that October and November are the peak months

TABLE 1. Common Terns color-banded on Great Gull Island, New York seen in Argentina and Brazil.

Location/band	Date banded	Age at banding	Date seen	Age when seen (yr)
<b>Punta Rasa (36°15'S, 56°47'W)</b>				
882-53214	26 Jun. 1984	adult	6 Feb. 1995	>11.6
882-53271	11 Jun. 1980	adult	7 Feb. 1995	>15.7
882-53429	12 Jun. 1980	adult	7 Feb. 1995	>15.7
882-53433	14 Jun. 1986	adult	11 Mar. 1995	>9.7
882-53617	22 Jun. 1981	chick	6 Feb. 1995	13.6
882-53851	28 Jun. 1985	adult	11 Mar. 1995	>10.6
882-54371	12 Jun. 1984	chick	7 Feb. 1995	10.7
882-54500	15 Jul. 1982	chick	6 Feb. 1995	12.6
882-54811	22 Jun. 1982	chick	7 Feb. 1995	12.6
882-55263	30 Jun. 1988	adult	11 Mar. 1995	>7.7
882-57247	28 Jun. 1981	chick	7 Feb. 1995	13.6
882-57983	13 Jun. 1986	chick	6 Feb. 1995	8.7
882-58746	21 Jun. 1986	adult	11 Mar. 1995	>9.7
9802-11575	14 Jun. 1987	chick	11 Mar. 1995	7.7
9802-13068	17 Jun. 1986	chick	11 Mar. 1995	8.7
9802-13318	11 Jun. 1984	chick	11 Mar. 1995	10.8
9802-13474	2 Jul. 1990	adult	11 Mar. 1995	>5.7
9802-13880	29 Jun. 1983	chick	11 Mar. 1995	11.7
9802-15953	23 Jun. 1977	chick	11 Mar. 1995	17.7
9802-16903	7 Jun. 1981	chick	7 Feb. 1995	13.7
9802-20501	29 Jun. 1987	chick	6 Feb. 1995	7.6
9802-22767	13 Jul. 1992	adult	7 Feb. 1995	>3.6
9802-23416	9 Jul. 1991	adult	7 Feb. 1995	>4.6
9802-23615	26 Jun. 1993	adult	11 Mar. 1995	>2.7
9802-24346	25 Jun. 1990	chick	7 Feb. 1995	4.6
9802-32460	29 Jun. 1990	chick	11 Mar. 1995	4.7
<b>Mar Chiquita (37°44'S, 57°23'W)</b>				
882-55876	28 Jun. 1988	chick	9 Mar. 1995	6.7
882-55919	30 Jul. 1985	adult	11 Mar. 1995	>10.6
9802-13332	10 Jun. 1981	chick	11 Mar. 1995	13.8
9802-23713	23 Jun. 1988	chick	9 Mar. 1995	6.7
<b>Lagoa do Peixe (31°22'S, 51°8'W)</b>				
882-53203	17 Jun. 1982	adult	12 Feb. 1995	>13.7
882-53408	21 Jul. 1985	adult	12 Feb. 1995	>10.6
882-54890	15 Jun. 1984	chick	13 Feb. 1995	10.7
882-59795	14 Jun. 1986	chick	12 Feb. 1995	8.7
9802-13346	30 Jun. 1988	adult	13 Feb. 1995	>7.6
9802-15137	27 Jul. 1983	chick	13 Feb. 1995	11.6
9802-15742	1 Jun. 1979	adult	12 Feb. 1995	>16.7
9822-05191	17 Jul. 1994	adult	12 Feb. 1995	>1.6

for birds arriving in the fall. The drop in recoveries in December suggests Roseates disperse or depart from this area after November. The only recovery in the southernmost block is a ten-year-old bird (USNBS band 902-38665, banded on Great Gull Island on 2 Jul. 1984) recovered in Brazil

TABLE 2. Recoveries outside the United States of Roseate Terns banded in New York and Connecticut.

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
20°N–10°N													
Under 1 <sup>a</sup>	0	1	1	0	0	1	0	3	2	1	0	0	9
Over 1 <sup>b</sup>	0	0	2	0	2	1	0	0	0	0	0	0	5
10°N–0°													
Under 1	0	1	4	21	18	13	7	2	1	4	2	2	75
Over 1	1	1	8	24	21	5	4	0	2	2	0	3	71
0°–10°S													
Under 1	0	0	0	0	0	2	1	0	0	0	1	0	4
Over 1	0	0	0	0	3	1	0	0	0	1	0	0	5
10°S–20°S													
Under 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Over 1	0	0	0	0	0	0	1	0	0	0	0	0	1

<sup>a</sup> Birds less than one-year-old.<sup>b</sup> Birds over one-year-old.

TABLE 3. Recoveries outside the United States of Common Terns banded in New York and Connecticut.

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
20°N–10°N													
Under 1 <sup>a</sup>	0	6	42	38	16	15	21	7	9	16	9	8	187
Over 1 <sup>b</sup>	4	6	10	10	4	5	2	5	0	4	3	5	58
10°N–0°													
Under 1	3	3	15	60	56	63	47	19	27	16	8	8	325
Over 1	9	19	33	66	58	37	27	11	18	17	9	10	314
0°–10°S													
Under 1	1	0	0	3	7	10	13	8	6	6	1	1	56
Over 1	5	0	3	7	5	4	5	1	5	2	0	3	40
10°S–20°S													
Under 1	0	0	0	0	5	4	3	0	0	0	2	0	14
Over 1	4	1	1	4	6	5	9	8	5	0	1	0	44
20°S–30°S													
Under 1	0	0	0	0	0	0	2	3	0	1	0	0	6
Over 1	0	0	2	0	3	3	4	5	3	0	2	0	22
30°S–40°S													
Under 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Over 1	0	1	2	0	18	3	12	16	21	99	4	0	176

<sup>a</sup> Birds less than one-year-old.<sup>b</sup> Birds over one-year-old.

TABLE 4. Mean age of recovered known-age Common Terns in 10° latitude blocks.

Latitude block	Mean (yr)	SD	Max.	Min.	<i>n</i>
20°N–10°N	0.9	1.24	8.8	0.1	228
10°N–0°	1.6	2.33	17.3	0.1	494
0°–10°S	1.7	2.11	11.5	0.3	85
10°S–20°S	3.2	3.98	18.3	0.4	45
20°S–30°S	2.5	1.91	6.6	0.5	17
30°S–40°S	4.8	3.92	26.2	1.4	119

at 18°00'S, 39°30'W on 24 Jan. 1995. This is about 80 km south of where we sighted Roseates off Alcobaça in March 1995.

Table 3 summarizes the recoveries of Common Terns in 10° blocks from 20°N to 40°S. Moving from north to south in the three blocks from 20°N to 10°S peak recovery months for Common Terns are September/October, October/November, and December/January, respectively. There is a drop in recoveries of birds > one-year-old in the two northern blocks in November and December. This drop is more marked for the block 10°N–0° which includes Guyana and is the block in which we have most recoveries. These figures show clearly that the numbers of birds > one-year-old peak earlier and drop off before those of hatching-year birds during the period September through March. For the blocks south of 10°S to 40° we did not determine a peak month because the recoveries are not representative, either because there are too few of them, or, as in the most southern block, more banding has been done in one month (April) than in any other. The 176 Common Tern recoveries from the southernmost block (30°S to 40°S) have all been birds > one-year-old. Thirty-one birds (18%) were between one- and two-year-old, ranging in age from 17 mo to 22 mo, averaging 20 mo. The farthest south a bird < one-year-old has been recovered is 27°30'S. The bird was 10-mo-old.

Table 4 shows the mean ages of known-age Common Terns recovered in the different 10° blocks. Mean ages ranged from 0.9 yr in the north to 4.8 in the south. The birds in the south are significantly older than the birds in the north (ANOVA,  $F = 44.96$ ,  $P < 0.001$ ).

Between 1986 and 1994, CEMAVE/IBAMA field researchers netted Common Terns in April and May. During this period they recovered a number of birds that had been banded on Great Gull Island. Twenty-five of these birds were trapped on nests in the Great Gull Island colony later in the same year that they had been netted in Brazil. I. Nascimento netted one bird, 9802-11473, at Lagoa do Peixe on 29 Apr. 1993 and on 31 May, 32 days later, we found its first egg on Great Gull Island. First egg dates for the 25 birds ranged from 32–81 d (mean 51.8 d, SD = 10.9) after the date they were netted in Brazil. In addition, a Common Tern (9822-05138) netted by Bremer 24 Apr. 1995 at Punta Rasa was on an egg on Great Gull Island, the first week in June, six weeks and 8650 km later.

Common Terns do not lay eggs immediately upon arrival in the colony. Each year the first egg is marked on Great Gull Island 10–14 d after the

first birds remain on the island overnight (H. Hays, per. obs.). For 50 color-banded individuals identified by Hays the first week in May 1995 first eggs were marked 14–29 days ( $\bar{x}$  = 21.7, SD = 3.92) after these individuals were first sighted.

#### DISCUSSION

Our observation of Roseate Terns off Alcobaça 6 Mar. 1995 as well as the recovery of a banded bird 18°00'S, 39°30'W on 24 Jan. 1995 are the southernmost records for the species in the Western Hemisphere. The previous southernmost records were from Salvador, in northern Bahia. Further work is needed to determine where most North American Roseate Terns winter.

In Argentina we saw no Common Terns south of Mar Chiquita and Fiameni (1994) does not include the species in the list of birds of Necochea. The large concentration of Common Terns at Punta Rasa makes this location the most significant wintering area in Argentina and perhaps anywhere in South America for Common Terns from North America. Large concentrations of Common Terns have been observed at Punta Rasa by Bremer since 1985. It would be interesting to determine the extent of exchange of birds between Punta Rasa, Mar Chiquita, and Lagoa do Peixe in southern Brazil. Bremer is concerned about proposals for commercial development of Punta Rasa. It is critical to make every effort to ensure that Punta Rasa remains a site where Common Terns as well as other species can gather to roost and feed between September and April.

The mixture of adult and young Common Tern recoveries from the northern coast of South America and south to 27°S contrasts sharply with the recoveries of adults only from southern Brazil, Uruguay, and Argentina. Although both adults and birds of the year are recovered along the northern coast of South America, the data in this paper indicate many of the adults move to the more southern parts of the range for the winter. The data suggest the adults arrive on the north coast earlier than the young of the year with numbers of adults being recovered starting in August and September. The number of adults peaks in October/November. The drop in recoveries of adult Common Terns from November to December suggests the period when the adults move on to the southern part of the wintering range. An observation by George Barrowclough provides data on the timing of this move. On 14 Nov. 1987 he observed thousands of Common Terns flying past his cruise ship all day as it ran between Recife and Salvador de Bahia (G. Barrowclough, pers. comm.). It is possible that many of the adults stage on the north coast, resting and feeding before moving south. Staging would give the birds a chance to gather and move together in the large numbers Barrowclough observed. The similar decrease in recoveries of adult Roseate Terns on the north coast after November suggests that they too may move further south or perhaps out to sea as suggested by del Nevo.

Austin (1953) and Kasperek (1982) point out that Common Terns may move more quickly when migrating to the breeding grounds in the spring

than they do when moving south in the fall. The two shortest periods that we have in which terns moved from one hemisphere to the other are 24 d for a Roseate Tern moving from north to south and 32 d for a Common Tern, netted in the south and later found on a nest in the north. These times are maximum times as there is no way of knowing when either bird started migrating. First egg dates for the colony as well as for individuals give a minimum of 10–14 d between the time birds were first seen and the time their first eggs were marked. To estimate the length of time it took the Common Tern mentioned above to migrate north we subtracted 10–14 d, the period of “on island time” prior to egg laying, from the 32 d between the netting date in the south and the first egg date in the north. This gives a period of no more than 18–22 d for this Common Tern to migrate from Brazil, a period a little shorter than the time it took the Roseate to move south. Using the same method for the bird with the shortest migration time from Argentina the maximum time would be 28 d for the bird to move north from Argentina. As we collect more data on timing, these periods will probably get shorter, and we will get a better idea of the range in times and how long it takes most birds to make the trip.

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