Studies in Avian Biology No. 19:272–280, 1999.

SEASONAL MOVEMENTS AND CONSERVATION OF SEEDEATERS OF THE GENUS *SPOROPHILA* IN SOUTH AMERICA

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Abstract. Small seed-eating finches of the genus *Sporophila,* commonly called seedeaters, are among the most characteristic elements of South America's grassland avifauna. Twenty-three species of *Sporophila* seedeaters were classified into three groups according to their seasonal movements. Fourteen species make long-distance movements between at least two major ecological regions in South America, four species make intermediate to long-distance movements within a single ecological region, and five species make short-distance movements between adjacent habitats. The grasslands in the Cerrado region seem to be the most important wintering sites for most of the long-distance migrant *Sporophila.* Mapping the ranges of all threatened or near-threatened *Sporophila* species identified seven critical areas between southern coastal Colombia and southernmost Brazil. Creating reserves in these seven areas would protect at least one population of 23 *Sporophila* species. Mapping the ranges of all species and well-marked subspecies with restricted ranges (350,000 square kilometers or less) identified nine critical areas (five of which were also identified by mapping threatened or near-threatened species) between northern South America and southernmost Brazil. Creating reserves in these nine areas would protect populations of 29 species or well-defined subspecies of *Sporophila.* The conservation of South American grasslands needs urgent action. The areas identified here are important grassland habitats that should be priority areas for organizations and agencies interested in grassland conservation.

LOS MOVIMIENTOS ESTACIONALES Y LA CONSERVACIÓN DE GRANÍVOROS DEL GÉNERO *SPOROPHILA* EN AMÉRICA DEL SUR

Sinopsis. Entre los elementos más característicos de la avifauna de pastizal de América del Sur se encuentran pequeños fringílidos del género *Sporophila* que se alimentan de semillas, llamados comúnmente granívoros. Se clasificaron veintitrés especies de granívoros *Sporophila* en tres grupos según sus movimientos estacionales. Catorce especies realizan movimientos de larga distancia entre, al menos, dos grandes regiones ecológicas en América del Sur; cuatro especies realizan movimientos de distancia media a larga dentro de una sola región ecológica; por último, cinco especies hacen movimientos de corta distancia entre hábitats adyacentes. Los pastizales en la región Cerrado parecen ser los sitios invernales más importantes para la mayoría de los *Sporophila* que migran largas distancias. La delineación de mapas de las extensiones de todas las especies *Sporophila* amenazadas o casi amenazadas identificó siete áreas críticas entre la costa sur de Colombia y el sur de Brasil. La creación de reservas en estas siete áreas protegería por lo menos una población de cada una de 23 especies de *Sporophila.* La delineación de mapas de las extensiones de todas las especies y subespecies bien definidas con extensiones limitadas (350.000 kilómetros cuadrados o menos) identificó nueve áreas críticas (cinco de las cuales se identificaron también haciendo mapas de las especies amenazadas o casi amenazadas) entre el norte de América del Sur y el sur de Brasil. La creación de reservas en estas nueve áreas protegería poblaciones de 29 especies o subespecies bien definidas de *Sporophila.* La conservación de pastizales sudamericanos requiere medidas inmediatas. Las áreas aquí identificadas son importantes hábitats de pastizal que deberían ser áreas prioritarias para las entidades y organizaciones interesadas en la conservación de pastizales.

Key Words: Cerrado; conservation; grassland birds; seedeaters; *Sporophila.*

Grasslands are among South America's most threatened environments because of the ever-growing expansion of human activities. Large areas of grasslands in the continent have been converted to agricultural fields or pastures. This has led to an impoverished native fauna and flora and large-scale declines in the extent of these ecosystems. Because conservation efforts in South America are directed mainly at the species-rich tropical forests (e.g., Rylands 1991), few measures have been taken to conserve South American grasslands and their biota (Ratter 1995; Silva 1995a, 1996).

In general, knowledge about South American grassland birds is limited. There is little information about range limits, geographic variation, migratory patterns, and population dynamics of most species. For some species (e.g., Blue-eyed Ground Dove [*Columbina cyanopis*], White-winged Nightjar [*Caprimulgus candicans*], and Gray-backed Tachuri [*Polystictus superciliaris*]), even basic data about their natural history are lacking.

Among the most characteristic elements of the grassland avifauna in South America are the small (8–15 g) seed-eating finches of the genus *Sporophila* (Family Emberizidae), commonly called seedeaters. This genus includes about 30 species that range from the southwestern United States to central Argentina (Paynter 1970,

Ridgely and Tudor 1989, Sibley and Monroe 1990, Ouellet 1992). *Sporophila* species are associated primarily with grasslands, but a few species also inhabit medium and upper levels of tall tropical forests (Sick 1985). Seedeaters feed mostly on seeds, but several species also include small fruits and even insects in their diet, at least seasonally (Sick 1985; J. M. Silva, pers. obs.).

Because seedeaters occur in almost all major grassland regions of South America and appear to be sensitive to human pressures on their habitat, they can be a useful indicator group to assess and monitor the magnitude and distribution of the major threats to South American grassland avifaunas. For instance, in the most recent edition of the "red data" book for American birds (Collar et al. 1992), eight and three *Sporophila* species were classified as threatened and near threatened, respectively.

One of the reasons why so many *Sporophila* species make intermediate to long-distance seasonal movements is that they are stem-gleaner specialists, i.e., they feed primarily on seeds still borne on the stalks (Remsen and Hunn 1979). Because of this behavior, when areas no longer have grasses producing appropriate seeds on stalks, most *Sporophila* species must look for food elsewhere, resulting in seasonal changes in their distributions. In this regard, stem-gleaner specialists contrast with other granivorous species that are able to feed on fallen seeds on the ground, as these species remain in their breeding areas until the stock of fallen seeds is consumed. The few long-term studies that have examined seasonality of grassland birds in South America (Thomas 1979, Cintra and Yamashita 1990) support the hypothesis that feeding behavior may predict whether or not a given granivorous species will migrate during periods when seed production in its breeding area decreases. In the Venezuelan llanos, Thomas (1979) found that some well-known granivorous species that feed on seeds on the ground (e.g., Grassland Sparrow [*Ammodramus humeralis*], Saffron Finch [*Sicalis flaveola*]) were year-round residents, whereas some *Sporophila* species (Lesson's Seedeater [*S. bouvronides*] and Ruddy-breasted Seedeater [*S. minuta*]) were absent for several months. Similarly, in the Pantanal of Poconé in Mato Grosso, Brazil, Cintra and Yamashita (1990) found that ground-feeding finches (e.g., Grassland Sparrow, Saffron Finch, Rufous-collared Sparrow [*Zonotrichia capensis*]) were present year-round whereas all six *Sporophila* species showed marked seasonal movements.

The association between *Sporophila* seedeaters and the native grasses they consume is still poorly understood and deserves investigation. Large areas of natural grasslands in South America have been replaced by artificial pastures, which means native grasses have been replaced by exotic, mostly African, grasses. Although a few *Sporophila* species (e.g., Double-collared Seedeater [*S. caerulescens*]) may adjust their diets to include exotic grass species, it is likely that several other species may suffer population reductions because of the large-scale replacement of native grass species (Sick 1985). Replacing native grasses with exotics may also have a serious impact on the seasonal movements of several *Sporophila* species, as we now know that these movements (either regional or long-distance) are closely tied to the seed production of some critically important grass species (Remsen and Hunn 1979, Silva 1994). To evaluate such impacts, detailed information about the diet of most *Sporophila* species is urgently needed. For instance, a list of grass species and the seedeaters that consume them would help contribute to a database that could be used to monitor populations of *Sporophila* seedeaters and their food sources.

The wintering areas of *Sporophila* seedeaters that make long-distance migrations are incompletely known, and much more study is necessary to accurately determine these ranges. Several species exhibit remarkable seasonal movements in response to fluctuations in food availability on their breeding grounds (Remsen and Hunn 1979, Sick 1985, Ridgely and Tudor 1989). Data on the nature of these movements, however, are scarce.

It is possible that the wintering areas currently mapped in some reference books (e.g., Ridgely and Tudor 1989) are underestimated. For example, Remsen and Hunn (1979) demonstrated how knowledge of wintering distributions of a *Sporophila* seedeater changed dramatically when additional distribution data became available. They recorded migrant Double-collared Seedeaters in southern Colombia, several hundred kilometers north of the species' previously known range. More recently, Dark-throated Seedeater (*S. ruficollis*), a species known to winter in the Cerrado region and northern Bolivia (Ridgely and Tudor 1989), was recorded in Humaitá (07°31′ S, 63°02′ W), Amazonas, Brazil, in upland savannas along the Rio Madeira. Specimens are housed at the Museu Paraense Emílio Goeldi (MPEG) in Belém, Pará, Brazil: one male (MPEG 49606, collected 14 October 1991) and one female (MPEG 49607, collected 15 October 1991).

This paper has two main objectives: (1) to identify, in a preliminary fashion, the general patterns of seasonal movements exhibited by South American *Sporophila* seedeaters and (2) to analyze the distribution of two sets of *Spo-*

TABLE 1. TWENTY-THREE SPECIES OF SOUTH AMERICAN *Sporophila* SEEDEATERS CLASSIFIED ACCORDING TO THEIR SEASONAL MOVEMENTS

Common name	Species	References[a]
Local movements		
Gray Seedeater	*intermedia*	10
Plumbeous Seedeater	*plumbea*	10
Variable Seedeater	*americana*	10
Rusty-collared Seedeater	*collaris*	10
White-bellied Seedeater	*leucoptera*	10
Regional movements		
Buffy-fronted Seedeater	*frontalis*	2, 7
Temminck's Seedeater	*falcirostris*	2, 7
Slate-colored Seedeater	*schistacea*	4
Ruddy-breasted Seedeater	*minuta*	10
Long-distance movements		
Lined Seedeater	*lineola*	8
Lesson's Seedeater	*bouvronides*	5, 10
Yellow-bellied Seedeater	*nigricollis*	1
Double-collared Seedeater	*caerulescens*	4
Capped Seedeater	*bouvreuil*	3, 10
Tawny-bellied Seedeater	*hypoxantha*	6, 7
Rufous-rumped Seedeater	*hypochroma*	6, 10
Dark-throated Seedeater	*ruficollis*	7
Marsh Seedeater	*palustris*	5
Chestnut-bellied Seedeater	*castaneiventris*	7
Chestnut Seedeater	*cinnamomea*	5, 7
Black-bellied Seedeater	*melanogaster*	6, 7
White-throated Seedeater	*albogularis*	9
Narosky's Seedeater	*zelichi*	11

Note: For some species (e.g., Yellow-bellied Seedeater [*S. nigricollis*] or Capped Seedeater [*S. bouvreuil*]), one population may make shorter, regional movements whereas others may make long-distance movements.

[a] 1 = Antas and Cavalcanti 1988; 2 = Collar et al. 1992; 3 = Chesser 1994; 4 = Hilty and Brown 1986; 5 = Ridgely and Tudor 1989; 6 = Rosário 1996; 7 = Sick 1985; 8 = Silva 1995a; 9 = Silva 1995b; 10 = J. M. Silva, pers. obs.; 11 = Stotz et al. 1996.

rophila seedeaters: species regarded as threatened or near threatened and species with restricted ranges. This analysis should help identify priority areas for conserving *Sporophila* seedeaters and other grassland birds, and their habitats, in South America.

METHODS

SEASONAL MOVEMENTS

To classify the movements of *Sporophila* seedeaters, I used data I collected during several years of field work (1982–1995) in Brazil as well as a literature survey (Remsen and Hunn 1979; Sick 1985; Hilty and Brown 1986; Antas and Cavalcanti 1988; Ridgely and Tudor 1989; Fjeldså and Krabbe 1990; Collar et al. 1992; Chesser 1994; Silva 1995a, b; Rosário 1996; Stotz et al. 1996). I identified three major types of movements. The first category includes species that make only local movements, which I defined as short-distance movements (less than a few kilometers) between two or more adjacent habitats in response to seasonal changes. For example, Variable Seedeater (*S. americana*) moves from várzea grasslands to open várzea forests during the seasonal rising of the water level of the Amazon River (J. M. Silva, pers. obs.). The second category includes species that make regional, intermediate movements (100–1,000 km) within a single large South American ecological region. Examples of this category include Buffy-fronted Seedeater (*S. frontalis*) and Temminck's Seedeater (*S. falcirostris*), which move within the Atlantic Forest region following the seeding of bamboos (primarily *Merostachys* spp. and *Chusquea* spp.; Sick 1985). The third category includes species that make long-distance seasonal movements (>1,000 km) between at least two major ecological regions in South America. For example, Lined Seedeater (*S. lineola*), a species that has two distinct populations breeding in northeastern and southeastern South America, moves north to the Llanos and Amazonia, respectively, during the austral fall and winter (Silva 1994).

CONSERVATION PRIORITIES

I used two methods to identify areas critical to the conservation of *Sporophila* seedeaters in South America. The first method consisted of mapping the breeding ranges of all *Sporophila* species regarded as threatened or near threatened in the "red data" book of American birds (Collar et al. 1992) and then determining where species' distributions overlapped. The second method consisted of mapping the breeding ranges of all species or well-marked subspecies with a restricted range. I considered well-marked subspecies to

TABLE 2. WINTERING AREAS OF LONG-DISTANCE MIGRANT *Sporophila* SEEDEATERS IN SOUTH AMERICA

Common name	Species	Wintering areas
Lined Seedeater	*lineola*	
Caatinga population		Llanos, savannas of northern South America
southern population		Amazonian várzea grasslands
Lesson's Seedeater	*bouvronides*	Amazonian várzea grasslands
Yellow-bellied Seedeater	*nigricollis*	Cerrado region
Double-collared Seedeater	*caerulescens*	Cerrado region
Capped Seedeater	*bouvreuil*	Cerrado region
Tawny-bellied Seedeater	*hypoxantha*	Cerrado region
Rufous-rumped Seedeater	*hypochroma*	Cerrado region, central Brazil
Dark-throated Seedeater	*ruficollis*	Cerrado region, Humaitá
Marsh Seedeater	*palustris*	Cerrado region
Chestnut-bellied Seedeater	*castaneiventris*	Cerrado region
Chestnut Seedeater	*cinnamomea*	Cerrado region
Black-bellied Seedeater	*melanogaster*	Cerrado region
White-throated Seedeater	*albogularis*	Cerrado region
Narosky's Seedeater	*zelichi*	unknown

be any populations that are distinct from other populations of the same species by discrete morphological characters. I made determinations of well-marked taxa by studying museum specimens from the American Museum of Natural History (United States), Museu de Zoologia da Universidade de São Paulo (Brazil), Museu Paraense Emílio Goeldi (Brazil), and Zoological Museum of the University of Copenhagen (Denmark). These subspecies could be regarded as different species under the phylogenetic species concept (Cracraft 1983, McKitrick and Zink 1988). I defined a restricted range as 350,000 km^2 or smaller.

High-priority areas for the conservation of *Sporophila* seedeaters were determined to be areas that included at least one population of all threatened or near-threatened species (in the first method) or all restricted-range taxa (in the second method). For both methods, I assumed that the taxa whose ranges were mapped were the most likely to go extinct if current trends in habitat modification in South America continue.

RESULTS

PATTERNS OF SEASONAL MOVEMENTS

Based on a literature survey and my own studies, I gathered data about the seasonal movements of 23 species of South American *Sporophila* seedeaters (Table 1). Fourteen species make long-distance movements, five make local movements, and four make regional movements (Table 1).

Eleven of the 14 species that make long-distance movements are part of a larger migration system in South America known as neotropical austral migration, a migration from southern South America to central or northern South America during the austral fall and winter (Table 2; Zimmer 1938, Sick 1983, Chesser 1994, Hayes 1995). An additional three species, al-

TABLE 3. BREEDING DISTRIBUTIONS OF SOUTH AMERICAN *Sporophila* SEEDEATERS REGARDED AS THREATENED OR NEAR THREATENED BY COLLAR ET AL. 1992

Common name	Species	Category[a]	Area[b]						
			NAR	CB	URP	ARA	PAR	SC	ERC
Buffy-fronted Seedeater	*frontalis*	T					√	√	
Temminck's Seedeater	*falcirostris*	T					√		
Hooded Seedeater	*melanops*	T				√			
Black-and-tawny Seedeater	*nigrorufa*	T		√	√				
Tumaco Seedeater	*insulata*	T	√						
Rufous-rumped Seedeater	*hypochroma*	T		√	√		√		√
Dark-throated Seedeater	*ruficollis*	NT		√	√	√			√
Marsh Seedeater	*palustris*	T							√
Chestnut Seedeater	*cinnamomea*	NT							√
Black-bellied Seedeater	*melanogaster*	NT					√		
Narosky's Seedeater	*zelichi*	T							√

[a] T = threatened, NT = near threatened.
[b] NAR = Nariño, CB = central Bolivia, URP = upper Rio Paraguay, ARA = Araguaia, PAR = upper Rio Paraná, SC = Santa Catarina, ERC = Entre Ríos-Corrientes.

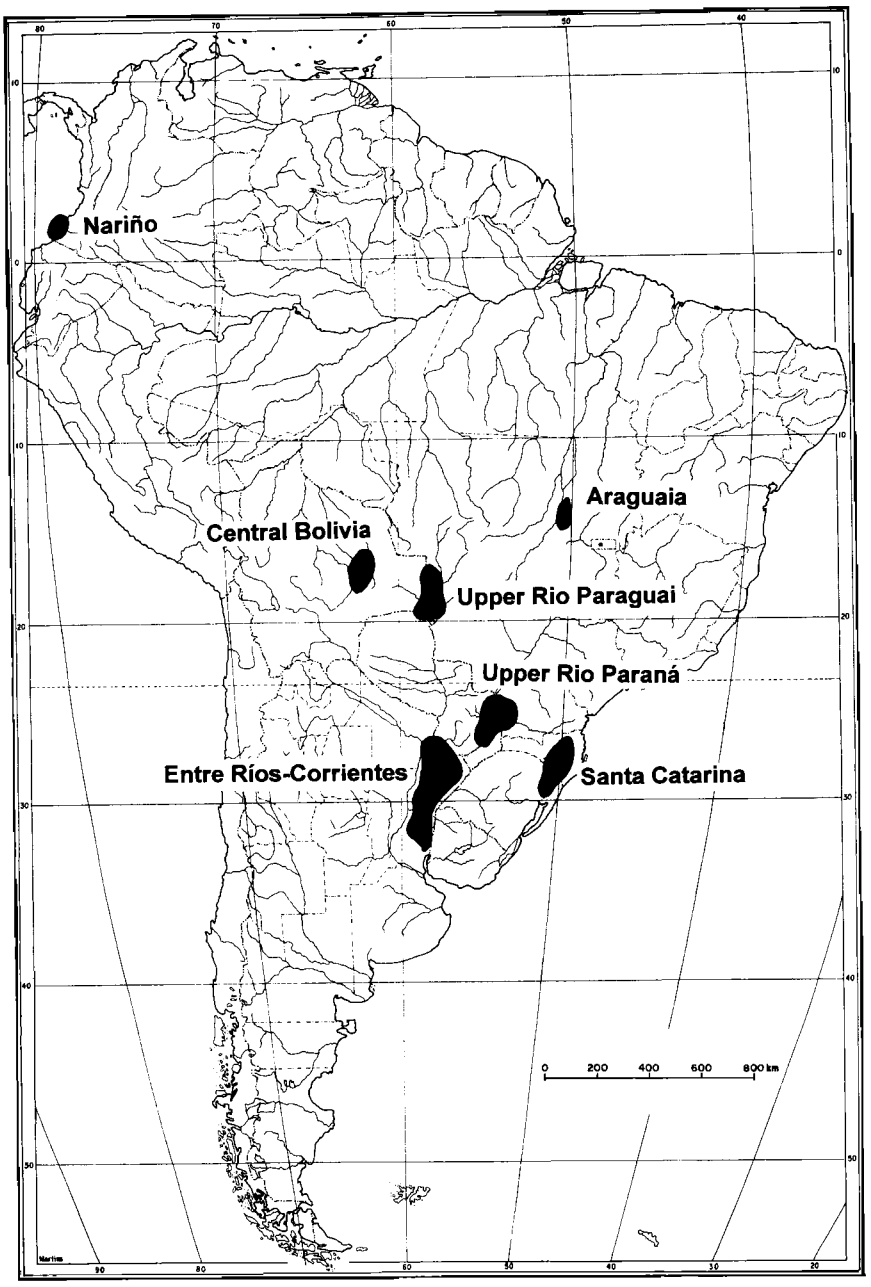

FIGURE 1. Priority areas for conservation of *Sporophila* seedeaters in South America. Areas were identified by mapping the ranges of 11 species regarded as threatened or near threatened by Collar et al. 1992.

though long-distance migrants, are not austral migrants and thus do not fit this migration pattern. Lesson's Seedeater breeds in the Llanos and other grasslands of northern South America between June and December (Thomas 1979) and then moves south to upper and central Amazonia (Ridgely and Tudor 1989; J. M. Silva, unpubl. data); Chestnut-bellied Seedeater (*S. castaneiventris*) breeds mostly in Amazonia but has been recorded in the Cerrado region, on the grasslands along the Rio São Francisco (Sick 1985; but see comments in Ridgely and Tudor 1989);

TABLE 4. BREEDING DISTRIBUTION OF *Sporophila* SEEDEATERS WITH RESTRICTED RANGES IN SOUTH AMERICA

Common name	Species	Area[a]								
		NSA	NAR	PC	CB	ARA	RJ	SP	SC	ER
Buffy-fronted Seedeater	*frontalis*						√	√	√	
Temminck's Seedeater	*falcirostris*						√	√		
Lesson's Seedeater	*bouvronides*	√								
Hooded Seedeater	*melanops*					√				
White-bellied Seedeater	*leucoptera bicolor*				√					
Parrot-billed Seedeater	*peruviana*			√						
Drab Seedeater	*simplex*			√						
Black-and-tawny Seedeater	*nigrorufa*				√					
Capped Seedeater	*bouvreuil crypta*						√			
Capped Seedeater	*bouvreuil saturata*							√		
Tumaco Seedeater	*insulata*		√							
Marsh Seedeater	*palustris*									√
Chestnut Seedeater	*cinnamomea*									√
Black-bellied Seedeater	*melanogaster*								√	
Chestnut-throated Seedeater	*telasco*		√	√						
Narosky's Seedeater	*zelichi*									√

[a] NSA = northern South America, NAR = Nariño, PC = Peruvian coast, CB = central Bolivia, ARA = Araguaia, RJ = Rio de Janeiro, SP = São Paulo, SC = Santa Catarina, ERC = Entre Ríos-Corrientes.

and White-throated Seedeater (*S. albogularis*) breeds in the Caatinga and possibly moves south to the Cerrado (Silva 1995b).

Even though the wintering distributions of several *Sporophila* species are poorly known, it is clear that grasslands in the Cerrado region are the most important wintering sites for populations of at least 10 species (Table 2). Other important sites for migrant *Sporophila* include Amazonian várzea grasslands, central Bolivian grasslands, some Amazonian upland savannas (e.g., Humaitá, Brazil), and the Llanos (Table 2).

CONSERVATION PRIORITIES FOR *SPOROPHILA* SPECIES

I mapped the ranges of 11 *Sporophila* species regarded as threatened or near threatened (Table 3). Seven critical grassland areas that include at least one population of each of these species were identified: Nariño (defined here as the western portion of the Department of Nariño in southern Colombia and the islands of Tumaco and Boca Grande), central Bolivia, the upper Rio Paraguay, Araguaia (defined as the grasslands along the Rio Araguaia, south of Bananal Island and on the border between the Brazilian states of Mato Grosso and Goiás), the upper Rio Paraná (a region including the province of Misiones in Argentina, southeastern Paraguay, and the western portion of the Brazilian state of Paraná), Santa Catarina (defined as southern Santa Catarina and northern Rio Grande do Sul states, Brazil), and Entre Ríos-Corrientes (the vast wet grassland region located in the Argentine provinces of Entre Ríos and Corrientes, between the Rios Paraguay and Uruguay; Fig. 1). If reserves are created in these seven areas, populations of 23 *Sporophila* species would be protected. The seven species (Gray Seedeater [*S. intermedia*], Lesson's Seedeater, Black-and-while Seedeater [*S. luctuosa*], White-throated Seedeater, Parrot-billed Seedeater [*S. peruviana*], Drab Seedeater [*S. simplex*], and Chestnut-bellied Seedeater) that would not be protected in these reserves have adapted successfully to anthropogenic modifications in their habitats and are not likely to become threatened in the future (Stotz et al. 1996).

I regarded 16 species or well-marked subspecies of *Sporophila* seedeaters as having restricted ranges (Table 4). Based on the range overlaps of these 16 taxa, I identified 9 priority areas for conservation of South American *Sporophila* seedeaters: northern South America, Nariño, the Peruvian coast, central Bolivia, Araguaia, Rio de Janeiro (defined here as the Atlantic Forest remnants and natural grasslands around the city of Rio de Janeiro and neighboring towns), São Paulo (the Atlantic Forest remnants and natural grasslands around the city of São Paulo and neighboring towns), Santa Catarina, and Entre Ríos-Corrientes (Fig. 2). If reserves are created in these areas, populations of 29 species (96.6%) of *Sporophila* seedeaters would be protected. The only species that would not be protected, White-throated Seedeater, still is quite common in northeastern Brazil and seems to be expanding its range in other regions (J. M. Silva, pers. obs.)

DISCUSSION

Two major problems affect populations of several South American *Sporophila* species:

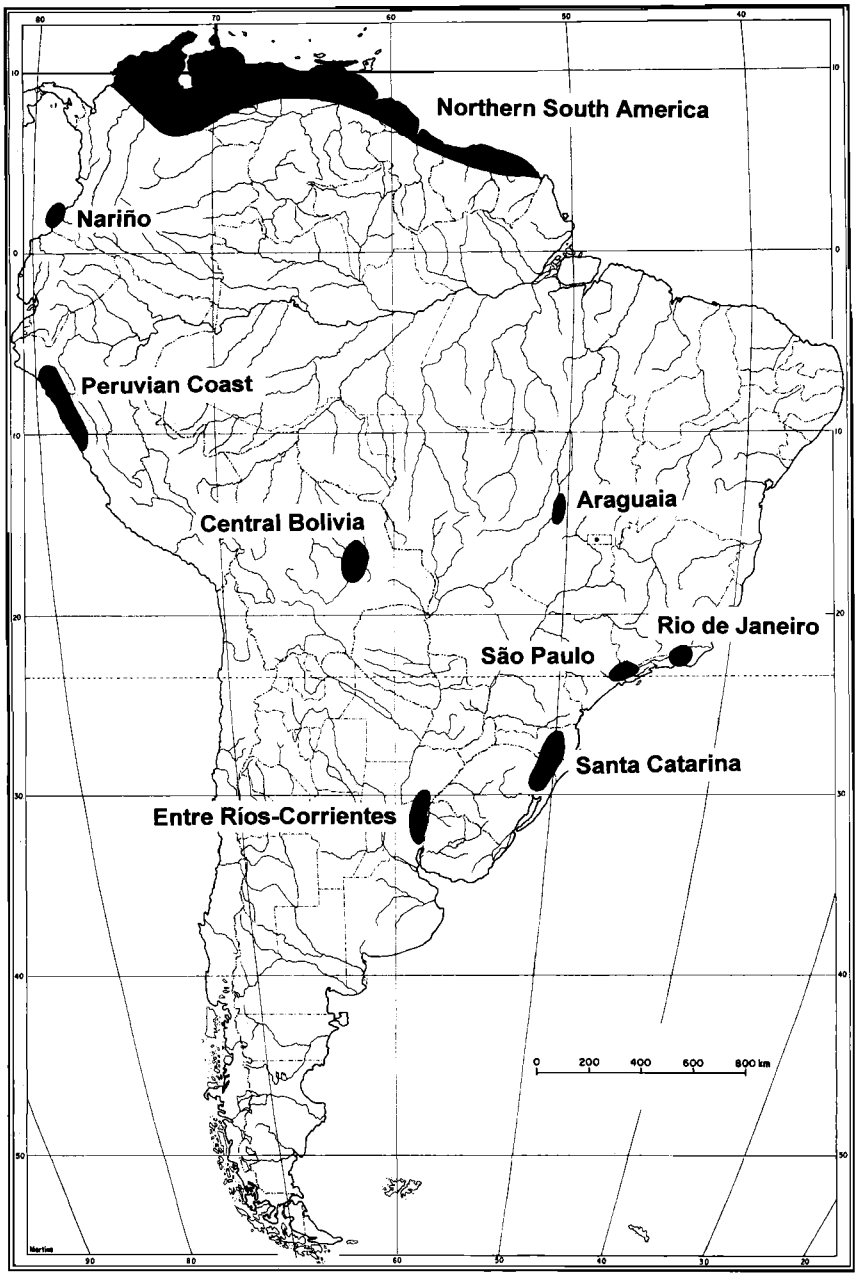

FIGURE 2. Priority areas for conservation of *Sporophila* seedeaters in South America. Areas were identified by mapping the ranges of 16 species or well-marked subspecies with restricted ranges ($\leq$ 350,000 km^2).

widespread capture for the cagebird trade and loss of habitat (Sick 1985, Collar et al. 1992, Willis and Oniki 1993). Although the first problem might be solved by education and enforcement of existing wildlife-protection laws, the second can be addressed only by conserving critical areas of natural grassland ecosystems.

The results of the two methods I used to identify priority areas for the conservation of *Sporophila* seedeaters were only partially congruent. Both methods identified five of the same areas: Nariño, central Bolivia, Araguaia, Santa Catarina, and Entre Ríos-Corrientes. Areas identified by only one method were northern South Amer-

ica, the Peruvian Coast, the upper Rio Paraguay, the upper Rio Paraná, Rio de Janeiro, and São Paulo. The method that focused on threatened and near-threatened species did not identify as many areas or protect as many species as the method based on restricted-range taxa. Many more *Sporophila* species will be protected if conservation areas are determined by the restricted-range method.

The International Council for Bird Preservation (ICBP; 1992) identified several endemic bird areas (EBAs) worldwide by mapping all species that had ranges of 50,000 km^2 or smaller. Compared with ICBP's study, eight areas identified in this study showed high spatial congruence with previously recognized EBAs: northern South America, Nariño, the Peruvian coast, the upper Rio Paraná, Rio de Janeiro, São Paulo, Santa Catarina, and Entre Ríos-Corrientes. Areas that were not identified by the ICBP study include central Bolivia, Araguaia, and the upper Rio Paraguay.

The methods I used in this study did not take into account several important factors one might use when evaluating and selecting priority areas for conservation, such as levels of habitat modification, population trends of species, and viability of reserves. Therefore, the priority areas I have identified must be viewed as initial recommendations where government agencies and private organizations and institutions can direct their conservation efforts to protect South American grasslands. The need for conservation action is critical because human pressure has been so intense and major environmental modifications have already occurred in some of these areas, notably Entre Ríos-Corrientes, Nariño, the Peruvian coast, Santa Catarina, Rio de Janeiro, and São Paulo.

The methods used in this study and in other efforts (e.g., ICBP 1992) to identify priority conservation areas have not accounted for the wintering areas of migratory birds. Unfortunately, the winter distributions of most South American birds, including several *Sporophila* seedeaters, are not adequately known (Marantz and Remsen 1991). Despite this limitation, my analysis has identified some critical areas that are clearly important for migratory *Sporophila* seedeaters (Table 2). Among these areas, the most important is the Cerrado region, the largest savanna region in South America, which harbors a rich flora and fauna (Silva 1996). Unfortunately, the Cerrado is undergoing rapid environmental degradation, encouraged by the Brazilian government. Approximately 50% of the region has been converted to modern agricultural use, either as "improved" pastures planted with exotic grasses (*Brachiaria, Hyparrhenia rufa,* and *Panicum maximum*) or as arable land, primarily for the cultivation of annual crops such as soybeans, maize, rice, and cassava (Ratter 1995). To date, only 0.7% of the Cerrado is protected in national parks or ecological stations (Silva 1996). Because conserving wintering areas is as important for migratory birds as is protecting breeding areas (Terborgh 1980, Basili and Temple 1999), creating new reserves in the Cerrado must be regarded as a leading conservation priority for several migratory species of *Sporophila* seedeaters, as well as for other South American grassland birds.

ACKNOWLEDGMENTS

I thank R. B. Cavalcanti, E. Bucher, and P. D. Vickery for suggesting that I present this paper at the Ecology and Conservation of Grassland Birds Conference in Tulsa, Oklahoma, in 1995. I thank D. C. Oren for his invaluable comments on the first draft of the manuscript. J. Fjeldså discussed with me several issues about conservation of South American grasslands. My studies have been supported by the Conselho Brasileiro de Desenvolvimento Científico e Tecnológico, Brasília, Brazil. Field work and collection studies were supported by the National Geographic Society (grant no. 4964-93), Danish Natural Science Research Council (grant j. nr. 11-0390), World Wildlife Fund-US, Frank M. Chapman Memorial Fund, John D. and Catherine T. MacArthur Foundation, Museu Paraense Emílio Goeldi, and Universidade de Brasília.

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