Assessment of the distribution and status of the Southern Pochard *Netta e. erythrophthalma* in South America

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Abstract

The Southern Pochard *Netta erythrophthalma* occurs in southern and eastern Africa, and in northern and eastern South America. It is widespread and common in Africa, where the population of the subspecies *Netta e. brunnea* is estimated at 30,000–70,000 individuals. Distribution of the nominate subspecies *Netta e. erythrophthalma* in South America is more localised, with breeding populations in the Caribbean and Pacific coasts, and the Andes from Venezuela south to the Andes in Argentina, and on the Atlantic coast of Brazil. Estimates of total numbers in South America, put at *c.* 25,000 birds, have been rather imprecise due to lack of data and likely overestimate the actual numbers. The species has been declining and contracting its range in South America since the 1970s. A review of the current distribution and status of Southern Pochard in South America suggests a major decline throughout most of its range, particularly in the Andes, Caribbean coast and Pacific lowlands, with no recent confirmed records from most of Colombia and Peru and dramatically reduced numbers in Ecuador. It is declining in Venezuela and numbers in Argentina have always been low. In Brazil the species is still numerous in Ceará south to Bahia and Goiás states, but apparently declining. Hunting and habitat loss from siltation, dredging and destruction of riparian vegetation appear to be the major threats. We estimate that the current maximum numbers are of 10,000 Southern Pochard in South America (although potentially as few as 5,000), making it necessary to update and revise the conservation status of this South American subspecies.

Key words: Conservation, *Netta erythrophthalma*, population size and trends, South America, Southern Pochard, threats.

South America supports 46 species of Anatidae, including six Nearctic migrants and two vagrants from the northern hemisphere (Madge & Burn 1988; Carbonell & Garvin 2002). Of the resident species, two belong to the genus *Netta*: Southern Pochard *N. erythrophthalma* and the endemic Rosy-billed Pochard *N. peposaca*. The former is represented by the nominate subspecies *N. e. erythrophthalma*, whereas the subspecies *N. e. brunnea* is endemic to Africa.

Unlike its African counterpart, the Southern Pochard of South America remains poorly studied (Carboneras 1992). It is a diving and dabbling omnivore (Madge & Burn 1988; Carboneras 1992) that lives primarily in large, deep, freshwater wetlands and brackish lagoons with abundant submerged vegetation (Madge & Burn 1988) and shallower, permanent wetlands with abundant algae and aquatic vegetation (Fjeldså & Krabbe 1990; Carboneras 1992; Hilty 2003). Also, unlike Southern Pochard in Africa, the South American subspecies is not known to undergo regular seasonal movements (Madge & Burn 1988). However, records away from its regular (and former) breeding grounds, as well as the fact that most known records from Argentina are from the late summer, suggest some seasonal dispersal (Fjeldså & Krabbe 1990; Carboneras 1992; Hilty 2003). It has been suggested that the species' populations have been declining since the 1970s throughout its patchy and poorly-known distribution in the northern half of South America (King 1981).

Here we present a historical overview of the distribution and abundance of the species in South America, and assess its current conservation status. We also explore possible causes of the species' decline and suggest some conservation actions that should be taken in order to prevent further declines and potentially recover populations in South America. Overall, the purpose of this paper is to draw attention to the possibility that the South American subspecies is going extinct unnoticed and that conservation actions are needed to reverse its declining trend.

Distribution and status

The nominate race of Southern Pochard occurs locally in northern South America (Fig. 1), with resident breeding populations in Venezuela, Colombia, Ecuador, Peru and Brazil. It is a regular visitor to Argentina, with observations reported from Chile, Paraguay, Suriname, and Trinidad and Tobago. It appears never to have been numerous, or to have formed large congregations (Johnsgard 1978; King 1981; Madge & Burn 1988). Earlier estimates indicated a total of 25,000–50,000 birds (Rose & Scott 1994), later updated to 10,000–25,000 individuals in Brazil and a declining population of < 2,500 individuals in Venezuela (Delany & Scott 2002; Wetlands International 2006, 2015).

In order to reassess the status of Southern Pochard in South America, we here summarise its distribution and provide country-by-country population data – chronologically when possible – for those countries where the Southern Pochard is known to breed or regularly occur.

Trinidad and Tobago. The species is known only from a single lost specimen obtained in Trinidad in the 1860s (ffrench 1991), with

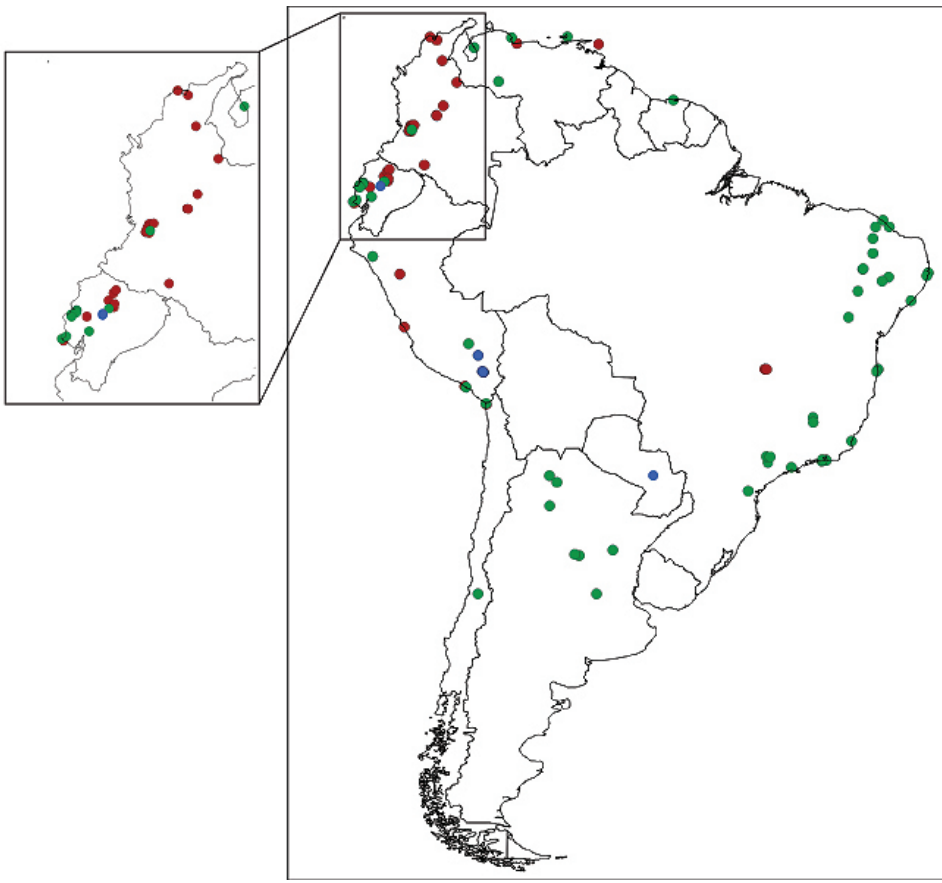

Figure 1. Locality records of Southern Pochard *Netta erythrophthalma* in South America. Green dots: recent records (post 1980); red dots: old records (pre 1980); blue dots: unverified records (identification uncertainties). Number of individuals in each locality is not shown; some recent records involve 1–2 individuals and most do not surpass 100–150 individuals. Inset shows the extent of lost populations in Colombia and Ecuador.

no records for over 150 years (Kenefick *et al.* 2007).

Venezuela. There are scattered records from the northern coast up to 500 m elevation, including Zulia Department (Lagunillas), east Falcón (Chichiriviche), western Apure, Barinas (Puerto de Nutrias), Aragua, Portuguesa, southern Carabobo and Guárico (near Calabozo) (Hilty 2003). A recent record from Los Cerritos Pampatar (Nueva Esparta) is the first record for Margarita Island (David Ascanio, unpubl. data). Additional sites where the species has been recorded include Mantecal and Hato Cedral (Hilty 2003). There is a published

estimate of 5,000–10,000 Southern Pochard in Venezuela (Kear 2005), but the original source cannot be located (C. Sharpe, unpubl. data). This estimate is now considered an over-estimation (Rojas-Suárez *et al.* 2015). There are no well-documented assessments of numbers from before the 1990s. It was considered to be relatively common at Lago de Valencia (Carabobo) and Chichiriviche (Falcón) back in the 1950s (Hilty 2003; Rojas-Suárez *et al.* 2015). Its populations in Venezuela are in severe decline (Rojas-Suárez *et al.* 2015). Only 17 birds were recorded during recent waterfowl censuses (*i.e.* the Neotropical Waterbird Censuses; see Table 1).

Colombia. Southern Pochard was previously known from the lower Magdalena in Atlántico (south of Baranquilla), Cesar (Chiriguaná), and Magdalena Departments (Ciénaga Grande de Santa Marta, where one male specimen was collected in March 1976). In the mid 20th century, Lehmann (1957) reported it as an abundant, likely breeder, with flocks numbering up to 200 birds, in the central Cauca Valley of the Valle del Cauca Department. The species was also known from localities in Valle del Cauca including Río Cauca, Laguna de Sonso, Cali, Candelaria and Paso de la Torre (where birds were last found in 2001). There have been additional sightings from the Bogotá plateau, east Andes, up to 2,600 m elevation in south Boyacá and Cundinamarca Departments (Fúquene, La Herrera, Fontibón), and birds have also been reported from the eastern lowlands in west Caquetá (Tres Esquinas) (Olivares 1969; Hilty & Brown 1986; Renjifo *et al.* 2002). Except for four birds at Ciénaga Grande de Santa Marta in March 2012 (Ruiz-Guerra *et al.* 2012), there have been no records in Colombia in recent decades (Arzuza *et al.* 2008), not even during the 2002–2013 waterbird counts (Cifuentes-

Table 1. Southern Pochard recorded in Venezuela during the Neotropical Waterfowl Censuses (2006–2013).

Month, year	Locality, state	No. of individuals	Source
2006–2008		0	Martínez (2007, 2008); Martínez *et al.* (2009)
Feb. 2009	Los Cerritos, Nueva Esparta	1	Martínez (2010)
Jul. 2009	Undetermined locality, Zulia	16	Martínez (2010)
2010–2013		0	Martínez & Giner (2011); Martínez (2012); Sainz-Borgo *et al.* (2014)

Sarmiento & Castillo-Cortés 2013). The species may still occur in poorly-explored wetlands in the middle Magdalena valley and the Llanos of eastern Colombia, given its discovery in the Llanos of Venezuela in the 1980s (Gómez-Dallmeier & Cringan 1989; but see Renjifo *et al.* 2002).

Ecuador. There have been a few records from the northern highlands and southwest lowlands, up to 3,200 m elevation in the former, but not above 100 m in the latter (Juan Freile & Robin Restall, unpubl. data). Two males were collected at the La Carolina marshes, north of Quito (which no longer exist; Lönnberg & Rendahl 1922). Other records from the Andes (Lakes San Pablo and Yaguarcocha in Imbabura Province; Lake Micacocha in Napo Province) date back to the 1930s and 1940s (Ridgely & Greenfield 2001; Félix Man-Ging, unpubl. data). The last report from Yaguarcocha was in 1981 (Scott & Carbonell 1986) and from Lake Papallacta in 1974 (Ridgely & Greenfield 2001). Marchant (1958) collected a male near Ancón in Santa Elena Province (July 1956) and observed a few individuals at Represa Velasco Ibarra between October 1954 and August 1957. In the same area, Haase (2011) observed a pair at the Mar Bravo saltpans in July 1997, and one female in July 2005 at the Pacoa saltpans. López-Lanús & Gastezzi (2000) reported a flock of 14–20 birds at the La Segua marshes in 1995–1996. The species was last seen at La Segua in February 2007, when four birds were observed (Santander & Lara 2008; Freile *et al.* 2013), with no further records in subsequent years (Santander *et al.* 2013). A report of 32 birds counted at Colta Lake in July 2005 is undocumented and is regarded as a misidentification (Santander *et al.* 2006).

Peru. The Southern Pochard has been recorded from a handful of sites in coastal and Andean wetlands, in the departments of Lima (Veguetá, Mala, Villa), Lambayeque (Tumán, Tinajones), Arequipa (Mejía, Mollendo), San Martín (Pajatén, Pajaz), Apurimac (Hacienda La Laguna) and Cusco (Huacarpay) (Chubb 1919; Hughes 1970; Valqui 2004; Schulenberg *et al.* 2006, 2007; Manuel A. Plenge & Thomas S. Schulenberg, unpubl. data). The species was also reported in 1992–1993 at seven lakes above 4,000 m in Puno Department and one lake in Cusco (Velarde 1998; Table 2). There were two sightings from Lake Marcapomacocha, Junín Department, at 4,400 m elevation in September 2002 (Manuel A. Plenge, unpubl. data). Southern Pochard is currently considered to be extinct in coastal Peru (Angulo-Pratolongo *et al.* 2010), where the last reliable records date back to the 1960s (Hughes 1970). It was not recorded at Etén, Lambayeque Department by Angulo-Pratolongo *et al.* (2010), where it had been collected in 1899 (Chubb 1919) and there are no reports from annual waterbird censuses during 2005–2010 (González & Pulido Capurro 2011).

Chile. Southern Pochard was probably only ever a vagrant in Chile (Peredo & Miranda 2001) and Barros (2015) suggests that existing published records are not valid because they lack supporting documentation. Several specimens were supposedly collected in Arica in October

Table 2. Southern Pochard recorded in Peru during the Neotropical Waterfowl Censuses (1992 –1995), from Velarde (1998).

Month, year	Locality, department	No. of individuals*
1992	Laguna Maquera, Puno	29
1993	Laguna Maquera, Puno	18
1992	Laguna La Calzada, Puno	96
1993	Laguna La Calzada, Puno	29
1992	Laguna Chacchura, Puno	27
1993	Laguna Chacchura, Puno	5
1993	Laguna Suytococha, Puno	2
1993	Laguna Huaycho, Puno	93
1992	Laguna Saytococha, Puno	306
1993	Laguna Saytococha, Puno	40
1993	Laguna Chakán, Cusco	18

*These records have been questioned because identification was uncertain (Manuel A. Plenge & Thomas S. Schulenberg, unpubl. data).

1883 (Barros 2015). A pair was reported from San Rafael, Chacabuco Province, in April 1992 (Aguirre *et al.* 1992) and one sighted on the Lluta River estuary, Arica region, in April 1998 (Peredo & Miranda 2001). The species was not recorded in Chile during the 2005–2010 waterbird censuses (Schmitt *et al.* 2011).

Argentina. Observations of Southern Pochard are mostly from lagoons and rivers in the Andean provinces of Jujuy, Catamarca and San Juan in northwest Argentina, but have also been reported from forested areas of Parque National El Rey, Salta Province and at two sites in Córdoba (Weller 1968; Canevari *et al.* 1991; Serra *et al.* 1999; Chebez 2008). An unusually high count of 220 birds at Laguna Melincué (Santa Fe Province) on 24 February 1996 is the highest count for the country, but this requires confirmation (Wetlands International 2015). Nine birds were reportedly seen in 2004 from an unknown locality (Nores & Serra 2005). Information compiled during recent waterfowl censuses (the Neotropical Waterbird Censuses) is presented in Table 3.

Brazil. Southern Pochard has been reported from Ceará, Piauí, Rio Grande do Norte, Pernambuco, Alagoas, Bahia, Espírito Santo, Río de Janeiro and São Paulo states; as well as westwards to central Bahía and

Table 3. Southern Pochard recorded in Argentina counts the Neotropical Waterfowl Censuses (1995–2012).

Month, year	Locality, province	No. of individuals	Source
Feb. 2005	Embalse El Caldillal, Tucumán	9	Serra (2006)*
2006–2007		0	Serra (2007, 2008)
Feb. 2008	Isla El Mistolar, Córdoba	9	Serra (2009)
Jul. 2009	Laguna del Plata, Córdoba	4	Serra (2010)
Jul. 2009	Bañados del Río Dulce, Córdoba	5	Serra (2010)
Jul. 2009	San Salvador de Jujuy, Jujuy	4	Serra (2010)
2010		0	Rabuffetti (2011)
Jul. 2011	No locality data	8	Rabuffetti (2012)
2012		0	Rabuffetti (2013)

*1,777 birds quoted for July 2005 count is a typing error.

Goiás states and Brasília Federal District (Teixeira & Nacinovic 1981; Antas & Resende 1983; Willis 1991; Sick 1993; Farias *et al.* 2002; Olmos *et al.* 2005; Pereira *et al.* 2008; see Table 4).

Teixeira & Nacinovic (1981) suggested that the species was uncommon, but possibly local or scarce in Brazil, while other authors considered that it was increasing and spreading to the south and west (interior) Brazil following habitat modification, but failed to provide evidence to this effect (Antas & Resende 1983; Alvarenga 1990; Willis 1991; Sick 1993). The scant information available does not suggest large numbers aside from rough estimates provided by Antas & Resende (1983) and a decade later by Blanco & Canevari (1993). Several hundred birds present from the 1970s until about 1990 at Brasília National Park are apparently no longer present (Gwynne *et al.* 2010). Further, the species was not reported at any Brazilian locality during the 2005–2010 waterbird censuses (Menegheti 2006; Disconzi 2010). The absence of records during 2005–2010 Neotropical Waterbird Censuses is puzzling, given that there were a number of records (see Table 4) during these years.

Paraguay. Despite a couple of sightings reports from the Paraguayan Chaco, no documented records exist (del Castillo & Clay 2004).

Suriname. Occurs as a vagrant on coastal wetlands, where it has been reported at only two localities (Ottema *et al.* 2014).

Table 4. Counts available from published literature and public online sources, in chronological order, of Southern Pochard in Brazil. Only counts of > 6 individuals are included.

Month, year	Locality, state	No. of individuals	Source
Aug. 1979	Lakes Itaipu-Piratininga, Rio de Janeiro	80	Teixeira & Nacinovic (1981)
Aug. 1979	Lakes Marapendí-Jacarépaguá, Rio de Janeiro	12	Teixeira & Nacinovic (1981)
Aug. 1980	Santa Maria Reservoir, Brasília	several flocks of 50–100	Antas & Resende (1983)
Apr. 1981	Santa Maria Reservoir, Brasília	20	Antas & Resende (1983)
Jun. 1981	Santa Maria Reservoir, Brasília	7	Antas & Resende (1983)
Jul. 1992	Volta da Serra, Bahía	1,000	Blanco & Canevari (1993)
Feb.–Mar. 1993	Lago de Sobradinho, Bahía	94	Blanco & Canevari (1994)
Jan. 1997	Bodocó and Ouricuri, Pernambuco	28	Pereira *et al.* (2008)
Jan. 1997	Piratininga, Rio de Janeiro	20	D. Beadle, eBird*
Jan. 2000	Bodocó and Ouricuri, Pernambuco	18	Pereira *et al.* (2008)
Feb. 2000	Chapada Diamantina, Bahía	9	P. Bono, eBird
May. 2001	Bodocó and Ouricuri, Pernambuco	35	Pereira *et al.* (2008)
Jan. 2006	Bodocó and Ouricuri, Pernambuco	7	Pereira *et al.* (2008)
Feb. 2007	Lagoa Lagamar, Rio Grande do Norte	51	Grupo Ornitológico Potiguar (unpubl. data)
Apr. 2007	Mocambeiro, Rio de Janeiro	10	R. Simpson, eBird
Jul. 2007	Lagoa de Queimado, Pendências, Rio Grande do Norte	150	Grupo Ornitológico Potiguar (unpubl. data)
Jul. 2007	Ipanguaçu, Rio Grande do Norte	19	Grupo Ornitológico Potiguar (unpubl. data)
Feb. 2009	Lagoa Lagamar, Rio Grande do Norte	21	Grupo Ornitológico Potiguar (unpubl. data)
Oct. 2013	Quixeramobin, Ceará	28	F. Rowland, eBird
Jan. 2014	Iguatú, Ceará	150	D. Gochfeld & L. Muscher, eBird

* 16 records uploaded in eBird do not provide numbers counted and are not included.

Population status overview

Previous accounts of the distribution and status of Southern Pochard in South America have been imprecise and contradictory. Johnsgard (1978) stated that it bred primarily from northwest Venezuela to southern Peru and that it extended in winter along the coasts of Peru, Colombia, Venezuela and Brazil (*contra* Delacour 1959). More recently, Carboneras (1992) listed only Venezuela, east Brazil and northwest Argentina as constituting the sub-species' distribution. This has probably led to an under-appreciation of the importance of local breeding (now mostly extinct) populations in Colombia, Ecuador and Peru, and limited concern regarding the overall status of the Southern Pochard in South America.

The size of the South American breeding populations is not well known and has likely been overestimated by most authors because of the scarcity of count data (Rose & Scott 1997; Delany & Scott 2002). Trends in abundance at regularly monitored localities suggest a considerable decline, with the species probably now scarce or even extinct in areas where it was reported as uncommon to abundant up until the 1970s (Lehmann 1957; Hughes 1970; Borrero 1972; Ortiz-Crespo 1983; Fjeldså & Krabbe 1990; Angulo-Pratolongo *et al.* 2000; Ridgely & Greenfield 2001; Renjifo *et al.* 2002; Hilty 2003). Worryingly, it seems that the species has disappeared from a majority of known localities over a short time-span (Fig. 1), is currently absent from most of Colombia, Ecuador and Peru, and is likely declining in Venezuela and possibly Argentina.

Overall, only one published count exceeds 1,000 birds (Blanco & Canevari 1993; see Tables 5–6); most standardized waterbird censuses found the species to be absent, or rarely exceeding 100 individuals (Blanco & Carbonell 2001; Tables 5–6). The most recent records of Southern Pochard in the Neotropical Waterbird Censuses (NWC) date back to 2009 for Venezuela, 2007 for Ecuador, 1995 for Peru, 2011 for Argentina, and 2011 for Brazil (with no records from Colombia). NWC data suggest declines in already small populations at several localities during the short sampling duration of these censuses.

We estimate that the total population for the Andean, Caribbean and Pacific regions (Venezuela through to Argentina) barely reaches 750–2,000 birds, based on a maximum of 50–100 individuals reported from 15–20 localities between 2000–2014. We acknowledge, however, that this estimate may probably be optimistic, given that most recent records from these regions involved just 1–10 birds.

The Brazilian population is likely larger than that of western South America. We estimate a rough population size of 3,750–9,000 individuals for Brazil, on the basis of up to 150–300 individuals at 25–30 localities where Southern Pochard were reported between 2000–2014.

It therefore seems that the most optimistic assessment of total numbers in South America is unlikely to exceed 10,000 birds. This is probably over-optimistic, because recent counts from coastal Brazil suggest low and/or declining numbers (Pereira *et al.* 2008; Disconzi 2011) and it is unknown whether numbers in interior

Table 5. Largest recent counts of Southern Pochard available for the entire Neotropical region. * = uncertain or unverified records.

Count	Locality	Coordinates	Date
1,000	Volta da Serra, Bahía, Brazil	10°53'52"S, 40°43'58"W	Jul 1992
306*	Saytococha, Puno Department, Peru	15°54'S, 70°32'16"W	Feb 1992
220*	Melincué, Santa Fe Province, Argentina	33°39'36"S, 61°27'57"W	Feb 1996
150	Iguatú, Ceará, Brazil	6°21'57"S, 39°17'59"W	Jan 2014
150	Lagoa de Queimado, Rio Grande do Norte, Brazil	5°14'09"S, 36°40'03"W	Jul 2007
100	Santa María, Brasília, Brazil	15°39'36"S, 47°57'57"W	Aug 1980
94	Lago de Sobradinho, Bahía, Brazil	9°25'59"S, 40°50'38"W	Feb 1993
80	Itaipu & Piratininga, Rio, Brazil	22°57'57"S, 43°01'59"W	Aug 1979
35	Bodocó & Ouricuri, Pernambuco, Brazil	7°37'58"S, 40°6'21"W	May 2011
28	Bodocó & Ouricuri, Pernambuco, Brazil	7°34'58"S, 40°4'58"W	Jan 1997
28	Quixeramobin, Ceará, Brazil	5°10'59"S, 39°17'59"W	Feb 2000

Brazil have increased, remained stable or declined since the observations of Antas & Resende (1983) during the early 1980s. The largest published count dates back two decades (Blanco & Canevari 1993), so a more realistic estimate for the total South American population is perhaps a maximum of 5,000 birds.

Conservation status

The species has never been considered globally threatened because of the large African population which, until recently, showed no indications of significant declines. BirdLife International (2016) suggests a declining trend in global numbers, but with African populations still numerous, this decline was not believed sufficiently rapid to approach the thresholds needed for Southern Pochard to be included in International Union for Conservation of Nature (IUCN) threatened species categories.

King (1981) ranked the South American subspecies of the Southern Pochard as "Indeterminate", highlighting that it has disappeared in most of its range in South America and that the cause of the declines is unclear. Other authors indicate a more serious decline since the 1980s (Madge & Burn 1988; Fjeldså & Krabbe 1990; Carboneras 1992; Hilty 2003). At national

Table 6. The most recent "large" counts of Southern Pochard available for each Neotropical country were the species breeds or visits regularly. * = approximate location; ** = uncertain or unverified records.

Country	Locality	Coordinates	Count	Date
Venezuela	Lagunillas, Zulia Department	10°7'58"N, 71°15'57"W	16	Jul 2009
Colombia	Valle del Cauca	3°53'N, 76°16'W*	200	1956–1957
Ecuador	La Segua, Manabí Province	00°42'S, 80°10'58"W	20	Oct 1996
Peru	Saytococha, Puno Department	15°54'S, 70°32'16"W	306**	Feb 1992
Argentina	Melincué, Santa Fe Province	33°39'36"S, 61°27'57"W	220**	Feb 1996
Brazil	Iguatú, Ceará State	6°21'57"S, 39°17'59"W	150	Jan 2014

levels, using IUCN criteria (*e.g.* IUCN 2010), it has been classified as Critically Endangered in Ecuador (Granizo *et al.* 2002), Vulnerable in Peru (El Peruano 2004), Critically Endangered in Colombia (Renjifo *et al.* 2002), and Endangered in Venezuela (Rojas-Suárez *et al.* 2015). Further, Chebez (2008) considered it as Vulnerable in Argentina (contra López-Lanús *et al.* 2008) (Table 7). Likewise, the Threatened Waterfowl Specialists Group (TWSG) has regarded this sub-species as Near Threatened since 2001 (TWSG 2001, 2003, 2006; Young *et al.* 2013). A re-assessment of its global conservation status is, therefore, desirable.

Despite the inexactness of previous population estimates for South America, we consider that the Southern Pochard in South America has declined from roughly 50,000 individuals (Rose & Scott 1994) to fewer than 10,000 (Table 7) within a three-generation time-span (with an estimated generation time of 7 years; BirdLife International 2016). This decline suggests a 70–80% decrease in numbers, qualifying the South American sub-species as Endangered or Critically Endangered because the causes for this decline are still operating, are not well understood and are not reversible (criterion A2). The current small population in South America is apparently divided into at least two isolated sub-populations: 1) a fragmented one in the western part of its South American range; and 2) eastern to central Brazil.

Threats

The reasons behind the decline of the Southern Pochard in South America are

Table 7. Overview of the conservation status of Southern Pochard in the Neotropical region. CR = Critically Endangered; EN = Endangered; VU = Vulnerable; LC = Least Concern; A2 = declining population (≥ 80% decline; classifications based on IUCN 2010).

	Area	Measure
Actual population size	Andes + Pacific + Caribbean	750–2,000
	E. Brazil	3,750–9,000
Approximate decline	South America	70–80%
Status in countries where likely breeds or has bred	Venezuela	EN: in decline
	Colombia	CR: possibly extinct since 1970s
	Ecuador	CR: not reported since 2007
	Peru	VU: no recent confirmed records
	Argentina	VU: < 10 birds last in 2012
	Brazil	LC: > 1,000 birds locally in 1990s; lower recent counts
Main threats	South America	Major habitat loss by siltation, dredging, pollution, destruction of riparian vegetation; overhunting
Overall status in South America	South America	EN/CR [A2]

little understood, but major habitat loss possibly resulting from siltation caused by soil erosion (Fjeldså & Krabbe 1990; Kear 2005), pollution, dredging and destruction of riverine and aquatic vegetation (Teixeira & Nacinovic 1981), along with overhunting (Callaghan & Green 1993; Renjifo *et al.* 2002), have been identified as the main threats to the species in South America (Table 7). It is not well-known whether factors threatening the species differ between the populations in western South America and in Brazil. An additional threat, identified only in Brazil, is egg collection for medicinal use (Alves *et al.* 2011). Moreover, conversion of natural wetlands into rice fields is likely extensive in the species' range in South America. Renjifo *et al.* (2002) specified over-hunting and habitat loss as being the causes of the drastic decline in Southern Pochard numbers in Colombia.

Key sites and conservation actions

Key sites, defined as sites that hold ≥ 1% of the biogeographic population of a species, are those localities holding more than 250–500 individuals based on the last population estimate for South America

(Wetlands International 2015) or up to 100 individuals based on our more conservative estimate of roughly < 10,000 birds (Tables 5–6). There is seemingly not a single site in Venezuela, Colombia, Ecuador, Peru or Argentina that supports more than 100 individuals, and several large counts in this region date back two decades, while other counts remain undocumented and are regarded as dubious due to identification problems. The last key sites for the species in South America lie in northeast and central Brazil (www.wikiaves.com.br) (Table 5; see Farias *et al.* 2002; Olmos *et al.* 2005; Pereira *et al.* 2008; Grupo Ornitológico Potiguar, unpubl. data), but here also some large counts are two decades old, with no recent data from the same general areas.

Urgent actions are needed to conserve wild populations of Southern Pochard in South America, including identification of factors driving population declines, a thorough population assessment for each country where the species is known to breed, and the identification of effective management and monitoring policies (see Austin *et al.* 2014).

Research must focus on spatial and temporal demographic patterns and trends, habitat use and seasonality, movements, current distribution and threats. A taxonomic assessment is also desirable given diagnostic differences in bill size and overall plumage colour (Delacour 1959) between the two completely isolated sub-species that face different conservation challenges (Tobias *et al.* 2010).

Information on the status of the species and threats faced at the few sites where the Southern Pochard was formerly numerous in South America is mostly out-dated. Further fieldwork at known sites and expeditions to other potentially occupied sites/regions (*i.e.* the llanos of eastern Colombia and southern Venezuela, or areas with similar environmental conditions to those currently holding viable populations) might help to identify key sites for the species.

Likewise, a number of habitat-level strategies and actions are considered important, to combat population declines and work towards enhancing abundance locally. These actions include: efficient protection of suitable areas where breeding populations are present and relatively stable; lobbying for responsible agricultural practices (*i.e.* where wetlands are being converted into rice fields) and improved hydrological management (*i.e.* water quality and quantity); habitat restoration in and around key wetlands; and education, training and public awareness at different levels. These actions need to involve a range of different stakeholders, including national and local authorities, landowners, hunters and local communities.

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References

Aguirre, J., García, M.D., Egli, G. & Philips, R. 1992. Segundo reporte de Pato castaño (*Netta erythrophthalma*). *Boletín Informativo UNORCH* 13: 8. [In Spanish.]

Alvarenga, H.M.F. 1990. Novos registros e expansões geográficas de aves no leste do estado de São Paulo. *Ararajuba* 1: 115–117. [In Portuguese.]

Alves, R.R.N., Barbosa, J.A.A., Santos, S.L.D.X., Souto, W.M.S. & Barboza, R.R.D. 2011. Animal-based remedies as complementary medicines in the semi-arid region of northeastern Brazil. *Evidence-Based Complementary and Alternative Medicine* doi:10.1093/ecamp/nep134.

Angulo-Pratolongo, F., Schulenberg, T.S. & Puse-Fernández, E.E. 2010. Las aves de los humedales de Eten, Lambayeque, Perú. *Ecología Aplicada* 9: 71–81. [In Spanish with English summary.]

Antas, P.T.Z. & Resende, S.M.L. 1983. First record of the South American Pochard in central Brazil. *Auk* 100: 220–221.

Arzuza, D.E., Moreno, M.I. & Salaman, P. 2008. Conservación de las aves acuáticas en Colombia. *Conservación Colombiana* 6: 1–72. [In Spanish.]

Austin, J., Slattery, S. & Clark, R.G. 2014. Waterfowl populations of conservation concern: learning from diverse challenges, models and conservation strategies. *Wildfowl* (Special Issue No. 4): 470–497.

Barros, R. 2015. Algunos comentarios a la lista de las aves de Chile. *La Chiricoca* 20: 57–78. [In Spanish.]

BirdLife International. 2016. *IUCN Red List for Birds*. BirdLife International Data Zone, Cambridge, UK. Accessible at http://www.birdlife.orghttp://www.birdlife.org (last accessed 10 January 2016).

Blanco, D.E. & Canevari, P. (eds.). 1993. *Censo Neotropical de Aves Acuáticas 1992*. Humedales para las Américas, Buenos Aires, Argentina. [In Spanish.]

Blanco, D.E. & Canevari, P. (eds.). 1994. *Censo Neotropical de Aves Acuáticas 1993*. Humedales para las Américas, Buenos Aires, Argentina. [In Spanish.]

Blanco, D.E. & Carbonell, M. (eds.). 2001. *El Censo Neotropical de Aves Acuáticas. Los Primeros 10 años: 1990–1999*. Wetlands International & Ducks Unlimited, Buenos Aires, Argentina & Memphis, USA. [In Spanish.]

Borrero, J.I. 1972. *Aves de Caza Colombianas*. Universidad del Valle, Cali, Colombia. [In Spanish.]

Callaghan, D.A. & Green, A.J. 1993. Wildfowl at risk, 1993. *Wildfowl* 44: 149–169.

Canevari, M., Canevari, P., Carrizo, G.R., Harris, G., Rodríguez Mata, J. & Straneck, R. 1991. *Nueva Guía de las Aves Argentinas*. Fundación Acindar, Santiago, Chile. [In Spanish.]

Carbonell M. & Garvin, J. 2002. *Know Your Ducks: a Waterfowl Identification Guide for the Caribbean, Central America and Northern South America*. Ducks Unlimited, Memphis, USA.

Carboneras, C. 1992. Family Anatidae. *In* J. del Hoyo, A. Elliott & J. Sargatal (eds.), *Handbook of the Birds of the World, Vol. I: Ostrich to Ducks*, pp. 536–628. Lynx Edicions, Barcelona, Spain.

Chebez, J.C. 2008. *Los Que se Van. Fauna Argentina Amenazada*. Editorial Albatros, Buenos Aires, Argentina. [In Spanish.]

Chubb, C. 1919. Notes on collections of birds in the British Museum from Ecuador, Peru, Bolivia, and Argentina. *Ibis* 61: 1–55.

Cifuentes-Sarmiento, Y. & Castillo-Cortés, L.F. 2013. Colombia: informe anual. Censo

Neotropical de Aves Acuáticas 2012. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2012; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Delacour, J. 1959. *The Waterfowl of the World*. Country Life, London, UK.

Delany, S. & Scott, D. (eds.). 2002. *Waterbird Population Estimates, 3rd Edition*. Wetlands International Global Series No. 12. Wetlands International, Wageningen, The Netherlands.

Del Castillo, H. & Clay, R. 2004. *Lista Comentada de las Aves de Paraguay*. Guyra Paraguay, Asunción, Paraguay.

Disconzi, G. 2010. Brasil: informe anual. Censo Neotropical de Aves Acuáticas 2010. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2010; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Portuguese with English summary.]

Disconzi, G. 2011. Brasil: informe anual. Censo Neotropical de Aves Acuáticas 2011. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2011; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Portuguese with English summary.]

El Peruano. 2004. *Categorización de Especies Amenazadas de Fauna Silvestre*. Decreto Supremo No. 034-2004 – AG del 22 de Septiembre de 2004, Lima, Peru. [In Spanish.]

ffrench, R. 1991. *A Guide to the Birds of Trinidad and Tobago, 2nd Edition*. Christopher Helm, London, UK.

Farias, G.B., Brito, M.T. & Pacheco, G.L. 2002. *Registros Ornitológicos de Pernambuco*. Observadores de Aves de Pernambuco, Recife, Brazil. [In Portuguese.]

Fjeldså, J. & Krabbe, N. 1990. *Birds of the High Andes*. Apollo Books, Svendborg, Denmark.

Freile, J.F., Ahlman, R., Brinkuizen, D.M, Greenfield, P.J., Solano-Ugalde, A., Navarrete, L. & Ridgely, R.S. 2013. Rare birds in Ecuador: first annual report of the Committee of Ecuadorian Records in Ornithology (CERO). *Avances en Ciencias e Ingenierías* 5: B24–B41.

Gómez-Dallmeier, F. & Cringan, A.T. 1989. *Biology, Conservation and Management of Waterfowl of Venezuela*. Editorial Ex-Libris, Caracas, Venezuela.

González, O. & Pulido Capurro, V. 2011. Perú: informe anual. Censo Neotropical de Aves Acuáticas 2010. *In* D.A. Unterkofler & D.E. Blanco (eds.), *Censo Neotropical de Aves Acuáticas 2010*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Granizo, T., Pacheco, C., Ribadeneira, M.B., Guerrero, M. & Suárez, L. (eds.). 2002. *Libro Rojo de las Aves del Ecuador*. Simbioe, Conservation International, UICN, Ministerio del Ambiente & EcoCiencia, Quito, Ecuador. [In Spanish.]

Gwynne, J.A., Ridgely, R.S., Tudor, G. & Argel, M. 2010. *Wildlife Conservation Society Birds of Brazil: the Pantanal and Cerrado of Central Brazil*. Comstock Publishing Associates, Ithaca, USA.

Haase, B. 2011. *Aves Marinas de Ecuador Continental y Acuáticas de las Piscinas Artificiales de Ecuasal*. Aves y Conservación, BirdLife International & Ecuasal, Guayaquil, Ecuador. [In Spanish.]

Hilty, S.L. 2003. *Birds of Venezuela*. A. & C. Black Publishers, London, UK.

Hilty, S.L. & Brown, W.L. 1986. *A Guide to the Birds of Colombia*. Princeton University Press, Princeton, USA.

Hughes, R.A. 1970. Notes on the birds of the Mollendo district, southwest Peru. *Ibis* 112: 229–241.

IUCN Standards and Petitions Subcommittee. 2010. *Guidelines for Using the IUCN Red List Categories and Criteria. Version 8.1*.

Prepared by the Standards and Petitions Subcommittee in March 2010. Accessible at http://intranet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf (last accessed 21 May 2016).

Johnsgard, P.A. 1978. *Ducks, Geese and Swans of the World*. University of Nebraska Press, Lincoln, USA.

Kear, J. 2005. *Ducks, Geese and Swans, Volume 2: Species Accounts* (Cairina *to* Mergus). Oxford University Press, Oxford, UK.

Kenefick, M., Restall, R. & Hayes, F. 2007. *Birds of Trinidad & Tobago*. Christopher Helm, London, UK.

King, W.B. (ed.). 1981. *Endangered Birds of the World: The ICBP Bird Red Data Book*. Smithsonian Institution Press, Washington, DC, USA.

Lehmann, F.C. 1957. Contribuciones al estudio de la fauna colombiana XII. *Novedades Colombianas* 3: 101–156. [In Spanish.]

López-Lanús, B. & Gastezzi, P. 2000. An inventory of the birds of Segua Marsh, Manabí, Ecuador. *Cotinga* 13: 59–64.

López-Lanús, B., Grilli, P., Coconier, E., Di Giacomo, A. & Banchs, R. 2008. *Categorización de las Aves de la Argentina Según su Estado de Conservación*. Aves Argentinas & Secretaría de Ambiente y Desarrollo Sustentable, Buenos Aires, Argentina. [In Spanish.]

Lönnberg, E. & Rendahl, H. 1922. A contribution to the ornithology of Ecuador. *Arkiv für Zoologi* 14: 1–87.

Madge, S. & Burn, H. 1988. *Waterfowl. An Identification Guide to the Ducks, Geese and Swans of the World*. Houghton Mifflin Company, Boston, USA.

Marchant, S. 1958. The birds of the Santa Elena Peninsula, S.W. Ecuador. *Ibis* 100: 349–387.

Martínez, M. 2007. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2006. *In* A.J. Lesterhuis & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2006; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Martínez, M. 2008. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2007. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2007; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Martínez, M. 2010. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2009. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2009; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Martínez, M. 2012. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2011. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2011; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Martínez, M. & Giner, S. 2011. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2010. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2010; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Martínez, M., Calchi, R. & Araujo, A. 2009. Venezuela: informe anual. Censo Neotropical de Aves Acuáticas 2008. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2008; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Menegheti, J.O. 2006. Brasil: informe anual. Censo Neotropical de Aves Acuáticas 2005. *In* B. López-Lanús & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2005; una*

herramienta para la conservación. Wetlands International, Buenos Aires, Argentina. [In Portuguese with English summary.]

Nores, M. & Serra, D.A. 2005. Argentina: Informe 2000–2004. *In* B. López-Lanús & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2004; una herramienta para la conservación,* pp. 13–30. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Olivares, A. 1969. *Aves de Cundinamarca*. Universidad Nacional de Colombia, Bogotá, Colombia. [In Spanish.]

Olmos, F., Silva, W.G.A. & Albano, C.G. 2005. Aves em oito áreas de caatinga no sul do Ceará e oeste de Pernambuco, nordeste do Brasil: composição, riqueza e similaridade. *Papeis Avulsos de Zoologia* 45: 179–199. [In Portuguese with English summary.]

Ortiz-Crespo, F. 1983. Ecuadorean wetlands: past, present, and future, with special attention of waterfowl. *In* H. Boyd (ed.), *Proceedings of the First Western Hemisphere Waterfowl and Waterbird Symposium,* pp. 127–132. International Waterfowl Research Bureau and Canadian Wildlife Service, Ottawa, Canada.

Ottema, O., Ribot, J.H. & Spaans, A. 2014. *Species lists of birds for South American countries and territories: Surinam*. South American Classification Committee (SACC), Baton Rouge, USA. Accessible at http://www.museum.lsu.edu/~Remsen/SACCCountryLists.html (last accessed on 21st May 2016).

Peredo, R. & Miranda, L. 2001. Nuevos registros para la avifauna del estuario del río Lluta (Arica, región de Tarapacá). *Boletín Chileno de Ornitología* 8: 2–9. [In Spanish with English summary.]

Pereira, G.A., Whittaker, A., Whitney, B.A., Zimmer, K.J., Dantas, S.M., Roda, S.A., Bevier, L.R., Coelho, G., Hoyer, R.C. & Albano, C. 2008. Novos registros de aves para Pernambuco, Brasil, com notas sobre algunas espécies pouco conhecidas no Estado. *Revista Brasileira de Ornitologia* 16: 47–53.

Rabuffetti, F. 2011. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2010. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2010; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Rabuffetti, F. 2012. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2011. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2011; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Rabuffetti, F. 2013. *Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2012*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Renjifo, L.M., Franco-Maya, A.M., Amaya-Espinel, J.D., Kattan, G.H. & López-Lanús, B. (eds.). 2002. *Libro Rojo de Aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente, Bogotá, Colombia. [In Spanish.]

Ridgely, R.S. & Greenfield, P.J. 2001. *Birds of Ecuador: Status, Distribution and Taxonomy*. Cornell University Press, Ithaca, USA.

Rojas-Suárez, F., Lentino, M. & Sharpe, C. J. 2015. Pato negro, *Netta erythrophthalma*. *In* J.P. Rodríguez, A. García-Rawlins & F. Rojas-Suárez (eds.), *Libro Rojo de la Fauna Venezolana, 4ta Edición*, pp. 123. Provita & Fundación Empresas Polar, Caracas, Venezuela. Accessible at www.animalesamenazados.provita.org.ve/content/pato-negro (last accessed on 31st May 2016).

Rose, P.M. & Scott, D.A. (eds.). 1994. *Waterfowl Population Estimates 1*. International

Waterfowl and Wetlands Research Bureau Publication No. 29. IWRB, Slimbridge, UK.

Rose, P.M. & Scott, D.A. (eds.). 1997. *Waterfowl Population Estimates 2*. Wetlands International Publication No. 44. Wetlands International, Wageningen, The Netherlands.

Ruiz-Guerra, C., Eusse-González, D., Johnston-González, R., Castillo, L.F., Angulo, C. & González, A.F. 2012. *Distribución de Aves Acuáticas de la Ecorregión Ciénaga Grande de Santa Marta, Costa Caribe Colombiana*. Asociación Calidris & Dirección Territorial Caribe de Parques Nacionales Naturales de Colombia, Cali, Colombia. [In Spanish.]

Sainz-Borgo, C., García, D., López, E., Espinoza, F., Yáñez, G., Torres, L., Martínez, M., Hernández, M., Caula, S., Sanz, V. & Giner, S. 2014. Censo Neotropical de Aves Acuáticas en Venezuela 2013. *Revista Venezolana de Ornitología* 4: 18–25. [In Spanish with English summary.]

Santander, T. & Lara, A. 2008. Ecuador: informe anual. Censo Neotropical de Aves Acuáticas 2007. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2007; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Santander, T., Muñoz, I. & Lara, A. 2006. Ecuador: informe anual. Censo Neotropical de Aves Acuáticas 2005. *In* B. López-Lanús & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2005; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Santander, T., Ágreda, A. & Lara, A. 2013. *Censo Neotropical de Aves Acuáticas, Ecuador 2008–2012*. Aves y Conservación, Quito, Ecuador. [In Spanish.]

Schmitt, F., Matus, R., Díaz, F. & Barros, R. 2011. *Censos Neotropicales de Aves Acuáticas en Chile, Resultados 2010*. Red de Observadores de Aves y Vida Silvestre de Chile, Santiago, Chile. [In Spanish.]

Schulenberg, T.S., Stotz, D.F. & Rico, L. 2006. *Distribution Maps of the Birds of Peru, Version 1.0*. Environment, Culture and Conservation (ECCo), The Field Museum, Peru. Accessible at http://fm2.fieldmuseum.org/uw_test/birdsofperu (last accessed on 21st May 2016).

Schulenberg, T.S., Stotz, D.F. Lane, D.F., O'Neill, J.P. & Parker, T.A. 2007. *Birds of Peru*. Helm Field Guides, London, UK.

Scott, D.A. & Carbonell, M. 1986. *A Directory of Neotropical Wetlands*. International Wetlands Research Bureau (IWRB) & International Union for Conservation of Nature (IUCN), Slimbridge & Cambridge, UK.

Serra, D.A. 2006. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2005. *In* B. López-Lanús & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2005; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Serra, D.A. 2007. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2006. *In* A.J. Lesterhuis & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2006; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Serra, D.A. 2008. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2007. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2007; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Serra, D.A. 2009. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2008. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2008; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Serra, D.A. 2010. Argentina: informe anual. Censo Neotropical de Aves Acuáticas 2009. *In* D.A. Unterkofler & D.E. Blanco (eds.), *El Censo Neotropical de Aves Acuáticas 2009; una herramienta para la conservación*. Wetlands International, Buenos Aires, Argentina. [In Spanish.]

Serra, D., Urcelay, C. & Soria, A. 1999. El Pato Castaño (*Netta erythrophthalma*) en el Parque Nacional El Rey, Salta, Argentina. *Nuestras Aves* 40: 20–21. [In Spanish.]

Sick, H. 1993. *Birds in Brazil: A Natural History*. Princeton University Press, Princeton, USA.

Teixeira, D.M. & Nacinovic, J.B. 1981. Notas sobre a "marreca-preta" *Netta e. erythrophthalma* (Wied, 1832). *Anais da Sociedade Sul Rio Grandense de Ornitologia* 2: 19–22. [In Portuguese with English summary.]

Threatened Waterfowl Specialist Group. 2001. Threatened waterfowl species and subspecies. *TWSG News* 13: 2–4.

Threatened Waterfowl Specialist Group. 2003. Threatened waterfowl species and subspecies. *TWSG News* 14: 2–4.

Threatened Waterfowl Specialist Group. 2006. Threatened waterfowl species and subspecies. *TWSG News* 15: 2–4.

Tobias, J.A., Seddon, N., Spottiswoode, C.N., Pilgrim, J.D., Fishpool, L.D.C. & Collar, N.J. 2010. Quantitative criteria for species delimitation. *Ibis* doi: 10.1111/j.1474-919X.2010.01051.x

Valqui, T. 2004. *Where to Watch Birds in Peru*. Gran Perú, Lima, Peru.

Velarde, D. 1998. *Resultados de los Censos Neotropicales de Aves Acuáticas en el Perú 1992–1995*. Programa de Conservación y Desarrollo Sostenido de Humedales de Perú, Lima, Peru. [In Spanish.]

Weller, M.W. 1968. Notes on some Argentine anatids. *Wilson Bulletin* 80: 189–212.

Willis, E.O. 1991. Expansão geográfica de *Netta erythrophthalma, Fluvicola nengeta* e outras aves de zonas abertas com a "desertificação" antrópica em São Paulo. *Ararajuba* 2: 101–102. [In Portuguese with English summary.]

Wetlands International. 2006. *Waterbird Population Estimates, 4th edition*. Wetlands International, Wageningen, The Netherlands.

Wetlands International. 2015. *Waterbird Population Estimates, 5th edition*. Wetlands International, Wageningen, The Netherlands. Accessible at http://wpe.wetlands.org (last accessed on 21st May 2016).

Young, G., Williams, M., Hughes, B. & Hall, C. (eds.). 2013. *TWSG News, Bulletin of the IUCN-SSC/Wetlands International Threatened Waterfowl Specialist Group No. 16*. Wildfowl and Wetlands Trust, Slimbridge, UK.

Photographs: Male (left) and female (right) Southern Pochard, by Graham Maples.

