Bird Conservation International (2007) 17:283–293. © BirdLife International 2007
doi: 10.1017/S0959270907000779 Printed in the United Kingdom

The Chestnut-banded Plover is an overlooked globally Near Threatened Species

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Summary

Species that show obvious population declines are relatively easy to categorize as globally threatened under IUCN Red List criteria. However, species whose populations are highly concentrated at a few inaccessible sites that are unprotected or habitat-threatened and then disperse are more difficult to pigeon-hole. Here we re-assess the conservation status of one such species – the Chestnut-banded Plover *Charadrius pallidus* – that occurs across Africa in specialized, inaccessible and arid habitat. Wetland bird counts from 1991 to the present allow us to determine a new world population estimate of about 17,830 birds. This allows us to determine a new 1% level and we identified only eight sites in southern and East Africa where these plovers congregate in numbers >1% when non-breeding. There are only five other sites that hold more than 100 birds, indicating that the species is not simply widely dispersed across suitable habitats. Simultaneous counts across southern and East Africa indicate that just three sites – Walvis Bay and Sandwich Harbour in Namibia and Lake Natron in Tanzania – can hold 87% of the world population during non-breeding periods. Since two of these sites are under threat from pollution, siltation and water abstraction, and the eight sites in total comprise just 30% of the area criteria set by IUCN, the bird meets one of the two qualifiers for globally Vulnerable status. Despite this, we cannot detect any long-term declines in population size, partly because of wide variations in population numbers over decadal time periods (itself an IUCN qualifier). It is clear that this bird should move from its present Least Concern status to Near Threatened and conservation measures be enacted at two of the top three sites – Walvis Bay and Lake Natron.

Introduction

The world population of the Chestnut-banded Plover *Charadrius pallidus* occurs in two populations: a small East African population (*C. p venustus*) centred on the Kenyan and Tanzanian Rift Valley (Baker 1997) and a southern African population (*C. p pallidus*) centred on Namibia, Botswana and South Africa (Tree 1997). The East African population is estimated at 6,000 birds (Wetlands International 2007, N. Baker and O. Nasirwa unpubl. data) and the southern African population has been estimated at 11,200 birds (Simmons 2000, Wetlands International 2002). It is a highly specialized species found foraging and breeding on highly saline or alkaline pans (Baker 1997, Turpie 2005), and its population probably fluctuates as strong rainfall creates suitable breeding sites on previously dry inland pans and lakes. It does not appear to be in decline (Wetlands International 2002). However, on account of its highly specialized habitat and its small range, East African, South African and Namibian Red Listing have all categorized the bird as Near Threatened (Bennun and Njoroge 1996, Barnes 2000, Simmons and Brown 2007). Despite this it is designated as Least Concern in global assessments

because the world population is above the threshold of 10,000 individuals, the bird's extent of occurrence exceeds 20,000 km² and it is not declining at more than 30% per decade or over three generations (Birdlife International 2004 and updates).

We argue here that this species should be re-categorized as Near Threatened because it approaches the thresholds for Vulnerable (under criterion B2a+b(iii)). Under this criterion a species is restricted to 10 or fewer locations at one point of its life cycle and the area of occupancy at these times is <2,000 km², with continuing decline in area, extent and/or quality of the habitat.

In southern Africa, these small, specialized plovers are more highly concentrated at certain times (June–July–August) than in January when rains flood pans in central regions of southern Africa. During the January rains they move away from non-breeding sites such as coastal bays, saltflats and other relatively saline areas to visit vast saltpans such as Etosha Pan in Namibia, and Makgadikgadi Pans in Botswana to breed (Dodman *et al.* 1997, Tree 1997, Simmons *et al.* 2001). This is less apparent in East Africa where the more saline rift valley lakes provide permanent habitat and breeding may occur year-round (Bennun and Njoroge 2001, Baker 1997).

Methods

To explore how concentrated Chestnut-banded Plovers are in non-breeding seasons we averaged the two highest July counts for all wetlands across southern Africa for which there are data. By doing so we have removed very high single counts and also indicated the likely maximum capacity of the most important areas. For East Africa we did so for January counts for reasons justified below. We subsequently assessed how many sites hold at least 1% of the total population using 15 years' data generated from African Waterbird Census (e.g. Dodman *et al.* 1997). We have extensively mined the individual data sets from each country. These are either published summaries appearing in the Wetlands International African Waterbird census series from 1991 (Perennou 1991) through to the present (Dodman and Diagana 2003, Diagana and Dodman in press) or contained in our own countries' data bases (e.g. N. Baker unpubl., O. Nasirwa unpubl., CWAC data base, Jarvis *et al.* 2001, Tyler 2001). An example of one set of counts from southern Africa is given in Figure 1. Total population estimates derived from these counts are given in Wetlands International (2007). A second method of assessing the importance of each site is to ask how many times in a decade the 1% level was exceeded at that site.

Different areas used different methods to count plovers but most used teams of experienced counters strung across mudflats or around the edges of lakes and tallied their totals later (Simmons 1991, Wearne & Underhill 2005).

For a non-breeding season site to qualify as important it must hold more than 1% of the world population of plovers more than once. Below we re-assess the world total based on the best ''instantaneous'' counts available across several countries.

Wetland counts from July were available from southern Africa but not for East Africa, where January counts are more usual because of financial and logistic reasons (N. Baker, O. Nasirwa pers. comm.). Fortunately the East African lakes identified as important have resident populations with lower population fluctuations than those in southern habitats (e.g. Lake Magadi: Bennun and Njoroge 2001, O. Nasirwa 2005). As these lakes seldom dry out the birds are resident, allowing us to substitute the summer (January) counts for which there are 11 years' of count data from East Africa (e.g. Baker 1997, Dodman and Diagana 2003, N. Baker unpubl. data).

In one case we have extrapolated the total number of birds for Lake Natron given that only 75% of the lake perimeter could be covered. The remainder of the lake did not differ in habitat from the portion covered and the birds were distributed evenly (not patchily) along the water's edge (N. Baker pers. obs.), allowing some certainty in the extrapolated total.

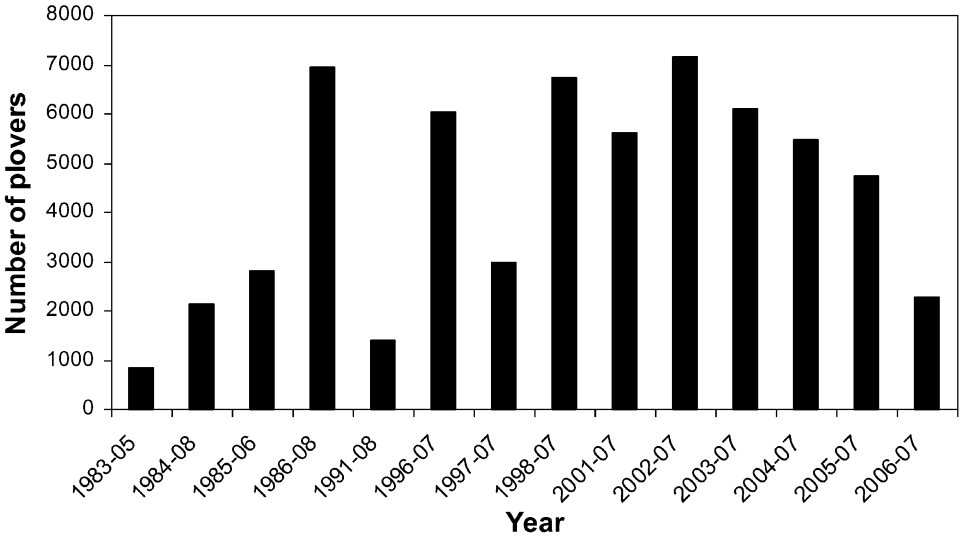

Figure 1. Long-term fluctuations in wintering (May–August) populations of Chestnut-banded Plovers at Walvis Bay – a premier global site for plovers. Only the top two counts were taken to determine the >1% levels given in Table 2. Most other sites showed higher year-to-year fluctuations than shown here.

The total area of the sites in which these birds are concentrated is also important but harder to quantify because the plovers rarely use the entire area of the pans they occur on. Instead they often use damp salty substrate within 1 km of the water's edge in both southern and East Africa (R. E. Simmons, R. Braby, N. Baker pers. obs.). To calculate a realistic Area of Occupancy for the larger rift valley lakes we simplistically assume that plovers feed over a band of salt or alkaline flats 1 km wide around the entire perimeter of each lake. Hence Lake Natron, which is 58 km long and 15 km wide (Baker and Baker 2001), will have an available area of 58 km × 1 km on each of the east and west sides and 15 km × 1 km each for the north and south sections: a total of 146 km². Similarly, Lake Manyara (40 km × 13 km) will have a useable foraging perimeter of approximately 106 km² (40 km² + 40 km² + 13 km² + 13 km²). Lake Magadi, slightly smaller in size than Lake Manyara (Baker and Baker 2001), is given a similar useable total area of 105 km².

Results

World population estimate

The July 1998 instantaneous count for southern Africa was ideal because of dry conditions and concentrated populations and 11,486 plovers were then recorded (Table 1). This is very similar to the 11,200 estimate (Simmons 2000). In East Africa the best instantaneous count was from January 2005 when 4,896 birds were counted in six areas of Tanzania (Table 1, Figure 2). Given that 75% of Lake Natron was covered during this survey and 4,357 birds were counted there alone, the possible total for Natron was about 5,810 birds (Table 1). The only regularly used site in Kenya (Lake Magadi: Figure 2) had 529 birds in January 2005 giving a possible East African total of 6,338 birds. Our estimate for the world population is thus 17,830 birds (Table 1) of which *venustus* comprises 36% of the total. This differs from the 17,200 estimate of Wetlands International (2007) by a mere 3.6%.

https://doi.org/10.1017/S0959270907000779 Published online by Cambridge University Press

Table 1. New world population estimates of Chestnut-banded Plovers based on the best instantaneous counts available from East Africa and southern Africa during the period 1991–2005.

Location	No. of birds	Date
EAST AFRICA		
Lake Eyasi, Tanzania	14	January 2005
Lake Lagarja, Tanzania	16	January 2005
Lake Masek, Tanzania	35	January 2005
NCA Makati, Tanzania	53	January 2005
Lake Manyara, Tanzania	421	January 2005
Lake Natron, Tanzania	4,357[a] [5,810]	January 2005
Lake Magadi, Kenya	529	January 2005
East African total (for subspecies *venustus*)	6,338 birds	
SOUTHERN AFRICA		
Walvis Bay, Namibia	6,720	July 1998
Sandwich Harbour, Namibia	4,350	July 1998
Orange River Mouth, Namibia/RSA	94	July 1998
Olifants River Mouth, RSA	69	July 1998
Wadrif saltpan, RSA	69	July 1998
Berg River, Hotel saltpan, RSA	58	July 1998
Berg River, De Plaat, RSA	35	July 1998
Berg River, mudflats and estuary, RSA	30	July 1998
Berg River, Kliphoek saltpans, RSA	26	July 1998
Berg River, Cerebos, RSA	14	July 1998
Berg River, Kliphoek Riv floodplain, RSA	12	July 1998
Nantwich saltpan, RSA	7	July 1998
Ghio saltpan, RSA	1	July 1998
Jakkalsvlei, RSA	1	July 1998
Makgadikgadi pans, Botswana	0	July 1998
Southern African total (for subspecies *pallidus*)	11,486 birds	
World population estimate (*venustus* + *pallidus*)	17,830 birds[b]	

[a]Seventy-five per cent of area covered.
[b]Rounded up.

Important sites

Only eight sites could be identified that have ever held more than 1% of the world population of Chestnut-banded Plovers: three in Namibia, two in Tanzania, and one each in Botswana, Kenya and South Africa (Table 2). As important, just three of these sites can in theory hold between them 100% of the entire population (Table 2); these are Walvis Bay (40%), Sandwich Harbour (47%) and Lake Natron (13%). These are not simultaneous counts, however, and these totals never occur at the same time. The highest simultaneous July counts for southern Africa indicate that 11,070 birds (62%) can occur at Walvis Bay and Sandwich Harbour simultaneously. The Chestnut-banded Plover is therefore highly concentrated in its non-breeding grounds and virtually the entire population across its world range can be found at just three sites.

Using the second method of looking at the frequency of occasions that sites exceeded the 1% levels in January (East Africa) or July (southern Africa) we see for East Africa Lake Magadi did so 9 times in 12 years (75%); Lakes Natron and Manyara, counted only twice in the last decade, did so both times (100% and 100%). In southern Africa, Walvis Bay, counted 14 times since 1983 (see Figure 1), exceeded 1% every time (100%), as did Sandwich Harbour (100%) in 14 counts while Mile 4 saltworks did so once in four counts (25%). Berg River site 4 exceeded the 1% level in only two of 12 counts (17 %). Nata Delta, Botswana did so in only one of eight counts (13%). These findings indicate that the top sites in terms of numbers were also those that consistently held the most birds.

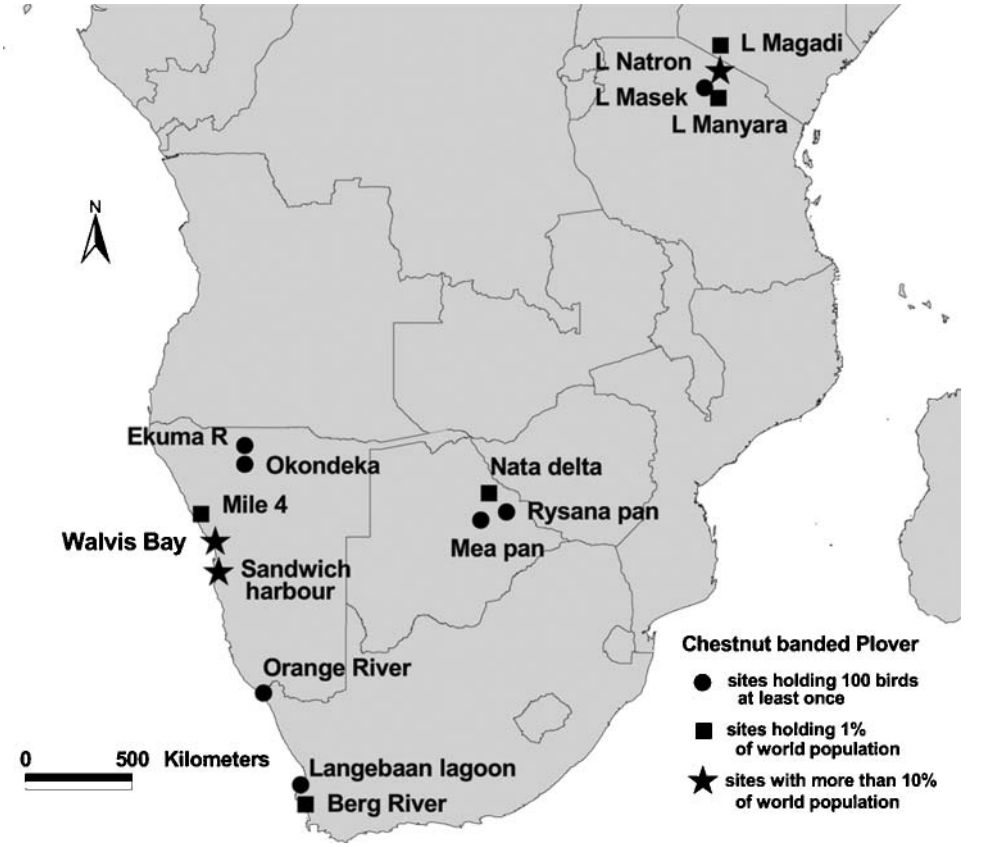

Figure 2. Locations of the most important Chestnut banded Plover sites in southern and East Africa. The three sites holding 87% of the population are shown with a star, those supporting 1% levels are shown with a square and other sites that have at least once supported over 100 birds are shown with a circle.

Area of occupancy

In total we estimate the global area for the eight sites where >1% of the world's Chestnut-banded Plovers occur as about 588 km² (Table 2): less than 30% of the 2,000 km² threshold criteria for Vulnerable status under criterion B2 (Birdlife International 2004). We assess each region below to determine whether there are overlooked sites where birds may accumulate.

Southern African sites

In the species' stronghold, 11 wetland sites in Namibia, South Africa and Botswana monitored from 1990 to 2001 averaged over 100 birds in July counts (Table 2). However, only four of these sites achieved an average of more than 178 birds (1% of the world total) for the two highest (July) winter counts (Table 2, entries in bold). These were dominated numerically by Sandwich Harbour and Walvis Bay on the central Namibian coast where 87% of the population can occur (Table 2).

Long-term trends in population numbers at these sites are hard to quantify because of large fluctuations in numbers over the decade in which they have been followed. This is exemplified

Table 2. Wetlands in Africa that hold large numbers of Chestnut-banded Plovers in July (southern Africa) and January (East Africa).

Location	Mean of the two highest counts (% of world population)	Area occupied by plovers
NAMIBIA		
Walvis Bay	**7,063 (40%)**	**50 km²**
Sandwich Harbour	**8,338 (47%)**	**20 km²**
Mile 4	**174 (1.0%)**	**8 km²**
Ekuma River	147	10 km²
Okondeka	132[a]	~5 km²
Cape Cross	80	16 km²
Lake Oponono	42	10 km²
SOUTH AFRICA		
Berg River 4 – Hotel saltpans	**181 (1.1%)**	**3 km²**
Orange River Mouth	157	2 km²
Langebaan Lagoon	107	2 km²
Skoppan	96	
Deelpan	67	
BOTSWANA		
Nata delta	**188 (1.6%)**	**150 km²**
Rysana pan	151	50 km²
Mea pan	145	4 km²
KENYA		
Lake Magadi	**590[b] (3.4%)**	**105 km²**
TANZANIA		
Lake Manyara	**520[b] (3.0%)**	**~106 km²**
Lake Natron	**2,340[b] (13.3%)**	**~146 km²**

The eight sites in bold hold on average 1% or more of the world population (i.e. >178 birds). Data are taken from African Waterbird Census (see Methods) and Area Occupied was estimated by the observers counting there.

[a]From one count only.

[b]Based on average from 12 January (summer) counts; no non-breeding counts available.

by winter (June–August) counts from the longest time series for Walvis Bay (Figure 1).

The other sites qualifying at the 1% level in Namibia, Botswana and South Africa occurred at the Mile 4 (Swakopmund) saltworks on the coast of central Namibia, at the Berg River Section 4 on the south-west coast of South Africa, and at the Nata Delta inflow to the Makgadikgadi Pans in north-eastern Botswana (Table 2). The combined area of all the sites in southern Africa that hold >1% of the world's Chestnut-banded Plovers is estimated at only 231 km² by the biologists who conduct the wetland bird counts there.

There are no other non-breeding concentrations of Chestnut-banded Plovers elsewhere in southern Africa according to extensive bird atlas data (Tree 1997), and only six others (Table 2) that have held over 100 birds (Figure 2). We note that data for the Makgadikgadi Pans when wet may be an underestimate given the great extent of the pan system there (S. Tyler pers. obs.). However, these pans are frequently dry when the July non-breeding accumulations occur (Tyler and Bishop 2001, Table 1). A few birds have been recorded on the coast of Mozambique but they are vagrant rather than resident there (Parker 1999).

East African sites

The subspecies *venustus* only occurs in East Africa, and non-breeding counts are less frequent from there. Three sites regularly hold >1% of the world population: Lake Magadi (Kenya) averaging 590 plovers, Lake Manyara (Tanzania) averaging 520 birds and Lake Natron

https://doi.org/10.1017/S0959270907000779 Published online by Cambridge University Press

(Tanzania) averaging 2,340 plovers (Table 2). With one January count of 4,357 birds from Lake Natron (Table 1), these three sites can hold most (86%) of the East African race during January. Data for July, when populations elsewhere are usually concentrated, are unavailable. The area occupied by the plovers at these sites is estimated at 357 km² (Lakes Manyara, Magadi and Natron combined).

Only Lake Masek elsewhere in Tanzania has held more than 100 plovers (Figure 2) and no other wetlands in Kenya are known to do so (O. Nasirwa 2005, Baker 1997). Thus like southern Africa, plovers in East African sites are equally concentrated at a few lakes which occur in arid regions.

Discussion

From widespread wetland bird surveys spread over more than two decades across all major pans and alkaline lakes in East and southern Africa, the Chestnut-banded Plover was found in significant numbers at just eight sites. This species can at times become so concentrated that just three sites – Walvis Bay, Sandwich Harbour and Lake Natron – can hold almost 90% of the population. Since two of these sites are under some threat from pollution or water abstraction, the Chestnut-banded Plover faces an uncertain future, and its global red data listing of Least Concern needs to be re-assessed.

Given that the species is effectively restricted to fewer than 10 sites at one point in its life cycle, and that the area encompassed by these sites is 70% below the threshold of 2,000 km² for criterion B2 for Vulnerable status, the appropriate categorization then depends on whether the species meets one of the other two qualifiers. These are: extreme population fluctuations (i.e. frequent and typically greater than one order of magnitude) or continuing decline in range, population size or habitat area, extent or quality (Birdlife International 2004). Populations do fluctuate greatly depending on the suitability of flooding of inland sites. The non-breeding data for Walvis Bay (Figure 1) indicate that the fluctuations are just less than the one magnitude set for Vulnerable status. The lowest and highest July records were 1,400 and 7,172 plovers. For Sandwich Harbour the lowest and highest plover populations were 1,130 and 9,800 birds. The differences, therefore, were 5.1-fold and 8.7-fold for these premier sites.

Before we explore each region for threats to sites, we note that the population data used to identify sites of concentration were not simultaneous counts but represent the mean of the two highest counts for each site since 1991. While this will reveal how concentrated these plovers can be at each site (Table 2), it may give artificially high totals when wetlands are combined. This is our motivation for using simultaneous or instantaneous counts to determine more realistic population estimates (Table 1). Moreover, at the two main Namibian sites, counts are undertaken within a day or two to counteract any movement that may occur between them.

Habitat use and threats

Habitat use in East Africa differs somewhat from that in southern Africa. East African plover habitat is always inland and comprises the large alkaline Rift Valley lakes in arid and semi-arid areas. Southern sites where non-breeding concentrations occur are mainly coastal. They are similar in that they are generally hyper-saline or hyper-alkaline in nature and occur in arid to hyper-arid regions where rainfall can be as low as 20 mm per year. All sites also offer little disturbance to feeding birds because of their inaccessibility and size (Tree 1997, Underhill 2000, Baker and Baker 2001).

Among these, several sites are threatened including the premier site at Walvis Bay. This large natural sandy bay on Namibia's central coast is neither a national park (unlike Sandwich Harbour) or a game controlled area (as is Lake Natron). It is the site of Namibia's largest port where pollution is a real risk. The main threats include concentrations of fish oils, from local factories, and other detritus flushed from the many ships that anchor in the bay (Wearne 1997, Simmons *et al.* 2001). It has also experienced considerable siltation in the three decades since a

salt works was established at the southern end of the lagoon (K. Wearne pers. comm., Ward 1997). These threats have the potential to reduce habitat quality, reducing numbers in the most important site for Chestnut-banded Plovers in Africa.

Lake Natron, despite its inhospitable climate and inaccessibility, may suffer reduced water input in future years for two reasons. First, an irrigation project on the Ewaso-Ngiro River was proposed in the 1990s which could also generate hydro-electric power (Katondo and Mwasaga 1997). Second, there are more recent plans to expand operations for an existing soda-extraction plant on the south-western shores, threatening to use much of the water that would otherwise flow into the lake (Baker and Baker 2001). As East Africa's main Chestnut-banded Plover site and one of only three sites where Lesser Flamingos *Phoenicopterus minor* breed in Africa (Brown 1973, Simmons 1996, Howard 1997), it is a critical site for wetland bird conservation in Africa.

Sandwich Harbour is the least threatened of all the key plover sites due to its remoteness, inaccessibility and lack of human infrastructure (Simmons *et al.* 2001). All three sites, however, are designated Ramsar sites and Important Bird Areas (Fishpool and Evans 2001). Despite these threats to two of the three main plover concentration sites, our data do not show any long-term population decline.

On the positive side, artificial sites can also support large numbers of plovers and three sites – Mile 4 salt works (Namibia), the salt works section of Walvis Bay (Namibia) and salt works on the Berg River (South Africa) – each can hold significant numbers of Chestnut-banded Plovers. These habitats are not under threat and may have increased the saline habitat available to these specialized feeders, thereby increasing population numbers.

Conclusions

We have shown on a global scale that the number of sites that hold 1% or more of the Chestnut-banded Plover population during the non-breeding period is fewer than 10 across its global range and the total area of those sites is about 30% of the 2,000 km^2 designated by IUCN for Vulnerable status (Birdlife International 2004). These eight sites occur unevenly across more arid sections of Namibia, South Africa, Botswana, Tanzania and Kenya, and just three of them (Walvis Bay, Sandwich Harbour, Lake Natron) can hold 87% of the entire world population. Given that the area of occupancy of these three critically important sites is just 216 km^2 and two of the three are threatened by pollution, siltation or water abstraction, the world population of Chestnut-banded Plovers is under some threat. Despite the threats there is no present indication of population decline and we recommend that this species be designated as globally Near Threatened based on the restricted number and size of the sites used when the population is concentrated. Such a categorization does not of course make the Chestnut-banded Plover a conservation priority any more than Least Concern does. Instead what we hope to do by showing the bird is close to the Vulnerable category on several fronts is to raise the flag over this species and enact conservation (and research) activities that will prevent this species from entering the global Red Data list. To avoid erosion of this population conservation efforts should be concentrated at Walvis Bay (Namibia) and Lake Natron (Tanzania). It has not escaped our notice that the same sites are important for the globally Near Threatened Lesser Flamingo too (www.unep-aewa.org/news/news_elements/2006/lesser_flamingo_workshop_kenya.htm) and thus conservation at these sites will benefit two highly specialized and globally threatened species.

Acknowledgements

We thank Graham McCulloch for his assistance from Botswana and Stuart Butchart (Birdlife International) for extensive help on interpretation and the structure of the manuscript. Neil McCulloch, Muchane Muchai and an anonymous referee made many helpful suggestions to improve the paper. Numerous wetland bird counters allowed us to identify these sites and thereby flag this species as of conservation concern. Lorien Pichegru produced the map.

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Received 10 April 2006; revision accepted 6 November 2006