

Shorebird counts in Panama during 2002 emphasize the need to monitor and protect the Upper Panama Bay

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Counts at three sites in the Gulf of Panama during winter and spring 2002 showed peak totals of over 250,000 shorebirds. Twenty-two species were recorded, but Western Sandpipers were by far the most abundant, usually about 80% of each count. Recent loss of a major roosting site to housing led 80,000 shorebirds to fly continuously throughout at least one particularly high spring tide. The consequences of this and the general lack of adequate measures to conserve these vital sites are matters of concern.

INTRODUCTION

In view of recent declines in the shorebird populations that breed in North America (Morrison *et al.* 2001), it is vital to identify and monitor the wintering and staging sites they use throughout their annual cycle. Several important sites for non-breeding shorebirds occur in the Republic of Panama, which exists as a bridge between North and South America where large numbers of international migrants converge (Watts 1998).

Aerial surveys by the Canadian Wildlife Service have documented the importance of Panama as a wintering and staging area for shorebirds (Morrison *et al.* 1998). In January 1993, they found a wintering population of 255,000 Nearctic shorebirds and during southward migration in October 1991 over 369,000 were counted in the Upper Bay alone. These numbers, concentrated in a very small area, represent 10% of the wintering populations of South America, and highlight the crucial importance of Panama for shorebirds.

The Upper Bay of Panama experiences a 7-m tidal range and the intertidal mudflats there extend several kilometres at low tide. The greatest area of flats is to the east of Panama City, in the Bayano Coastal Wetlands, and consists of 17,000 ha of mangroves and 22,000 ha of exposed mud. The total number of shorebirds using the Upper Panama Bay at some time during the year has been estimated at well over 500,000 qualifying it as a Hemispheric Reserve of the Western Hemisphere Shorebird Reserve Network (Morrison *et al.* 1995). Despite this, the site remains unprotected and unmonitored, and only recently the westernmost part (the main study area of Watts (1998)) was lost to housing.

The purpose of this study was to make an updated assessment of the numbers of shorebirds using certain key sites in Panama during winter and spring migration.

METHODS

Observations took place between 5 January and 15 April 2002 at three sites in Upper Panama Bay and Parita Bay, Panama (Fig. 1).

The Panama City site (9°0'N, 79°3'W) comprises mudflats at the east end of the city in the Panama Viejo and Costa del

Este districts. It suffered the most human disturbance and was easy to access. The mudflats lie outside a new 10 m sea-wall built to protect a housing development. In 1997, the area now covered by houses was an extensive area of marsh and mangroves and was the study area of Watts (1998).

The Rio Pacora site (9°0'N, 79°15'W) is 25 km east of the Panama City site. It was far less disturbed and was accessed by four-wheel drive on a dirt road through rice fields and mangroves. Both the Panama City and Rio Pacora sites comprise soft, silty mud.

The Chitré site (8°1'N, 80°4'W) is on the western shore of the Gulf of Panama in Parita Bay. This is a hard mud and sand beach flanked by mangrove, marsh and an abandoned shrimp nursery. The site is near a small village but is much less disturbed than the Panama City site. It was accessed by a paved road from the city of Chitré, 10 km to the west.

All three sites experience dry-season upwellings. These are caused by westerly winds blowing warm surface water to sea and drawing cooler nutrient rich bottom water to the surface near the shore. Upwellings increase invertebrate activity and reproduction making intertidal areas that experience upwelling particularly rich in invertebrates for shorebirds (Morrison *et al.* 1998).

During each count, I scanned the site for 0.5 to 4 hours using binoculars and a telescope. All observations were made within two hours of high tide and at each site I walked the shoreline for the same distance each time. At the Panama City and Rio Pacora sites approximately 2 km were walked each visit. At the Chitré site 1 km of shoreline and marsh was covered. Birds were first counted by size-group – small, medium and large species – following Watts (1998). Where possible, they were then identified to species level. In the case of large mixed flocks (>20,000), species composition was determined by counting a section of the flock in detail and then extrapolating.

Red Knots, Ruddy Turnstones and Sanderlings were scanned for the presence of colour flags and bands put on during expeditions organised by the Western Atlantic Shorebird Association (Scientific names of the study species are set out in Table 1). Observations were also made on Red Knots, Black-bellied Plovers, Short-billed Dowitchers and



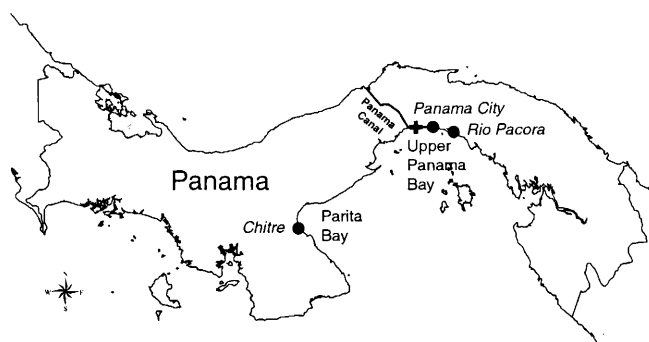


Figure 1. The Republic of Panama showing the locations of the three study sites (black circles). Panama City is shown by a cross at the south-east end of the Panama Canal.

Ruddy Turnstones of the proportion of birds showing any amount of breeding plumage.

RESULTS

Altogether, eight counts were made between 2 February and 15 April, five at the Panama City site, two at Rio Pacora and one at Chitré. The highest count of over 150,000 was the first, made at Rio Pacora on 2 February; a date when it is likely that all birds would have been wintering and not undergoing any movement (Table 1). Three weeks later, numbers had declined by 50,000, mainly because of a reduced count of Western Sandpipers (Tables 1 & 2). At Panama City, which was counted five times between 28 February and 15 April numbers declined from over 100,000 at the end of February to only 12,000 in mid-April, with the main exodus taking place in the second week of April (Table 1). Twenty-two species were recorded, eleven in four or more of the eight counts (Table 2) and eleven in only one or two (Table 3).

Of the size-classes, small shorebirds were by far the most abundant, especially on the silty flats east of Panama City where they comprised about 98% of the total. Western Sandpipers occurred in the greatest numbers (usually about 80% of each count). Semipalmated Sandpipers and Semipalmated Plovers were also very common. Wilson's Plovers were less abundant though they occurred in nearly every count. These small species seemed to fare better on the extremely soft mud, whereas larger shorebirds often sank and mostly kept to the firmer areas close to shore. No invertebrate sampling was carried out, but soft silty mud usually contains an abundance of small invertebrate prey, the main food of small shorebirds (Watts 1998).

On one particularly high spring tide in the Costa del Este area of Panama City, where prime roosting sites were re-

cently lost to housing, flocks of up to 80,000 small shorebirds were observed flying continuously for the duration of the high tide. Some plover species roosted for short periods of time within landfill sites, but the sandpipers did not appear to roost at all. Shortly after the birds started to feed, a Peregrine *Falco peregrinus* was seen attacking a flock. Normally the birds would fly together in tight formation, performing aerial acrobatics in response to a Peregrine attack. On this occasion, however, the birds were hardly disturbed and seemed more concerned with eating than with synchronized flight to avoid predation.

Medium sized shorebirds were found primarily in areas with firmer ground such as the hard packed sand flats of Chitré and the dried and thus harder mud areas fringing the water near Panama Viejo at Panama City. The most abundant were Black-bellied Plovers, followed by Short-billed Dowitchers. Also present during the winter with numbers increasing slightly during spring migration were Red Knots and Ruddy Turnstones.

Of large species, Willets were the most common, followed by Whimbrels as well as smaller numbers of Greater and Lesser Yellowlegs, Southern Lapwings, Black-necked Stilts and American Oystercatchers. These larger species were seen at all sites, but were almost always found on firm mud and not on soft silty areas. At Chitré, especially during high tide, the larger species would often feed in nearby marshes and not on the mudflats.

Two Red Knots were seen with orange flags on the tibia, indicating that they had been banded in Argentina. One, with the flag on the left tibia and no colour bands, was seen on 20 February and had probably been banded at Rio Grande, Tierra del Fuego, in February 1995. The other, with the flag on the right tibia and a red band on the left tarsus, was seen on 15 and 28 March and had been banded at San Antonio Oeste, Patagonia, in March 1998.

Many of the Red Knots seen in January and February were identified as juveniles because they had yellowish legs. The first knots showing breeding plumage were observed on 15 March when the proportion was 20%. By 28 March, the proportion had increased to 70% with a similar figure on 7 April. By 15 April, the majority of Red Knots had left the area and of the 10 birds that remained, only one was in breeding plumage.

The first Black-bellied Plovers with breeding plumage were seen on 15 March when the proportion was 20%. This rose to 70% on 28 March. By 7 April, most had departed and only half the remaining birds had breeding plumage.

The first Short-billed Dowitchers with breeding plumage were seen on 28 March when the proportion was 60%. By 7 April, this had risen to 75%. On 15 April many birds had departed and all of those remaining were in non-breeding plumage.

Table 1. Total shorebirds counted at three sites in Panama between 2 February and 15 April 2002 (empty cells indicate sites and dates when no count took place).

Date	2 February	21 February	24 February	28 February	15 March	28 March	7 April	15 April
Panama City				106,512	53,460	63,511	64,770	12,005
Rio Pacora	152,530		101,005					
Chitré		6,142						



The single Ruddy Turnstone observed 28 March showed breeding plumage, as did 90% of those seen on 7 and 15 April.

DISCUSSION

Overall, the numbers and species seen in Panama during this study are comparable to those recorded in previous studies (Delgado & Butler 1993, Morrison *et al.* 1998, Watts 1998).

Both of the colour-banded Red Knots were adults at least four years old and in the years that they were banded, they

had wintered at the southern end of South America. However, in view of the early dates on which they were observed in Panama in 2002, 20 February and 15–28 March, it seems most unlikely that they wintered so far south that year. Nevertheless it is unclear whether they had wintered in Panama or elsewhere in tropical South or Central America.

The fact that many of the knots seen in January and February were juveniles is compatible with other observations suggesting that young birds do not migrate in their first year as far as the main wintering grounds of the adults in Tierra del Fuego. For example, juveniles were recorded in Salinas,

Table 2. Counts of the most numerous shorebird species at three sites in Panama between 2 February and 15 April 2002 (empty cells indicate sites and dates when no count took place). * Red Knots alone were also counted at the Panama City site on 5 and 19 January, 200 being present on both dates.

Date	2 Feb.	21 Feb.	24 Feb.	28 Feb.	15 Mar.	28 Mar.	7 Apr.	15 Apr.
Whimbrel <i>Numenius phaeopus</i>								
Panama City				1,000	500	200	20	300
Rio Pacora	100		100					
Chitré		100						
Willet <i>Catoptrophorus semipalmatus</i>								
Panama City				3,000	1,000	1,500	1,300	1,000
Rio Pacora	1,000		0					
Chitré		100						
Ruddy Turnstone <i>Arenaria interpres</i>								
Panama City				0	10	1	100	150
Rio Pacora	0		0					
Chitré		200						
Short-billed Dowitcher <i>Linodromus griseus</i>								
Panama City				200	700	500	500	80
Rio Pacora	200		500					
Chitré		300						
Red Knot <i>Calidris canutus</i>								
Panama City*				100	250	300	250	10
Rio Pacora	20		5					
Chitré		100						
Semipalmated Sandpiper <i>Calidris pusilla</i>								
Panama City				10,000	5,000	6,000	15,000	1,000
Rio Pacora	18,000		10,000					
Chitré		0						
Western Sandpiper <i>Calidris mauri</i>								
Panama City				80,000	40,000	48,000	45,000	4,000
Rio Pacora	120,000		80,000					
Chitré		2,500						
Least Sandpiper <i>Calidris minutilla</i>								
Panama City				150	0	0	100	0
Rio Pacora	200		100					
Chitré		0						
Black-bellied Plover <i>Pluvialis squatarola</i>								
Panama City				2,000	1,000	1,000	500	400
Rio Pacora	1,000		300					
Chitré		500						
Semipalmated Plover <i>Charadrius semipalmatus</i>								
Panama City				6,000	3,500	4,000	2,000	4,000
Rio Pacora	10,000		8,000					
Chitré		1,000						
Wilson's Plover <i>Charadrius wilsonia</i>								
Panama City				3,000	1,500	2,000	0	1,000
Rio Pacora	2,000		2,000					
Chitré		700						



Table 3. Counts of scarcer species at three sites in Panama between 2 February and 15 April 2002.

Species	Site	Date	Count
Marbled Godwit <i>Limosa fedoa</i>	Chitré	21 February	30
	Panama City	15 April	30
Greater Yellowlegs <i>Tringa melanoleuca</i>	Chitré	21 February	10
Lesser Yellowlegs <i>Tringa flavipes</i>	Panama City	28 February	2
Spotted Sandpiper <i>Actitis macularia</i>	Panama City	28 February	10
	Panama City	15 April	30
Surfbird <i>Aphriza virgata</i>	Panama City	15 April	5
Sanderling <i>Calidris alba</i>	Chitré	12 February	500
American Oystercatcher <i>Haematopus palliatus</i>	Rio Pacora	2 February	10
	Chitré	21 February	2
Black-necked Stilt <i>Himantopus himantopus</i>	Chitré	21 February	100
American Golden Plover <i>Pluvialis dominica</i>	Panama City	28 March	10
Collared Plover <i>Charadrius collaris</i>	Panama City	28 February	1,000
Southern Lapwing <i>Vanellus chilensis</i>	Panama City	28 February	50

Pará (P. Gonzalez pers. comm.) and Lagoa de Peixe, Brazil and Buenos Aires Province, Argentina (Baker *et al.* 1999), in larger numbers than were recorded in Tierra del Fuego (Baker *et al.* 1996).

As juvenile Red Knots normally acquire virtually no breeding plumage in their second calendar year, the fact that 70% of the flock were in breeding plumage from 28 March to 7 April suggests that the juveniles present in the winter had moved away and had been replaced by adults stopping over on northward migration. Most of the knots departed between 7 and 15 April, which is similar to the departure dates recorded in 2001 when all but one had departed by 22 April (DMB, unpublished data).

The first species seen with breeding plumage were Red Knots and Black-bellied Plovers, followed by Short-billed Dowitchers and Ruddy Turnstones. However, it is unclear whether this reflects the timing of moult or the arrival of already moulting adults from further south.

Black-bellied Plovers departed between 28 March and 7 April, and the majority of Short-billed Dowitchers and Western Sandpipers between 7 and 15 April. Ruddy Turnstone numbers were still increasing with no observed departures at the time the study ended.

This investigation is the first since the Costa del Este marshes at the Panama City site were lost to housing. All studies in the Upper Panama Bay have shown that the main feeding area used by small shorebirds is the mudflats to the east of Panama City. When tides are >5 m, the mudflats in the southern part of the bay are submerged and large flocks move to the northern part near Panama City. In the past, these flocks were able to roost in the marshes (Watts 1998), but not since they were filled for housing. The loss of this important roost site has degraded the value of the bay for shorebirds and the consequences were observed one spring tide when large flocks spent the whole high water period flying without rest. Continuous flying is a waste of energy, increases food requirement and increases the risk of predation. Though it is possible that some of the birds had found an alternative roost site, the observation of 80,000 shorebirds flying continuously, followed by an apparent disregard for a predator is a matter for concern.

This research provides much needed monitoring of some of the most important shorebird areas of Panama. It adds to the evidence that shows the key role of Panama's shorebird

sites, especially Upper Panama Bay, in the Western Hemisphere Network. It is vital that they are monitored regularly and given the protection they deserve as a matter of urgency.

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