

## IMPORTANCE OF LITTORAL MUDFLATS FOR MIGRANT AND RESIDENT AVIFAUNA

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### Résumé

Les opérations de dénombrement d'oiseaux de rivage effectuées sur toutes les cotes d'Amérique du sud par Morisson et Ross (1989) montre l'importance des vasières du littoral guyanais pour la nutrition des migrateurs néartiques. Sur une vasière de 20 hectares nous avons dénombrés l'avifaune migratrice et résidente pendant une année et observés qu'à coté des grands pics de migration, les vasières étaient une source régulière de nourriture pour une avifaune résidente composée principalement de hérons et d'aigrettes.

### Summary

The Atlas of Neartic shorebirds on the coast of South America (Morrison and Ross, 1989) shows the importance of the north coast and mainly the mudflat for the small shorebirds. These mudflats provide also the food for a large number of residents seawaterbirds (ardeidae and laridae) as it is show from a regular survey during 1989-90 of a 20 hectares mudflat

**Mots-clés:** vasières, littoral guyanais, limicoles, hérons

**Keywords:** mudflat, shorebirds, herons, guyanese coast

## INTRODUCTION

The coast's importance in the Guyanas is related to the presence of very extensive mudflats, the sediments of which come from those of the Amazon River. The bulk of sediments carried to the sea by the vast Amazon system originate in the Andes mountains ; after discharge into the Atlantic, the sediments are carried northwestwards by the Guiana Current and are deposited along the northern coast of South America, especially along the Guianas's coast. The currents and

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tides produce a very dynamic coastal system, with mudflats steadily migrating westwards along the coast, leading to an alternative pattern of sandy beaches and intertidal flats. Despite the unstable sediments, heavy currents, and high turbidity of the water, the vast intertidal areas are productive enough to be able to support enormous populations of shorebirds. In Suriname, Swennen et al. (1982) showed that a zone with a high density of crustaceans (mainly tined shrimps) occurred on the upper part of the flats below mean high-tide level, with much lower densities of invertebrates occurring at lower tidal levels where immersion times were longer.

In addition to the lateral migration of mudflats, cycles of propagation and erosion of the shoreline occur, so that the areas of open swamp and lagoons may develop where mangrove forests have died out, providing further near-coastal habitats for shorebirds (Ouellet and Mcneil, 1986, Spaans, 1978). Sediment deposition appears to be particularly extensive along the coasts of Suriname and French Guyana that occupy an indentation in the Guyana Shield. Farther east, intertidal sediments tend to become sandier.

To obtain a global and direct figure of the mudflat primary production, Rojas-Beltran (1986) established the trophic chain of guyanese estuaries, showing the main effect of zoo and phyto plancton for the feeding of shrimps, crabs and small fishes, first scavenger, then omnivorous, then sometime carnivorous.

All these animals provide natural food for birds.

An aerial survey, carried out in January/February from 1982 to 1986 covered some 28 000 km of the South America coastline (Morrison and Ross, 1989). More than 2,9 million Nearctic shorebirds were counted. It was possible to clearly identified the most important coastal wintering areas used by various categories and species of shorebirds. A relatively small number of sites supports major portions of the censused population.

Flights were timed to coincide with high tide whenever possible, so that shorebirds would be encountered in roosting flock along the water's edge. The Guyanese area was covered in February 1982.

Based on given numbers alone, the north coast of south America was clearly the most important wintering area for Nearctic shorebirds, holding nearly 2.5 million, or 85.6% of the total for South America; on about 7% of the whole screened coast line.

Based on the results of these studies we analyzed along the guyanese coast line the dependance of shorebirds for the mudflats habitats. A one year bird count

on Cayenne old harbour mudflats allow to estimated their importance to provide food for migrants and residents' birds.

## METHODS AND STUDY AREA

Localization: Cayenne's old harbour is located in Cayenne's estuary river's. A concrete pier built 200-meters West then 80 meters South causes a mudflat deposit of almost the same size throughout the year. The study area was delimited West by the sea line at low tide, South by the left bank of a little stream crossing the city of Cayenne, East and North by the mangrove forest in front of the town. During the low tide the feeding area is of approximately 20 hectares.

The censuses that began in October 1989 are still to be continued. At the end of September 1990, 105 were done. All censuses were conducted around low tide; they are the sum of three observation points: in the North, south and eastern (facing the mangrove) direction. The further distance observed was of 400 meters with 10 x 50 binoculars. Bird species were identified (table 1). The number of individuals encountered of each species was estimated. The small sandpipers were identified as individuals when there were few. They were only classified as *Calidris* sp. and *Charadrius semipalmatus* in large flocks. Egrets where counted in white forms or blue forms; ratios of the immature little blue Herons/Snowy egrets were established and corrected daily. It takes about twenty minutes to make a bird count of the total study area.

## RESULTS

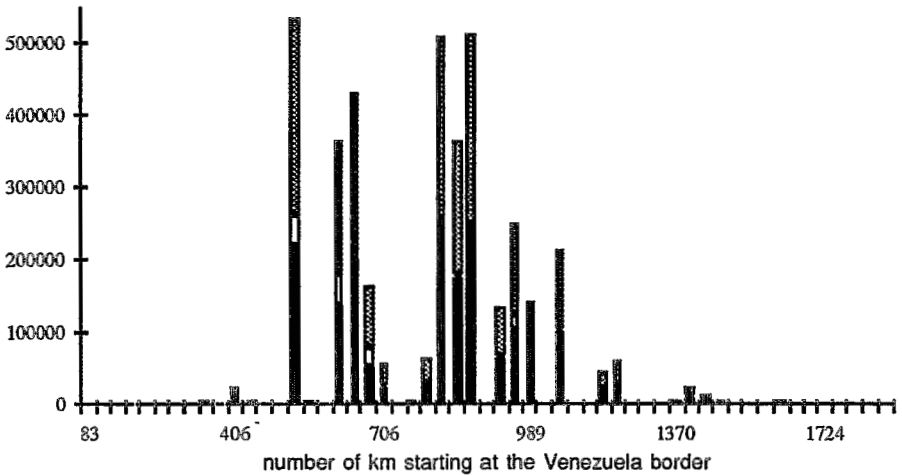
Figure 1 shows a summary of the Morrison and Ross sensus along the guyanese coast in 1982, between the Venezuelan and the Brazilian borders.

Birds are classified as:

- Large shorebirds : Willet (*Catoptrophorus semipalmatus*), Whimbrel (*Numenius phaeopus*);
- Medium -sized shorebirds: Black-bellied Plover (*Pluvialis squatarola*), Ruddy Turnstone (*Arenaria interpres*), yellowlegs (*Tringa melanoleuca* and *Tringa flavipes*) and the dowitchers. (*Limnodromus* spp.);
- Small shorebirds: small sandpipers from the *Calidris* genus as well as small plovers from the *Charadrius* genus, as it is generally impossible to identify closely similar species from the air, with the exception of Sanderlings (*Calidris alba*).

Morrison and Ross (1989) found that the distribution of small species was centered on the Guianas, with Suriname(57.9 %) and French Guyana (16.9 %) together composing some 75 % of the South America total ; 64.6 % of the small

sandpipers -mostly Semipalmated Sandpipers- are found in Surinam, followed by 18.9% in French Guiana and 0.5 % in Guyana.



Total nearctic shorebirds between Guiana and Amazon estuary

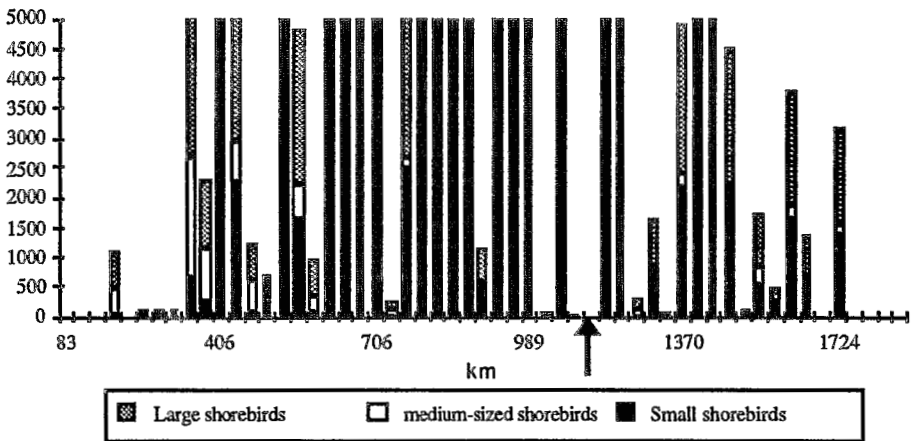


Figure 1 : Top: Variation of migrant shorebirds populations along the northern South America coast, between Venezuela-Guyana border and Amazon estuary. Bottom: detail. (Variations de l'avifaune néartique sur la côte nord d'Amérique du Sud entre la frontière vénézuélienne et l'Amazone)

This 2000 km-coast line alone holds 42.1% of the total number of medium-sized shorebird in South America (Suriname: 32.4 %, French Guiana: 7.2 % and Guiana: 2.5 %).

Brazil has the largest rate of large species (29 %) along with Guyana's coast: 20 % .

Figure 1b shows on a much smaller scale that the most important number of birds is localised on specific areas.

From Morrisson and Ross's habitat's description, we classified the survey zones in regard to the physical quality of the soil: from rocky headlands to broad mudflats. For each type of habitat, the density of birds is calculated on the basis of one kilometer.

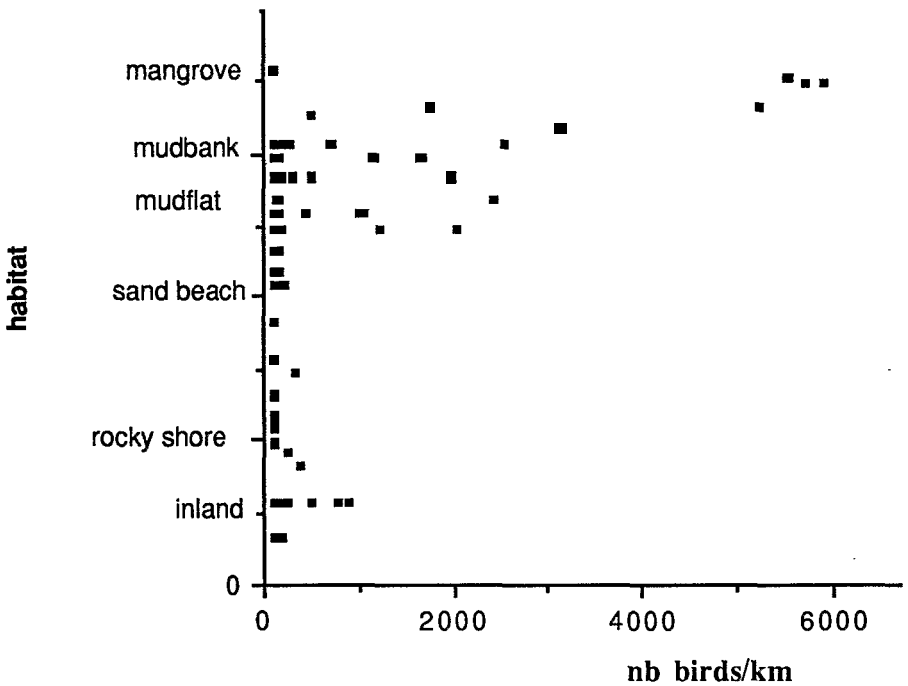


Figure 2: Density of shorebirds in relation to habitat type (after Morrison and Ross, 1989) between Venezuela-Guyana border and Amazon estuary.

Figure 2 shows that the most important nearctic shorebirds sensus were done on muddy beaches opened during low tides.

The intertidal mudbanks are very mobile (erosion's cyclical pattern and accretion are discussed elsewhere in this book). The repartition of the migrant bird population also changes every year because of the coast line's evolution and the repartition of the mudflats.

The arrow on Figure 1b enlightens a part of the coast where no birds were counted in 1982. It is a 15 km line of sandy beaches, rocky headlands and mainly mudflats around the city of Cayenne.

Observing that this part of the coast line was occupied in 1989 with numerous waders, we made a long term birds' sensus on a part of it: Cayenne's old harbour mudflat.

Table I: Status, habitat and feeding behaviour of the bird species currently observed in Cayenne Old Harbour mudflats.

Species	Status	Habitat	Feeding behaviour	Group
<i>Egretta caerulea</i>	B-RBn	M-MC-LM-EVS	V-W-S	LS
<i>Egretta thula</i>	B-RBn	M-MC-LM-EVS	V-W-A	LS
<i>Egretta tricolor</i>	B-RBn	M-MC-LM-EVS	V-ST	LS
<i>Nycticorax violaceus</i>	B-RBn	M-MC-LM	V-W-A	LS
<i>Tringa melanoleuca</i>	H-P-E	EVS	V-T-W-lb	MS
<i>Tringa flavipes</i>	H-E	EVS	V-T-W-lb	MS
<i>Arenaria interpres</i>	H-P-E	VS-MC	V-sb	MS
<i>Pluvialis squatarola</i>	H-P-E	EVS-MC	V-sb	MS
<i>Catoptrophorus semipalmatus</i>	H-E	EVS-MC	V-T-W-lb	MS
<i>Numenius phaeopus</i>	H-P-E	EVS-MC	T-lb	MS
<i>Calidris pusilla</i>	H-P-E	EVS-MC	V-T-W-lb	SS
<i>Charadrius semipalmatus</i>	H-P-	EVS-MC	V-T-W-lb	SS
<i>Eudocimus ruber</i>	B-RBn	M-MC-LM	T-S	LS
<i>Rynchops niger</i>	VNR	LM-EC-EVS	T-F	F
<i>Larus atricilla</i>	H-VBR	LM-EVS	V-F	F
<i>Sterna maxima</i>	H	LM-EC-EVS	V-F	F
<i>Sterna antillarum</i>	B-VNR-MI	LM-EC-EVS	V-F	F
<i>Pandion haliaetus</i>	H-VNR	EC-MC	V-F	F

## Legend :

Status: H= Neartic migrant; MI=intratropical migrant; B= breeding; RBn= Resident but non breeding; VNR= nonbreeding visitor; P= seen during spring and fall. Note that the same specie can have different status as some birds can just be passing through the area, some others can be staying during winter and some others a year or more.

Habitat: EC= coastal waters; EVS= mudflats or sandyflats; LM= laguna; M= mangroves; MC= coastal marshes.

Feeding strategy: T= tactile; V= visual; Feeding behaviour: A= active; S= standing; W= walking; F= flying; sb= short beak; lb= long beak.

Group: LS= large shorebirds; MS= medium sized shorebird; SS= small sized shorebird; F= fish eating birds.

On Cayenne's old harbour two bird groups are represented: the migrants and the residents birds.

Most migrants encountered are limicols from nearctic regions, nesting in Alaska. For most of them, northern South America's mudflats are the first stop-over after a continuous flight over the Caribbean Sea (Hicklin and Smith, 1984).

They accumulate energy for molting when they go South and the one needed for migrating North during spring time. Competitive exclusion during migration may be avoided thanks to the abundance of food and its constancy along the path of migration (Recher, 1966). On this mudflat two peaks of migration occur: one in October for fall's migration and the second in January or February for spring's migration. However, we noted waders flying at almost any time between the end of September and the end of March.

An other group of migrant or semi-migrants birds is included in the guild of fish-eating birds. First is the osprey (*Pandion haliaetus*); one was here from september to april fishing at mid tide. Black Skimmers (*Rynchops niger*) were also fishing at mid tide; their number was reaching sometime 200 birds and on october 28 1989: 577 birds but the average was around 50 Black Skimmers between september and april. Gulls were mainly Laughing gulls (*Larus atricilla*) and Royal Terns (*Sterna maxima*) coming from their nesting area of the "Grand Connétable" and "Battures de Malmanoury" islands (Dujardin and Tostain, 1989).

As it was note by Dujardin and Tostain (1985), Cayenne Old Harbour mudflat is also an area with several of the major indigeneous herons: *Egretta thula*, *Egretta caerulea*, *Egretta tricolor* and *Nycticorax violaceus*. Some others are see from time to time like *Egretta alba* and *Ardea cocoi*. Four to eight scarlet ibis (*Eudocimus ruber*) are also feeding on the same area. From our numerations, the number of so called large shorebirds is constant all along the year (Fig. 3).

The status and food habits are given Table I (Kushlan, 1978, Ouellet and Mcneil, 1986).



Table 2: Diet and food requirements by the bird species currently observed in Cayenne Old Harbour mudflats.

Species	Average weight g.	daily food g.	Main diet
<i>Egretta caerulea</i>	320	64	Fishes, shrimps...
<i>Egretta thula</i>	370	70	Fishes
<i>Egretta tricolor</i>	280	56	Fishes, shrimps
<i>Nycticorax violaceus</i>	650	130	Crustacea
<i>Tringa melanoleuca</i>	170	34	Diptera
<i>Tringa flavipes</i>	75	15	Diptera
<i>Arenaria interpres</i>	100	20	Mollusca, Diptera
<i>Pluvialis squatarola</i>	165	33	Mollusca
<i>Catoptrophorus semipalmatus</i>	210	42	Mollusca, Crustacea...
<i>Numenius phaeopus</i>	350	70	Mollusca, Insects
<i>Calidris pusilla</i>	25	5	Mollusca, Crustacea
<i>Charadrius semipalmatus</i>	40	8	Mollusca
<i>Eudocimus ruber</i>	800	160	small Crustacea...
<i>Rynchops niger</i>	300	60	Mollusca, Fishes...
<i>Larus atricilla</i>	260	52	Fishes, shrimps
<i>Sterna maxima</i>	410	82	Fishes, Crustacea ...
<i>Sterna nilotica</i>	180	36	small fishes
<i>Sterna antillarum</i>	45	9	small fishes
<i>Coragyps atratus</i>	1350	270	Offal
<i>Pandion haliaetus</i>	1520	340	Fishes

## CONCLUSIONS

An important part of the migratory birds are staying or passing through the north America coast and they are mainly attracted for their food on the mudflats. There is also a continuous food pressure on the same mudflat by the resident population.

In an area considered as poor in migrants shorebirds we determine that some 250 birds/hectare are feeding during migration.

Taking into account the number for each species and their food need in regard to their weight (Table 2), the prey quantity available must reach during the top of the migration 8 kg wet weight per hectare. All along the year, this mudflat must provide a minimum of two kg/hectare of prey to the resident bird population. Such density of prey and of predators are outstanding and underline the importance of the northern south american coastline. Conservation measures

must be taken soon to protect from destruction by all sorts of pollution such habitat of hemispheric importance for bird survival.

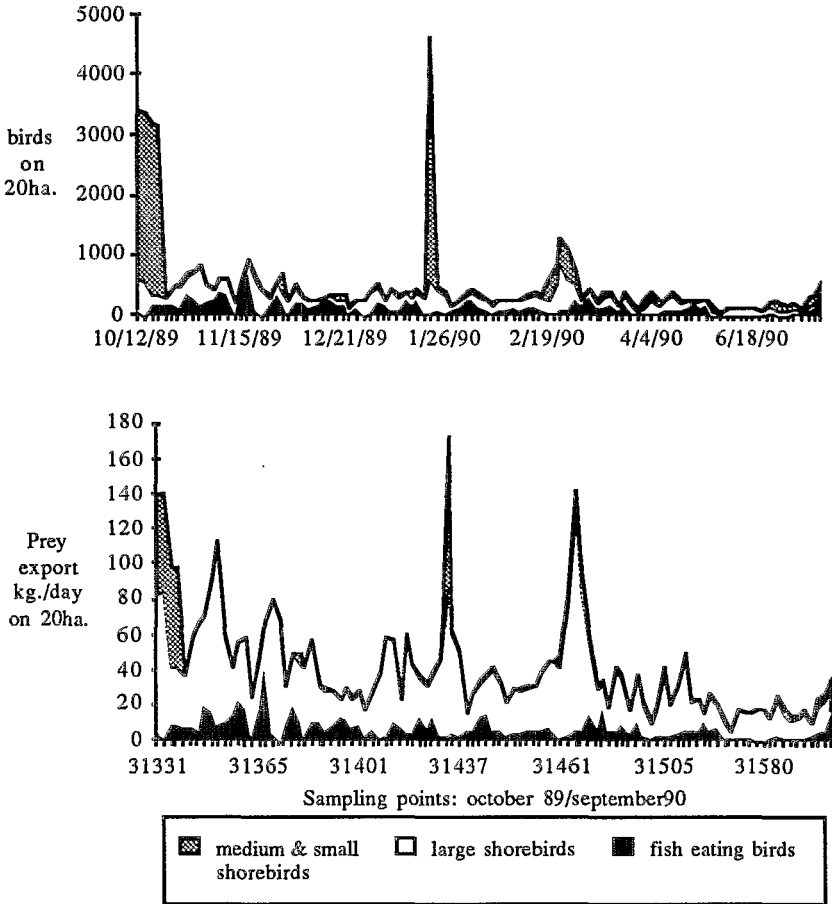


Figure 3: Variations of the shorebird population on Cayenne's Old Harbour mudflat (20 hectares) between October 1989 and September 1990. Top: number of birds in the three main groups. Bottom: Food ( kg per 20 hectares) required by the three main groups

(Variations de l'avifaune sur les 20 hectares de vasières du vieux port de Cayenne entre octobre 1989 et septembre 1990. En haut: nombre d'oiseaux dans les trois groupes : moyens et petits limicoles, échassiers, laridés. En bas : nourriture prélevé journallement sur les 20 hectares de vasières par les trois groupes)

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