

# The Mont Saint Michel Bay: a site of international importance for wintering and migrating Palearctic waders

Sophie Le Drean-Quenec'hdu, Roger Mahéo & Patrice Boret

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The importance of the Mont Saint Michel Bay for waders was studied by analysing the presence, abundance, annual cycle and between-year variation of numbers of the main species: Dunlin *Calidris alpina*, Oystercatcher *Haematopus ostralegus*, Curlew *Numenius arquata*, Grey Plover *Pluvialis squatarola*, Black-tailed Godwit *Limosa limosa*, Bar-tailed Godwit *Limosa lapponica*, Knot *Calidris canutus* and Ringed Plover *Charadrius hiaticula*. The bay is a site of international importance for wintering and migrating waders, as well as being a refuge in severe winter weather for waders wintering in more northerly areas.

S. Le Drean-Quenec'hdu, R. Mahéo, & P. Boret, *Laboratoire d'évolution des systèmes naturels et modifiés, campus scientifique de Beaulieu, Université de Rennes I, 35042 Rennes cedex, France.*

## INTRODUCTION

Mont Saint Michel Bay is an exceptional coastal wetland both in terms of its physical and ornithological features. The Bay is in the Normano-breton gulf (Figure 1) which opens into the English Channel. The Laboratory of the Natural and Modified Systems Evolution from Rennes I University works here on a European contract dealing with organic matter exchange between terrestrial and marine environments. In this context, wader populations, as consumers of benthic macrofauna have been studied. In this paper, we describe and discuss the importance of the Mont Saint Michel Bay for waders during the different phases of the annual cycle (winter, migration, summer) as well as during hard winters (by examining the between-year variations of January numbers). In a second paper (Le Drean-Quenec'hdu *et al.* 1995b), we report on the spatial distribution of the main wader species present.

## STUDY SITE

The study area comprises coastline which stretches from Granville in the north-east to Cancale in the south-west and includes the Sée and Sélune estuary (Figure 1). More than 200 km<sup>2</sup> of mudflat is uncovered at every tide. The intertidal area can achieve a width of more than 10 km. The saltmarshes are very seldom flooded and the lowest lines of the mussel farms are very seldom exposed. In between, there is an area which is exposed daily. The tidal range can achieve 15 m during the September spring tide: there are important tidal currents and intense sediment movements in relation to the small mean depths (Hamon 1984). Currents and sediment movements are more important in the central part of the bay which has led to silting around Mont Saint Michel. *Macoma balthica* dominates the macrobenthos (Hamon 1984).

## METHODS

Two counts each month were carried out during two annual cycles as part of an ornithological study of the Mont Saint Michel Bay (Boret *et al.* 1981). We collected data with the help of surveys for the IWRB International Waterfowl Census (Mahéo 1981-1992), counts by Boret and Mahéo and by the Manche section of the Normandy Ornithological Group (NOG). These counts take place in mid-January each year.

To limit the potential errors outlined by Smit & Piersma (1989), a count protocol was developed after a preliminary study of bird distribution in the bay, at different states of tide and tidal levels. The tidal range is so large that the birds can be only counted accurately at high water mid-way between neap and spring tides. On neap tides, the birds are too far from the observer. On spring tides, the submersion of the whole saltmarsh means that waders have to stay in flight throughout the high water period.

During the winter 1992/93, co-ordinated counts were made by the ornithological section of the SSPNB-Ille et Vilaine (Society for the Study and the Protection of Nature in Brittany) and the Manche section of the NOG.

Yates & Goss Custard (1991) made comparisons between high water and low water counts of shorebirds on the Wash (east England) which is of similar size. Twenty-five of their under-estimates at low water were due to the great difficulty of counting all areas used by waders. This problem, which is also experienced in the Mont Saint Michel Bay, has led PB and RM to investigate those conditions which give complete counts. Some unusually low totals, for example in 1993 for Knot *Calidris canutus*, can simply be explained by an incomplete count.

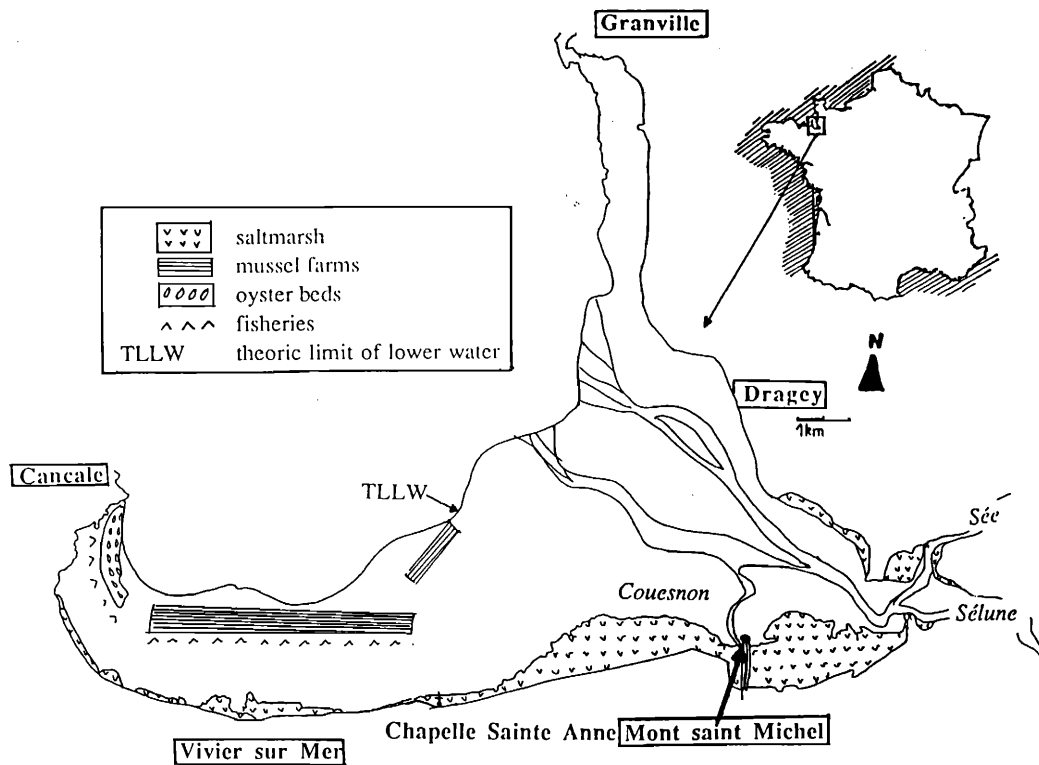


Figure 1. Mont Saint Michel Bay: the study area.

## MONT SAINT MICHEL BAY: AN INTERNATIONALLY IMPORTANT WINTERING AREA

The number of Dunlin *Calidris alpina*, Oystercatcher *Haematopus ostralegus*, Grey Plover *Pluvialis squatarola*, Curlew *Numenius arquata*, Black-tailed Godwit *Limosa limosa*, Bar-tailed Godwit *Limosa lapponica* and Knot show a winter peak, particularly in January (Table 1). On average, from 1981 to 1993 (Figure 2a), a little more than 53,000 waders are present in January in the whole of the bay. This is equivalent to 0.7% of the total western Palearctic wader population, 2.3% of the north-western Europe population and 12.5% of the French littoral total (after Smit & Piersma 1989).

Dunlin (Figure 2b) is the most numerous species in the bay, with a maxima of more than 28,000 birds in January, more than half of the total number of waders in the study area. Mont Saint Michel Bay is an internationally important area, with more than 12% of national numbers (Mahéo 1992).

Oystercatchers (Figure 2c) are present in the bay throughout the year. It is the only internationally important area in France for wintering Oystercatcher with 28% of the national wintering population (Mahéo 1992). Less than 10% of the East Atlantic flyway population winters in France, almost entirely on the shore of the English Channel.

Curlews (Figure 2d) are present in the bay throughout the year. There are no internationally important areas for wintering Curlew in France but many nationally important areas, of which this Bay is the most important.

Grey Plovers (Figure 2e) are present throughout the year with an important peak during the migratory period and winter months. Mont Saint Michel Bay, with more than 13% of the national total (Mahéo 1992), is an internationally important area for wintering Grey Plover.

Black-tailed Godwit is present in significant numbers from June to early April with two peaks of abundance: one in winter, the other in summer. The winter peak, which consists of *L. l. islandica* varies between 1,200 and 2,500 birds (Figure 2f), and is lower than the summer peak. The Bay is one of the internationally important area for Black-tailed Godwit, with more than 20% of the national wintering population (Mahéo 1992).

Bar-tailed Godwits are present throughout the year in the bay but are especially abundant in winter. Wintering numbers have declined considerably between 1980-1982 and 1993 (Figure 2f), although these is still a peak in winter. The Bay, with an average of more than 20% of the national wintering population (Mahéo 1992), is one of the two internationally important areas for Bar-tailed Godwit in France.

Knot (Figure 2g) can be seen in significant numbers from the end of July to early April. The numbers increase progressively from November to January/February. The first departures are noted from the end of February and increase abruptly in March. Wintering Knot in the Bay are those of the *islandica* race from Greenland, whilst *Calidris canutus canutus* from Siberia pass though on passage. Mont Saint Michel Bay, with 27% of the national wintering population (Mahéo 1992), is internationally important for wintering Knot

Table 1. Wader counts. A: average of bimonthly counts from May 1980 to May 1982; B: monthly counts from December 1992 to December 1993; C: average January numbers (average of January counts from 1981 to 1993) and 1% thresholds of international population sizes (International Qualifying Levels: IQL), under the Ramsar Convention (from Smit & Piersma 1989 and Maheo 1992).

	Oystercatcher <i>Haematopus</i> <i>ostralegus</i>	Grey Plover <i>Pluvialis</i> <i>squatarola</i>	Curlew <i>Numenius</i> <i>arquata</i>	Bar-tailed Godwit <i>Limosa limosa</i>	Black-tailed Godwit <i>Limosa lapponica</i>	Knot <i>Calidris canutus</i>	Dunlin <i>Calidris alpina</i>	Ringed Plover <i>Charadrius</i> <i>hiaticula</i>	TOTAL wadens
<b>A</b>									
January	10,250	2,830	2,050	2,720	1,500	6,270	22,030	41	47,691
February	8,940	2,710	2,330	2,330	1,070	6,290	26,130	60	49,860
March	3,300	3,010	1,200	580	260	920	8,400	150	17,820
April	1,940	2,400	870	280	50	70	5,280	370	11,260
May	1,380	1,060	240	400	1	110	1,790	1,180	6,161
June	1,480	180	430	210	40	20	80	120	2,560
July	1,550	180	1,330	180	610	60	1,390	3	5,303
August	1,720	470	2,140	450	2,240	460	1,880	450	9,810
September	3,800	2,530	2,210	890	1,990	410	1,780	3,300	16,910
October	5,880	3,540	1,840	940	800	580	10,150	810	24,540
November	6,460	2,930	1,640	1,140	1,010	2,680	17,880	80	33,820
December	8,450	3,100	1,390	1,740	1,270	4,550	23,130	40	43,670
December 1992	3,671	1,336	954	614	1,200	554	12,675	163	21,167
January 1993	8,837	2,401	4,328	650	2,500	1,650	28,230	212	48,808
February 1993	5,392	2,235	4,049	810	810	1,560	18,171	126	33,153
March 1993	2,064	3,131	2,308	6	86	63	4,072	51	11,781
April 1993	2,200	1,800	214	1	0	51	3,650	2,700	10,616
September 1993	6,000	4,000	750	500	700	500	6,000	2,000	20,450
October 1993	4,500	2,775	1,835	1	0	0	4,000	632	13,743
November 1993	4,047	2,771	1,166	16	750	3,200	18,441	62	30,453
December 1993	6,517	1,588	2,228	296	200	1,800	23,990	125	36,744
Average January numbers (1981-1993)	9,500	2,700	2,200	1,300	1,000	4,000	30,000	130	50,830
IQL	9,000	1,500	3,500	1,000	700	3,500	14,000	500	

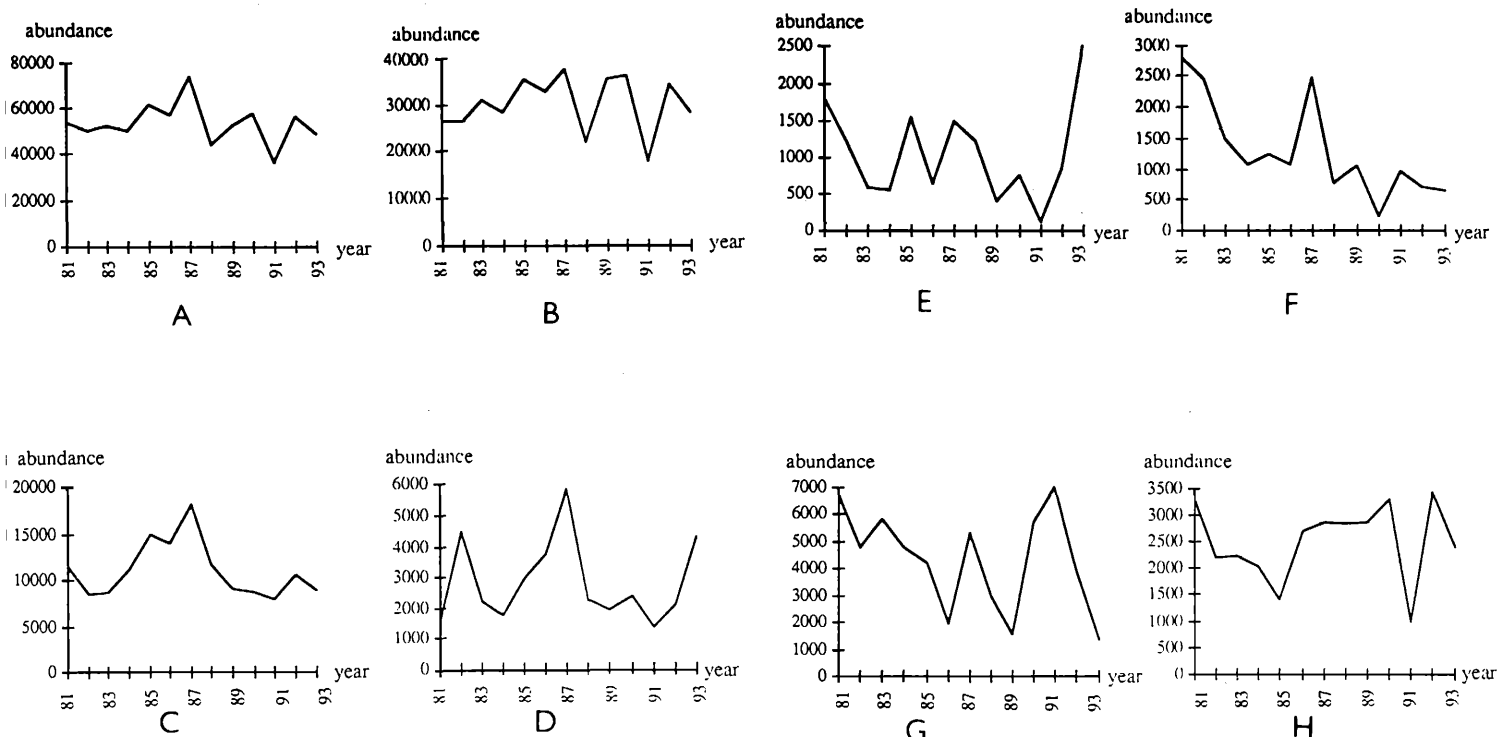


Figure 2. Between-year variation in January wader numbers in Mont Saint Michel Bay from January 1981 - January 1993. a - total numbers; b - Dunlin; c - Oystercatcher; d - Curlew; e - Black-tailed Godwit; f - Bar-tailed Godwit; g - Knot; h - Grey Plover.

### MONT SAINT MICHEL BAY: A MIGRATORY STAGING AREA

The Bay is a migratory staging area, particularly for Grey Plover and Ringed Plover *Charadrius hiaticula*, but also for Curlew, Black-tailed Godwit and Bar-tailed Godwit. There are many more species present during migratory periods than in winter. Between 20-22 species are present in September but only 11/15 in January (Table 1).

There is a peak in Curlew numbers from September to October, corresponding to post-breeding migration. High numbers of Grey Plovers, which can exceed 4,000 birds, are observed during autumn migration. Spring migration is important too, the arrival of Grey Plovers at the end of March masking departures of wintering birds. For Black-tailed Godwit, migratory movements occur in October and November but in relatively small numbers. Spring migration is less marked and overlaps probably with departure of wintering birds. Numbers of Bar-tailed Godwit begin to increase from the beginning of August, despite some reduction in October and November, because of post-breeding migratory movements. Spring migration results in an increase in March. From the end of April to early May, numbers rise a little because of the arrival of pre-breeding migrants birds. The end of May seems to mark the end of migration. Ringed Plovers are present in the bay throughout the year but it is only during the pre- and post-breeding migrations that the numbers are significant. Peak numbers occur in September during autumn migration, with 2,000 to 4,000 birds. The spring migration is less important with 1,200 to 2,700 birds present. The pattern of abundance cycle emphasises the

brevery and yet the importance of migratory movements in the bay.

### MONT SAINT MICHEL BAY: A SUMMER AND MOULTING AREA

There are Dunlin, Oystercatcher, Curlew, and Grey Plover in the bay throughout the year, but with a slack period in summer. Generally, most summering birds are juvenile birds. However, the number of Black-tailed Godwits reaches a peak in the first fifteen days of August, due to summering *L. l. limosa* (1,700 to 2,700 birds) which use the bay as a moulting area. Moreover, we have noted an important proportion of one year or older birds present which are still in breeding plumage.

The use of Mont Saint Michel Bay during the annual cycle can be simply summarised. Some species, such as Ringed Plover, arrive early after the end of the breeding season, with adults before juveniles. Wintering birds are generally present in small numbers but migrants are relatively abundant in the spring. The bay seems to be a migratory staging area. Some species (Dunlin, Godwits, Grey Plover and Curlew) arrive early and complete their moult in the bay. A proportion of these then remain to overwinter. There are large variations between species in the timing of migratory and wintering peak numbers.

Other species like Oystercatcher and Knot, arrive relatively late in autumn. For these, the bay is primarily a wintering area. Finally, for Kentish Plover *Charadrius alexandrinus*, the bay is a breeding area (20-25 pairs,

Dubois & Mahéo 1986). This calendar of the use of Mont Saint Michel Bay by waders reflects that found at other Western Palearctic sites, particularly in Ireland and Britain (Prater 1981) and in Nearctic areas, particularly in Bodega Bay, California, USA (Page *et al.* 1979).

## MONT SAINT MICHEL BAY: A CLIMATIC REFUGE

The mean number of waders between January 1981 and January 1993 was 50,000 birds. In 1985 and 1987, numbers increased significantly: respectively more than 61,000 and more than 74,000. In 1988 and 1991, the numbers decreased notably: respectively by more than 36,000 and by more than 44,000 (Figure 2a).

The effects of a hard winter are twofold: firstly, prey availability is reduced due to deeper burrowing and a decrease in activity (and thus detectability), and secondly, an increase in energetic needs (Davidson 1981). Large wader species seem to be better adapted to cold temperatures than small ones (less loss of body heat and a longer bill to probe for deeply burrowed prey if the ground is not frozen) (Prokosch 1984). In fact, waders seem to be well adapted to survive during relatively short cold periods, if the low tide occurs in the middle of the day when it is warmer and daylight feeding time is maximised (Clark *et al.* 1993).

When a cold weather front moved down from the north in 1985 and more significantly in 1987, many waders moved ahead of it towards warmer areas. The importance of Mont Saint Michel Bay as a severe weather refuge was confirmed by watching birds that were present during these severe winters. It is particularly important for Dunlin (Figure 2b), Oystercatcher (Figure 2c), Curlew (Figure 2d), Black and Bar-tailed Godwits (Figure 2e and 2f) and to a lesser degree, Knot (Figure 2g). However, it is thought that winter mortality during these two winters was particularly high due to the greater vulnerability to hunting of the birds weakened by starvation. The whole French coastline (Mahéo 1988) seems to be a severe weather refuge for the species coming from the North Sea, despite a decrease in the carrying capacity of the mudflats following freezing conditions. There are around 400,000 waders in the German Wadden Sea during warm winters, but only c. 150,000 during hard winters (Prokosch 1984). Grey Plover (Figure 2h) alone seems not conform to this rule, probably because of its more southerly distribution and its feeding behaviour, which makes it equally sensitive to periods of intense wind and rain.

## CONCLUSION

The study of seasonal wader abundance in Mont Saint Michel Bay highlights the importance of the site, not only as a wintering area for between 42,000 and 61,000 waders, but also as a migratory staging area, particularly for Ringed plover and Grey Plover. Other species, such as Oystercatcher and Dunlin are present throughout the year. In winter, the importance of the Bay is especially clear during periods of severe winter weather: the bay is a

refuge, particularly for large species which usually winter in the North Sea areas. In recognition of its international importance, Mont Saint Michel Bay was listed as a Ramsar site in October 1994.

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