Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme

Shorebird Monitoring 2002-2003 Report

Y. T. Yu, G.J. Carey and H.K. Ying

The Hong Kong Bird Watching Society Limited

Agriculture, Fisheries and Conservation Department

WATERBIRD MONITORING AT THE MAI PO INNER DEEP BAY RAMSAR SITE

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Cover photo: Waders including Great Knot *Calidris tenuirostris*, Curlew Sandpiper *Calidris ferruginea*, Pacific Golden Plover *Pluvialis fulva* and Lesser Sand Plover *Charadrius mongolus* at Mai Po (Photo by: Ho Fai CHEUNG)

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Shorebird Monitoring at the Mai Po Marshes and Inner Deep Bay Ramsar Site: 2002- 2003 Report

Y.T. Yu, G. J. Carey and H. K. Ying[1]

Introduction

Systematic, long-term monitoring of waterbirds in the Mai Po and Inner Deep Bay Ramsar Site commenced in March 1998. This project is administered, coordinated and executed by the Hong Kong Bird Watching Society, and funded by the Agriculture, Fisheries and Conservation Department. Counts of shorebirds (also called waders) form one part of this programme, the other components being monthly counts of waterbirds and surveys of ardeid nesting colonies. This report concerns the shorebird monitoring component for autumn 2002 and spring 2003.

Methodology

During spring and autumn migration shorebird migrants feed on the intertidal mudflats of Deep Bay and, during the high tide period, roost in the hinterland. The size and geographic layout of Deep Bay is such that it is not viable to count shorebirds when they are feeding in the intertidal areas of Deep Bay, except for a short period immediately prior to and after the tide has reached or withdrawn past the two 'boardwalk' hides situated at the edge of the bay (facilities provided by the WWF-HK Mai Po Marshes Nature Reserve – see Map 1). Consequently, counts need to be made mainly during high tide when birds are roosting inland. Since the mid 1980s management activities at the Mai Po Marshes Nature Reserve (Mai Po NR) have generally ensured that there are suitable roosting areas on the reserve that allow counts to be made with a relatively high degree of accuracy for many species. Depending on the height of the tide, this high tide period when full counts can realistically be made lasts up to four hours, in addition to the time spent in the boardwalk hides.

However, on some days the tide does not reach a height sufficient to force birds to roost inland or even to move close to the boardwalk hides, which means that accurate counts cannot be

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made. Consequently, the census period is divided into 'blocks' of days that are long enough to ensure the likely occurrence of a high tide sufficient to allow at least one count to be made, yet short enough to ensure that counts are made with sufficient frequency that the majority of birds utilizing the bay during that season can be recorded.

Taking into account these factors the following schedule is used:

- 22 March to 17 May: one count every block of three days
- 18-31 May: one count per week
- 1 June to 15 July: two counts per month
- 16 July to 4 November: one count per week

The equipment used consisted of 8x or 10x binoculars and a telescope with wide angle 32x or 20-60x zoom eyepieces. The procedure for each count was as follows:

- count birds on the rising tide, beginning at a tidal height of around 1.5m.
- count birds roosting in Mai Po NR using a bicycle (essential on some days to complete the count during the time available).
- Count birds on the falling tide until such a time as counting is no longer possible due to distance from the observer.

On days with a relatively low early morning or late afternoon high tide, counts were made prior to high tide on the reserve, where night-time roosts of waders were situated. Counts were carried out by the authors of this report. The numbers of each species in winter were monitored as part of the monthly waterbird counts.

When counting from the boardwalk hides at the edge of Deep Bay, the emphasis is on counting species that do not generally roost on the reserve or are difficult to count there, primarily smaller species such as the sand plovers, Broad-billed Sandpiper and Red-necked Stint. The sand plovers, stints and Broad-billed Sandpipers have roosted away from Mai Po NR in recent years, and appear to fly up the Shenzhen River in the direction of Ma Tso Lung to an unknown roost site. In addition, however, and where possible, counts of species already counted on the reserve were also made as a method of checking or refining numbers, in particular Curlew Sandpiper which is usually the most numerous species and may constitute up to 50% of shorebirds present on any given date. Species that have a tendency to arrive *en masse* at the mudflat when the tide is falling are also suitable for such counts. *Tringa* sandpipers, although numerous, generally behave differently arriving in small groups over a longer period of time, and can rarely be checked this way.

In addition to identification and counting, records were also made of birds carrying coloured leg-flags most of which were attached in Australia, and in autumn, where possible, birds were aged as adults, non-adults, juveniles or first-summer birds.

Finally with regard to methodology, it should be noted that the provision through habitat management by WWF-HK of suitable roosting areas for shorebirds is essential to the success of this monitoring programme. At present, the great bulk of larger shorebirds roost within the reserve area, which means that using a bicycle on most days a single experienced observer can make an accurate count of the number of birds present. During autumn 2002 and spring 2003 roosting shorebirds were mainly in pond 8, 11 and 16/17 but also in pond 20, 22 and 23 occasionally (see Map 1). There were no phenomena that were considered to have significantly affected the accuracy of counts.

As regards waders such as Red-necked Stint and Greater Sand Plover, which at present do not generally roost on the reserve, these can generally be counted accurately on the falling tide; the falling tide cannot be relied on for the larger shorebirds, however. It is important to note that should significant roosts form elsewhere in the Deep Bay area in the future, then provision will need to be made to ensure that these birds are counted simultaneously with birds roosting at Mai Po in order to maintain the accuracy of counts and of the monitoring programme. Proposals to create further wader scrapes in the Deep Bay area must be viewed with this in mind. At present, it would appear that Mai Po Nature Reserve is providing adequate areas for those waders that wish to roost there. In addition, as far as is known, there are not significant numbers of shorebirds using Tsim Bei Tsui as a roosting area.

Habitat management activities in pond 16-17 that are designed to enhance its attractiveness and the capacity of the shorebird roosting site at Mai Po Marsh Nature Reserve are still being undertaken. The outcome is not yet fully known but shorebird numbers and species diversity in pond 16-17 seemed to have increase during the 2003 spring migration. A notable example is Red-necked Stint, a species that had not roosted in any numbers on the reserve for some years, of which over 2000 individuals were recorded in pond 16-17 during spring.

Results

Results of all wader counts are presented in full in Appendices 1 and 2. The numbers of selected species are illustrated graphically in Appendix 3.

Autumn 2002

As can be seen from Figure 1, the total number of shorebirds recorded during autumn 2002 reached a shallow peak in mid August, with the count of 2,101 on 19 August. Subsequently,

numbers of waders slowly increased with some fluctuations and reached another peak of 3,095 birds in late September (24th). Then numbers decreased in the first half of October. Numbers rose again in the second half of October and early November with the peak count of autumn 2002 being 4,147 birds. This comprised many waders wintering in Mai Po and Deep Bay area.

The initial peak in mid August largely comprised passage migrants. Peak counts of 108 Whimbrels, 542 Common Redshanks, 132 Terek Sandpipers, 295 Red-necked Stints and 48 Curlew Sandpipers were recorded.

It appears from Figure 1 that for some species the first winter visitors began to arrive in early September. Analysis of the patterns of occurrence of individual species (see Figure 2 -19) indicates that wintering birds may begin to arrive at the following times for the following species:

Pacific Golden Plover – early October (Figure 3)
Kentish Plover – mid October (Figure 4)
Grey Plover – mid September (Figure 5)
Lesser Sand Plover – mid September (Figure 6)
Black-tailed Godwit – late August (Figure 8)
Eurasian Curlew – mid September (Figure 11)
Spotted Redshank – late September (Figure 12)
Marsh Sandpiper – early September (Figure 14)
Common Greenshank – early September (Figure 15)

Species that occur primarily as passage migrants in the later half of the autumn are Bar-tailed Godwit (Figure 9), Whimbrel (Figure 10), Wood Sandpiper (Figure 16), Great Knot (Figure 17), Red Knot (Figure 18) and Broad-billed Sandpiper (Figure 19). The greatest number of Common Redshank occurred early in the autumn, while Common Greenshank seemed mainly to pass through Hong Kong in the third week of September in autumn 2002.

Winter 2002-2003

A minimum aggregate total of 11,689 waders was recorded wintering in Hong Kong during winter 2002-03, somewhat larger than the 10,971 in winter 2001-02. The count of 11,689 was achieved by summing the peak counts of each species during the midwinter waterbird counts of December, January and February. The bulk of birds, approximately 94%, comprised Pied Avocet (5,864), Pacific Golden Plover (230) Grey Plover (295), Black-tailed Godwit (340), Eurasian Curlew (1,014), Spotted Redshank (450), Marsh Sandpiper (1,760) and unidentified

tringa sandpiper (1,093). Numbers of Kentish Plover (20) and Dunlin (11) were not representative due to poor counting conditions. The peak count of Pied Avocet is a dramatic increase on previous years, and constitutes by far the highest count on record in Hong Kong.

Spring 2003

The figure for the minimum number of birds passing through, including some estimate of turnover, was 16,984, slightly lower than in 2002 (17,421) but similar to 2001 (16,804) and 2000 (16,479). The peak day count was 11,391 on 23 April 2003, which is the new highest single day count in the shorebird count programme and over 37% more than the peak day count in spring 2002 (i.e. 8,271).

The most remarkable peak count was that of 540 Asian Dowitchers on 2 May – a historical high number of this species in Hong Kong, the previous peak count being 325 on 29 April 1984. Relatively high peak spring counts were also noted for Pacific Golden Plover (358), Spotted Redshank (1,827), Marsh Sandpiper (2,051), Terek Sandpiper (425 – an unusually high number in early June), Red-necked Phalarope (43 – an unusually high number for the Deep Bay area), Red-necked Stint (2,302), Sharp-tailed Sandpiper (231 – the second highest count on record). It is notable that 3,700 Pied Avocets were recorded during shorebird counts and a new high number of 5,846 was present in winter. This high number of Pied Avocets in shorebird count almost certainly comprises wintering individuals, and so it is excluded from estimates of the minimum number of shorebirds utilizing Mai Po and Deep Bay (ref. Table 1). A relatively low peak spring count was noted for Greater Sand Plover (243), which compares with totals of 512 and 733 in spring 2001 and 2002 respectively.

Summer

The number of waders recorded during summer was relatively high; a total of 488 were recorded during July 2002 and 593 birds were counted in June 2003. These numbers are much higher than previous two summers (c.f. 284 birds in June 2001). It is likely that many of these were first-summer birds in moult. The most numerous species was Common Redshank (376) in July 2002 and Terek Sandpiper (315) in June 2003.

Total numbers recorded

In an attempt to estimate the actual number of migrant waders that utilized the Mai Po and Inner Deep Bay Ramsar Site during the 12-month period from July 2002 to June 2003, the peak winter (defined as December to February) count obtained during winter waterbird counts can generally be added to the estimated minimum number of birds passing through during the spring and autumn migration seasons (see Table 1). For some species, however, it is not possible to rule out some overlap in individuals occurring in different seasons; consequently,

such records (marked by a dash in Table 1) are excluded from the calculation.

With regard to the number of birds passing through during each migration season, the estimate of the minimum number of individuals occurring is arrived at by taking the peak count or by summing the number of 'new' birds between successive peaks and troughs where such a pattern was observed and where it was felt that such peaks included an element of newly-arrived birds.

It can be seen that a minimum of 28,514 shorebirds utilized the Ramsar Site during the 12-month period from July 2002 to June 2003; this is lower than the 30,759 recorded in the previous 12-month period, and slightly lower than the figure of 29,580 for the period from July 2000 to June 2001. However, the peak winter counts of some species, including Kentish Plover, Dunlin and some *tringa* sandpipers were underestimated (Yu 2003) and so the number could be larger than this present figure. Of this total, 19,040 were migrant shorebirds recorded during autumn and spring migrations, with 16,984 occurring on spring passage.

Shorebird turnover rates in Hong Kong have yet to be determined; however, Howes and Bakewell (1989) quoted studies using marked birds in Morocco and Malaysia as indicating that the total number of shorebirds using a given area during migration lies in the range 3 – 4.5 times the peak daily count of passage shorebird species. Using this basis for calculation, with peak day counts of 16,836 in spring and 2,056 in early autumn, totaling 18,892, Deep Bay may have supported in the range 56,676 to 85,014 migrant shorebirds during 2002-2003.

Table 1. Estimated minimum number of shorebirds utilizing the Mai Po Inner Deep Bay Ramsar Site during the 12-month period July 2002 to June 2003.

Species	autumn	winter	spring	Minimum
Pheasant-tailed Jacana *Hydrophasianus chirugus*			1	1
Greater Painted-snipe *Rostratula bengalensis*			1	1
Black-winged Stilt *Himantopus himantopus*	162	6	128	296
Pied Avocet *Recurvirostra avosetta*	-	5864	-	5864
Oriental Pratincole *Glareola maldivarum*			10	10
Grey-headed Lapwing *Vanellus cinereus*		1		1
Pacific Golden Plover *Pluviallis fulva*	120	230	358	708
Grey Plover *P. squatarola*	12	295	28	307
Little Ringed Plover *Charadrius dubius*	-	191	-	191
Kentish Plover *C. alexandrinus**	5	20	26	31
Lesser Sand Plover *C.mongolus*	3	1	115	119

Species	autumn	winter	spring	Minimum
Greater Sand Plover *C.leschenaultii*	76		243	319
Black-tailed Godwit *Limosa limosa*	21	340	721	1082
Bar-tailed Godwit *Limosa lapponica*	4		11	15
Whimbrel *Numenius phaeopus*	135		39	174
Eurasian Curlew *N. arquata*	-	1014	-	1014
Far Eastern Curlew *N. madagascariensis*	1		10	11
Spotted Redshank *Tringa erythropus*	1	-	1827	1828
Common Redshank *T. totanus*	680	105	1671	2456
Marsh Sandpiper *T. stagnatilis*	-	-	2051	2051
Common Greenshank *T. nebularia*	-	67	873	940
Nordmann's Greenshank *T. guttifer*	1	-	35	36
Green Sandpiper *T. ochropus*		44	1	45
Wood Sandpiper *T. glareola*	197	64	227	488
Terek Sandpiper *Xenus cinereus*	132		425	557
Common Sandpiper *Actitis hypoleucos*	5	87	11	103
Grey-tailed Tattler *Heteroscelus brevipes*	8		34	42
Ruddy Turnstone *Arenaria interpres*	2		86	88
Red-necked Phalarope *Phalaropus lobatus*	1		43	44
Pintail/Swinhoe's Snipe *Gallinago stenura/megala*	2		3	5
Common Snipe *Gallinago gallinago*	2	14	1	17
Long-billed Dowitcher *Limnodromus scolopaceus*		-	3	3
Asian Dowitcher *Limnodromus semipalmatus*	9		540	549
Red Knot *Calidris canutus*	2		62	64
Great Knot *C. tenuirostris*	45	-	161	206
Sanderling *C. alba*			22	22
Red-necked Stint *C. ruficollis*	295		2302	2597
Little Stint *C. minuta*			4	4
Temminck's Stint *C. temminckii*	1	27		28
Long-toed Stint *C. subminuta*	13		11	24
Sharp-tailed Sandpiper *C. acuminate*	13		231	244
Dunlin *C. alpine**	4	11	2	6
Curlew Sandpiper *C. ferruginea*	48		4535	4583
Spoon-billed Sandpiper *Eurynorhynchus pygmeus*			6	6
Broad-billed Sandpiper *Limicola falcinellus*	55		123	178
Ruff *Philomachus pugnax*	1	-	3	4
Large *tringa* sandpipers *Tringa spp.*		1093		1093

Species	autumn	winter	spring	Minimum
NUMBER OF SPECIES	37	24	44	46
TOTAL NUMBER OF BIRDS	2056	9474	16984	28514

Note: a dash indicates that birds were recorded, but not thought to comprise different individuals to those in other seasons.

*Numbers of Kentish Plover and Dunlin were under-counted and therefore the winter and minimum total numbers of birds are likely to be underestimated.

Regionally important numbers

Wetlands International (2002) made detailed reviews and estimates on the known population size and the 1% of the flyway or regional population of all waterbird species that is criterion 3c for determining a wetland of international importance. Some wader species pass through Mai Po and Inner Deep Bay Ramsar site in numbers that constitute a significant proportion of their populations. These species are listed in Table 2 with their flyway or regional population, numbers recorded in the Ramsar site and percentages of the flyway or regional population during the course of July 2002 to June 2003.

Table 2. Species recorded in flyway/regional important numbers in Deep Bay during July 2002 to June 2003.

Species	Flyway/regional population	Number recorded	Percentage
Pied Avocet *Recurvirostra avosetta*	25,000 – 100,000	5,846	5.8 – 23.4%
Kentish Plover *Charadrius alexandrius*	100,000	-	Minimum 1%
Eurasian Curlew *Numenius arquata*	35,000	1,014	2.9%
Spotted Redshank *Tringa erythropus*	25,000 – 100,000	1,828	1.8 - 7.3%
Marsh Sandpiper *Tringa stagnatilis*	90,000	2,051	2.3%
Common Greenshank *Tringa nebularia*	55,000	940	1.7%
Terek Sandpiper *Xenus cinereus*	50,000	557	1.1%
Curlew Sandpiper *Calidris ferruginea*	180,000	4,583	2.5%

Note: No representative figure was made for Kentish Plover during July 2002 to June 2003.

Threatened species

With regard to species listed in BirdLife International (2000), the following were recorded during July 2002 to June 2003 (population figures from Wetland International (2002)):

- Far Eastern Curlew: listed as Near-threatened, the world population is estimated to be 38,000 birds. Eleven birds were recorded during July 2002 to June 2003.

- Nordmann's Greenshank: listed as Endangered (i.e. facing a very high risk of extinction in the wild in the near future), the world population is estimated to be 250 to 1,000 birds. One was recorded in autumn 2002 and a total of 35 birds (22 adults and 13 first-summer birds) were recorded in spring 2003, which constituted to 3.6 – 14.4% of world population. A total of 35 birds recorded during the spring passage was a relatively high figure in recent years.

- Asian Dowitcher: listed as Near-threatened, the world population is estimated to be 23,000. A new peak number of 540 birds were recorded on 2 May, which constituted to 2.3% of the world population. However, numbers fluctuate year by year and only 40 and 49 birds were recorded during the spring passages of 2002 and 2001 respectively.

- Spoon-billed Sandpiper: listed as Vulnerable, the world population is estimated to be fewer than 3,000 individuals and is decreasing. A total of six individuals occurred during the spring migration. This is a relatively high number in recent years, and compares with two birds in spring 2002 and only one bird in spring 2001.

Other observations

The regular observations brought a series of leg-flagged birds. Some of these refer to the wader colour ringing programme recently commenced in Hong Kong, while the majority were attached in Australia (see Appendix 4). These latter records have been sent to the Australian Wader Studies Group, which organizes the leg-flagging programme involved.

In addition, when possible, birds passing through in autumn were assigned to an age-class of juvenile or non-juvenile. Non-juvenile was chosen as it is often not possible in the field to be certain whether an individual bird is adult or first-summer (i.e. second calendar year). Details are provided in Appendix 5.

Acknowledgements

We would like to thank Lew Young and other staff at the WWF-HK Mai Po Marshes Nature Reserve for much help in ensuring that waders were provided with suitable roosting areas, without which this work would not be possible. We are also grateful to members of the Hong Kong Bird Watching Society who provided sightings of the colour-flagged waders.

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Map 1: Mai Po Marshes Nature Reserve

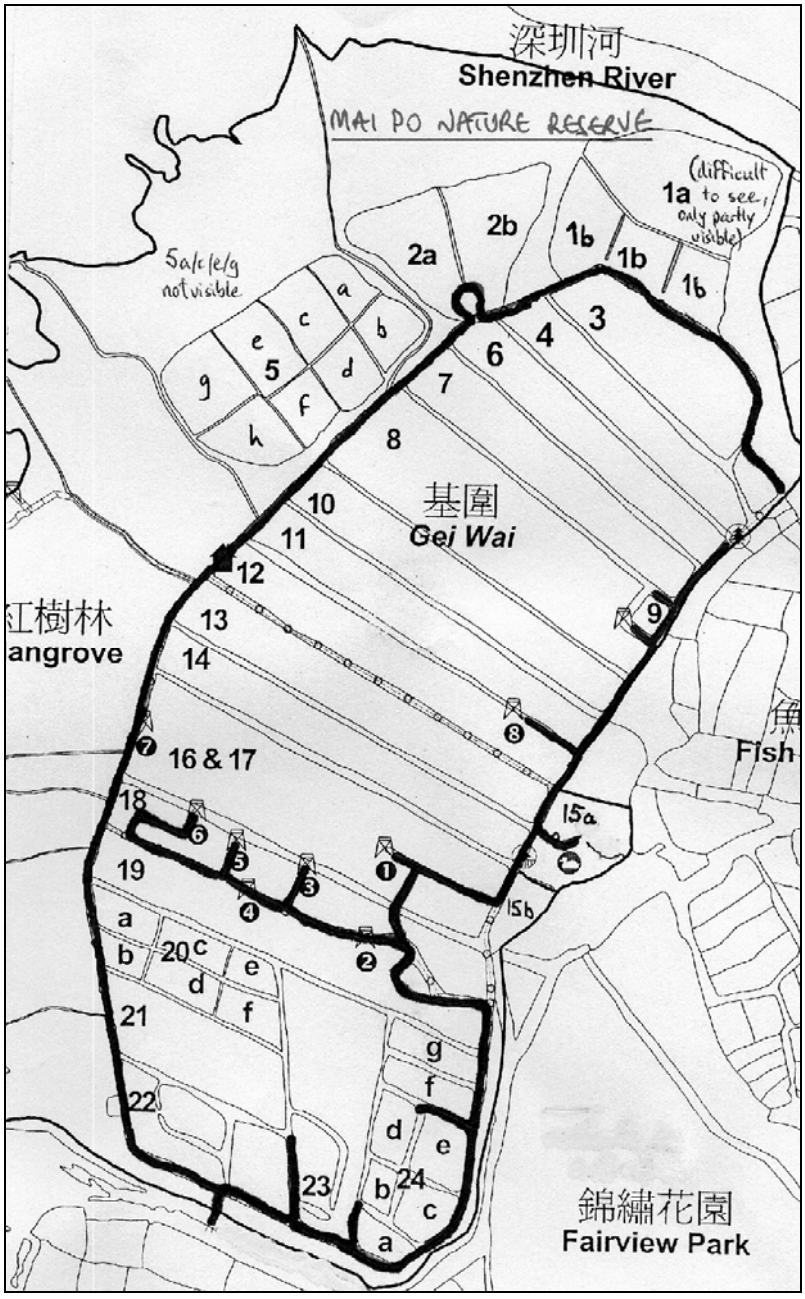

Figure 1. Total number of waders recorded at Mai Po Inner Deep Bay, autumn 2002

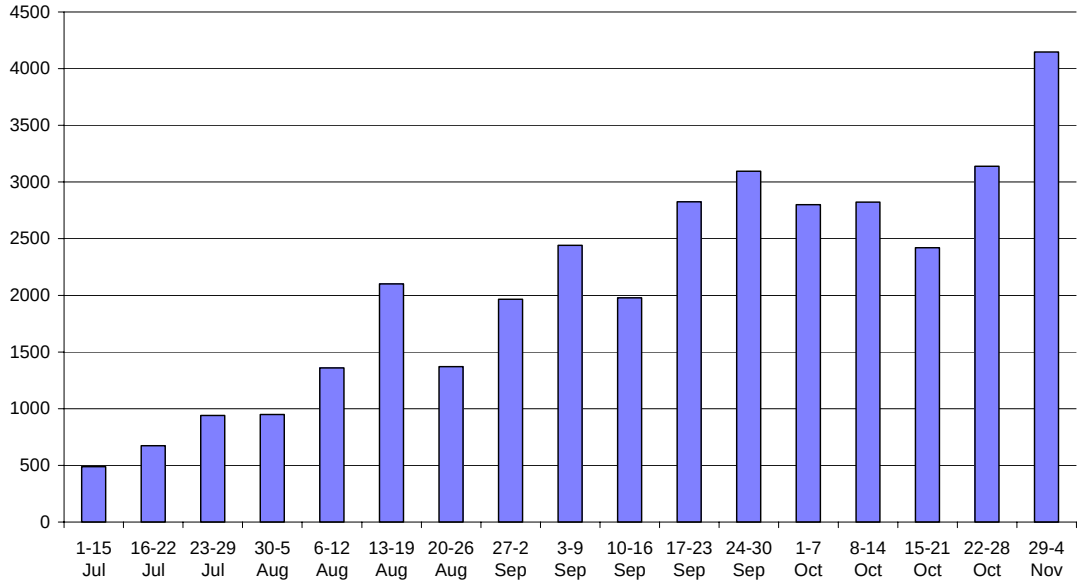

Figure 2. Counts of Black-winged Stilt at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

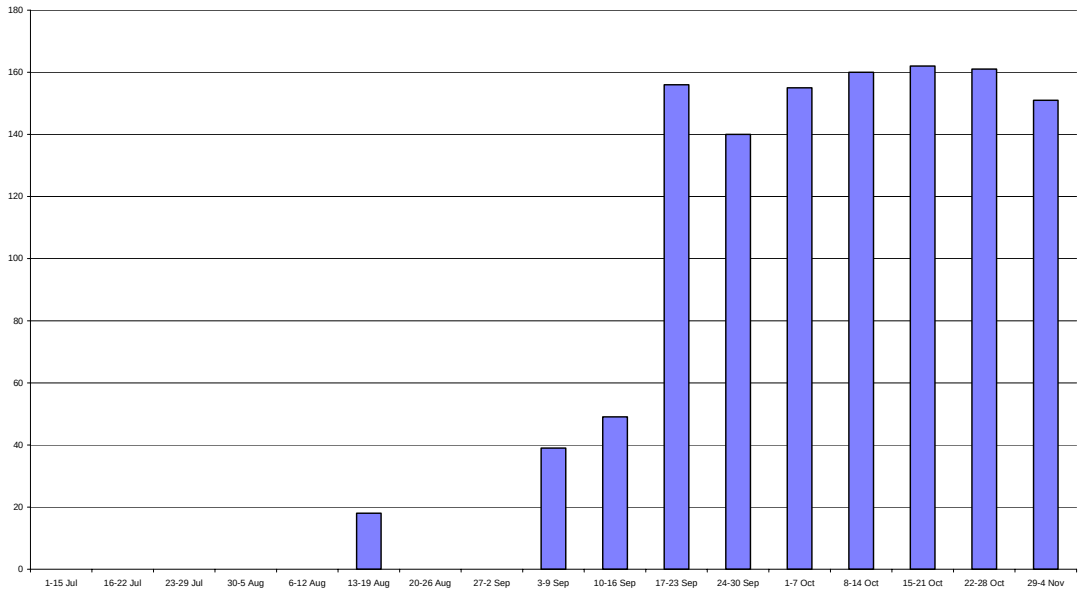

Figure 3. Counts of Pacific Golden Plover at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

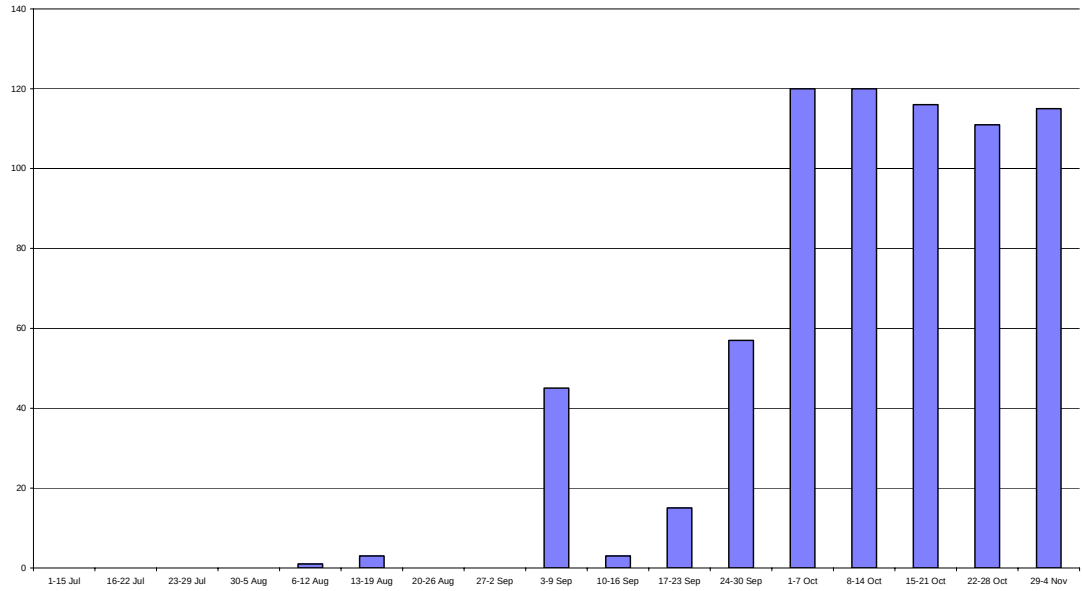

Figure 4. Counts of Kentish Plover at Mai Inner Deep Bay Ramsar Site, autumn 2002

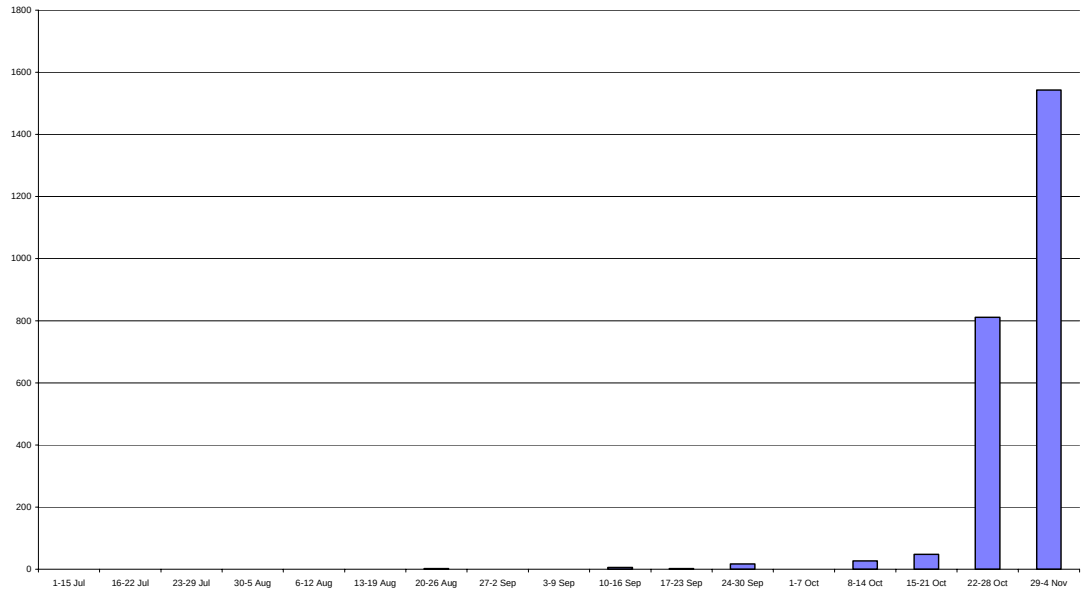

Figure 5. Counts of Grey Plover at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

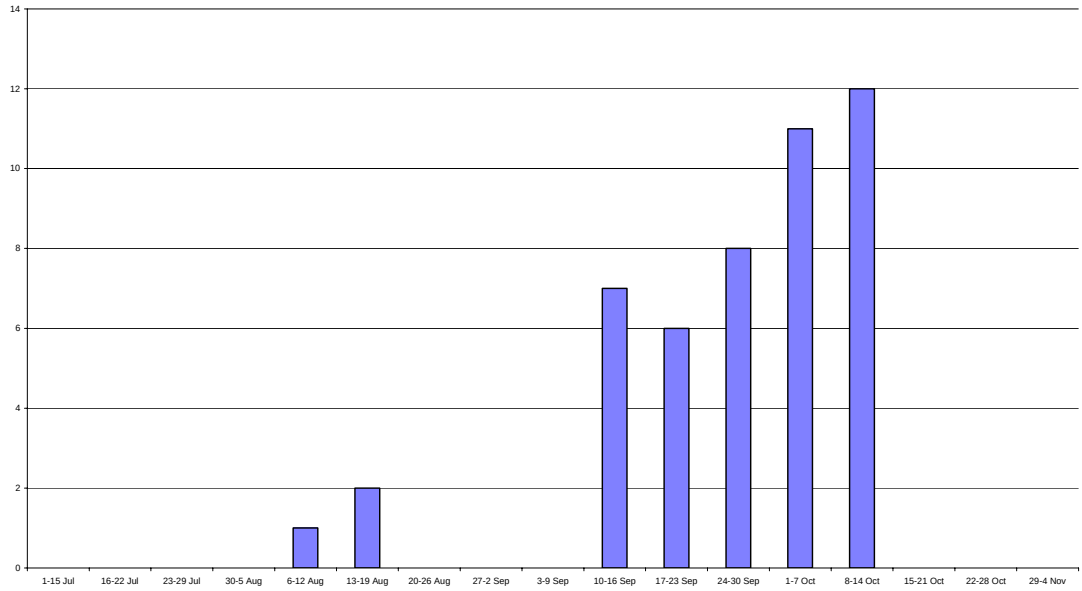

Figure 6. Counts of Lesser Sand Plover at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

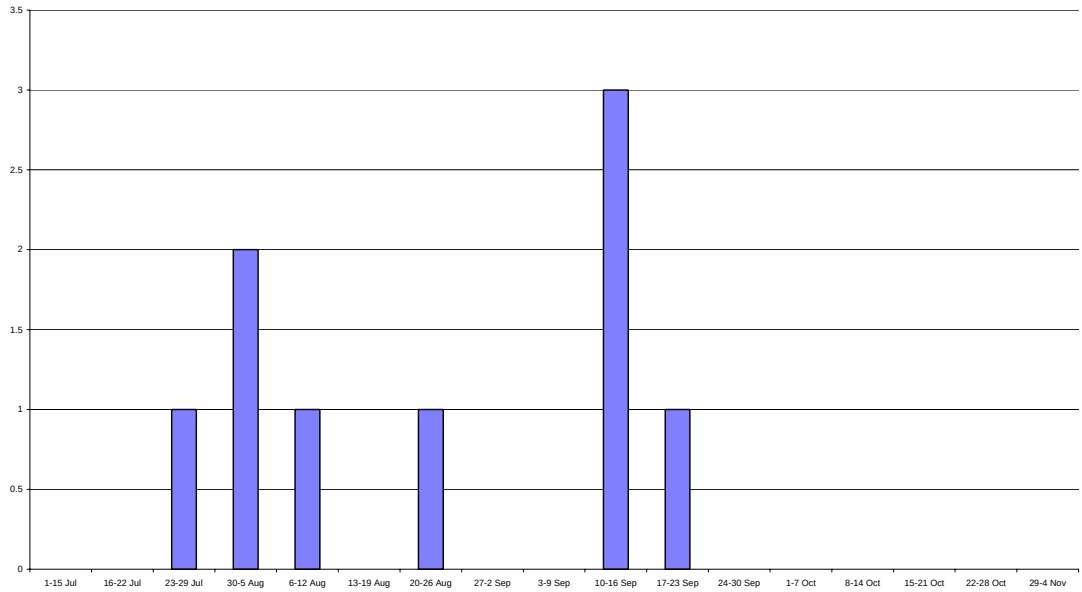

Figure 7. Counts of Greater Sand Plover at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

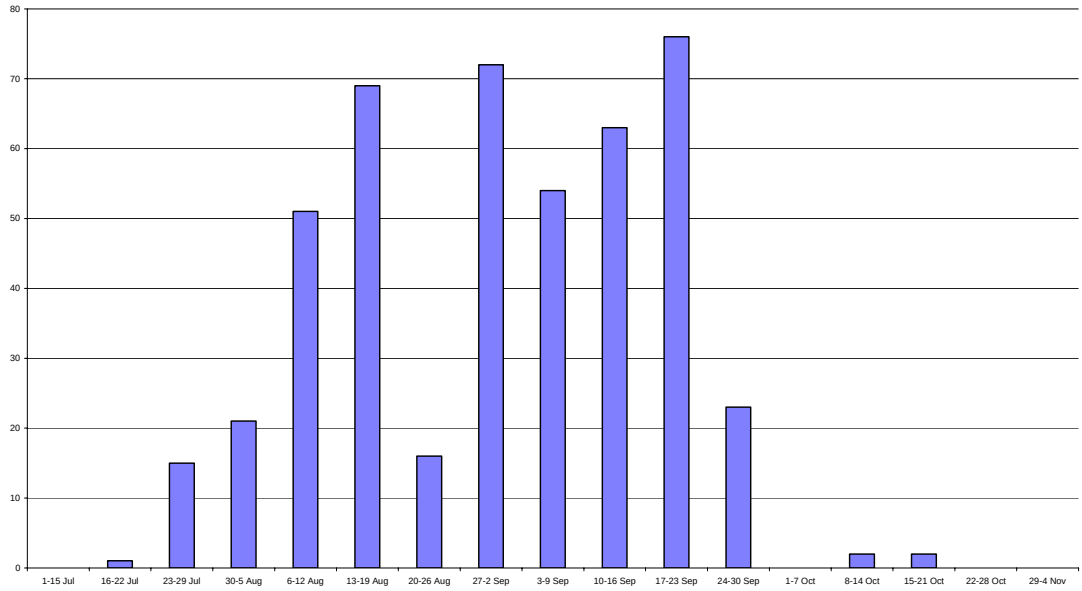

Figure 8. Counts of Black-tailed Godwit at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

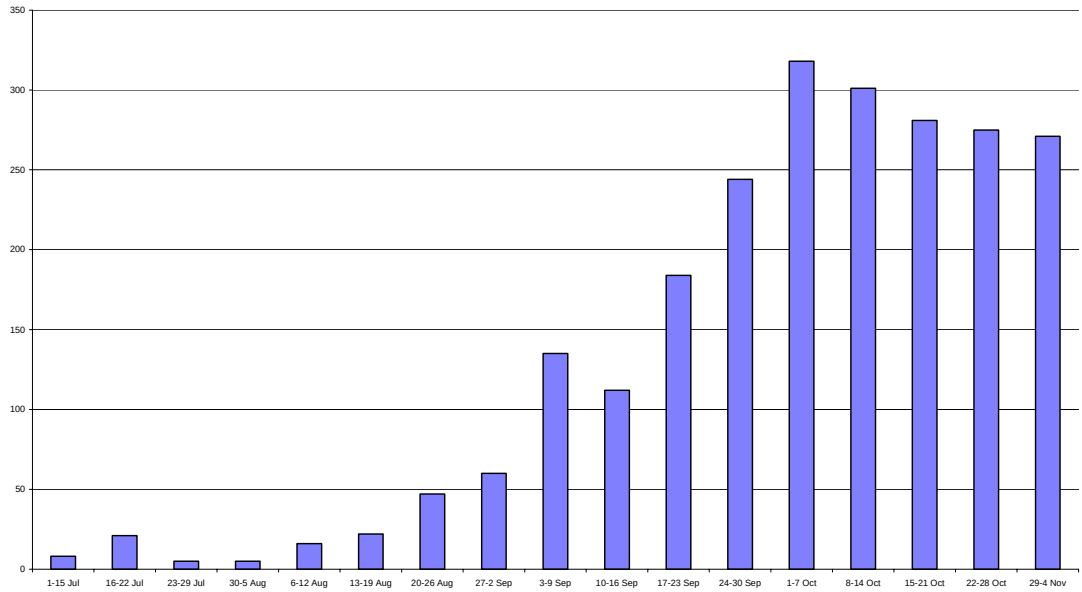

Figure 9. Counts of Bar-tailed Godwit at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

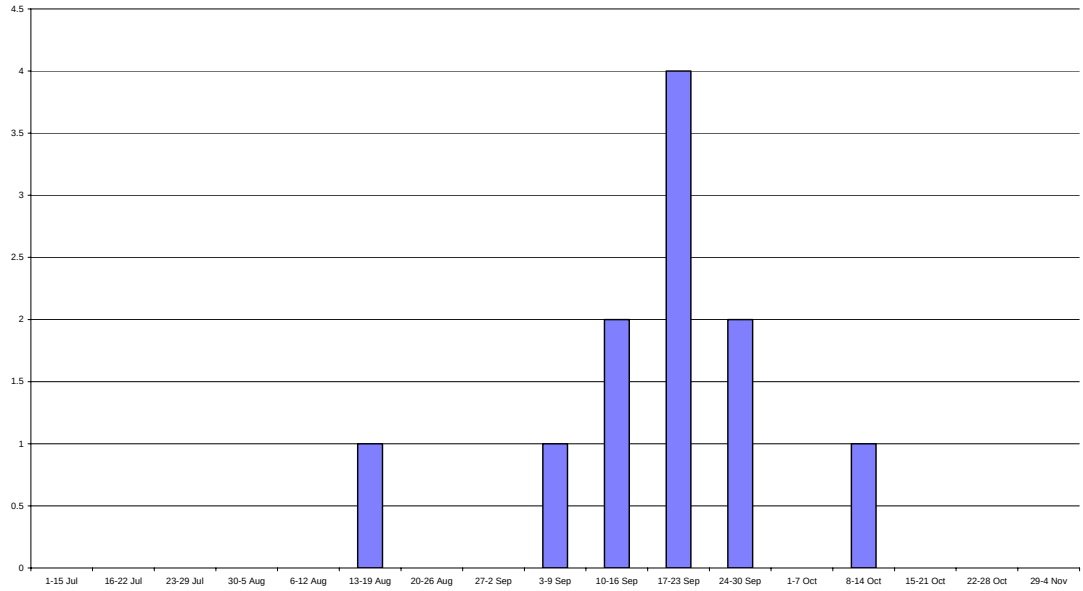

Figure 10. Counts of Whimbrel at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

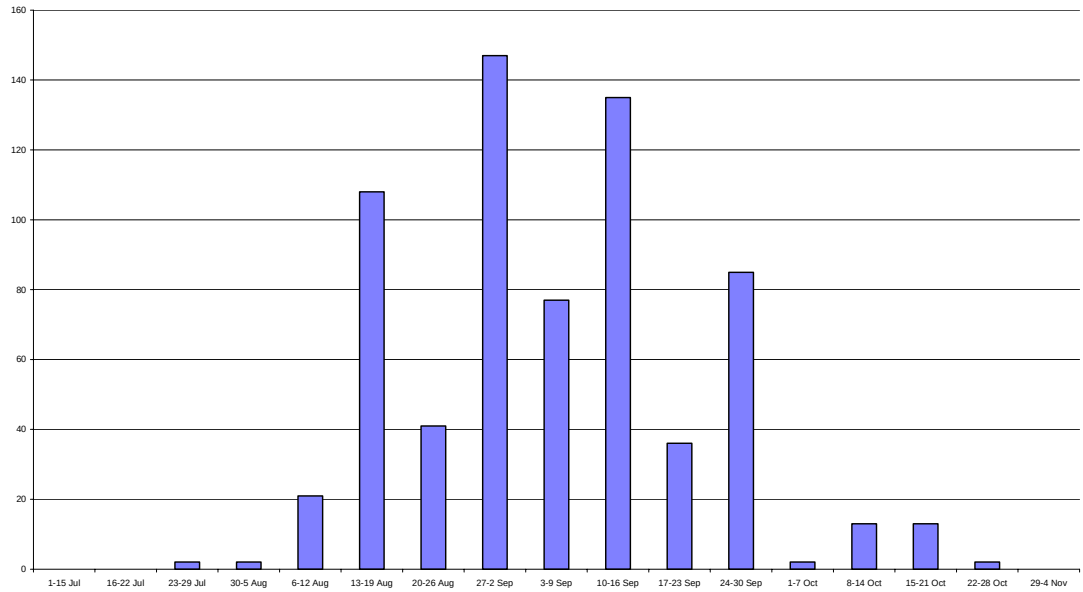

Figure 11. Counts of Eurasian Curlew at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

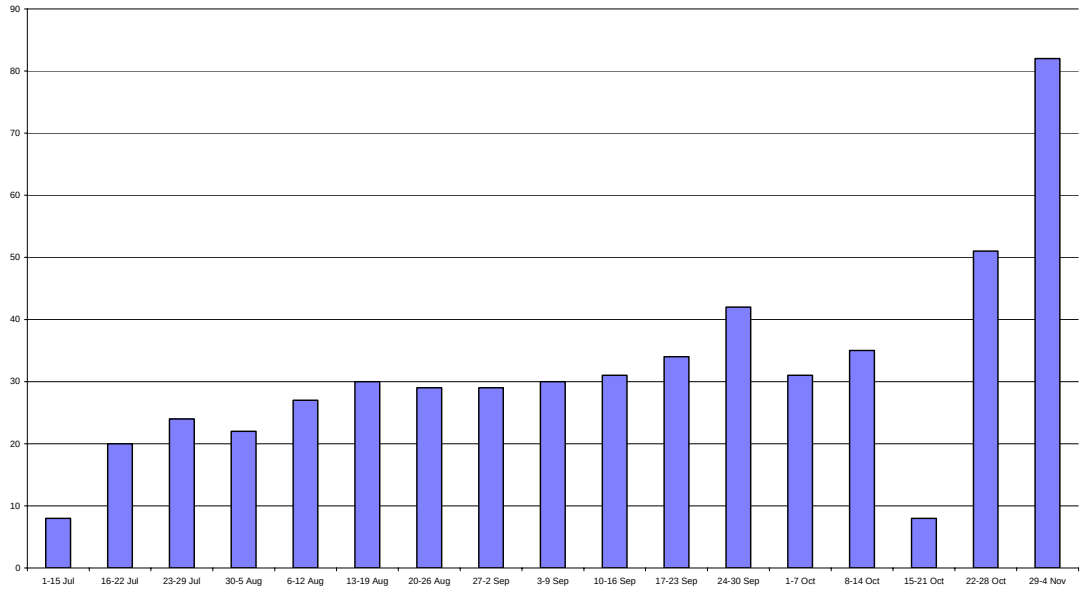

Figure 12. Counts of Spotted Redshank at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

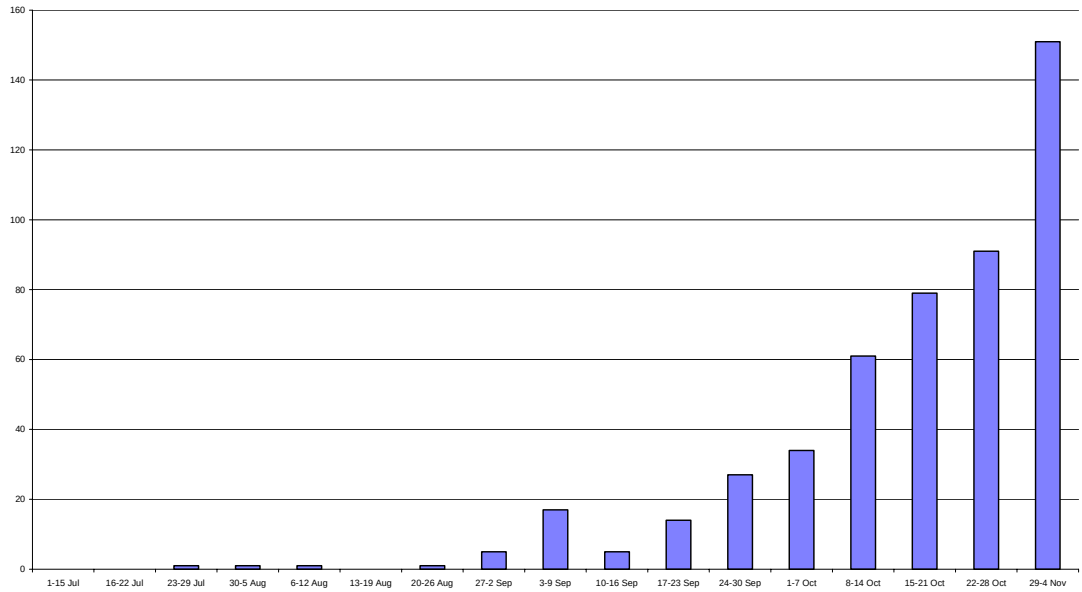

Figure 13. Counts of Common Redshank at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

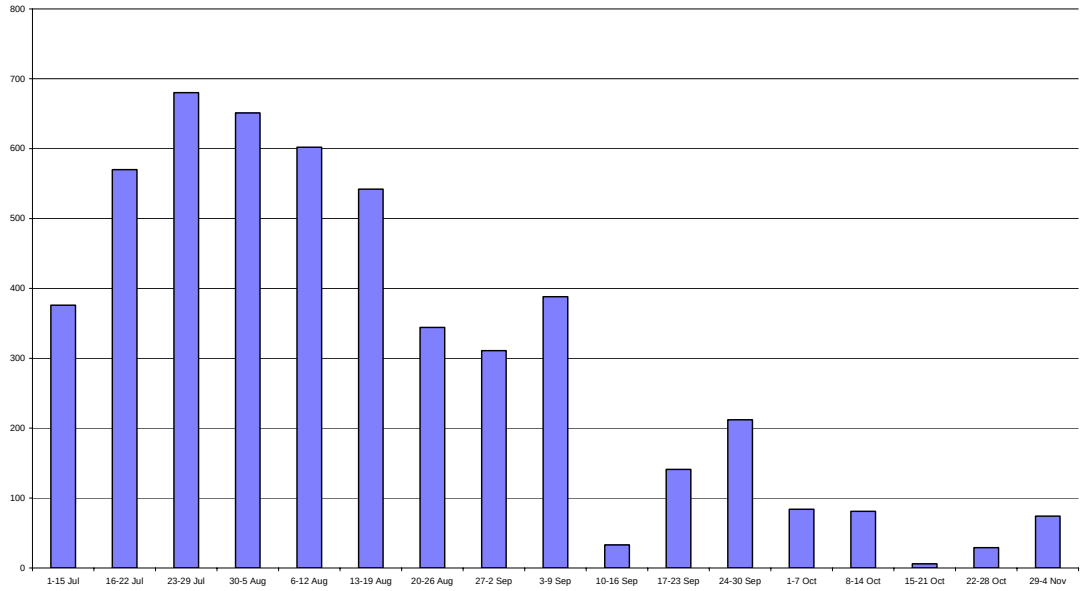

Figure 14. Counts of Marsh Sandpiper at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

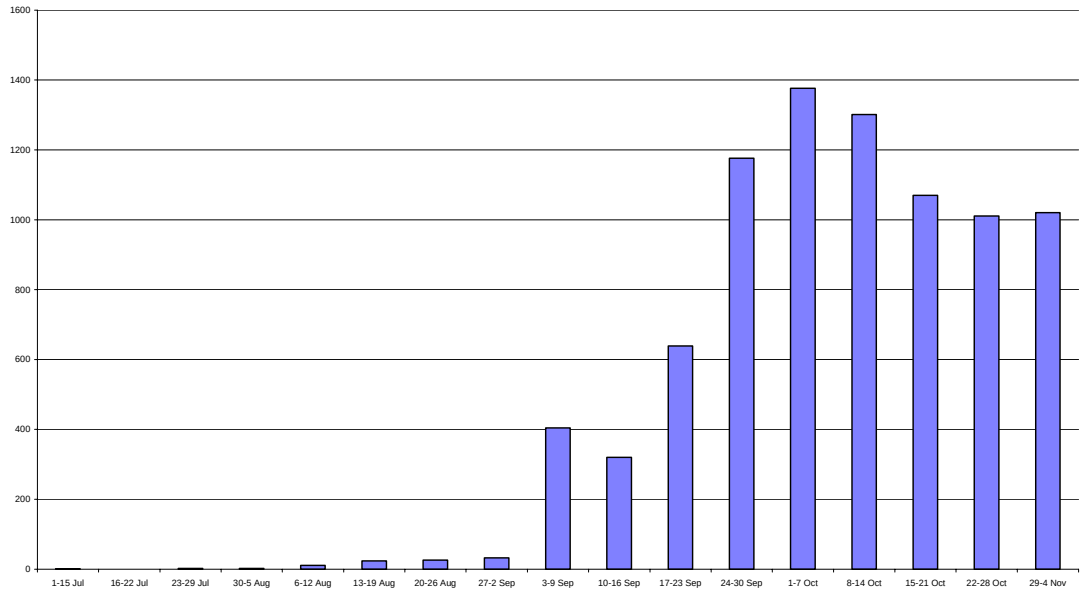

Figure 15. Counts of Common Greenshank at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

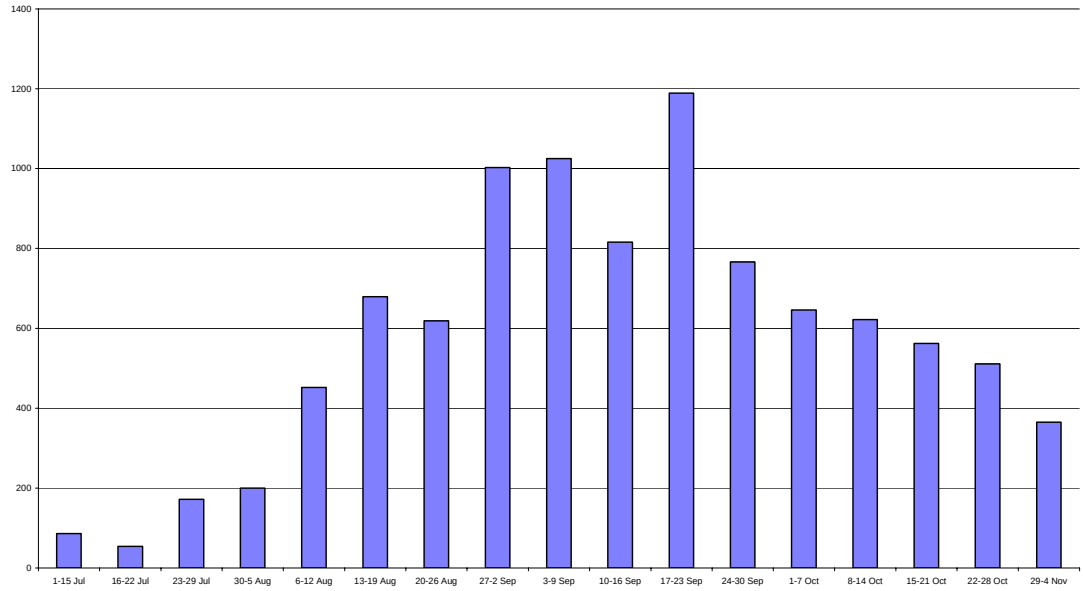

Figure 16. Counts of Wood Sandpiper at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

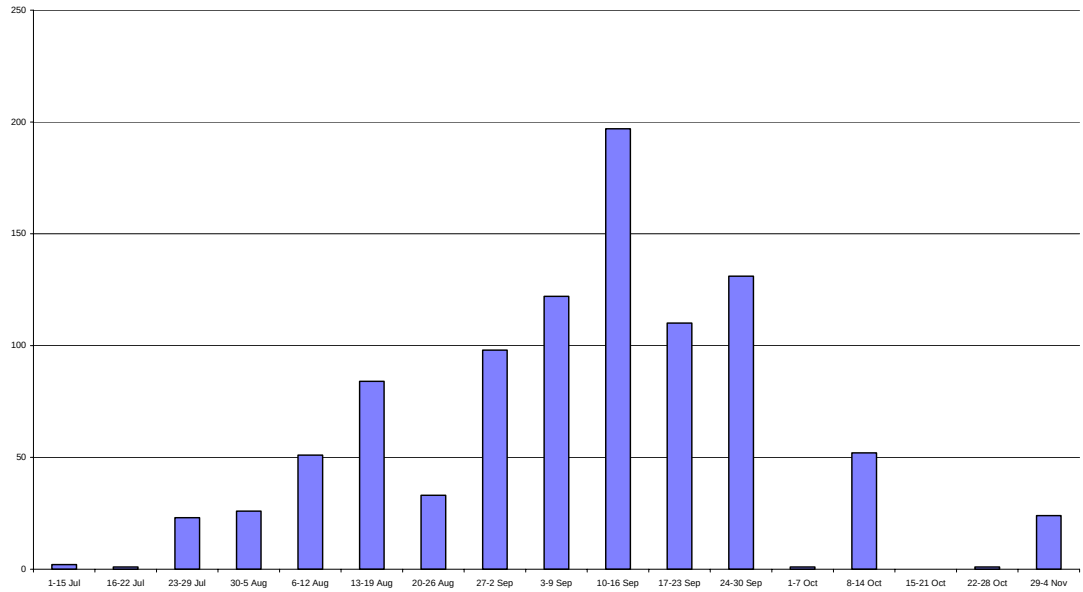

Figure 17. Counts of Great Knot at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

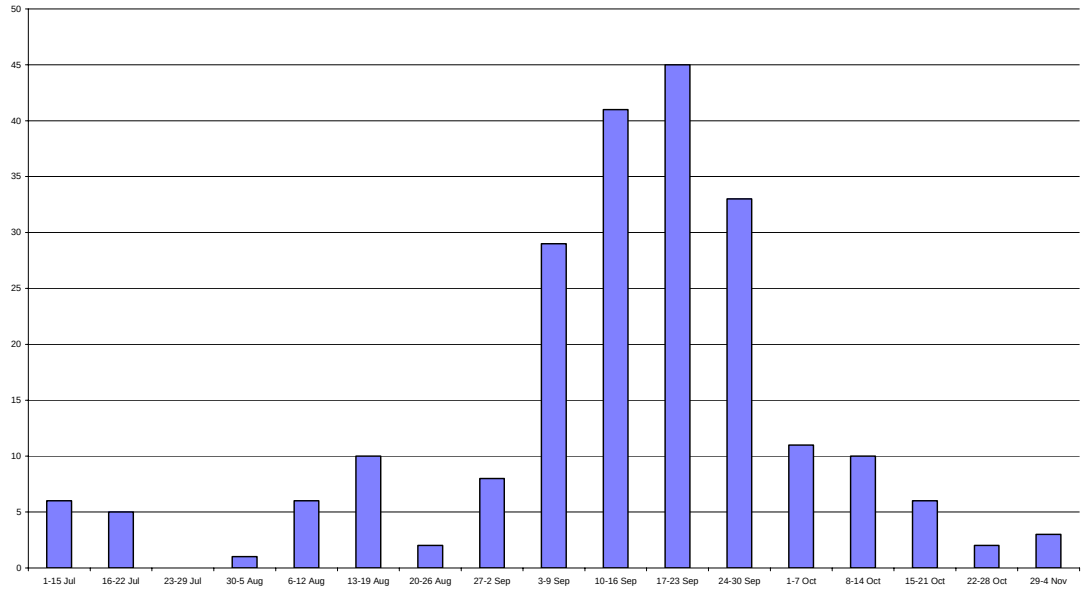

Figure 18. Counts of Red Knot at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

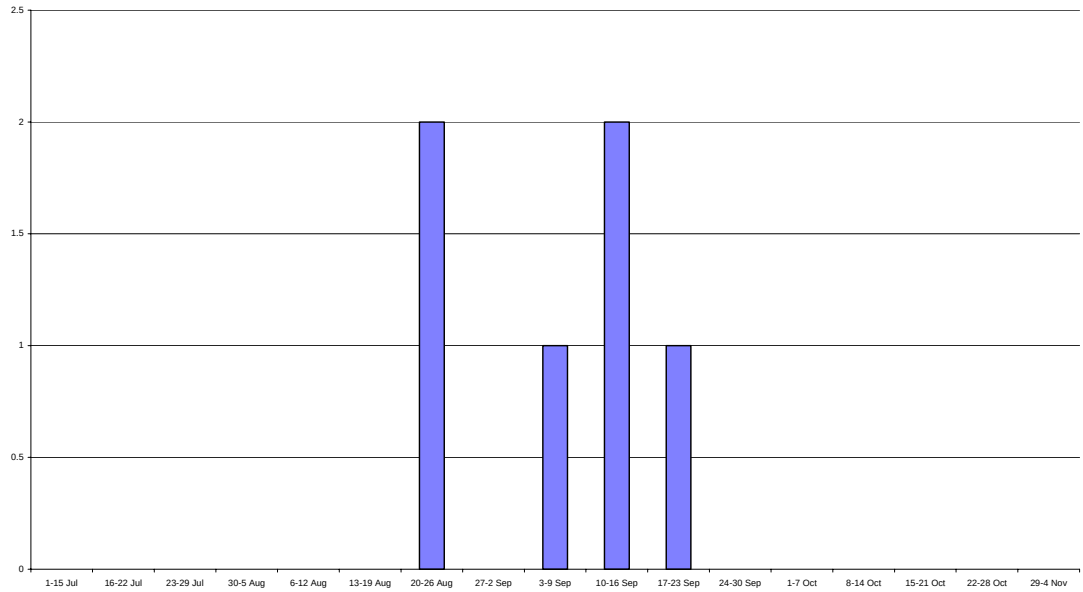

Figure 19. Counts of Broad-billed Sandpiper at Mai Po Inner Deep Bay Ramsar Site, autumn 2002

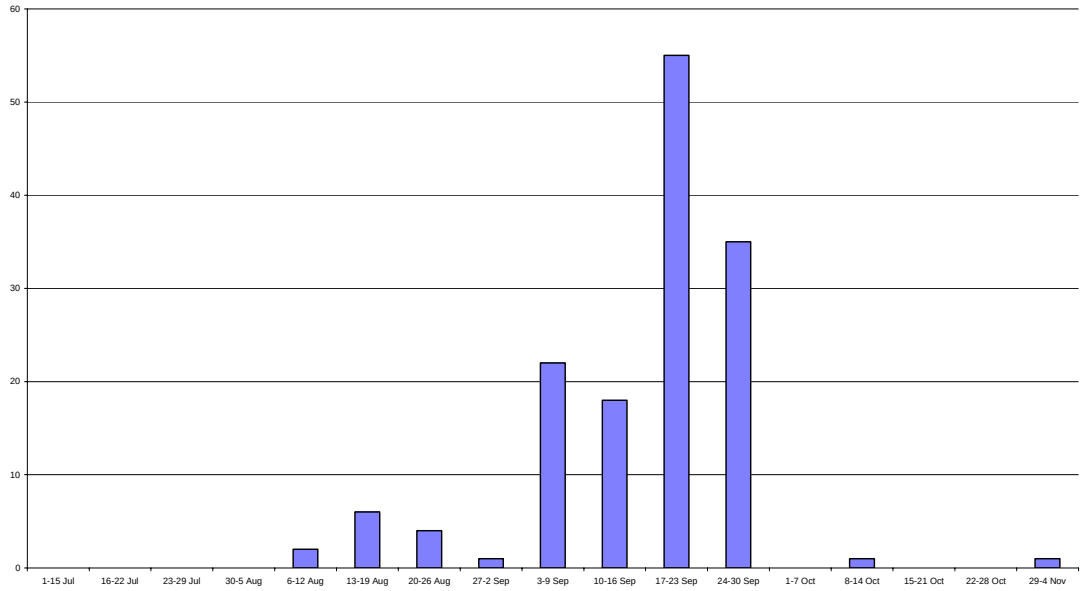

Figure 20. Total number of waders recorded at Mai Po Inner Deep Bay, spring 2003

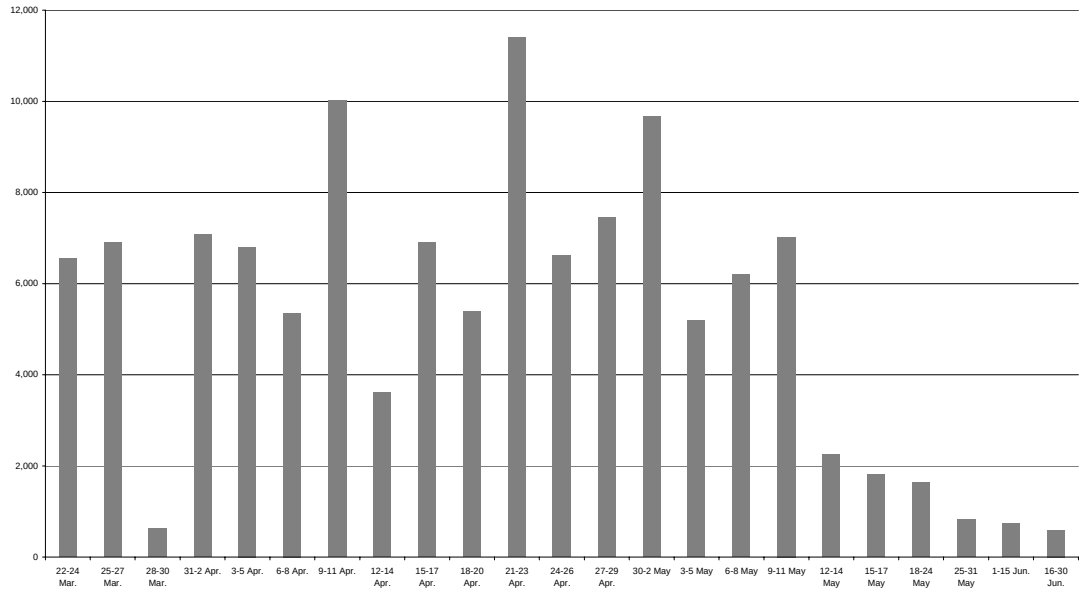

Figure 21. Counts of Pacific Golden Plover at Mai Po Inner Deep Bay Ramsar Site, spring 2003

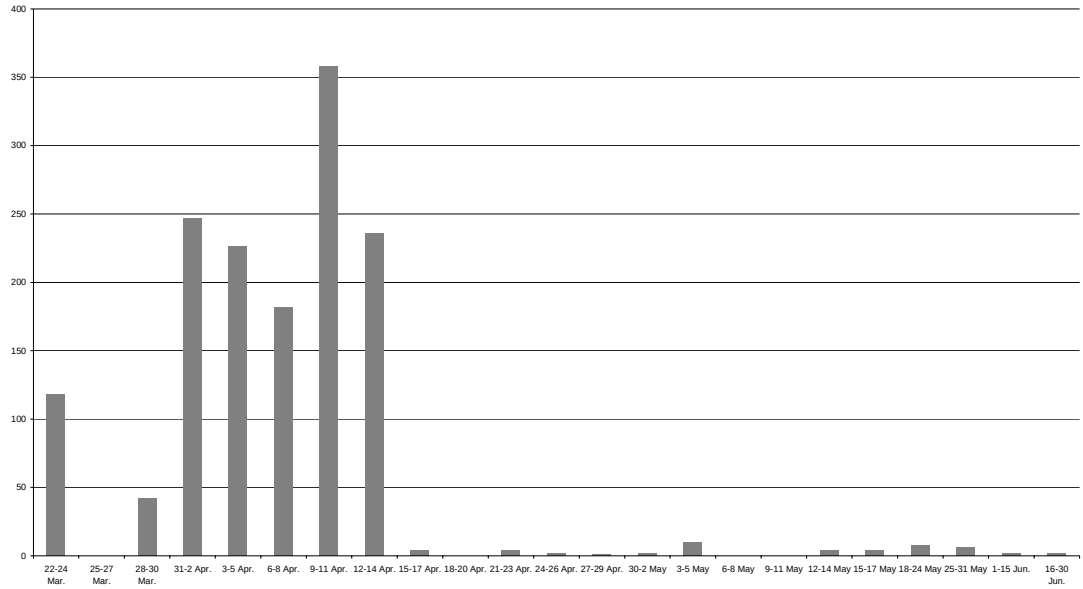

Figure 22. Counts of Lesser Sandplover at Mai Po Inner Deep Bay Ramsar Site, spring 2003

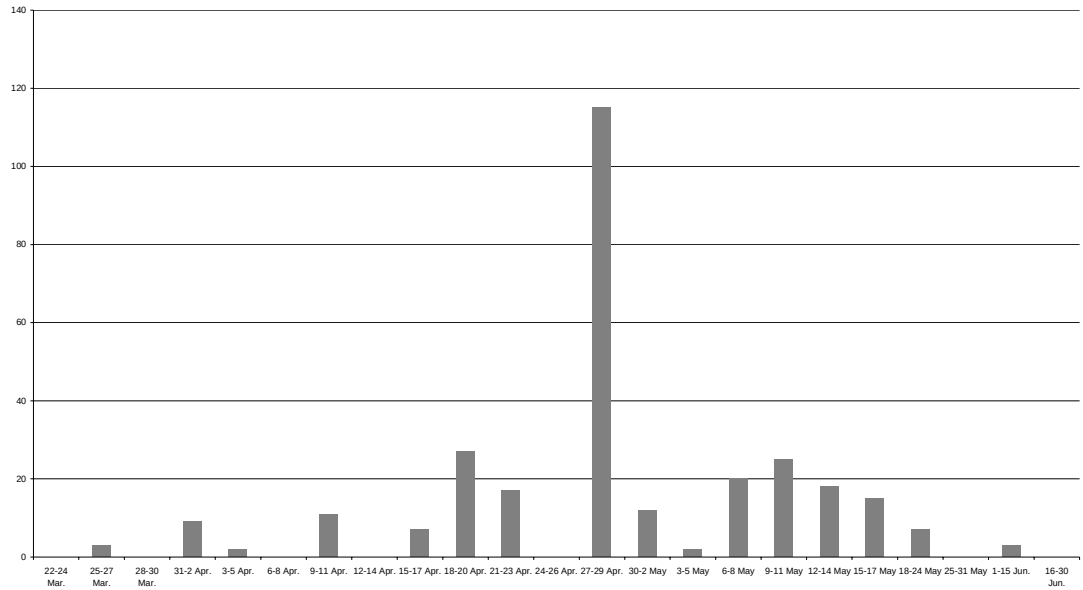

Figure 23. Counts of Greater Sandplover at Mai Po Inner Deep Bay Ramsar Site, spring 2003

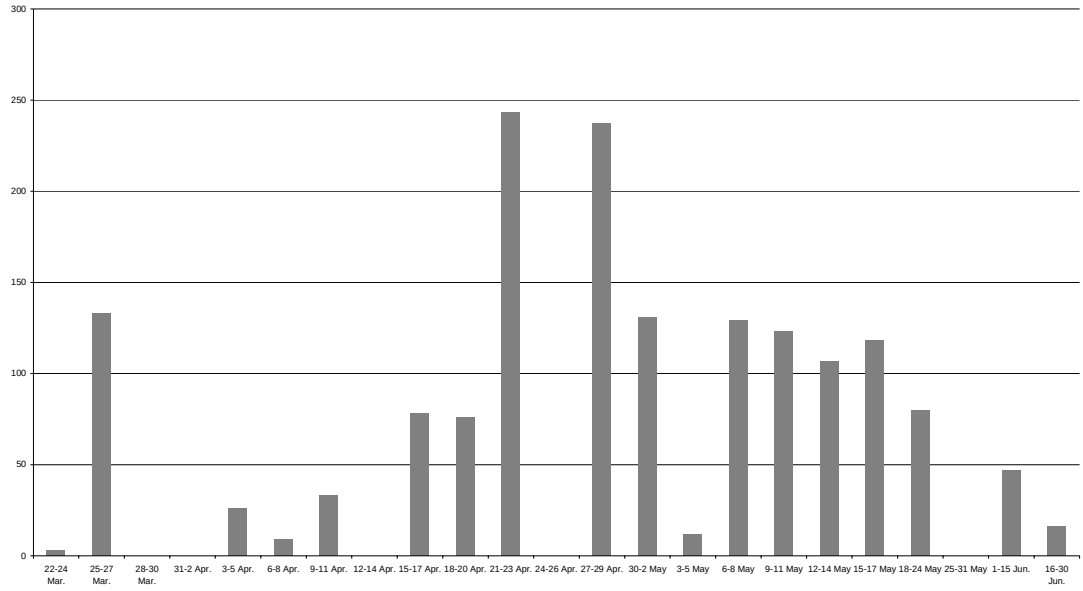

Figure 24. Counts of Black-tailed Godwit at Mai Po Inner Deep Bay Ramsar Site, spring 2003

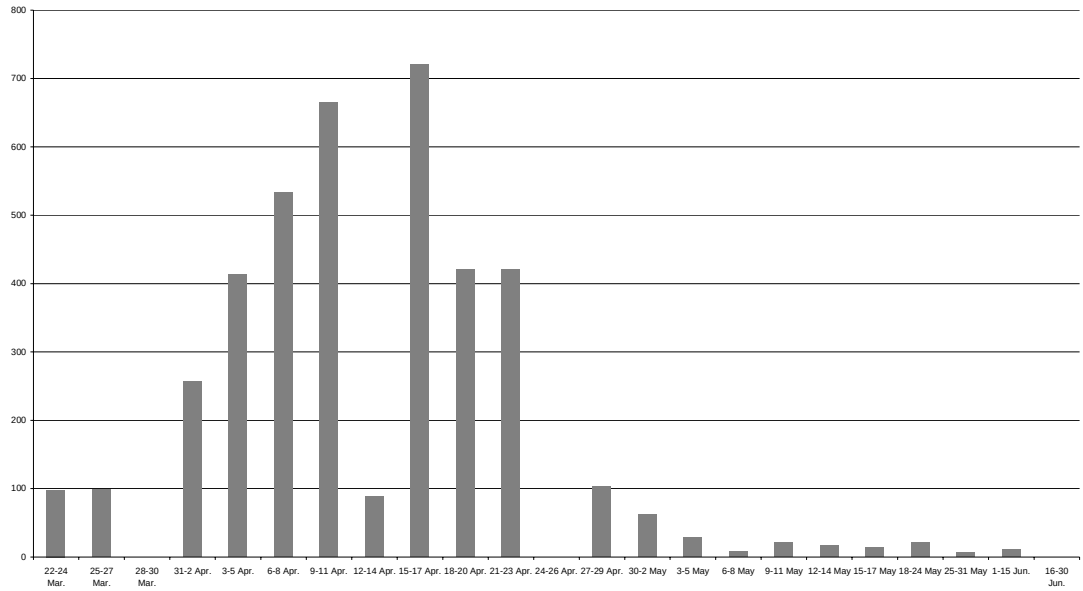

Figure 25. Counts of Spotted Redshank at Mai Po Inner Deep Bay Ramsar Site, spring 2003

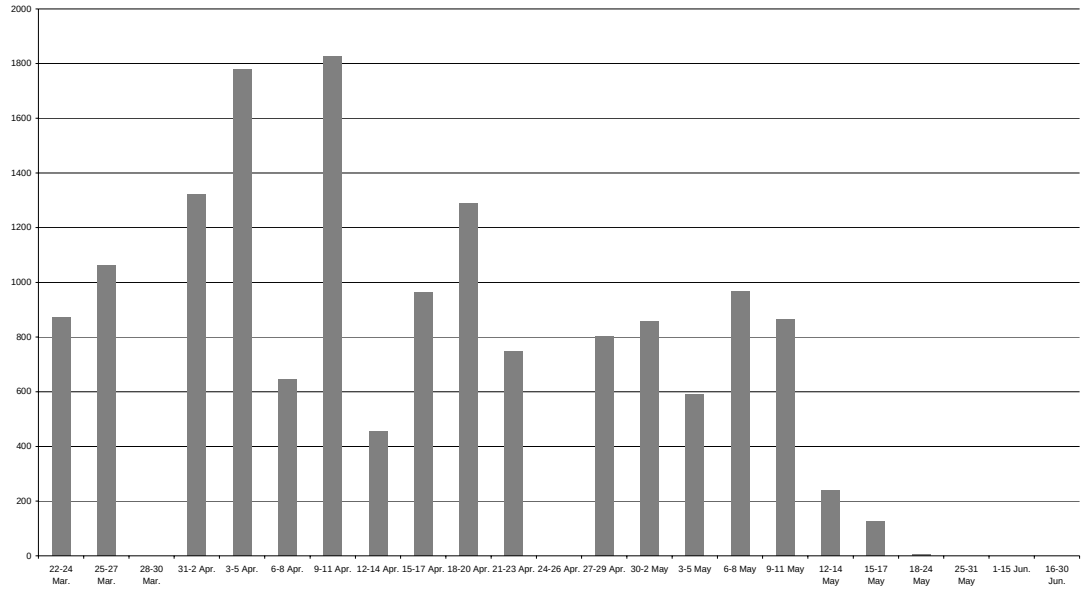

Figure 26. Counts of Common Redshank at Mai Po Inner Deep Bay Ramsar Site, spring 2003

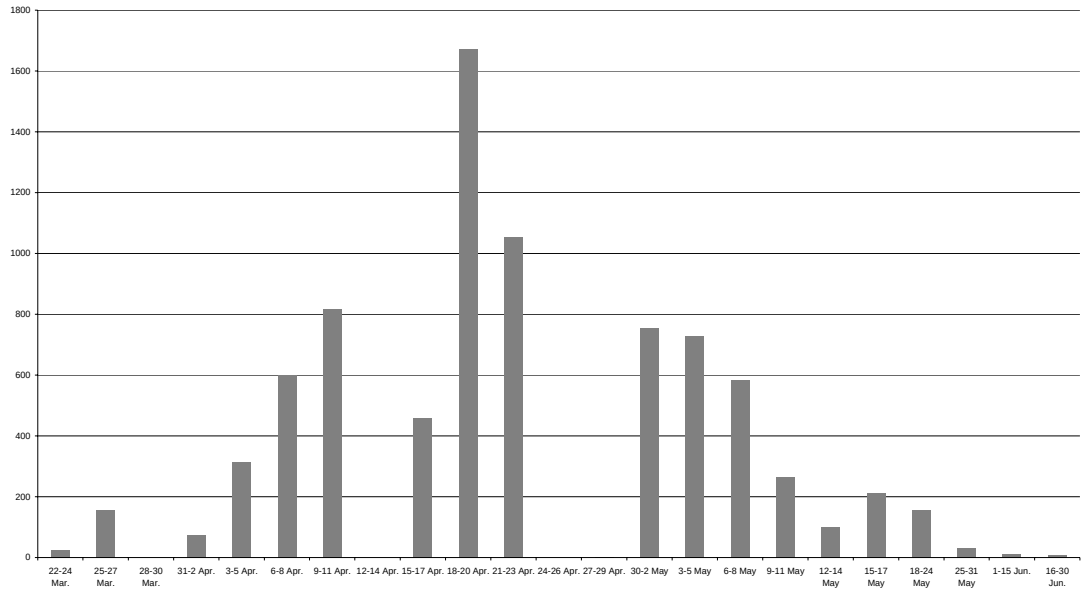

Figure 27. Counts of Marsh Sandpiper at Mai Po Inner Deep Bay Ramsar Site, spring 2003

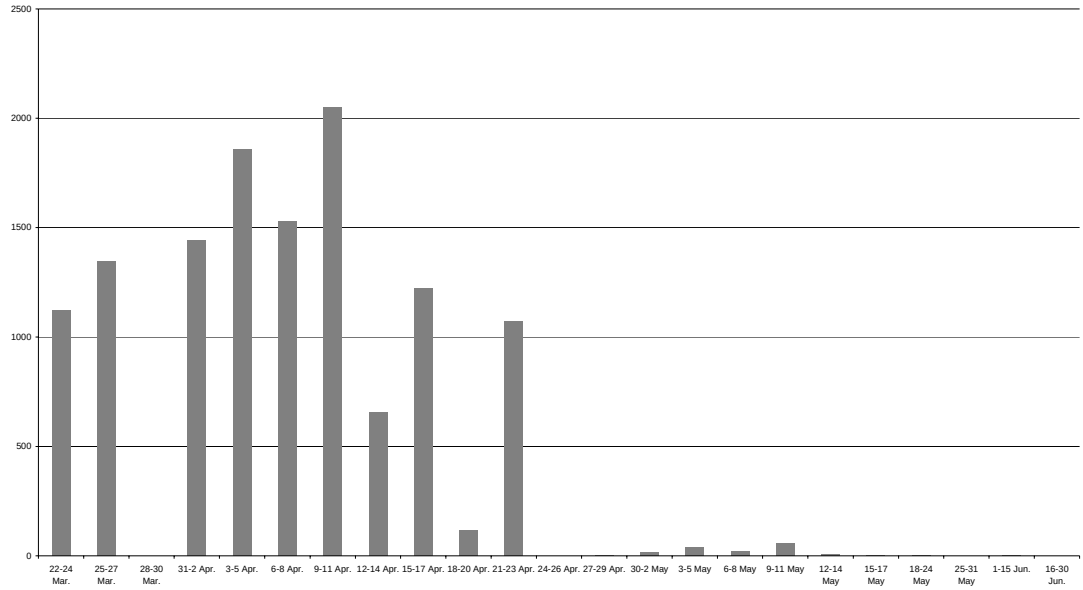

Figure 28. Counts of Common Greenshank at Mai Po Inner Deep Bay Ramsar Site, spring 2003

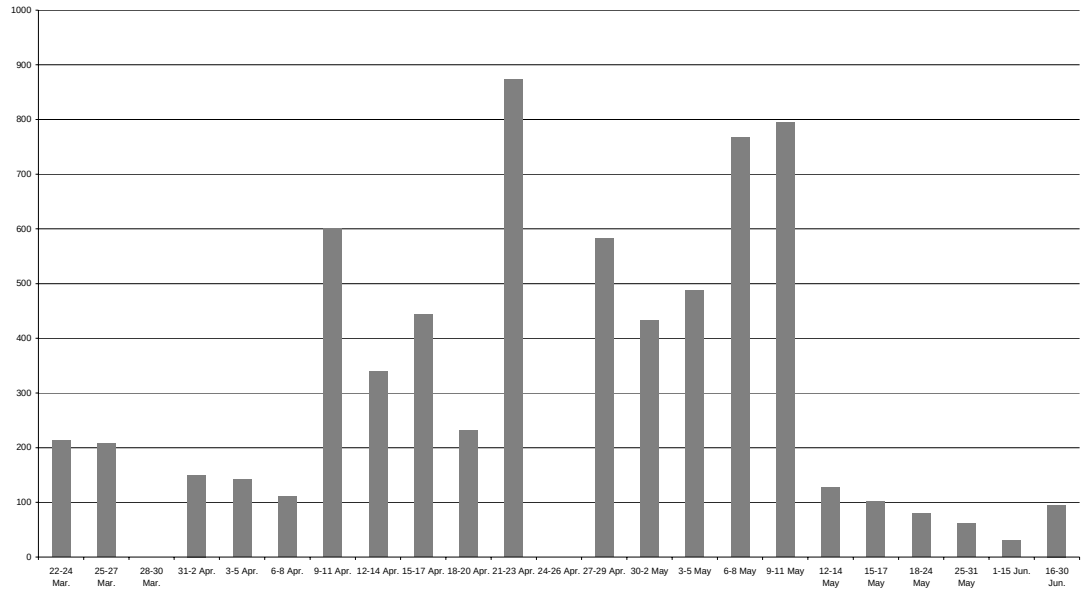

Figure 29. Counts of Terek Sandpiper at Mai Po Inner Deep Bay Ramsar Site, spring 2003

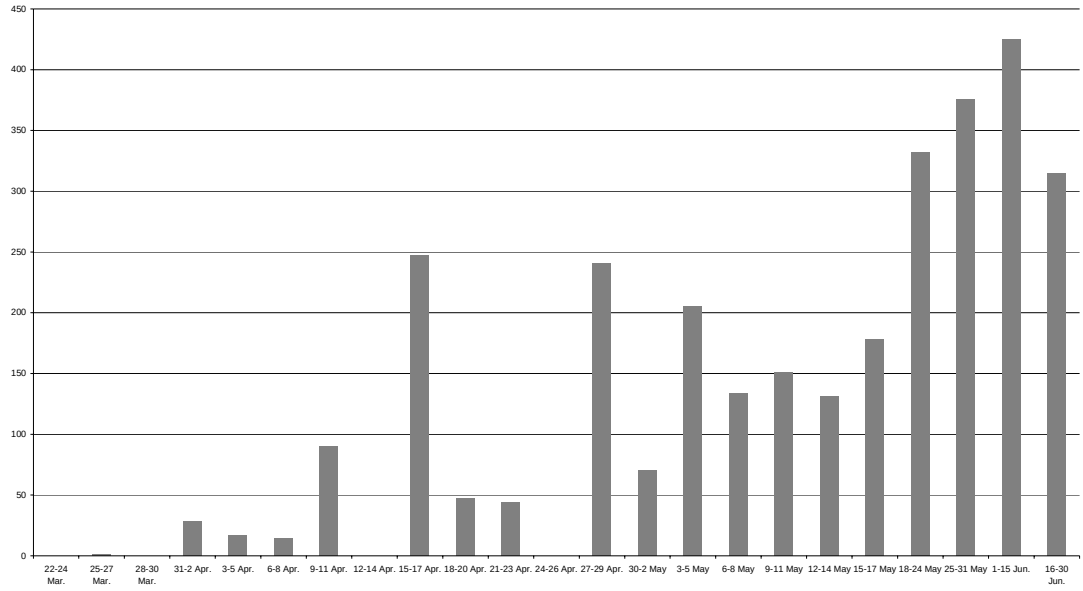

Figure 30. Counts of Grey-tailed Tattler at Mai Po Inner Deep Bay Ramsar Site, spring 2003

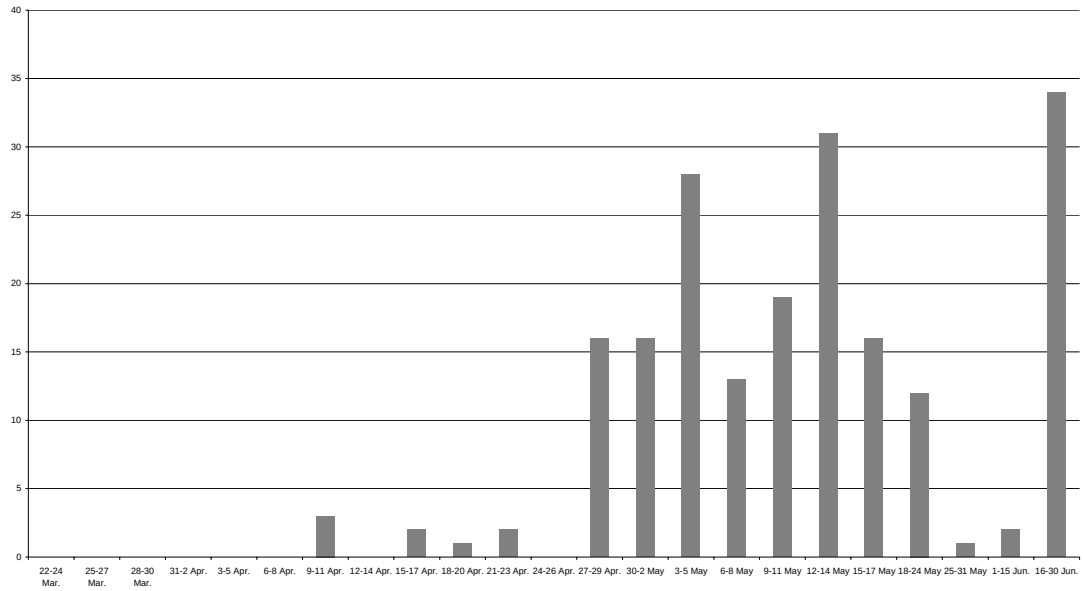

Figure 31. Counts of Ruddy Turnstone at Mai Po Inner Deep Bay Ramsar Site, spring 2003

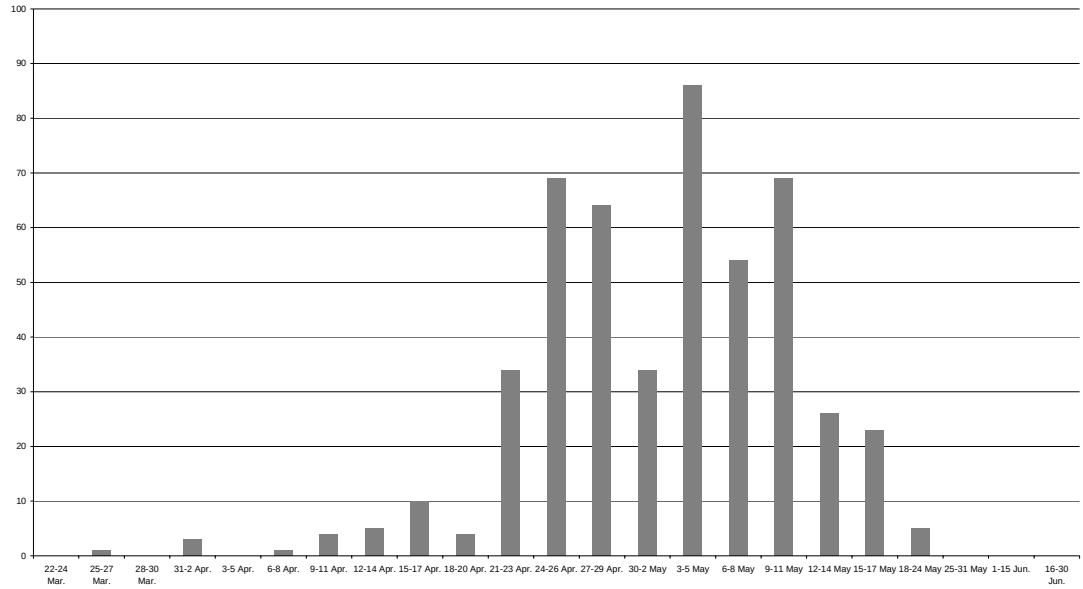

Figure 32. Counts of Asian Dowitcher at Mai Po Inner Deep Bay Ramsar Site, spring 2003

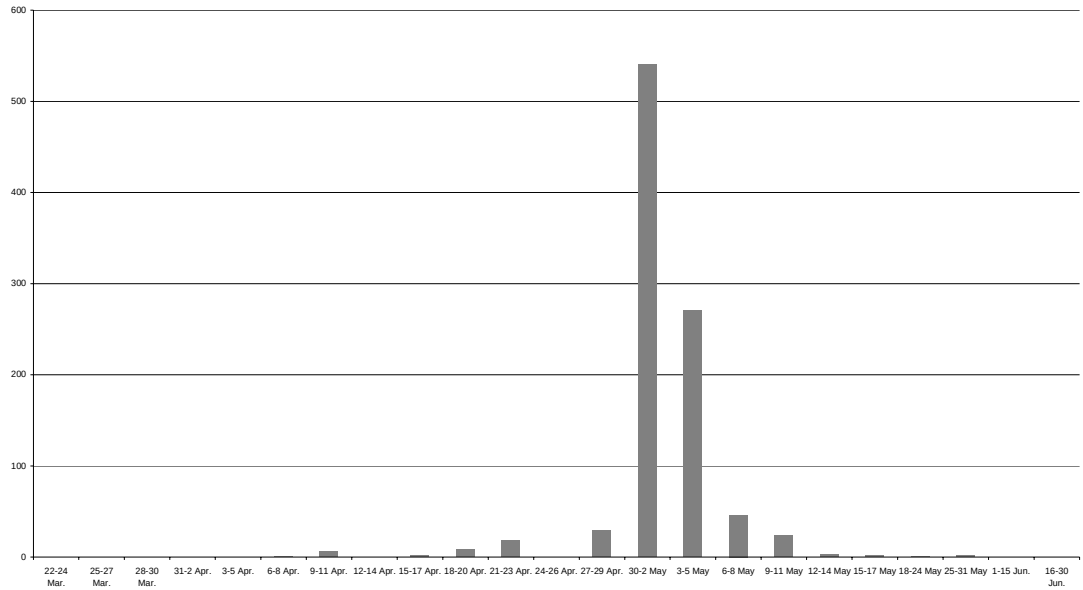

Figure 33. Counts of Red Knot at Mai Po Inner Deep Bay Ramsar Site, spring 2003

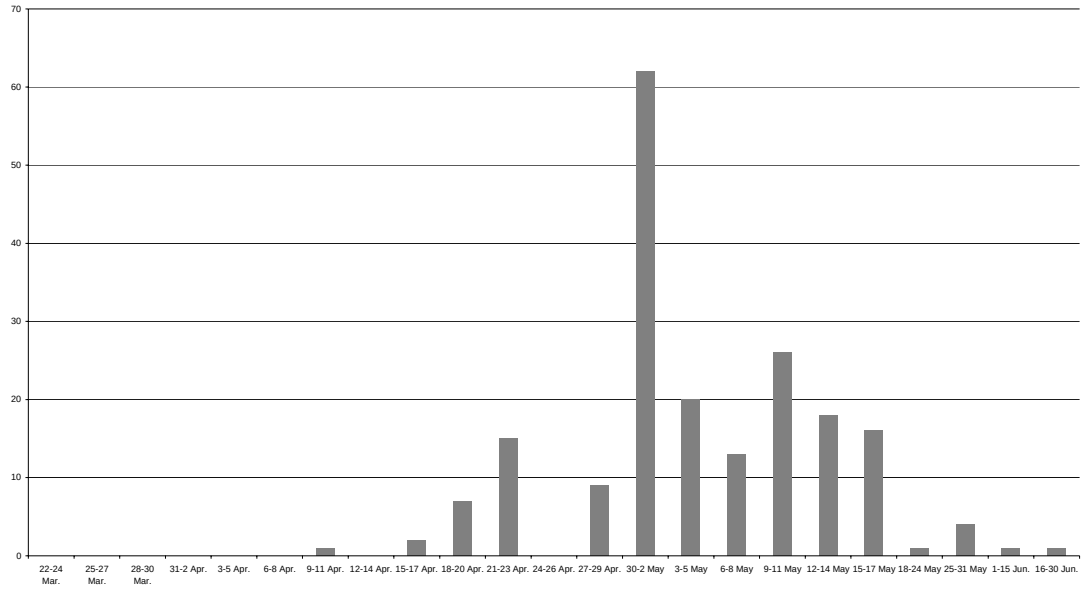

Figure 34. Counts of Great Knot at Mai Po Inner Deep Bay Ramsar Site, spring 2003

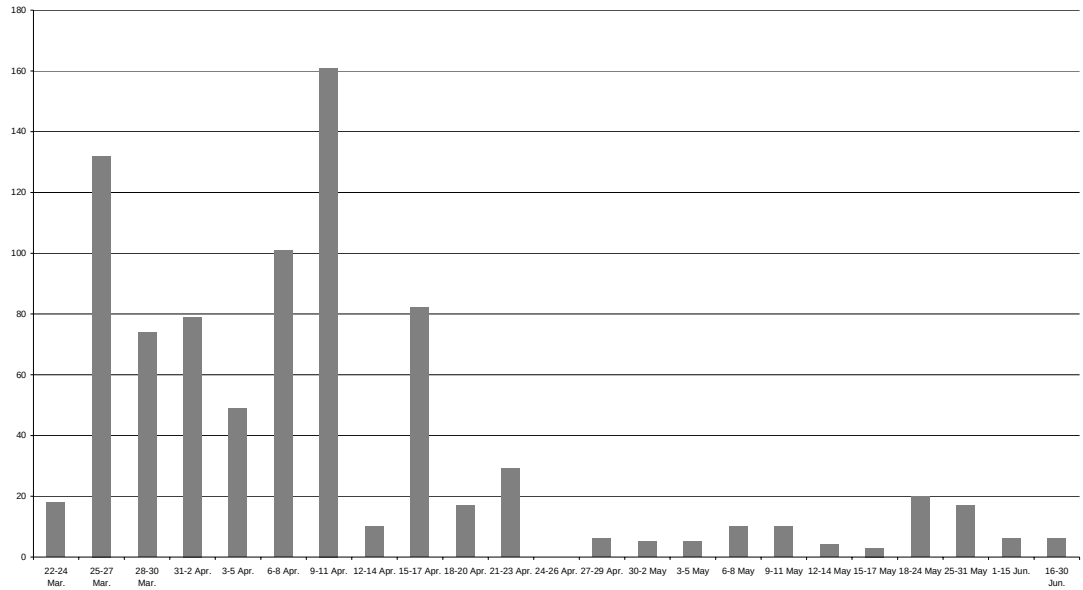

Figure 35. Counts of Red-necked Stint at Mai Po Inner Deep Bay Ramsar Site, spring 2003

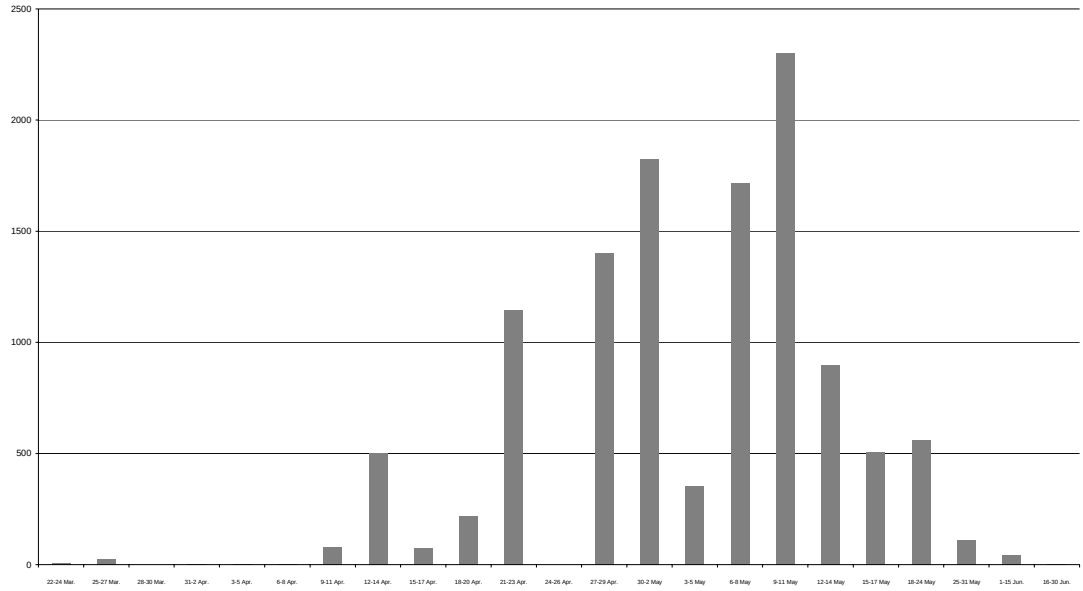

Figure 36. Counts of Sharp-tailed Sandpiper at Mai Po Inner Deep Bay Ramsar Site, spring 2003

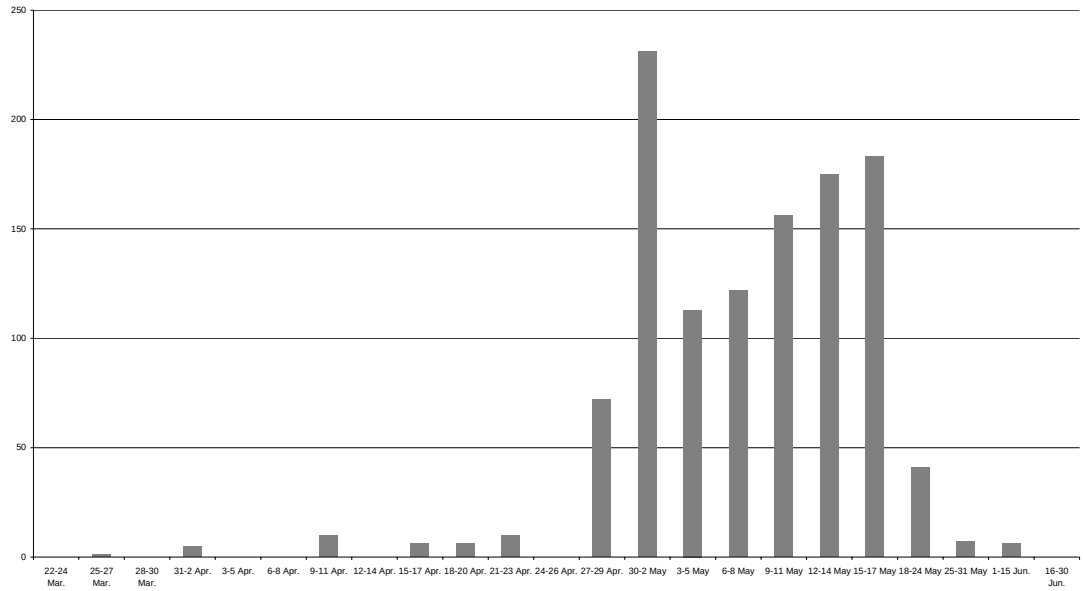

Figure 37. Counts of Curlew Sandpiper at Mai Po Inner Deep Bay Ramsar Site, spring 2003

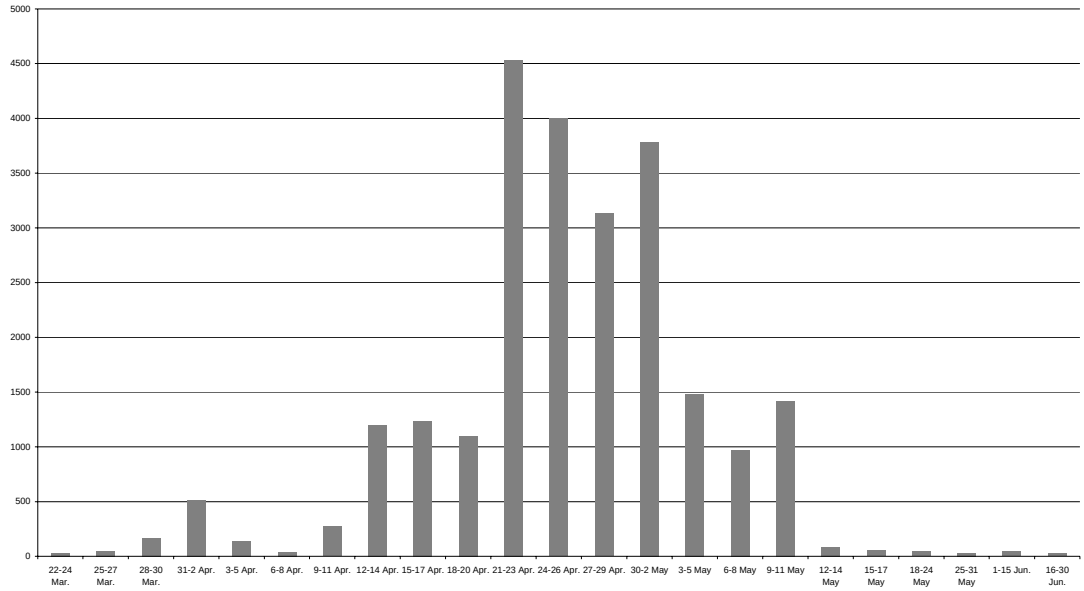

Figure 38. Counts of Broad-billed Sandpiper at Mai Po Inner Deep Bay Ramsar Site, spring 2003