

ON THE IMPORTANCE OF SUMATRA'S EAST COAST FOR
WATERBIRDS,
with notes on the Asian Dowitcher
Limnodromus semipalmatus.

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SUMMARY

Since 1984, three surveys were conducted along the east coast of Sumatra. Several coastal wetlands appeared to be of international importance for waterbirds (according to the criteria of the Ramsar Convention). More than 10,000 large waterbirds were identified, including large numbers of Milky Storks *Mycteria cinerea* and Lesser Adjutants *Leptoptilos javanicus*, and over 100,000 migratory waders (28 species) were counted. The observation of a minimum total of 3,800 Asian Dowitchers *Limnodromus semipalmatus* indicates that the east coast of Sumatra is the main wintering area of the species. In areas of high conservation importance, data were collected on habitat and threats. Several of these areas face heavy reclamation pressure, which necessitates urgent conservation action.

INTRODUCTION

Prior to 1983 the coastal wetlands of eastern Sumatra had received little ornithological attention, as is the case with most of Indonesia's coastal wetlands. Their importance to migrant and resident waterbirds remained undetermined as is illustrated by the most recent large-scale marine areas inventory (Salm and Halim, 1984), which lists no waterbird sites of importance on the east coast of Sumatra.

It is only since 1983 that detailed information on the distribution of coastal waterbirds has become available. In that year large numbers of waders were recorded on the mudflats of the Berbak Game Reserve (Silvius, *et.al.* 1984). As a result the Sumatran Waterbird Survey was conducted during the southward migration period in October and November 1984 (Silvius, Verheugt and Iskandar 1986), which revealed the high international and national importance of the mudflat and mangrove areas along a 1000 km length of coast.

In the following years several short surveys revealed valuable information on distribution of waterbirds during the northern breeding season and beginning of migration, July and August 1985 (Danielson and L'kov, 1986) and northward migration, March and April 1986 (Silvius, 1986). Some other waterbird counts were made in September 1986 (Elliott, pers. com.) in Jambi, in January 1987 in Riau

(Parish, pers. com.) and in 1985 in Way Kambas, Lampung (Milton, 1985).

In addition to these waterbird counts, information was collected on vegetation and threats to the key areas, and recommendations were made for protection. Vegetation studies have been carried out by Anderson (1976), Franken and Roos (1981), Silvius *et al.* (1984), Sukardjo *et al.* (1984), Silvius (1986), vegetation maps are available of south and central Sumatra (Laumonnier *et al.*, 1983 and 1986), and there are reports on soils and suitability for reclamation (Silvius *et al.* 1984; Diemont and Reuler, 1984). A large scale feasibility study for reclamation has been made (Nedeco/Euroconsult/BIEC, 1984).

In particular in the provinces of Lampung, South Sumatra and Jambi extensive areas of swamp forest have been cleared for agriculture. Along large stretches of coast, the mangrove forests have disappeared or are dramatically infringed upon by land reclamations, leaving very small fringes of less than 200 m, the viability of which is very doubtful in the long term (regarding the dynamics of the coastal habitat with alternating erosion and accretion periods in addition to the continued reclamation of land). Undisturbed transitions of mangrove forest to freshwater and peat swamp forest are now confined to the Musi-Banyuasin river delta in South Sumatra and some areas in Riau.

This illustrates that the collection of data on location of key sites for conservation of waterbirds and their habitat is of utmost urgency. The above mentioned surveys and research work have provided a start, but many important data are still lacking, such as the location of breeding colonies of storks, herons and ibises.

In this respect it should be noted that the Directorate General of Forest Protection and Nature Conservation, which has provided invaluable logistic and manpower support to the surveys, is now planning a nation-wide waterbird survey programme with assistance of the Asian Wetland Bureau/INTERWADER, to commence in October 1987.

METHODS

Surveys were conducted with 2-tonne fishing vessels, speedboats and perahu (local canoe), approaching important feeding and roosting sites from the seaward side. Some inland foot surveys were made into the mangrove and backswamps. Owing to the vast extent of mudflats, waders could not always be identified because of difficult field conditions such as heat, haze, great distance and dense flocks (in particular the smaller species which often feed on the higher shores and therefore were furthest away from

the observers standing in the shallow sea). Observations were made with binoculars and telescopes mounted on tripods.

HABITAT

The coastline of east Sumatra consists mainly of accreting shores with narrow (50m) to very wide (1,000m) mudflats. Some areas have eroding shores. Wide mudflats and very soft muds in which a person can sink down to the waist, occur often near promontories.

Sandy beaches are confined to only a few areas, mainly in Jambi Province. The Cemara beach of the Berbak Game reserve is an outstanding example. This beach is used as a roosting site by up to 4000 waders, which feed on the adjacent mudflats.

The coastal vegetation consists mainly of mangrove forest, which on sandy beaches is replaced by dry-beach forest (*Casuarina equisetifolia*). About 30 mangrove species have been recorded (Sastrapradja *et al.* 1978).

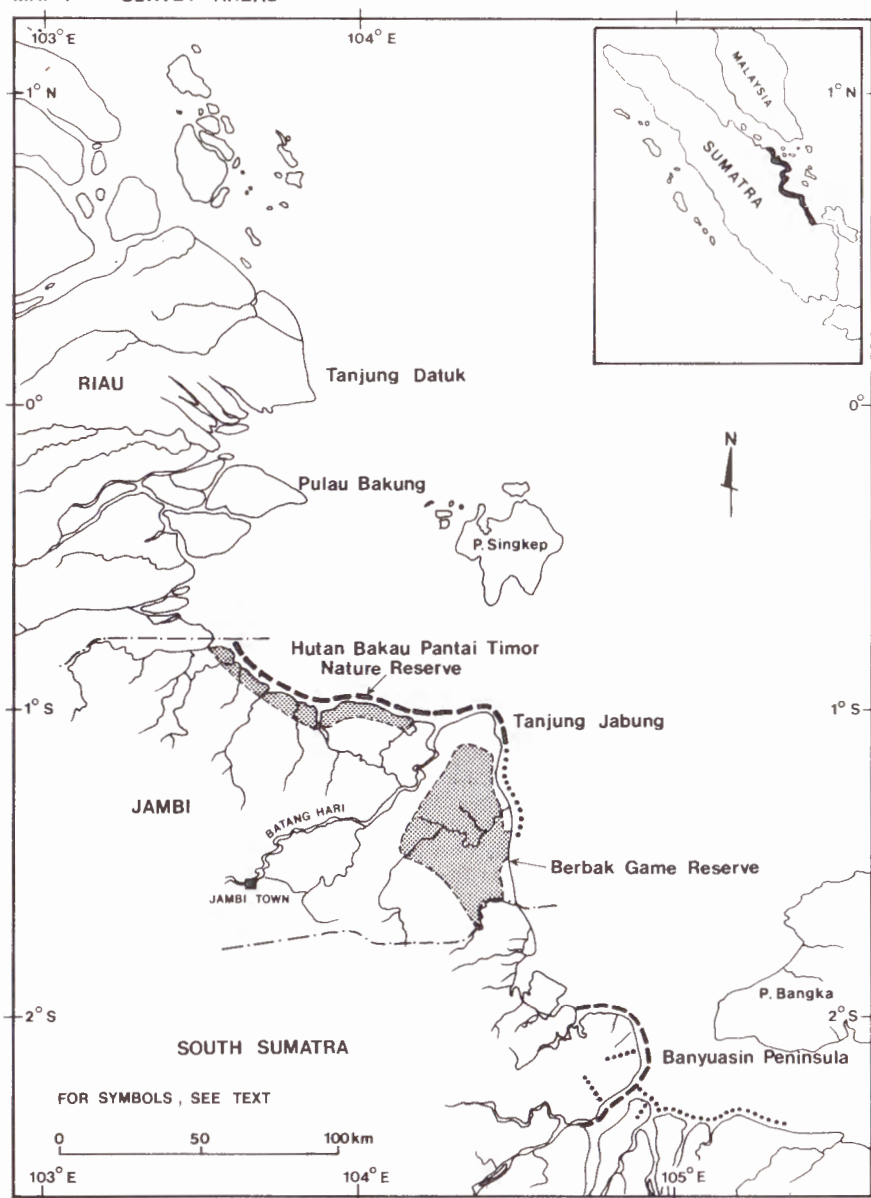
The mangrove forest has a high organic production. It enriches the tidal mudflats due to the export of dead plant material and nutrients. As the organic material decomposes, detritus particles are formed, serving as the starting point of a rich foodweb, used by the zoobenthic fauna of the mudflats and eventually by fish species, prawns and waterbirds. The mangrove forest is therefore an important economic resource. Several products from this ecosystem are used by local villagers for construction materials and fishing equipment, e.g. poles for fish traps. Even more important is the function as a spawning and nursery area for many marine fish and shellfish species, which leads to the conclusion that mangroves are often best left unreclaimed, to be used only on a sustainable yieldbasis or as protected marine areas. Migratory waterbirds can be used as indicators for the evaluation of coastal areas for sustainable resource utilization and conservation, as they tend to concentrate in areas of high productivity (Silvius and Parish, 1986).

WATERBIRD COUNTS

Location of main survey areas:

The 1984 survey covered the entire coastline of the mainland and adjacent islands, as shown on map 1 (excluding Pulau Bangka and Pulau Singkep).

MAP 1 SURVEY AREAS



The 1985 survey covered the entire northern coast of Jambi province, including the eastern coast of Tanjung Jabung. In South Sumatra only the coastal area of the Banyuasin peninsula (located between the Banyuasin river and Sungai Sembilang) was surveyed (dashed line on Map 1).

The 1986 survey covered approximately the same area as the 1985 survey, with in addition part of the east coast of Jambi province and a 30km coastal stretch east of Sungsang in South Sumatra (dashed and dotted lines on Map 1).

In the following sections the main results of the waterbird counts will be discussed.

LARGE WATERBIRDS

During the three surveys a total of more than 10,000 large waterbirds have been identified. The most common species were Milky Stork *Mycteria cinerea*, Great Egret *Egretta alba*, Grey Heron *Ardea cinerea*, Lesser Adjutant *Leptoptilos javanicus* and Black-headed Ibis *Threskiornis melanocephalus*. See table 1.

Date of survey	Oct-Nov 1984				July-Aug 1985			March-April 1986			Highest number
Species	Riau	Jambi	S.Sum	Total	Jambi	S.Sum	Total	Jambi	S.Sum	Total	
<i>Pelecanus philippensis</i>			7	7		4	4		9	9	9
<i>Anhinga melanogaster</i>			2	2	3	7	10	2	2	4	10
<i>Phalacrocorax niger</i>					2		2				2
<i>Ardea sumatrana</i>	1		1	2	2	3	5	3	2	5	5
<i>A. purpurea</i>					4	1	5	3	1	4	5
<i>A. cinerea</i>	32	304	93	429	1237	90	1327	485	81	566	1,327
<i>Ardeola</i> sp.			10	10					3	3	10
<i>Butorides striatus</i>		54		54	67		67	15	3	18	67
<i>Egretta sacra</i>	24	30	3	57	4	12	16	6		6	57
<i>E. alba</i>	310	468	517	1,295	268	590	858	53	2,414	2,467	2,467
<i>E. intermedia</i>		5		5	15	12	27	3	3	6	27
<i>E. garzetta</i>		13	23	36	2	3	5	24	48	72	72
Unidentified egrets									75	75	
<i>Myctycorax nyctycorax</i>					1		1				1
<i>Mycteria cinerea</i>	703	763	1,587	3,053	697	732	1,429	1,134	803	1937	3,053
<i>Leptoptilos javanicus</i>	70	191	388	649	475	620	1,095	152	534	686	1,095
<i>Threskiornis melanocephalus</i>	80	29	735	844	8	607	615	53	244	297	844
<i>Anas querquedula</i>		13		13				108		108	108
<i>Dendrocygna javanica</i>					133	1,000	1,133				1,133
Total	1,220	1,070	3,336	6,456	2,918	3,681	6,599	2,041	4,222	6,263	10,287

Table 1: Results of three surveys of resident and migrant large waterbirds along the east coast of Sumatra, covering two different migration seasons and one breeding season.

Storks and ibises

One of the most exciting results was the discovery of more than 3000 Milky Storks in 1984. This is three times the previous estimated total world population (see Luthin, 1984). The species appeared to be widespread and, in fact, the most common large waterbird along the surveyed coastline. Concentrations in flocks of up to several hundred individuals were found near coastal promontories such as Tanjung Bakung, Tanjung Datuk, Tanjung Jabung and the Banyuasin peninsula. In addition a large population was found in the nature reserve Hutan Bakau Pantai Timor. In 1985, Danielson and Skov (1986) found a breeding colony in this reserve, with a total of 74 active nests and 160 adult birds present. The colony was located at the outer fringe of the mangrove forest in 9 trees. Nests were at 6-12 m height. They presumed the tree species to be *Avicennia*, but the author examined the same site in 1986 and found six old nests in *Rhizophora apiculata* trees.

In South Sumatra colonies are expected to be located far inland at freshwater or brackish water lakes. The mangrove swamp of the Banyuasin peninsula has a width of more than 5 km. The storks are also reported to breed in the freshwater swamp in Pulai trees *Alstonia pneumatophora* which can reach up to 60 m height (Silvius 1986).

The counts of the three surveys do show a rather large variation. In particular in Jambi where the mangrove fringe is small and counts are most accurate the results indicate seasonal fluctuation. In South Sumatra differences may be due to either breeding or seasonal availability of inland feeding areas (as observed by the author in 1986). It may also be caused by short-range migration.

In 1986 three distinct feeding methods were observed, consisting of

1. walking and probing in exposed mud,
2. searching while walking with a half-opened bill about 3/4 submerged in shallow water, and
3. a passive technique with the bird standing still at the water edge (in the surf), holding the half-opened bill steady and half-submerged in the waves, allowing water to flush through the mandibles.

Display behaviour was noted once, consisting of a mixture of bows and raising of bills, while the two birds involved stood opposite each other, carrying out the same acts simultaneously as a mirror-action.

The Lesser Adjutant was also widespread but occurred in smaller numbers. It is worth mentioning that in West Malaysia, in a comparable length of similar coastal areas, the density is only 20% of that found in Sumatra, the Milky

Stork being even less common, with a total population of only ca. 100 individuals. This reflects the impact of mangrove deterioration and disturbance on these large waterbirds (Silvius *et.al.* 1987).

The feeding behaviour of the Lesser Adjutant was characterized by "walking, searching and probing", the bill being pushed in the mud and retracted rapidly. Prey of Milky Stork and Lesser Adjutant probably consists largely of mudskippers.

The Black-headed Ibis is far more common in South Sumatra than in the other provinces, possibly the result of the wider mangrove fringe in this province.

At Sungsang a flock of 75 individuals was seen feeding in inundated abandoned reclamations in mixed species aggregations with Milky Storks and Great Egrets.

Hérons

More than 4000 herons have been observed, of 10 species. The most common species were Great Egret (61%) and Grey Heron (33%).

The Great Egret was especially abundant in South Sumatra (2400 individuals) in March 1986. In Jambi (only two weeks later) only 53 individuals were observed. This may be due to habitat distribution, the main difference being the availability of extensive mangrove areas with brackish or freshwater lakes at the Banyuasin Peninsula, which are lacking in Jambi. These areas may be the preferred breeding sites for the species. Many birds were in courtship plumage and the breeding area must be in the vicinity. One bird in courtship plumage was observed flying with a branch in its beak, indicating nest-building activity (24 March).

Birds in courtship plumage had entirely black bills, red tibia and greenish lores. Tarsi were black although according to Hancock & Kushlan (1984) these should be red in full courtship plumage. For Sumatra no confirmed breeding records are known (K.H. Voous, pers.comm.).

Great Egrets were often feeding and roosting in large single species flocks, but mixed flocks with Milky Stork, Lesser Adjutant, Black-headed Ibis and Little Egret were also seen. Very often egrets were feeding near or on top of standing fishing nets.

The Grey Heron was most common in Jambi province. Breeding was observed by Danielson and Skov in late July/early August 1985 and by Silvius in March and April 1986. In March 1986, a small colony was found in South Sumatra with

most birds actively involved in nest building. In April, larger colonies were found in Jambi with most birds already breeding. Danielson & Skov found 122 active nests in Jambi, and Silviu 242 in the same colonies. All colonies were situated at the outer edge of the mangrove forest, adjacent to the mudflats. Host trees were mainly *Sonneratia caseolaris* and *Avicennia alba*. At several sites *Rhizophora apiculata* was also abundant but not used. Prior to these observations, no breeding records were known for Sumatra (K.H. Voous, pers.com.), but the species breeds in Java.

Other heron species were much less common but elsewhere they are known to be more restricted to freshwater/inland areas, such as the Intermediate Egret *Egretta intermedia*, Little Egret *E. garzetta* and Purple Heron *Ardea purpurea*, or they occur in lower densities, such as the Great-billed Heron *Ardea sumatrana* (Lansdown, 1987). However, this is not the case with the Black-crowned Night-Heron *Nycticorax nycticorax*.

There is a very large colony of this species in a mangrove area in Perak, West Malaysia (Ratnam, 1976, Silviu, *et al*, 1987) and it is also common on Java. Its limited occurrence in east Sumatra may be explained by lack of suitable feeding areas, which in West Malaysia comprise extensive ricefields behind the mangroves. In Sumatra mangroves are backed mainly by swamp forests or coconut plantations.

Other large waterbirds

Special attention must be paid to the observations of small groups of Spot-billed Pelicans *Pelicanus philippensis* at the Banyuasin river delta. They were observed during all three surveys, and their presence throughout the year has been confirmed by local fishermen. In 1984 and 1986 immature birds were seen, indicating possible breeding. This may well represent the last breeding population in Indonesia although breeding has not been confirmed.

The high numbers of Lesser Treeduck *Dendrocygna javanica* observed by Danielson and Skov in 1985 indicate seasonal movement, as none were seen during the other surveys.

There was one observation of White-winged Wood Duck *Cairina scutulata*. A single bird was observed several kilometres inland at Sungai Bungin, South Sumatra, flying over a freshwater swamp area of inundated grassland with shrubs and scattered high trees. Several areas of similar habitat were encountered along this river (Silviu, 1986).

WADERS

During the southward migration in 1984, more than 100,000 waders were recorded. In July-August 1985, half of this number was observed in part of the area covered by the 1984 survey, and slightly smaller numbers were counted during northward migration in 1986. See Table 2.

Date of survey	Oct-Nov 1984				July-Aug 1985			March-april 1986			Highest number
	Riau	Jambi	S.Sum	Total	Jambi	S.Sum	Total	Jambi	S.Sum	Total	
<i>Glareola maldivarum</i>		87		87	25		25	6		6	87
<i>Pluvialis squatarola</i>	54	468	217	739		2	2	200	3	203	739
<i>P. fulva</i>		6	11	17				3		3	17
<i>Charadrius alexandrinus</i>		1		1				14		14	14
<i>C. peronii</i>		6		6				30		30	30
<i>C. peronii/alexandrinus</i>	2			2							2
<i>C. mongolus</i>	2,199	3,481	10,746	16,426	10		10	2,786	750	3,536	16,426
<i>C. leschenaultii</i>	5+?	35	?	40+?	7		7	215	145	360	360
<i>C. mongolus/leschenaultii</i>					294	200	494				494
<i>C. veredus</i>								1		1	1
<i>Numenius arquata</i>	137	1,393	3,190	4,720	2,253	800	3,053	114	227	341	4,720
<i>N. phaeopus</i>	112	700	865	1,677	366	700	1,066	345	430	775	1,677
<i>N. madagascariensis</i>		23	383	406		2	2	181	39	220	406
<i>Limosa limosa</i>	4,104	7,477	8,255	19,836	12,800	30,000	42,800	2,949	141	3,090	42,800
<i>L. lapponica</i>	30	1,209	7,781	9,020	20	2,000	2,020	88	1	89	9,020
<i>Tringa totanus</i>	2,197	6,222	6,161	14,580	1,024	1,000	2,024	4,557	2,978	7,535	14,580
<i>T. stagnatilis</i>	28	301	58	387	80	100	180	375	20	395	395
<i>T. nebularia</i>	97	38	26	161	1	8	9	269	106	375	375
<i>T. guttifer</i>								8		8	8
<i>T. glareola</i>								27		27	27
<i>Ixenus cinereus</i>	754	2,331	3,323	6,610	783	500	1,283	571	630	1,201	6,610
<i>Actitis hypoleucos</i>	16	128	74	218	3	21	24	12	4	16	218
<i>Arenaria interpres</i>		17	504	521	1		1	56	5	61	521
<i>Limnodromus semipalmatus</i>		1,460		1,460	16		16	2,042	1,763	3,805	3,805
<i>Calidris tenuirostris</i>	54	186	35	275	2	1	3	22	66	88	275
<i>C. canutus</i>								299	5	304	304
<i>C. ruficollis</i>	2	42	45	89		100	100	58		58	100
<i>C. ferruginea</i>	2	419	443	864	144	100	244	2,033	700	2,733	2,733
<i>C. alba</i>								4		4	4
<i>Limicola falcinellus</i>								33		33	33
Unidentified waders	11,200	11,550		22,750				9,500	6,350	15,850	
Total	20,993	37,580	42,319	100,892	17,829	33,534	53,363	27,018	14,363	41,381	104,800

Table 2: Results of three surveys of waders along the east coast of Sumatra, covering northward and southward migration and the end of the European breeding season.

Several observations constitute first or second records of species in Sumatra or Indonesia, such as Nordmann's Greenshank *Tringa guttifer*, Sanderling *Calidris alba*, Oriental Plover *Charadrius veredus* and Broad-billed Sandpiper *Limicola falcinellus* (see Silviu, 1987). Others provide valuable information on population sizes, such as the minimum of 3,800 Asian Dowitchers *Limnodromus semipalmatus* which were counted in March/April 1986, indicating Sumatra to be the main wintering area (Silviu, 1986). More details are given below.

The high numbers of waders recorded in July-August 1985 are remarkable as the survey period was very early in the southward migration season. The fact that nearly all birds were in full non-breeding plumage or could be identified as immatures may indicate that Sumatra is an important summering area for waders of several species during the northern breeding season, in particular for Black-tailed Godwit *Limosa limosa*. (For details see Danielson and Skov, 1986).

Kersten & Smit (1984) and Parish *et al.* (in prep) have estimated turnover rates of migratory waders to be in the range of 4-5 times and 3-6 times, respectively, of the peak count of an area. For the survey area in Sumatra this would mean a total of 300,000 to 600,000 visiting waders, which is 5 to 12% of the estimated total eastern Palearctic wader population (5 to 6 million).

The most common waders were respectively Black-tailed Godwit, Mongolian Plover *Charadrius mongolus*, Common Redshank *Tringa totanus*, Bar-tailed Godwit *Limosa lapponica*, Terek Sandpiper *Xenus cinereus*, Eurasian Curlew *Numenius arquata*, Asian Dowitcher, Curlew Sandpiper *Calidris ruficollis* and Whimbrel *Numenius phaeopus*.

However, the relative abundance of certain species varied significantly over the three survey periods, Table 3 shows the percentage differences of the most common species.

It is remarkable that the Asian Dowitcher was the second commonest wader during the survey of the northward migration in 1986. The Curlew Sandpiper was also significantly more common during this period. Eurasian Curlew, Bar-tailed Godwit and Mongolian Plover were more common during the southward migration survey of 1984. The Black-tailed Godwit predominated during the non-breeding season in 1985.

The fluctuation in abundance probably reflects different timings of peak migration of the various species. This is certainly the case for the Black-tailed Godwit of which the main influx and outflux of immature birds were missed by the surveys in the two migration seasons (assuming large summering concentrations to occur each year). For some other species, possible different routeing during the northward and southward migration may play a role, but the available data do not provide sufficient information on which to draw any conclusions.

Table 3: Relative abundance of the most common wader species during three different survey periods, respectively southward migration 1984, northward migration 1986 and breeding season/start of southward migration 1985. (The relative abundance is expressed as the percentage of the total number of identified birds.)

Species	Survey	1984	1986	1985
<i>Limosa limosa</i>		25.4	12.1	80.2
<i>Charadrius mongolus</i>		21.9	13.8	0.9
<i>Tringa totanus</i>		18.7	29.5	3.8
<i>Limosa lapponica</i>		11.5	0.3	3.8
<i>Xenus cinereus</i>		8.5	4.7	2.4
<i>Numenius arquata</i>		6.0	1.3	5.7
<i>Limnodromus semipalmatus</i>		1.9	14.9	+
<i>Calidris ferruginea</i>		1.1	10.8	0.5
<i>Numenius phaeopus</i>		2.1	3.8	2.0
Total		97.1	91.2	99.3

SOME NOTES ON THE ASIAN DOWITCHER

In 1986, a total of at least 3800 individuals were counted with a maximum estimate of 4000. In 1984, Dowitchers were located only in Jambi Province (but may have been overlooked in South Sumatra due to the observer's lack of previous experience with the species). The 1986 survey shows an equal distribution over South Sumatra and Jambi. Prior to these observations, the species was known from Sumatra only from collected single individuals (Kozlova, 1962 vide Liedel, 1982).

In 1986, peak counts at different sites in South Sumatra and on different days, could not be added to obtain a total, therefore only the highest daily record (on 25 March; 1,763) is taken as a maximum estimate of birds present in the area between S. Banyuasin and S. Sembilang, although only part of the coast was surveyed on that day. Additional birds may have been present at the unsurveyed sites. In Jambi, counts were added from several different sites visited during a period of three days, since the areas surveyed are some 30-40 km apart, and the feeding and roosting sites are clearly separate. For more details see table 4.

Table 4:

Total numbers of Asian Dowitchers *Limnodromus semipalmatus* observed at 7 feeding sites in South Sumatra and Jambi, March-April 1986.

Area:	1	2	3	4	5	6	7	Total Estimate
Number:	1,763	500*	19	474	196**	1,497	52	3,800-4,000

* double counted (birds which changed sites during the count

** possibly double counted

Sites:

1. S. Apung - S. Dinding, South Sumatra (25 March),
2. S. Jentolo - Telok Galas, South Sumatra (25 March),
3. Cemara sandy beach, Jambi (12 April),
4. S. Jambat - Tg Jabung, Jambi (11/13 April),
5. Nipah Panjang - S. Pemusiran, Jambi (3/5/6 April),
6. S. Simbur Naik - Lambur Luar, Jambi (6/10 April),
7. Bendahara (west side rivermouth), Jambi (9 April).

Milton (1985) recorded 486 Asian Dowitchers on the coast of Way Kambas Game Reserve in Lampung province in early November 1985, indicating a much wider distribution along the Sumatran coast. It is therefore very likely that the total number of Asian Dowitchers using Sumatra's east coast as a staging area exceeds this 1986 estimated total.

Liedel (*op cit.*) described the wintering range of the Asian Dowitcher as being located mainly between the east coast of India and the Malay Peninsula, with records from the Greater Sunda islands and some birds reaching Australia and probably the Arabian Peninsula.

However, the recent data from Sumatra revises this distribution considerably. INTERWADER surveys have also found concentrations of 500 individuals in Sarawak (Howes, 1986). Although similar numbers have been observed in more northern areas, e.g. the Gulf of Thailand (Parish *et al.* 1987), these observations were made later in the spring or earlier in the autumn passage. It is now clear that the main wintering range is further south than suggested by Liedel and includes Sumatra and Borneo.

Liedel found no evidence that non-breeding individuals oversummer in the winter range. However, he overlooks the specimens collected by M. Bartels on the north coast of Java between 1908 and 1925, which include single specimens collected on 13 June 1915 and 18 July 1919 (collection National Museum of Natural History, Leiden) (see Silvius *et al.* 1986). The observations of Danielson and Skov (9 individuals on 22 July and 7 on 26 July 1985), although slightly later than the breeding season which lasts from mid-May to early July, may concern oversummering individuals.

It is not yet possible to make a reliable estimate of the world population as there are still gaps in our knowledge of possible wintering grounds, such as Lampung and the more northerly coasts in eastern Sumatra, and perhaps also the Philippines, Java, Borneo, Kalimantan and Sulawesi.

It is even possible that large numbers may be discovered in New Guinea, from where there are presently two records (Beehler *et al.* 1986). However, data from the passage down the Malay Peninsula and in the breeding grounds confirm its rarity, and 8000 individuals may be a conservative preliminary estimate.

Plumage:

In 1986, 80-90% of the birds observed in South Sumatra were in full or nearly full non-breeding plumage, while remarkably, in Jambi, nearly all birds were in nearly full to full breeding plumage. This may have resulted from clustering of different age groups with those in South Sumatra being mostly first-winter birds and those in Jambi mostly adults. This would however indicate that immatures form an unusually large percentage of the population.

As it was difficult to make close approach to sufficient numbers of birds for detailed study of plumage, no information is available on the relative abundance of adults in non-breeding plumage and of immatures. However, the differences between the two populations rules out the possibility of significant double counts between them. (The date of observations in South Sumatra and Jambi differ by three weeks).

Earlier lack of information on the plumage has now been overcome with the descriptions and plates available in Hayman *et al.* (1986). However, some additional notes show slight differences from these descriptions (for more detailed descriptions see Howes 1986):

Adult non-breeding: Scapulars and wing coverts are broadly fringed white to greyish white (as wide as the fringes of immature birds). This is a readily observed field identification feature.

Adult nearly full-breeding plumage: Scapulars and wing coverts are broadly fringed very light brown. There is a very conspicuous broad whitish supercilium which turns chestnut-red in full breeding plumage. Very few birds in Sumatra showed the chestnut-red supercilium.

Call:

The birds were mostly silent, but calls were heard at close range at three locations. The call resembles a rather soft "eouw" of about half a second duration and sometimes repeated up to ten or more times. Repeated calling was uttered only in flight, and was heard twice from single individuals and once from a flock of 17 birds.

Behaviour:

Most birds were feeding at the edge of the receding or incoming tide, with the "sewing machine action" as described by Jaensch (1983). While slowly walking, the bill was repeatedly pushed straight into the mud, normally down to the base, but sometimes as far as the eye. When in shallow water the same method was used, keeping the head submerged for 2-5 seconds at a time.

The birds appeared to swallow prey, probably small shellfish, with the bill in the mud, but worms were also caught regularly. These were pulled out of the substrate, for which the bird had to lean backwards in order to obtain enough space between the tip of the bill and the surface in order to pull the entire worm out.

During feeding they mostly kept apart from other species, and Redshanks, for example, were often feeding a few metres inland from the Dowitchers. Only the Black-tailed Godwit clearly intermingled with Dowitchers in feeding flocks. While roosting, mixed aggregations occurred with mainly Black-tailed Godwit, Curlew Sandpiper and Red Knot *Calidris Canutus*

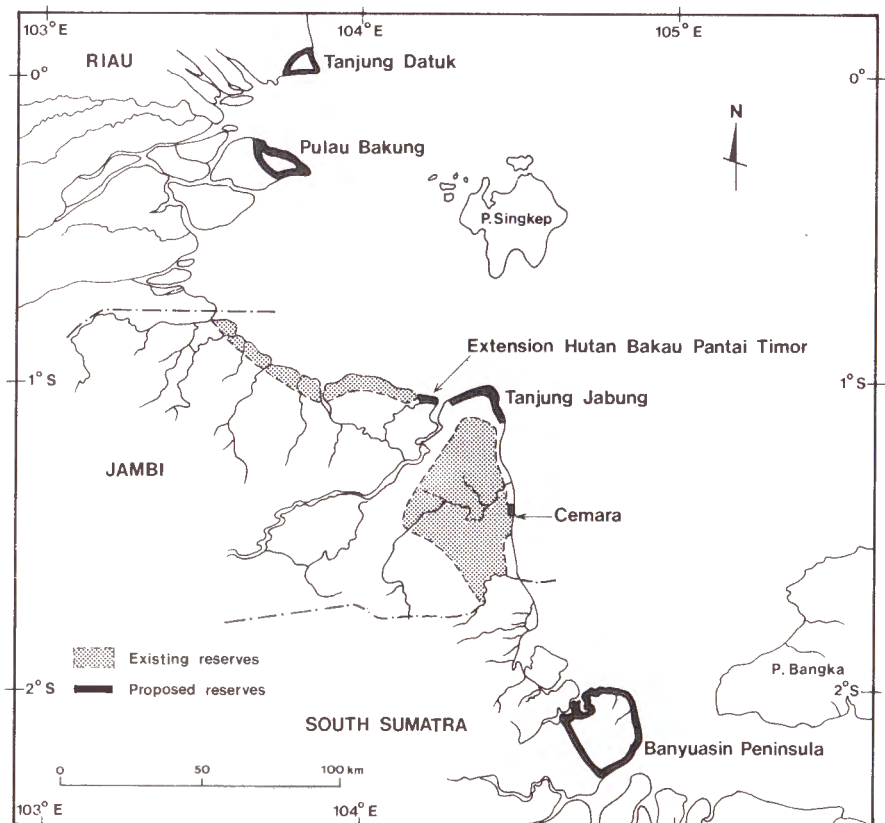
CONSERVATION OF KEY SITES

The following keysites were identified:

1. The Banyuasin peninsula (located between the Banyuasin river and Sungai Sembilang, South Sumatra).
2. The nature reserve Hutan Bakau Pantai Timor (north coast of Jambi Province).
3. Cemara sandy beach and mudflats south of this beach (along the east coast of Jambi province).
4. Tanjung Jabung (promontory south of the Batang Hari rivermouth).
5. Promontory and northern coast of Pulau Bakung, Riau province.
6. Tanjung Datuk, Riau province.

The rapid reclamation of mangrove areas by spontaneous settlers in Sumatra necessitates urgent conservation action, and the priorities are given below (see map 2).

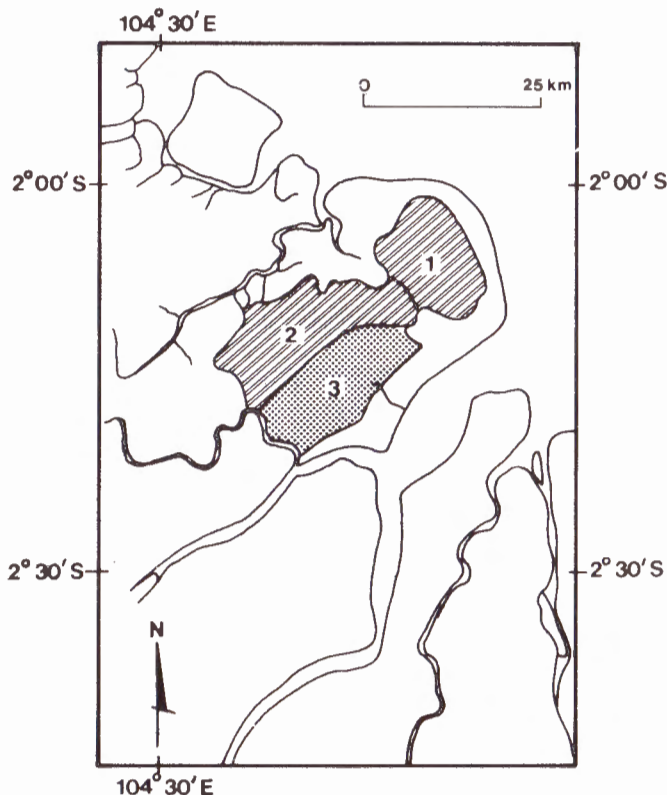
MAP 2 AREAS PROPOSED FOR PROTECTION



Banyuasin peninsula

Reclamation of mangroves in South Sumatra is still continuing, and land was recently reclaimed near Sungsang, south of the Banyuasin peninsula. Large areas on the peninsula itself have been reclaimed, mainly in the freshwater swamps. However, in both areas, ricecrops have failed and much of the reclaimed land has been abandoned. Despite these failures, new feasibility studies are still in progress to the north of the Banyuasin river. The peninsula was given high priority for reclamation in a feasibility study conducted by NEDECO/Euroconsult/BIEC for the Ministry of Public Works (Euroconsult *et.al.*, 1986). The proposed area covers about 45% of the peninsula and already 23% has been disturbed by the previous reclamation (map 3). The author's observations on the areas numbered on map 3 are given below.

Map 3: Areas on the Banyuasin peninsula, proposed for reclamation by NEDECO *et al.* 1984. The numbered areas are described below.



Area 1 - Mangrove forest with some open seasonally inundated patches covered by *Acrostichum* ferns, (from remote sensing the Consultant had described the vegetation as grassy plains with small trees). Thus by the Consultant's own criteria, the area is clearly unsuitable for reclamation (no reclamation in mangrove).

Area 2 - Freshwater swamp forest and peatswamp forest.

Area 3 - The eastern part was visited and consisted of abandoned reclaimed land. Former occupation was indicated by remnants of houses and overgrown drainage canals.

The recommendations from the feasibility study require comprehensive review, and indeed an Environmental Impact Analysis is now obligatory under Government regulations. Failed agricultural schemes show that although the area may seem suitable initially, severe problems soon occur, including intrusion of salt water and rapid acidification of soils, as was found in the abandoned areas near Sungsang. The only way to prevent this acidification is to prevent oxidation by maintaining a high groundwater level. The shortage of freshwater in the dry season is also a major constraint to settlement. (Silvius, 1986).

Probably the largest surviving colony of Milky Storks in the world is located in the proposed development site, together with colonies of Great Egret and Black-headed Ibis. It is also one of the last remaining areas in South-east Asia with an undisturbed transition of extensive mangrove swamps into peatswamp and freshwater swamp forests.

This impressively rich area would make an excellent RAMSAR site and the recommendations of the survey reports, to establish a 70,000 ha nature reserve, are presently under serious consideration by the Directorate General of Nature Conservation and Forest Protection.

Hutan Bakau Pantai Timor and Tanjung Jabung

The reserve area has adequate protection status, but is affected by illegal reclamation and logging in the backswamps of the rather small (200-500m wide) mangrove fringe. Two large breeding colonies of Grey Heron were located just outside the reserve boundaries and are now proposed for inclusion. Another recommendation is to include Tanjung Jabung in the reserve, as this promontory is important as a roosting and feeding area for both migratory waders and the larger waterbirds, some of which breed in the adjacent reserve.

Cemara beach

Nearly the entire coastal area of the Berbak Game Reserve has recently been excised from the reserve because it was largely occupied by spontaneous settlers. It is now proposed to re-include the Cemara beach as it has little value for the settlers and is important to migratory waterbirds.

Pulau Bakung and Tanjung Datuk

Little information exists on the reclamation pressure on these areas. At Pulau Bakung parts of the inland mangrove forest have been reclaimed. Breeding colonies may exist here also of large waterbirds, including the Milky Stork. Both areas are recommended for protection.

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