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**International Single Species Action Plan
for the Conservation of
the Spoon-billed Sandpiper
(*Eurynorhynchus pygmeus*)**

Prepared by: C. Zöckler, E.E. Syroechkovskiy, Jr. and G. Bunting



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Milestones in the production of this action plan:

Inclusion of the Spoon-billed Sandpiper in the CMS Appendix I by the CMS 7th Meeting of the Conference of the Parties, September 2002, Bonn, Germany

Endorsement of the draft ISSAP by the CMS 15th Meeting of the Scientific Council, December 2008, Rome, Italy

Adoption of the draft ISSAP by the CMS 9th Meeting of the Conference of the Parties, December 2008, Rome, Italy

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Foreword by the UNEP/CMS Secretariat

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) aims to protect migratory species throughout their range and the habitats on which they depend.

Parties to CMS cooperate among them and with other stakeholders to meet the conservation needs of the species listed on its two Appendices through the implementation of an array of initiatives.

Endangered migratory species included in Appendix I, in addition to enjoying strict legal protection by Parties, can benefit from the development of Concerted Actions. These range from field research and conservation projects to the establishment of technical and institutional frameworks for action. International Single Species Action Plans (ISSAPs) are an important instrument to promote and coordinate activities that seek to restore the places where species live, mitigating obstacles to migration and controlling other factors that might endanger them.

The Spoon-billed Sandpiper (*Eurynorhynchus pygmeus*) was included in Appendix I of the Convention by the 7th Meeting of the CMS Conference of the Parties (COP) (Bonn, Sep. 2002) and was designated for Concerted Actions under the Convention by that same meeting.

The present International Action Plan for the Spoon-billed Sandpiper is the main output of a broad programme of activities, co-ordinated by BirdLife International with financial support from CMS, which includes a series of workshops and meetings held in most range countries from 2005 to 2007.

The ISSAP was finally adopted by the CMS Scientific Council and subsequently by the CMS COP9 in 2008.

This ISSAP had already proved to bring benefits both to the conservation of this species and to the enhancement of cooperation of relevant organisations. For instance, the East Asian – Australasian Flyway Partnership, a mechanism established for regional cooperation on migratory bird conservation, of which CMS is a member, welcomed the preparation and adoption of the action plan. Furthermore, during the development of this ISSAP, regional networks of ornithologists and conservationists have been developed amongst the range states of the Spoon-billed Sandpiper, and some of the actions suggested are currently being implemented.

The UNEP/CMS Secretariat is confident that the publication and dissemination of this document will contribute to increasing awareness on the status of the Spoon-billed Sandpiper, encouraging further research and monitoring in the field as well as the effective implementation of conservation activities.

The UNEP/CMS Secretariat hopes that this plan will further improve regional cooperation and that the joint efforts of all stakeholders will eventually succeed in ensuring the long-term survival of this species.

Elizabeth Maruma Mrema
UNEP/CMS Executive Secretary

Foreword by the Working Group on Waders, the Commonwealth of Independent States

Human civilization needs for its progress increasing amounts of natural resources and produces increasing amounts of waste, thus transforming both the landscapes and climate of our planet. Biodiversity suffers from these environmental changes because the natural rate of species adaptation cannot keep pace with the current rate of the human-induced changes. All species on earth have a life history that developed in parallel with the evolution of the physical and biological environment. Therefore any species is unique, and its loss is irreplaceable as well as incompatible with any achievement of human civilization. Decreases in biodiversity will gradually bring our biosphere to a catastrophe, which is also highly likely to affect humanity. Hence for our survival we must take care of the planet's biodiversity and must focus our efforts and resources to prevent the extinction of any species and their environment.

Long-distance migratory animals particularly appeal to our imaginations because of their numerous adaptations to the contrasting environments in the regions that they visit during their annual migrations. Breaking of a link in the chain of these species' habitats during their life-cycle may easily influence the well-being of their populations. Among these long-distance migrants arctic waders (shorebirds) are specially adapted to undertake annual migrations of 5000-12,000 km one way from the harsh cold tundra to the luxuriant tropics. One such wader species, the Spoon-billed Sandpiper, is of special interest to birdwatchers around

the world not only because of its rarity but also its unusual appearance. The spatula-shaped bill makes the Spoon-billed Sandpiper peculiar although it is similar to any other small sandpiper in many other respects. The function of its unusual bill is still poorly understood, and there are many other gaps in knowledge regarding the ecology and migration of the species. Ironically this attractive and enigmatic wader appears to be on the way to extinction.

Our scientific knowledge about Spoon-billed Sandpiper was gained through some curious and dramatic episodes. It was originally described to science by Linnaeus in 1758 as a tiny relative of the Common Spoonbill, a much larger wading bird, and only in 1821 was placed in a separate genus among the waders. Nothing was known about its breeding grounds until 1879, when it was found on the arctic coast of Chukotka, Siberia, by the "Vega" Polar expedition under the leadership of A.E. Nordenskiöld. The species "was so common during a period of spring, that a couple of times it was served on the table of the gun-room", but expedition members did not find any more Spoon-billed Sandpipers in the area that year suggesting that it occurred there exclusively on migration. However, in the light of current knowledge we can state that the local breeding population was completely destroyed by the expedition.

General information about the species' breeding distribution and biology was gradually accumulated over the course of faunistic surveys by various expeditions. Only small numbers, usually a few pairs, of

Spoon-billed Sandpipers were found at various sites, until in 1972-1974 a significant breeding concentration of 50-95 males was found by Alexander Y. Kondratyev on Belyaka Spit, just ca. 50 km to the west of where the "Vega" expedition overwintered.

I am a researcher with special interest in sandpipers, and it is therefore no surprise that I chose Belyaka Spit to study the breeding ecology and social system of Spoon-billed Sandpiper in comparison with other species of sandpipers. This bird immediately became my favourite. My research at Belyaka took place in 1986-1988 when 45-51 Spoon-billed Sandpiper males were breeding in the area and the population seemed to be healthy. Colour-marking of birds during my study not only helped a lot with individual recognition of birds at Belyaka, but also provided some information about their migration route and wintering grounds as marked birds were found in China and Bangladesh. My photos of Spoon-billed Sandpipers on a nest were published in a number of papers and books, and unusual information was obtained about one of the downy chicks depicted on those photos. A letter I received with ring recovery data about this chick included "place: Hangzhou Bay, China; date recovered: 10th May 1990 (taken by hunter); fate: Eaten!" That was probably a common fate at that time for many waders on the East Asian-Australasian Flyway.

In 1978, Spoon-billed Sandpiper was listed in the official Red Data Book of the former USSR as a species with a restricted distribution and small total population, but nobody suspected that there was anything wrong with the species until 2000. In that year the Arctic Expedition of the Institute of

Ecology and Evolution of the Russian Academy of Sciences started regular annual surveys in Chukotka, and from the very beginning the expedition members were alarmed by the lack of Spoon-billed Sandpipers in many coastal areas of southern Chukotka where they formerly bred in good numbers. The total population was roughly estimated at no more than 1000 breeding pairs, far fewer than the former widely quoted estimate of 2000-2800 pairs. Further surveys by the expedition members allowed more precise calculations which highlighted an even worse situation. The species' global population turned out to be below 450 breeding pairs with sharp decline in, or extinction of, all local populations for which data were available for comparison, including the one on Belyaka Spit. The current population of the species is probably much smaller.

At the International level, Spoon-billed Sandpiper was listed in various Red Data Books and checklists as a 'Vulnerable' species, but based on the new information its status was upgraded to 'Endangered' in 2004 and to 'Critically Endangered' in 2008. The international Spoon-billed Sandpiper Recovery Team was established in 2003, and research projects have subsequently been initiated in many range countries.

The serious decline in the Spoon-billed Sandpiper population requires urgent conservation actions to save the species from extinction, but these cannot be implemented effectively without some key information that is still missing. This wader species needs conservation in its own right, but being so peculiar it can also serve as a charismatic flagship species for the conservation of the many declining waders

that utilise the East Asian-Australasian Flyway. This Action Plan provides an important basis for the practical measures required to save Spoon-billed Sandpiper, a bird species unlike any other creature in the World. I wish a long and successful flight for both this Action Plan and its hero.

Pavel S. Tomkovich, Dr. Sci.

Chairman of the Working Group on Waders (CIS)

Executive Summary

The Spoon-billed Sandpiper has a spatulate bill which is unique among the sandpipers, and it is entirely confined to coastal habitats throughout the year. Its breeding grounds are in Chukotka, Russia, and it regularly migrates more than 8,000 km to its passage and wintering grounds in 14 countries in Eastern and Southern Asia. It has declined dramatically over the last 30 years to an estimated 150-450 pairs and has recently been uplisted to 'Critically Endangered'.

The greatest threat to the survival of Spoon-billed Sandpiper is the destruction of the inter-tidal mudflats that it utilises on migration in China, Japan and Korea and on the wintering grounds in Vietnam, Thailand, Myanmar and Bangladesh. In addition hunting and trapping of sandpipers in Russia, China, Vietnam, Myanmar and Bangladesh are serious and continuing threats. Other issues include coastal development, pollution and the effects of climate change on stop-over sites. There are also threats on the breeding grounds, including egg and skin collection, human disturbance and subtle changes in the habitat caused by climate change.

All range states should list Spoon-billed Sandpiper as a species of high conservation priority and should protect all of the important stop-over sites known for the species. All major reclamation projects along

the flyway should be put on hold and where possible the regeneration of formerly reclaimed areas should be promoted. Hunting and trapping should be discouraged and education and awareness programmes for key target audiences should be undertaken. Education and outreach materials need to be produced for the general public on the status of this species, the threats that it faces and the conservation actions that are required. Continued research is required to improve understanding of the wintering areas and the needs of the species while on migration. An international monitoring system needs to be established to gather information on the Spoon-billed Sandpiper population and the success of the conservation measures that are taken for the species and its habitats. International and regional cooperation is essential for the survival of this migratory species, in order to provide effective and coordinated conservation activities. The CMS and regional flyway partnership agreements, in particular the East Asian-Australasian Flyway Partnership (EAAFP), can provide powerful instruments to ensure consistent conservation efforts across the region.

Acknowledgments

The authors would like to thank all those who have contributed valuable data to the Spoon-billed Sandpiper database over recent years. Especially Minoru Kashiwagi, Weiting Liu, Phil Round, Yu Yat Tung, Nial Moores, Mark Barter, Doug Watkins and all participants of the Spoon-billed sandpiper workshop in Thailand: Dr. Elena Lappo, Minoru Kashiwagi, Phil Round, Yu Yat Tung, Nial Moores, Nguyen Duc Tu, Lin Qingxian, Thura Win Htun, Willie Foo, David Li, Petch Manopawitr, S. Balachandran, Enam Ul Haque, Dr Pinsak, Kritsana Kaewplang, Simba Chan, Mike Crosby and many more.

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1. Introduction

The Spoon-billed Sandpiper (*Eurynorhynchus pygmeus*) is a small charismatic wader, related to the stints with a conspicuous and unusual spatulate bill structure. It is an endemic breeder to Russia's far north-east, with a discontinuous breeding range in coastal tundra which extends along 4,500 km of coastline. The species breeds only in limited types of habitat, mainly lagoon spits with crowberry-lichen vegetation (Tomkovich 1995, Tomkovich *et al.* 2002, Zöckler 2003, Syroechkovskiy 2004). The bill is used in different ways to capture food items mostly under water and in mudflats, but also in picking larger insects from tundra vegetation. It seems to be an adaptation to foraging in coastal mudflat substrates, in breeding but more particularly in the non-breeding areas. The species has always been rare and has been included as a threatened species on the IUCN Red List since the 1980's.

Expeditions of the Russian Academy of Sciences and its cooperating partners to the breeding grounds in Chukotka, Northeast Russia in 2000, 2002, 2003, 2004 and 2005 revealed a sharp decline in Spoon-billed Sandpiper numbers (Tomkovich *et al.* 2002, Zöckler 2003, Syroechkovskiy 2004, Zöckler & Syroechkovskiy in prep.). The main reason for the decline has been suggested to relate to the habitat conditions along the migration route (Syroechkovskiy 2004, Zöckler *et al.*

2006, Syroechkovskiy & Zöckler in prep). Declining numbers in observations in the wintering grounds and at major staging areas confirm the declining trend of the population (Moore 2001, Zöckler *et al.* 2005) and in 2004 the species was upgraded to globally 'endangered' on the IUCN Red List and in 2008 revision uplisted to 'critically endangered'. Spoon-billed Sandpiper is not the only affected wader in the flyway region. According to the latest global waterbird assessment 40% of the waterbird populations are declining worldwide, but the percentage is considerably higher, at 59% for the waterbird populations in the Asian region (Wetlands International 2006), further pointing to the region's fragile status of ecosystem health.

Recognising that the species is in sharp decline led to the development of this Action Plan (AP) under the auspices of the Convention on Migratory Species (CMS). The CMS has initiated several such plans. For the Asian-Pacific region the Siberian Crane AP was developed in 1993 with a Memorandum of Understanding and a conservation plan (UNEP/CMS 1999). In 1995, an AP was developed for the Black-faced Spoonbill by the BirdLife Partnership in Asia (Severinghaus *et al.* 1995). Both of these APs have been very successful and will serve as the main models for the Spoon-billed Sandpiper AP along with suggested

activities for threatened waterbirds in Asia by Crosby & Chan (2006).

The AP will address all issues at sites along the flyway, ranging from the breeding grounds, on migration to the wintering sites. In order to safeguard the globally threatened population immediate and internationally coordinated action is needed. The mechanism of an international action plan has been proven to be effective in improving or coordinating conservation efforts. It is the aim this document is to provide summary information on status and threats, to develop a concerted plan of action in the context of the overall flyway of the species and to agree on as many activities in all range countries as possible. The AP is coordinated and steered by BirdLife Asia and is based on a voluntary process, carried out by governmental and non-governmental bodies and is not legally binding. The process could lead to a Memorandum of Understanding (MoU) under the CMS, as has been developed already, e.g. for the Siberian Crane, the Slender-billed Curlew, two more bird species, marine turtles and a deer species. Whereas a MoU is a multilateral environmental instrument and legally binding on the agreed action items for its signatories, most importantly it will generate funding for implementing the activities. It is not necessary for countries to be a member of the CMS in order to sign the proposed

MoU. Most countries within the range of the species flyway are not members of the CMS at present.

Species Action Plans provide an important tool for promoting and coordinating conservation at the regional level. This will provide guidance for conservationists, researchers and concerned coastal managers over the next few years and in this respect serve as a model for the forthcoming Asian-Pacific Australasian Flyway Partnership in further advancing the Migratory Waterbird Conservation Strategy.

The AP outlines an internationally agreed list of activities, wherever necessary along the flyway, to improve the understanding of the species' status and conservation requirements, to halt its decline and safeguard its long-term survival. An important stage in the preparation of the AP was a regional consultation, including an international workshop held in Samut Sakhon in Thailand in December 2006. The AP will need to be seen as part of an ongoing process involving close collaboration with various stakeholders in each range country and internationally. In early 2008, it was possible to convene a brief workshop with stakeholders in Yangon, Myanmar.

This Action Plan was compiled for the BirdLife International under the auspices of the Convention of the Migratory Species. Apart from the three named authors, many researchers and conservationists have also

contributed in providing information and ideas. They are:

Simba Chan (BirdLife International Asia Division), Minoru Kashiwagi (Japan Wetland Action Network, Tokyo), Pavel Tomkovich (Moscow), Weiting Liu (Taiwan Wader Study Group), Phil Round (Mahidol University, Thailand), Yu Yat Tung (Hong Kong Bird Watching Society), Nial Moores (Birds Korea), Mark Barter, Doug Watkins and David Li (Wetlands International) and all additional participants of the Spoon-billed sandpiper workshop in Thailand: Elena Lappo (Russia), Nguyen Duc Tu (BirdLife International Indochina Programme), Lin Qingxian (Fujian Bird Watching Society), Thura Win Htun (Myanmar), Willie Foo (Nature Society Singapore), Petch Manopawitr (Kok Kham, Thailand), S. Balachandran (Bombay Natural History Society, India), Enam Ul Haque (Bangladesh), Dr Pinsak (Mangrove Research Centre, Samut Shakon, Thailand), Kritsana Kaewplang (Bird Conservation Society of Thailand) and Mike Crosby (BirdLife International) contributed in information and ideas to this AP. Martin Fowle, Adrian Long and Fion Cheung of BirdLife International have assisted in proofreading of the text of this AP.

2. Biological Assessment

<p>General information</p>	<p>The Spoon-billed Sandpiper is an endemic breeder to Russia's far North East. It also only breeds in coastal tundra along a discontinuous line of 4,500 km. The species has never been recorded breeding further than 5 (and exceptionally 7 km) from the seashore and breeds only in limited types of habitat, mainly lagoon spits with crowberry-lichen vegetation (Tomkovich 1995, Tomkovich <i>et al.</i> 2002, Zöckler 2003, Syroechkovskiy 2004). Its conspicuous spatulate bill is used in a different fashion to capture food items mostly under water and in mudflats, but also in picking larger insects from tundra vegetation.</p>
<p>Population trend</p>	<p>Serious population decline, by as much as about 80% in the last 40 years, with an accelerated decline in the last ten years when its numbers are estimated to have fallen to about one-third of their former level. For details see Table 1.</p>
<p>Distribution throughout the annual cycle</p>	<p>Breeding in Chukotka and the extreme north of Kamchatka, NE Russia, it arrives on the breeding grounds in early June. First chicks hatch around end of June and early July and fledglings occur in late July and August. Most birds leave the breeding area by mid-August and migrate across the Sea of Okhotsk. First migrants are observed in Japan and Korea from early August with the peak in late September. By early to mid-October the first migrants arrive at regular staging sites in the Gulf of Thailand, where some birds overwinter. Wintering birds in Bangladesh arrive at the end of November with some birds staying until April. By then most birds have started migration passing Chinese coasts between March and May, reaching Korea in April and peaking in mid-May, and Kamchatka in late May before arriving back on the breeding grounds.</p>

Productivity	<p>The overall productivity varies between the breeding regions.</p> <ul style="list-style-type: none"> • In the North the breeding success is much lower due to predation by foxes and avian predators, and other unknown reasons. • Southern breeding areas demonstrate a good breeding success in most years, for details see table 2. • Recruitment: see table 3
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Life history	<p>Breeding: Breeds in single pairs or small aggregations (2-5 nests over a distance of 200-500 m) on coastal tundra on the Chukchi and Bering Seas.</p>	<p>Feeding: On the breeding grounds mainly practises pecking (plover type feeding) and very limited 'probing' in shallow water. This latter type of feeding is believed to be the key technique at non-breeding grounds though observations are insufficient.</p>	<p>Migration: Wintering on coastal mudflats between Vietnam and Thailand in the East, and southern Bangladesh in the west. Stop over sites in Mainland China, Taiwan, Hong Kong, Japan and Korea.</p>
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Habitat requirements	<p>Breeding habitat: Mainly gravel spits covered by crowberry-lichen-moss tundra at coastal lagoons, deltas and estuaries; limited breeding in moraine hills nearby to spits.</p>	<p>Winter Habitat: Poorly studied. Prefers mixed sandy tidal mudflats with uneven surface and very shallow water, mainly in the outermost parts of river deltas and outer islands, often with a higher sand content and thin mud layer on top. In the areas with total coastal conversion it favours certain stages in the management of saltpans.</p>	<p>Habitat on passage: See winter habitat.</p>
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3. Population and Status

3.1 Population Status in the Breeding Areas

The species is confined to breed only in Chukotka and the northernmost part of Kamchatka in the Russian far North East. Table 1 summarises the status of the species in its breeding area. More detailed information of the situation on the breeding grounds is available in a paper in prep. (Zöckler & Syroechkovskiy Jr. in prep.).

Zöckler & Syroechkovskiy (in prep.) showed a very low return rate among the very site-confident adult and juveniles ringed in previous years in the prime breeding area of Meinypilgyno, South Chukotka, indicating overall an extremely low recruitment to the population and an alarming signal of a population on the brink of extinction. A summary from counts at major staging and wintering areas, mainly in Korea also confirms a very low juvenile percentage. Only two juveniles were identified among

180 Spoon-Billed Sandpiper seen at Saemangeum, in September 1998 (Moores 1999).

The first efforts to ring Spoon-billed Sandpiper on the breeding grounds date back to 1986-1988 in Northern Chukotka (Tomkovich 1994, 1995). Ringed birds have been recorded from Bangladesh in 1989 and extraordinarily on the breeding grounds in 2002 only 200m and 1km from the site of ringing after 14 and 15 years respectively (Tomkovich 2003). Since the surveys by the expedition of the Russian Academy of Sciences started again in 2000, over 450 birds (adults and pulli) have been ringed in both parts of the breeding range (see table 2 and 5).

Most other recoveries are from Japan where there is a high observer density, but there are others more recently from Korea, Thailand, Russia, China and Myanmar.

Table 1: Population Trends

Period	Estimate (in pairs)	Comment	Source
1970s	2,000-2,800	Based on calculated estimates from a limited number of surveys	Flint & Kondratyev 1977
2000	<1,000	– based on recent expedition into the breeding areas with previously known estimates	Tomkovich <i>et al.</i> 2002
2002	560-900	– current figure if population declined 3-5 times since mid-1970s	Syroechkovskiy unpubl.data.
2003	402-572	-based on surveys carried out until 2003 with 30% error incl.	Syroechkovskiy, 2004
2007	150-450	– current optimistic estimate based on 70% survey coverage	(Zöckler & Syroechkovskiy in prep.)

Table 2: Number of ringed juveniles and controls in the Meinypilgyno breeding area, South Chukotka

Year	No. of chicks ringed	Birds re-sighted	Number of re-sighted birds displaying or nesting
2001	30	-	-
2003	88	0	0
2004	44	0	0
2005	42	4	1-2

Table 3: Trends in Spoon-Billed Sandpiper observation during the non-breeding period between 1988 and 2007.

Year	Winter (Nov-Mar)**		South Migration (Aug-Oct)**	
	Total count*	No. of Juveniles Recorded***	Total count *	No. of Juveniles Recorded***
1988-9	258	0	1	0
1989-0	25	0	2	0
1990-1	^ 226	0	0	0
1991-2	64	0	7	0
1992-3	12	0	1	0
1993-4	0	0	3	0
1994-5	5	0	1	0
1995-6	16	0	3	0
1996-7	58	0	13	0
1997-8	8	0	5	0
1998-9	6	0	184	0

Year	Winter (Nov-Mar)**		South Migration (Aug-Oct)**	
	Total count*	No. of Juveniles Recorded***	Total count *	No. of Juveniles Recorded***
1999-0	7	0	200	0
2000-1	2	0	4	0
2001-2	5	0	7	0
2002-3	9	1	28	3
2003-4	29	8	21	2
2004-5	30	6	25	3
2005-6	31	0	28	14
2006-7	32	15	21	1

*Estimated total count of all sites, based on min and max. No. of birds at one site

**The distinction between southward migration (1st August to 30th October) and wintering (1st November to 1st April) was based on the time series of monthly distribution maps* created to analyse this pattern. Figures for the northward spring migration have not yet been added as they are generally too low to show any trend. To minimize the effects of any double counting, the estimated total value is the sum of all observations at different sites during the time period. Where many birds pass through a site (such as at Khok Kham in Thailand or Mai Po in Hong Kong) this will be an underestimate, but double counting of the same birds on consecutive days is avoided.

*** Information about juveniles has not always been provided and only been added where it is available; therefore this figure is a minimum count and probably an underestimate. Increasing numbers of juveniles are most likely to represent more detailed observation as a result of better optics and better collection of data.

^ Probably represent birds on migration: the flock of 221 was in north China and now considered to be doubtful as no references can be provided.

* Available from the authors

3.2 Status and Trends in the Non-Breeding Areas

In order to compile all the existing knowledge of Spoon-billed Sandpiper distribution and population, a geo-referenced species database was created in 2004 (Bunting & Zöckler 2006). Currently there are approximately 800 individual Spoon-billed Sandpiper observations listed in the database.

Table 3 shows a summary of the more recent information from the species database by year in order to demonstrate population trends. However the numbers seen every year are low, even when compared with the most conservative population estimates from research on the breeding grounds. This suggests that only a small proportion of staging and wintering birds are seen each year and that the increase in numbers of records in the last few years is almost entirely due to increased observation and better publication and recording of the data.

3.3 Status and Trends at National Level

The species migrates through some 12, possibly 14, countries with some presumed accidental observations from the Philippines, Canada and Alaska. Table 4 lists the status, trend and habitats within each country or region.

The Chinese coastline accounts for more than 30% of the length of the Spoon-billed Sandpiper flyway. It is therefore of critical importance for the species. Because of the

vast areas involved the coastline is here split into three regions. Although the Asian-Pacific region is relatively well covered by wader counts (Li & Mundkur 2004), many potential sites in Bangladesh, Myanmar, Cambodia, Vietnam and China were never specially surveyed for the presence of Spoon-billed Sandpiper, which are often mixed with large flocks of Red-necked Stints and other shorebirds (such as Broad-billed Sandpiper, Dunlin and plovers) and therefore easily missed.

Table 4: Status, trend and habitat during non-breeding season

Country / Territory	Species Status*	Degree of Monitoring*	Pop. Trends since 1990	Main Habitat Types
Bangladesh	Previously considered to be the main wintering area with flocks of well over 200 birds in the late 1980s and still is one of the most important wintering areas with regular sightings of up to 25 birds annually	Annual mid-winter counts provide a snapshot. Regular monitoring of key sites is increasing.	DEC	Large mudflats in eastern delta. Mostly on recently emerged islands and more stable areas along the east coast, inter-tidal mudflats with sandy substrate but muddy layer at the southernmost tip of the country. Feeding in drier harder places, never in water, in a fine layer of sand on loamy mud.
India	Only irregular visitor to east coast of India up to 4 birds regularly in Calimere until 2004	Annual mid-winter counts made at Chilika Lake. Few observations from other sites	Unknown	Sand banks and mudflats in major estuarine systems mixed with clay. Not found in salt pans. Not found in Sunder bans Mangroves. Partly submerged island in brackish Chilika Lake
Myanmar	Very recent new data from Arakan (36 birds) and Martaban coast (48 birds) indicate that this country is a very important wintering area.	Currently very little. Recent Irrawaddy delta surveys didn't find Spoon-billed Sandpiper; observations from Arakan region suggest gradual decline in the last 6 years.	Unknown	Sandbanks and mudflats in Arakan region and in Gulf of Martaban are highly important wintering sites
Thailand	Low numbers of up to 15 birds are regularly seen throughout migration and winter seasons	Regular monitoring of Inner Gulf sites	STA	Traditional salt pans near extensive mudflats in Inner Gulf. Mudflats in the gulf are estimated by Eftemeijer and Jukmongkol (1999) as 235 km ² , with salt pans 106 km ² , and prawn ponds/coastal flats 400 km ²

Country / Territory	Species Status*	Degree of Monitoring*	Pop. Trends since 1990	Main Habitat Types
Vietnam	Regular visitor to the Red River Delta, totalling 15-27 birds in the late 1990s, but subsequently only up to 4 birds; recorded once from the Mekong Delta	Many recent records originate from international bird watchers and tour groups. Monthly surveys in the Red River Delta	DEC	Roosts on outer delta sandbanks, but feeds on mudflats near them (Red River and Mekong), not observed on salt pans
Malaysia	Rare visitor	Regular at known key sites		Coastal mudflats, man-made ash ponds at power station
Singapore	Rare visitor		No recent observations	
China, North East / Yellow Sea	Very important stopover sites	Surveys in early 1990's, little recent data.	DEC	Not known
China, Eastern	Few recent data with max 8 birds	Increasing	DEC	
China, Southern	No data. Potentially important	Monthly and Increasing	Unknown	Sandy beaches and few records on salt pans
Hong Kong, China	Annual spring migrant, rare in autumn and a single record in January.	Weekly monitoring during migration season. Important time series data	FLU	Muddy inter-tidal flats
Taiwan, province of China	Low numbers	Regular monitoring of known key sites	STA or slightly declining	
South Korea	Very important stopover area with 30 sites. Some of the largest flocks with almost 200 birds in the late 1990's.	Good regular monitoring	DEC	Outer river estuaries with sandy mudflats (only two major estuaries left, after major embankments in 2006)

Country / Territory	Species Status*	Degree of Monitoring*	Pop. Trends since 1990	Main Habitat Types
DPR Korea	Few records. Potentially very important staging areas	Not known	No data	Largely unknown but Mundok mudflats appear to be important
Japan	Important stopover sites along almost all coasts, but small numbers up to 5 birds max	Good regular monitoring plus coverage by local groups. Hundreds of observations known	DEC	Inter-tidal mudflats, which decreased from 1950s-1990s, when c.70% of natural coastal areas were developed, most recently in 1997
Russia (on migration)	Important pre-breeding stopover sites, as last refuelling station before breeding grounds and early autumn stopovers	Some monitoring by ornithologists, but not enough to define the trends	Few data from Sea of Ochotsk do not suggest any trend	Coastal areas, sandy and muddy beaches and spits

* Country maps are available from the authors

Key: DEC = Declining, STA = Stable, FLU = Fluctuating, INC = Increasing

Table 5: Summary of Ringing Activities, 2000 – 2006

Year of study	Region	Adults ringed	Chicks ringed
2000	South	8	7
2001	South	1	33
2002	North	30	29
2003	South	53	93
2004	North	1	9
	South	15	44
2005	North	13	25
	South	13	57
2006	South	3	18
Totals	North (Light Blue)	44	63
	South (Light Green)	93	252
Grand Total		137	315

Table 6: Ring recoveries from the migration and wintering period:

Locality	Country	Year	Mon.	Day	No. in Flock	Observer / Reference	Status
Moulevir Char	Bangladesh	1989	Jan		202	Bakewell and Howes 1989, <i>Asian Wetland News</i> 2, 1 [1989]: 9	Two Flagged by P Tomkovich
Tokyo	Japan	2002	Sep	9	1	Minoru KASHIWAGI	Pale Blue
Mangyeung estuary	South Korea	2003	Sep	21	1	Kim Kyung-Won & KFEM	1 Juvenile, with blue leg flag, photographed
Tamashima Landfill	Japan	2004	Sep	19	1	NAKASHIMA Kenji	Pale Green
Yubu Island	South Korea	2004	Oct	1	3	Lee pers comm.	One flagged MP 2004 (Pale Green)
Ebiye Coast	Japan	2005	Sep	15	1	TATEI	Adult breeding plumage, pale green flag
Nakdong estuary	South Korea	2005	Sep	21	1	Jeon Shi-Jin	Juvenile, green flag on right tibia, metal on left
Khok Kham	Thailand	2005	Nov	3	1	Suchart Daengphayon	Juvenile, pale Green
Pak Thale	Thailand	2006	Mar	1	2	D. Bengtsson, B. Persson and K. Svensson	Juvenile, pale Blue (one)

Locality	Country	Year	Mon.	Day	No. in Flock	Observer / Reference	Status
Nanan, near Xiamen	China	2006	Apr	16	1	Mr Dong Guotai	One colour ringed bird Yellow over Blue Left leg
Minjiang Estuary	China	2006	Apr	15	6	Ms Chen Zhihong of Xiamen Bird Watching Society	One colour ringed bird Yellow over Blue Left leg
?	Japan	2006	Sep			?	Metal ring only
Geum	Korea	2006	Sep	25	15	Danny Rogers	Light green flag on left leg
Shmidtovka River mouth	Primorski Krai Russia	2007	Aug	1		Unknown Hunter	Adult colour-marked bird from Belyaka population shot
Nan Thar island, Sittwe	Myanmar	2008	Jan	15	24	J. Schwahn, Aung Moe & C. Zoeckler	Juvenile, light blue flag on right tibia, metal on left

* unclear origin of rings

Figures on sightings of Spoon-billed Sandpiper in range countries are available from the authors.

4. Threats

4.1 Threats on the Breeding Grounds

The threats on the breeding area can be summarised into five categories, based on the research carried out at 30 breeding locations visited between 2000 and 2006, with special emphasis on the two main breeding areas of Meinopylgino, South Chukotka and Belyaka, North Chukotka:

1. Habitat degradation and fragmentation
2. Natural predators
3. Anthropogenic disturbance
4. Collecting of skins and clutches
5. Climate change

4.1.1 Habitat degradation and fragmentation

Significant breeding habitat degradation was observed in 5 of 30 visited breeding locations. On the west coast of Provideniya Bay about 80% of the habitat was changed by military activities, causing the total loss of Spoon-billed Sandpiper population in the area. The building of country houses in former Spoon-billed Sandpiper breeding sites is reported from Lakhtina Lagoon and road construction had transformed the habitat near the town of Egvekinot. Serious damage to several square kilometres of the best Spoon-billed Sandpiper crowberry habitat has been observed on the spits of Uel'kal' in the North and Meinypilgyno, South Chukotka. Some habitat transformation was caused by caterpillar tracks, road construction and gravel collecting in 2005-

06 when construction works took place at the breeding sites south of Anadyr airport and north at Nikolaya spit. Despite low human population density in the breeding areas, human transformation may affect some of the best Spoon-billed Sandpiper habitat on the spits.

4.1.2 Natural predators

Natural predation on the Spoon-billed Sandpiper is lower than in many other Arctic waders (Syroechkovski & Zöckler in prep.). In the southern part of its breeding range, there are only Red Foxes (*Vulpes vulpes*) and avian predators, such as gulls and skuas. In the northern part of the breeding range, on the Chukchi Peninsula, Arctic Foxes (*Alopex alopex*) are responsible for considerably higher losses of nests and chicks. Between the 1950s and mid-1990s the Arctic Fox population was under severe pressure from the local people who hunted and trapped foxes along the sea coast, where traditionally the largest proportion of the hunting (80%) has been carried out. Since the mid-1990s the fox numbers have increased. The annual hunting bags contained 2200-8100 animals between 1933 and 1988. After 'perestroika' the price for furs fell sharply and the annual numbers of trapped foxes declined to only 100-300 animals (K.B.Klokov in litt.). Although no exact figures are available it is very likely the fox numbers have increased sharply.

Targeted studies are necessary to confirm the trend and likely impact. However, the continuing decline of Spoon-billed Sandpiper in areas without any Arctic foxes indicates that researchers should look beyond the local predators.

4.1.3 Anthropogenic Disturbance

This factor includes disturbances by local people, as well as by the research and monitoring activities themselves.

Although Chukotka is very thinly populated, 90% of the population lives along the coast, and 75% live near to Spoon-billed Sandpiper breeding sites. There are 20 settlements and over 50 fishing camps in the vicinity of breeding Spoon-billed Sandpiper (Syroechkovski 2004). Considering the high site fidelity of the species the constant presence of human habitation so close to the breeding sites does have an impact. Examples from the well-studied area of Meinypilgyno indicate frequent hunting, fishing and recreational activities, for which local people regularly pass through Spoon-billed Sandpiper breeding sites. The people have little or no knowledge of the species and its globally threatened status. Unleashed dogs accompanying the local people are also very dangerous for the Spoon-billed Sandpiper. These often roam in the neighbourhood, out to a radius of some 5 km, in search of food and in pursuit of their natural hunting instincts. Mostly they focus on ground squirrels and eiders. They seem rarely to be successful, but Spoon-billed

Sandpiper nests in the close neighbourhood of the village have always been predated, and dogs are the most likely culprits. In many Chukchi villages shooting at waders using slingshots is popular activity of children, which is sometimes even supported by elders as it “may help them to become a good hunter in the future”. Luckily this may influence Spoon-billed Sandpiper only near settlements. We have recorded these activities at least in 4 villages within the Spoon-billed Sandpiper range.

Research and monitoring activities, especially the capture of adult breeding birds on the nest, can cause significant disturbance although is considered vital for conservation research. Spoon-billed Sandpiper does react to the presence of observers and to being caught in the same way as other *Calidris* waders. Therefore only experienced, well-instructed and trained researchers should be allowed to catch and ring these birds. Two out of 76 nests found by researchers were abandoned after being monitored, presumably due to the observer influence. Nest finding and marking may also increase the predation rate by Arctic Foxes in North Chukotka. The absence of Arctic Foxes suggest that this might be one reason for the higher proportion of successful nests on the spits in South Chukotka. However, the increase of predation in the Meinypilgyno moraine hills in 2005 might be due to a Red Fox following the researcher's activity. Additional caution is needed and future research should build on a voluntary code of

conduct for researchers working on Spoon-billed Sandpiper, especially on nesting birds in Russia, considering the species' current status.

4.1.4 Collecting of skins and clutches

Being a rare and charismatic bird, restricted to very remote areas of the Russian Arctic, Spoon-billed Sandpiper has always been a target for museums and private collectors. As with many other rare species (Courchamp *et al.* 2006), the rarer the Spoon-billed Sandpiper becomes the more attractive the species is amongst collectors. In the past decade it has been impossible to obtain an official permit to collect the species, meaning that all of the recent collecting activities were illegal and therefore difficult to document. Several skins of the Spoon-billed Sandpiper now in collections of the Zoological Museum in Seattle, were collected legally as recently as the early 1990s at the Nikitkha river estuary, south of Anadyr, where the species was found to be extinct during surveys in 2000 and 2005. In several other cases we received reports from taxidermists or verbal reports from local people, who were well paid to guide collectors to Spoon-billed Sandpiper breeding sites. Most of these cases have been confirmed by independent sources and there is no doubt that there are ongoing efforts to collect skins and clutches. There are at least 3 sites where we failed to find breeding Spoon-billed Sandpiper for several years after visits of collecting expeditions:

Kivak Lagoon and Plover Spit near Provideniya, which were visited by American private collectors, who came via Nome in early 1996-98 and Gek Spit at the Anadyr Estuary, visited by a Swiss-French taxidermist expedition in the mid-1990s. In the year 2005-06 several private collectors from Western Europe offered to pay several thousand US dollars for one dead Spoon-billed Sandpiper; as announced through the network of game biologists and hunting tourism agencies in Moscow, Saint-Petersburg and Anadyr. Collecting expeditions are operating in Chukotka almost every year and among many other sought-after species is always the Spoon-billed Sandpiper. So far 17% of Spoon-billed Sandpiper breeding sites are known to have suffered due to collector activities and several others are likely affected. In one case the culprit admitted his activities and mentioned that the value of one clutch would cover his travel expenses plus additional lucrative profits. There is a danger that more local people will become involved in collecting Spoon-billed Sandpiper for high remuneration. A system of self-guarding key breeding sites by local communities needs to be developed.

4.1.5 Climate Change

The breeding area is in the region of the Arctic that is predicted to be the most heavily influenced by global climate change within the whole circumpolar Arctic (Grebmeier *et al.* 2006). As the coastal

lowlands at about sea level are expected to suffer from ocean level rise (ACIA 2005) it is clear that Spoon-billed Sandpiper breeds in the most vulnerable area. The breeding grounds are the only part of the species' range that may already have started suffering from climate change related events. For the Bering and Chukchi Sea coasts of Chukotka there is evidence of:

- 1) Decrease of sea ice coverage in June-July, which increases the probability of floods during the breeding period and wave erosion of the best breeding habitat.
- 2) Rising of the annual and summer temperatures, with changes in vegetation from crowberry tundra to richer, multi-layered bushy vegetation much less suitable as habitat for the species.
- 3) Decrease of precipitation in both winter and spring, with a drying of the tundra habitat, which has been observed already. Local authorities in Anadyr report an increase in tundra fires around Anadyr over the last 20 years. A recent study carried out at the University at Fairbanks in neighbouring Alaska concluded that Arctic lakes are drying up with a loss of lake surface area of 11% since 1973 (Hinzman *et al.* 2005).

Depending on the exact geographical location and microclimate conditions, this could mean significant changes for the key breeding habitats – the lagoon spits.

4.2 Threats on the Staging and Wintering Areas

This section gives an overview of the most common threats on the non-breeding grounds, with a table summarising the threats by country or territory and their significance. Numerous human activities, which may influence Spoon-billed Sandpipers in coastal non-breeding areas were grouped into the following categories, based on the expert consultations of the range countries during the Action Plan Workshop in Samut Sakhon, Thailand in December 2006:

1. Large Scale Reclamation
2. Urban / Industrial Development
3. Rural Development
4. Coastal Defences
5. Conversion for Salt Pans
6. Conversion for Intensive Aquaculture
7. Mangrove Plantation
8. Tourism and Recreation
9. Hunting and Trapping
10. Pollution
11. Hydrological Regime Changes
12. Climate Change

4.2.1 Large-Scale Reclamation

Coastal reclamation has many roots. The most important driver is land claim for agriculture and coastal development. Large-scale reclamation projects have taken place in the most economically developed areas of the Spoon-billed Sandpiper non-breeding range, first of all in Japan, South Korea and China. In Japan over 70% of existing inter-

tidal areas have already been reclaimed with the largest project only completed in 1997. Other countries, such as South Korea and Bangladesh also have significant, ongoing reclamation projects. In fact the largest ever reclamation project was completed in 2006 in South Korea with the Saemangeum reclamation claiming 40,000 ha of inter-tidal mudflats (Moore 2001, Moore et al. 2006). This project is in the process of destroying the best-known Spoon-billed Sandpiper stopover site. Coastal reclamation is not a new phenomenon. There is evidence of large-scale reclamation in Hangzhou Bay, just south of Shanghai, China as much as a thousand years ago (Ruesink and Wu 2005). Recent data (Ruesink & Wu 2005) suggest that reclamation in China is still increasing. Table 7 shows the increase in reclamation over time in the Cixi region, Hangzhou Bay (Ruesink & Wu 2005).

In another area of Hangzhou Bay (Qian-tang region), conversion activity showed a different pattern. Strong tides occur monthly in the Qian-tang region, which makes reclamation activity more demanding and expensive. Therefore, major reclamation did not occur until after the 1950s. The pace of the reclamation has accelerated in both regions, a trend which is likely to continue in the short term as the demand for land increases. Most of the reclaimed areas are used for agriculture, based on field observations, even on newly converted lands. Barter (2002) estimated approximately 37% of inter-tidal mudflats in the Yellow Sea, have been reclaimed since 1950. There are plans to reclaim a further 43% of the remaining mudflats.

Table 7: Area reclaimed in the Cixi region, Hangzhou Bay, China (ha) (Ruesink & Wu 2005)

	1047	1472	1725	1735	1797	1862	1909	1970	1980	1990	
	-	-	-1	-	-	-	-	-	-	-	Total
	1471	1724	734	1796	1861	1908	1959	1979	1989	2001	
Area Reclaimed	12400	10750	9860	6810	4120	11970	7260	3290	2160	6230	74850

4.2.2 Urban / Industrial Development

Overall, coastal development in South-East Asia is accelerating and reaching a pace which is unprecedented in any other part in the world. It includes development for industry, housing, tourist (e.g. hotels and golf courses) and transport infrastructure such as jetties and terminals. Among the

known important sites a new jetty in **Bangladesh's** most southern point to take tourists to St Martins Island was constructed in 2006 with further development threatening this area.

Plans for a huge bridge project across part of the Inner Gulf of **Thailand** have been put on

hold at present, partly as a result of concerns raised by the Asian Tsunami of 2004. This is extremely good news, as two important Spoon-billed Sandpiper sites would have been directly affected by the development. However, less than 1 km from the highly important Pak Thale site in **Thailand**, a new petrochemical refinery occupying one square kilometre of land is under construction. Additionally a textile factory was illegally constructed in part of the Khok Kham site. Examples of urban expansion in coastal areas are well known from **Singapore** and **Hong Kong** and most other countries and territories in the region. The planned 'eco' city of Dongtan near Shanghai in **China** is of particular concern as despite the stated intentions of low impact sustainable development, the site is very close to areas currently used by migrating Spoon-billed Sandpiper (eastern Chongming Dao). It is difficult to see how large-scale development can occur without causing a negative impact on the species.

4.2.3 Rural Development

In some Asian coastal areas, overpopulated by humans, inter-tidal areas are increasingly used for conversion into land for new settlements. It is especially a problem in Bangladesh – the country with highest human population density in the world. Most reclamation activities in this country do not result from large projects, but constant

creation of small new dikes. A great proportion of the existing inter-tidal areas are already converted for new human settlements and even the newly emerged islands are considered for this (Ul Haque pers. comm.). Local people on the ground in some of these areas confirmed observations that large tracts of mangrove forest have been cleared for agriculture. More worrying for the fate of the Spoon-billed Sandpiper, areas of newly formed mudflat are being surrounded by dykes and used for shrimp ponds and saltpans. The actual reclamation seems to be an ongoing process and the pace of the expanding dyke building is worrying with many suitable areas lost every year.

In Vietnam, the rapid population growth and economic development (especially aquaculture) is leading to the conversion of natural coastal habitats. Some coastal reclamation projects destroyed mudflats and wader habitats. A new reclamation project is under construction in the Ba Tri district, that will cut off the sandy island where Spoon-billed Sandpiper used to be recorded from the sea.

After detailed surveys of Spoon-billed Sandpiper in Bangladesh, several inter-tidal areas, most important for the species' survival, should be listed and protected from further development of new settlements.

Similar processes occur in **Myanmar**, but to a much lesser extent, as observed in parts of

the Arakan (Rakhine) area, but not in the Gulf of Martaban (Mottama). There have, as yet, been no significant coastal mudflat reclamations in **Thailand**.

4.2.4 Coastal Defences

Increasingly, coastal defences are established to prevent coastal wave erosion and floods. This includes the construction of dikes at various levels and of different types, ranging from clay to concrete walls, and even various industrial garbage like used tires in Thailand. There are thousands of kilometres of coastal defence constructions in East, South, and South-East Asia, which are growing under the threat of potential sea level rise in connection with climate change. These constructions destroy the high tide roosts of waders and influence the hydrological regime of streams and rivers, changing this way the whole littoral ecosystem functions. They are suspected to influence Spoon-billed Sandpiper habitats in the Inner Gulf of Thailand (P. Round pers. comm.) and some locations of Vietnam and South Korea and along the eastern coast of Bangladesh in the Chittagong area. Coastal areas and mudflats become less dynamic and the coastline is much more restricted by dams and polders for coastal protection but also increasingly for aquaculture.

4.2.5 Conversion for Saltpans

Salt Pans – big fields of flattened coastal areas divided by grids of small dikes and flooded by shallow seawater for evaporation,

are one of the main types of habitat where Spoon-billed Sandpiper have been recorded in the non-breeding grounds in last decades, particularly in **Thailand** and **South Korea** (where used as high-tide roosts). In the Inner Gulf of Thailand they are a key man-made habitat, completely converted from the natural state of mudflats, which used to serve as feeding habitats and high-tide roosts for waders. These saltpan habitats still play a role for Spoon-billed Sandpiper providing suitable feeding and roosting sites in Thailand. But the very low numbers of species in the saltpans may indicate that they are only a poor replacement for former natural habitats. Only certain types of little disturbed saltpans, in certain stages of the saltpan management are suitable for waders including Spoon-billed Sandpiper. Saltpans in Bangladesh are either too disturbed or of a different character and do not replace adequately the habitat requirements to serve as good wader habitat. Recently a change from salt production in favour of aquaculture, for example for shrimp-farming has been reported in most South-East Asian countries – a more profitable and less labour-intensive activity for local people.

4.2.6 Conversion for Intensive Aquaculture

The development of aquaculture is often connected with, and the consequence of, coastal reclamation. It does provide habitat for some waders, but it is largely unsuitable for Spoon-billed Sandpiper. In most cases, the inter-tidal exchange of seawater is

interrupted, water levels are too high and the vital sources of food are not available.

East Asia is a leader in world aquaculture. China produces more aquaculture products than any other country and the export value shrimps from Thailand make it a world leader as well (Nikanorov 2006). Developments in aquaculture in recent years accelerated the development of shrimp farms, often in connection with saltpans and with devastating consequences for coastal mudflats, mangroves and waders relying on the inter-tidal exchange of saltwater. The shrimp farms are temporarily very lucrative and based on increasing global demand. In the short term aquaculture supports the local economy but local people switch from small-scale fishing and become increasingly vulnerable to changes in the global market (WRI *et al.* 2005).

Coastal aquaculture is an old traditional practice in **Bangladesh**, but since the early 1970's when the demand for, and price of, shrimps in the world market became very high, much emphasis has been given to culture of *bagda* shrimp, *Penaeus monodon* rather than fishes, and shrimp culture expanded rapidly in the mangrove and polder areas. The culture operation of 51,812 ha (in 1983-84) was expanded to about 142,110 ha (in 1993-94) with the majority along the eastern shores. More recent figures are not available (Mahmood 2004). The small-scale fisheries are jeopardised by the expansion of certain aquaculture practises, especially in the Cox's

Bazar coast. Vital components of the coastal biodiversity are diminished by shrimp fry collectors, affecting inter-tidal mudflats, along the east coast Chittagong-Cox's Bazar-Teknaf, where they conflict with Spoon-billed Sandpiper. The fishery interactions are more complex. Shrimp fry are collected throughout the coastal areas of Bangladesh, including all areas where Spoon-billed Sandpiper has occurred. Although a lot of the *bagda* post-larvae used for aquaculture come from hatcheries (mostly along the Cox's Bazar coast), more of the *golda* (*Macrobrachium rosenbergii*) post-larvae come from wild catch. But the fry collectors catch any fry and this destroys many from non-target species. It is possible that the fry collection growth since the mid-1980s has affected the ecology in the coastal mudflats in addition to any loss of mudflats to shrimp farms.

Since late 1990s, large areas of suitable habitat in Vietnam were also converted for the development of intensive aquaculture replacing valuable habitats not only for Spoon-billed Sandpiper.

In the Inner Gulf of **Thailand** the conversion of saltpans and traditional prawn-capture ponds to deep and steep-sided intensive aquaculture ponds (especially for crabs) is a threat. This is linked with the incentive to excavate and sell coastal sediments for use in construction.

4.2.7 Mangrove Plantation

Another often-ignored issue is the plantation of mangroves to stabilise newly deposited mudflats. Although plantations are often intended to compensate for losses elsewhere through deforestation, they can cause serious disruption and convert attractive roosting and feeding sites for Spoon-billed Sandpiper into unsuitably dense mangrove monoculture. Careful management and planning in the framework of Integrated Coastal Zone Management can take the needs of waders into account as well as providing coastal protection. Mangroves and mudflats do build an important ecological unity, but a one-sided plantation programme can jeopardise the species' habitat requirements. Mangrove plantation is known to take place in Xuan Thuy NR, Red River Delta, **Vietnam** – one of the main site of this species and in **Bangladesh**, and **Thailand** potentially conflicting with habitat requirements of the Spoon-billed Sandpiper. In Vietnam, the newly planted mangroves do not only replace mudflats, but also change the dynamics of sedimentation, changing muddy flats to more sandy ones.

4.2.8 Tourism and Recreation

Increasing tourism requires a lot of development and often reclamation. These threats have been mentioned already above. In addition tourism, recreation and also fishing activities and transport increasingly puts pressure on the remaining beaches and wader roosts and feeding places. These

activities by people, visiting beaches and mudflats can influence the timing of bird feeding, their resting and finally the success of the energy intake needed for long migrations and ultimately their survival. A small-scale impact from this threat is reported from nearly all countries in the non-breeding range of Spoon-billed Sandpiper, especially taking into account that the species often uses sandy spits, which are attractive for tourism.

4.2.9 Hunting and Trapping

Recent ring recoveries illustrate the hunting pressure on waders in the **Russian Far East**. Although hunting still remains a serious threat throughout **Vietnam**, it has been minimised at Xuan Thuy since it was designated as a national park (Nguyen Duc Tu *et al.* 2006).

In **Thailand** fishing nets set at salt pans are regularly noticed, especially in the western part of the Inner Gulf of Thailand, by local people, especially immigrant workers (P. Round pers. comm.). Mist-netting of waders for local consumption and to supply local food markets still takes place in Thailand (Round and Gardner in press). In December 2006 we observed dead small waders of unidentified species in nets just 500 m from the key remaining Spoon-billed Sandpiper wintering site at Petchaburi.

The island of Sonadia, off the East coast of **Bangladesh**, has hosted up to 20 Spoon-billed Sandpiper in recent years (Islam *in litt.*). Although in 2006 no Spoon-billed Sandpiper

were found, the island seems to be an important roosting site for the species. Local people, interviewed on January 20 reported that 15-20 people are still regularly catching birds with nets. The interviewed person estimated that the per-season total yield is close to 700-800 birds. Most of them were Whimbrel *Numerius phaeopus* and Curlew *N. arquata*. He mentioned also 20-40 Spoon-billed Sandpiper, but after describing the features of the species, considerable doubts were raised and the figure cannot be verified. In addition waders are also shot using shotguns. Two people were also noticed using sophisticated catapults to shoot small birds. However these two particular hunters did not know of Spoon-billed Sandpiper.

At Point Calimere and a number of other **Indian** wetlands potentially good for Spoon-billed Sandpiper along the Bay of Bengal, trapping of waders has caused up to a 5 times decline in numbers of small waders and is still taking place (Balachandran 2005). At Chilika Lake local reserve wardens informed us of the continuing practise of netting birds over coastal wetlands, mostly aiming at bigger birds, but *Calidris* waders were trapped as well.

Barter (2002) reported from **China** that although tens of thousands of birds per year were trapped using clap nets in the early 1990's, this activity has now significantly reduced. In fact, in the Chinese section of the Yellow Sea, it was confined to the

Chang Jiang (Yangtze) Estuary by 2002 and reported to be declining there as well.

Recent data from **Myanmar** suggest that a major wintering area in the Gulf of Martaban is regularly subjected to wader trapping with mist nets. Local hunters confirmed an average yield of 500 birds per catch in moonless nights. Among the waders they regularly count Spoon-billed Sandpiper in these nets. Even if only small numbers are taken, the impact can be devastating in the long term.

4.2.10 Pollution

Pollution of coastal areas has been observed in several of the sites known for the species. On Patenga beach in the Chittagong area in eastern **Bangladesh**, industrial effluent from the ship breaking industry is dumped, largely untreated, into coastal waters. Some of the channels leading into the sea near the mudflats clearly showed colouration due to pollution. Nothing is known about the effects on shorebirds or the littoral benthos community. Although results from soil sample analyses indicate low pollution rates in terms of heavy metals, data on persistent organic pollutants (POPs) were not analysed (Schwahn *in litt.*).

Barter (2002) summarized the severe pollution in the Yellow Sea, which in such an enclosed sea, suffering from reduced freshwater input from rivers is particularly serious. Birds suffer from direct contamination, but also from reduced or

contaminated food supplies. Fertilisers and increasing amounts of pesticides threaten inland and ultimately coastal waters. However, little is known about the extent of use and whether thresholds have been passed which could harm waders on inter-tidal mudflats.

4.2.11 Hydrological Regime Changes

In some parts of the region (for example, Eastern China) large-scale projects to dam or divert the course of major rivers are expected to have a long-term impact on the sediment load they carry. This in turn is expected to have a serious negative impact on the rate of accretion of new mudflats in these areas (Barter 2002). The central Bangladeshi coastline is little affected by anthropogenic habitat destruction, but subject to constant change due to the highly dynamic estuarine processes of the Ganges-Brahmaputra system. Upstream land use changes and deforestation could be expected to have a counter-balancing effect to sea level rise. On a regular basis sediments are transported and replaced, creating new islands and habitats for waders in a short period of time. The shallow waters are constantly filled with sediments, reaching from as far as the Himalayan Mountains. However other factors, such as dams and water off-take for irrigation are also present, and it is not yet clear what the overall result is likely to be.

Not only upstream dams, but estuarine barrages can significantly affect estuarine habitats, altering patterns of deposition and

length of immersion by tides (e.g. Kim *et al.* 2006), as well as salinity levels. Following the construction of an estuarine dam across the Nakdong River, South Korea in the late 1980s, numbers of many waterbird species in the estuary downstream of the barrage declined. Prior to barrage closure, "several hundred" Spoon-billed Sandpiper had been counted there (e.g. Gore and Won 1971), while in recent years that number has fallen to less than ten annually (see figure 11). Although some of that decline might well be attributable to the decline in the total Spoon-billed Sandpiper population, many other shorebird species, such as Red-necked Stint, have also declined there by more than 90% in the past two decades (Moores 1999, Moores 2006), without showing similar declines in total population. In South Korea, several other major rivers have also been barraged, including the Geum and Yeongsan Rivers, and almost no unaltered estuarine habitat remains nationwide.

4.2.12 Climate Change

Climate Change is expected to have a major impact on coastal mudflats. In the long- and medium-terms sea-level rise, floods and more severe cyclones will affect wader habitats considerably. However, the impacts are so difficult to predict and complex in nature that it is far beyond the scope of this action plan to describe the impacts of climate change in detail.

It is felt that the direct human interference in and mismanagement of coastal ecosystems at present is a more severe threat and can

also be targeted and addressed within the framework of this action plan. This does not at all mean that climate change is not a serious threat for non-breeding Spoon-billed

Sandpiper habitats and future years might reveal the extent of the real impact on the flyway coasts.

Table 8: Summary of Threats by Country, based on best available assessment by the Samut Sakhon workshop participants

Threat	RU	DP RK	RO K	JP	CN			VN	TH	M Y	M	BD	IN
					S	E	N						
On the Breeding Grounds													
Habitat Transformation	2												
Predation	1												
Disturbance	1												
Collecting	3												
Climate Change	2												
On the Non-Breeding areas													
<i>Habitat Change</i>													
Reclamation for Agriculture	0	(3)	3	1	0	0	0	(1)	0	1	(1)	1	0
Conversion for Intensive Aquaculture	0	(2)	(1)	0	3	2	1	(2)	3	2	(1)	2	1
Conversion for Salt Pans	0	(?)	0	0	0	0	0	0	0	1	(2)	2	1
Mangrove Plantation	0	0	0	1	1	0	0	2	2	0	(1)	2	2
Rural Settlements	0	0	0	0	0	0	0	0	0	1	(1)	1	0
Large Scale Reclamation	0	(2)	3	2	3	3	3	2	0	0	0	1	0
Urban / Industrial Development	1	(0)	3	2	3	3	3	1	3	1	0	0	0
Tourism	0	0	1	0	1	1	1	1	1	0	(1)	0	0

Threat	RU	DP RK	RO K	JP	CN			VN	TH	M Y	M	BD	IN
					S	E	N						
Development													
Coastal Defences	0	(1)	1	0	0	0	0	1	1	0	0	0	0
Hunting and Trapping	2	0	0	0	3	3	3	2	2	2	(1)	1	2
Fishing activities	0	(1)	2	1	3	3	3	2	0	2	(1)	2	1
Other Human Disturbance (recreation, transport)	0	0	2	1	1	1	1	2	0	0	0	1	1
Industrial Pollution	1	0	(1)	(1)	3	3	3	1	(2)	(1)	(1)	1	(1)
Agricultural Pollution	0	(2)	(1)	(1)	2	2	2	(2)	(2)	(1)	(1)	1	(1)
Hydrological Regime Changes	0	(2)	(3)	(1)	?	(1)	(2)	(2)	0	0	(1)	0	2

3 = Critical threat with large impact, 2 = Important threat with significant impact,

1 = Impact relatively small, 0 = Little or no known impact, () = Suspected to be a threat

Ru=Russia, DPRK=Democratic People's Republic of Korea, ROK=Repulic of Korea, JP=Japan, CN=China, VN=Vientam, TH=Thailand, MY=Myanmar, M=Malaysia, BD=Bangladesh, IN=India

5. Present Conservation Activities

5.1 National Protection and International efforts

At present hardly any conservation activities are targeted specifically to protect Spoon-billed Sandpiper. However, several national and international schemes for coastal

protection do also serve the protection of the species to a varying extent. Some of the most important initiatives programmes and conventions are listed below.

Table 10: National species protection and Red Listing

Country / Territory	Protection Status including National Red List	Additional national protection needed
Russia	RDB	No, but little enforcement
Japan	Red Listed	No
China, Mainland	Low level protection	Add to regional and national Red List

Country / Territory	Protection Status including National Red List	Additional national protection needed
China, Hong Kong	Fully protected	
DPRK	Listed, medium level protection	
Republic of Korea	Low level protection	Upgrade
Vietnam	Has a list of protected species, but Spoon-billed Sandpiper is not on it	Include in Red List and protected species list
Thailand	Fully protected, but not on the list of Nationally Reserved Species	Include in Red List
Malaysia	No legal protection for Spoon-billed Sandpiper for both Peninsular and East Malaysia	Include in national Red List
Myanmar	All wild birds are legally protected	Upgrade
Bangladesh	All wild birds are legally protected	Upgrade
India	All wild birds are legally protected	Upgrade

5.2 Conventions and International Efforts

The following international Conventions are relevant for the protection and conservation of the species. Migratory species are specifically targeted and protected through the CMS. Multilateral agreements for specific regions have been developed and are operating for some regions, e.g. the African Eurasian Migratory Waterbird Agreement (AEWA). For the Eastern Asian Flyway the Asian Pacific Migratory Waterbird Flyway Strategy has been developed and a 5-year plan adopted up to 2005. This is due for renewal and a new strategy is under negotiation. In addition the Central Asian Flyway (CAF) has been developed to address the issues for species migrating along the Central Asian flyway between Siberia and South Asia. At present no formal agreement on this flyway has been reached. Table 11 lists the range countries and signatories of the main Conventions.

Considering both the rarity of the Spoon-billed Sandpiper and its ecological dependence on wetlands, all sites used by the species regularly should qualify such wetlands under Criterion 2 of the Ramsar Convention for designation as sites of international importance (i.e. as Ramsar sites). However, while several of the coastal wetlands important for the species have now been listed, many others have not. Moreover, many of the sites used by the species are threatened by unsustainable development (as noted above), despite

specific resolutions that have urged all contracting parties to “review and modify existing policies that adversely affect inter-tidal wetlands, to seek to introduce measures for the long-term conservation of these areas, and to provide advice on the success, or otherwise of these actions in their National Reports.” (Ramsar Resolution 7.21). Many countries appear to be failing to comply with the obligations of conservation-driven conventions, and are not integrating wetland and biodiversity conservation, and sustainable use, adequately into national land-use planning.

Table 11: Membership of range countries in International Conventions and Agreements

Country	CBD	Ramsar	CMS	EAAFP
Russia	M	M		M
Japan	M	M		M
China	M	M		M
North Korea	M			?
South Korea	M	M		M
Vietnam	M	M	*	M
Cambodia	M	M		?
Thailand	M	M		M
Malaysia	M	M		M
Myanmar	M	M		M
Bangladesh	M	M	M	M
India	M	M	M	

Party members (M) to multilateral environmental agreements, (CBD=Convention on Biological Diversity, CMS= Convention on Migratory Species, EAAFP =East Asian Australasian Flyway Partnership

*Vietnam is in the final stage of signing up to the CMS

5.3 Important Bird Areas (IBAs)

BirdLife International's Important Bird Areas Programme is a worldwide initiative aimed at identifying, documenting and working towards the conservation and sustainable management of a network of critical sites for the world's birds, termed IBAs. The Asian IBA Programme, initiated in 1996, aims to document and promote the conservation of a region-wide network of internationally important sites for the conservation of birds and biodiversity.

IBAs are identified through the application of a set of standard criteria, including sites that regularly hold significant numbers of a globally threatened species and sites that hold globally important congregations of

waterbirds and other species. Many of the sites where Spoon-billed Sandpiper has been recorded meet these criteria and have IBA status.

5.4 National site protection (Protected Areas)

Table 12 shows the degree of protection afforded to the locations where Spoon-billed Sandpiper has been sighted on migration. Only 17% of all of these sites are currently protected. Considering also the low percentage of the breeding areas protected, the key sites for the species appear to be highly vulnerable and exposed to uncontrolled coastal development.

Table 12: Protected areas (IUCN Cat. I-IV) coverage of Spoon-billed Sandpiper sites in the non-breeding areas.

Country/ territories	Number of Spoon- billed Sandpiper Sites	Number of Protected Spoon-billed Sandpiper Sites	Number of Un- protected Spoon- billed Sandpiper Sites	% Protection of Spoon-billed Sandpiper Sites*
India	11	3	8	27%
Bangladesh	15	1	14	7%
Myanmar	9	0	9	0%
Malaysia	2	0	2	0%
Thailand	4	1	3	25%
Vietnam	4	1	3	25%
China, Mainland	29	4	25	17%
China, Hong Kong	1	1	0	100%
South Korea	24	1	23	4%
DPRK	8	0	8	0%
Japan	102	19	83	19%
Russian Federation	28	9	19	32%
TOTALS	237	40	197	17%

*These figures were produced using a GIS overlay of Spoon-billed Sandpiper sites and the WPDA 2006 database. They represent a 'first cut' at this data and there are several potential sources of error that need to be mentioned. In general these errors will reduce the percentage of sites that are classified as protected, therefore the above figures may represent an underestimate. Firstly, only an exact match between the Spoon-billed Sandpiper coordinates and the boundary of the protected area is included. Therefore if coordinates are inaccurate, or have been rounded to the nearest minutes, they may 'miss' the protected area. Secondly, the protected area may not be present, or accurately represented in the database. Thirdly, there may be some 'double reporting' of Spoon-billed Sandpiper sites in the database, for example, where there are different names or spellings for the same site, this may falsely increase the number of sites in a country.

It is important to note that the mere status of a site as a protected area does not necessarily secure the conservation of the site. In South Korea, for example several of the sites used by the species are technically protected by national legislation, and in one area, Suncheon Bay, has been designated as a Ramsar site. However, in many protected sites, such as the Nakdong estuary, reclamation projects are ongoing, as well as the construction of a massive road-bridge through key habitat and the unsustainable use of much of the area by fishers.

Table 13 lists the most important sites on the non-breeding grounds over the last 6 years (since 2000). In total 21 sites have supported flocks of 2 or more birds during two or more seasons. The table reflects the state and lack of knowledge on the distribution of the species and as such should serve two purposes. For one, it highlights those sites of significance in recent times, but it also demonstrates the need for better data coverage.

Table 13: Important sites for non-breeding Spoon-billed Sandpiper

The sites included in the table have each supported 3 or more Spoon-billed Sandpipers at any one time since 2000

Locality	IBA Name	Country	No. of observations Since 2000	Protected Area	Ramsar Site	East-Asian-Australasian Network Site
Saga-gun		Japan	1		?	
Tatara-gawa Estuary		Japan	1		?	
Sanbanse		Japan	1			
Mangyeung estuary (including Okgu)	Mangyeong estuary	South Korea	18		No	
Dongjin estuary	Dongjin estuary	South Korea	8		No	Yes
Geum estuary (including Yuboo Is.)	Geum-gang river and estuary	South Korea	4		No	
Nakdong estuary	Nakdong-gang estuary	South Korea	5	Yes	No	
Mai Po Nature Reserve	Inner Deep Bay and Shenzhen River catchment area	Hong Kong, China	2	Yes	Yes	Yes
Minjiang Estuary	Min Jiang Estuary	China	4		No	
Nanan (near Xiamen)		China	2		No	
Xuan Thuy Nat. Park (including Lu Island)	Xuan Thuy	Vietnam	7	Yes	Yes	
Thai Thuy	Thai Thuy	Vietnam	3		No	
Pak Thale	Inner Gulf of Thailand	Thailand	19		No	

Locality	IBA Name	Country	No. of observations Since 2000	Protected Area	Ramsar Site	East-Asian-Australasian Network Site
Khok Kham	Inner Gulf of Thailand	Thailand	6		No	
Ratheduang		Myanmar	2		No	
Nan Thar Island		Myanmar	1		No	
Martaban		Myanmar	1		No	
Myit U		Myanmar	1		No	
Shaporir Dweep		Bangladesh	3		No	
Sonadia		Bangladesh	2		No	
Bodar Mukam		Bangladesh	2		No	
Point Calimere	Point Calimere Wildlife Sanctuary	India	1	Yes	Yes	

* Observations refers to the number of individual observations made, since 2000, of flocks of more than two Spoon-billed Sandpiper .

6. Proposed Conservation Activities

We can describe eight main areas of action on an international level to halt and reverse the species' decline. Each country or region can adopt the framework and design the

action needed at a local, sub-regional or national level. The actions are listed and summarised in table 14 and further described in the text below.

6.1 Species Protection

RECOMMENDATION 1: Publish an assessment of the potential change of status of the species from Endangered to Critical and upgrade in the Red Data Book, globally and in all range countries

At present the species is listed as globally Endangered (EN). The sharp and rapid decline of the population over the last 20 to 30 years, as well as its range contraction would justify an up-listing to globally Critically Endangered (CR) (for more details see Zöckler & Syroechkovskiy in prep.).

RECOMMENDATION 2: Stop and actively prevent species persecution and collection for museums and private collections through public awareness campaigns and local self-guarding systems. List the species on Appendix 1 on the CITES Convention

RECOMMENDATION 3: Upgrade the legal protection status of the species in all range states and prevent persecution by local hunters

In rare sub-national regions, such as Chukotka, the species is already listed as Critically Endangered, however many countries have not included the species on the national Red List. In almost all countries it is not legal to persecute the species. However, until recently the species was not only hunted for consumption but also collected for museums and private collections. Hunting, catching and persecuting small waders with nets and the illegal collection of specimens and eggs is still continuing, which requires coordinated action and improved legal enforcement. Most of private taxidermy collectors and museums interested in Spoon-billed Sandpiper skins and clutches are from developed countries (Europe and USA). It should be possible to raise the awareness on the critical status of the species, improving a self-controlling system among museums and potential collectors.

Parties to CITES need to be encouraged to list Spoon-billed Sandpiper on Appendix 1. This would immediately prevent the legal trade of specimens to developed countries.

6.2 Habitat protection

RECOMMENDATION 4: Identify Key areas for the species and improve its legal site protection and management using national legal mechanisms and collaborative international mechanisms (e.g. Ramsar and Waterbird Site Network)

Protected areas are still the most prominent and efficient measure to safeguard key habitats for the threatened species along the entire flyway. The task requires the full commitment and good coordination of all flyway countries. Again, the enforcement and management of the protected areas is essential for the tool to be successful.

All or most of the breeding areas should be declared as protected areas. At the moment the degree of protection is about 4% of the breeding site and less than 20% of the estimated breeding population. Urgent action on the designation of protected areas is required.

Many countries like Thailand do not really have any provision in their environmental or protected area legislation that allows for multiple uses, and conservation and sustainable use,

which prohibits conversion to other uses. Much of the land on which Spoon-billed Sandpiper occurs in Thailand and Bangladesh is already in private ownership, creating additional problems. ECAs (Environmentally Critical Areas) in wetlands carry no weight, and community initiated protection and sustainable management/use lacks long-term formal recognition. A review of national environmental legislation in Spoon-billed Sandpiper range states is needed so as to determine the most appropriate country-by-country response.

- Strengthen the management of sites where necessary
- Identify Key sites, which are not currently protected and list them for future legal site protection.
- Review and identify site protection approaches and strategies which will be appropriate at the national and local level

RECOMMENDATION 5: Endorse the action plan and integrate the activities with the East Asian – Australasian Flyway Partnership

The Flyway Partnership can provide an umbrella for the Action Plan which could potentially be adopted by the Partners as a framework for action for the Spoon-billed Sandpiper. The Partnership has a specific theme for threatened species. BirdLife Asia has volunteered to lead on developing this theme. In 2007 the Partnership will be very much finding its way in developing collaboration between international and national partners. The Spoon-billed Sandpiper Action Plan could be very useful in providing a specific checklist of actions that need to be built into the integrated delivery of awareness, capacity building, monitoring and site management activities across the Flyway.

The Spoon-billed Sandpiper Recovery Team could be identified by the members of the Partnership as focal points and invited to report to Meetings of Partners.

6.3 Site Management

RECOMMENDATION 6: Implement and improve the Integrated Coastal Zone Management (ICZM) of important stopover and wintering sites of the species

Inter-tidal mudflats are considered to be an ecological unit with other coastal habitats, in particular mangroves. The protection and Integrated Coastal Zone Management (ICZM) of healthy ecosystems along the flyway needs to take this unity into account. ICZM not only benefits Spoon-billed Sandpiper but also aids many others. Moreover, it will assist in securing the livelihoods of coastal communities who depend on ecosystem services. ICZM is based on the principle of the sustainable use and adopted for management planning but rarely implemented. In this context it is important to acknowledge coastal ecosystem services, such as coastal water purification, the buffer capacity against storm surges and providing livelihoods for small-scale fishing communities, in addition to Spoon-billed Sandpiper conservation.

In practise, coastal zone management comprises a wide range of activities. In effect, all coastal planning and management needs to consider the special protection requirements of the Spoon-billed Sandpiper. In many cases those are consistent with safeguarding other ecosystem services.

The afforestation of mudflats with mangroves can be detrimental for the species. Mangrove regeneration is important and vital to sustain coastal ecosystems, but it needs to be carefully planned and the habitat requirements of Spoon-billed Sandpiper are part of coastal zone management and planning processes.

- Improve Integrated Coastal Zone Management (ICZM) along the entire flyway
- Promote Spoon-billed Sandpiper habitat requirements in ICZM
- Identify key sites priorities to promote ICZM in relation to maintaining Spoon-billed Sandpiper habitats.
- Make aquacultural projects subject to strategic and environmental impact assessments
- Promote traditional non-intensive management of shrimp- and fish- ponds to maximise their value to water birds and Spoon-billed Sandpiper
- Promote certification schemes for sustainably produced sea-foods

In the breeding areas specific requirements have become necessary, e.g.:

- Providing the nature conservation agencies and construction companies with information on important Spoon-billed Sandpiper locations nearby villages to avoid disturbance and the development of these areas
- Regulating the use of caterpillar vehicles in some restricted places, where tracks cross breeding habitats

RECOMMENDATION 7: Develop model projects in three countries to showcase the integration of saltpans management and shorebird conservation

The management of saltpans might provide a crucial key for sustaining some of the wintering populations of Spoon-billed Sandpiper. The investigation and promotion of sustainable saltpan management could provide a suitable habitat for waders. Thailand, but also Bangladesh and China seem to have suitable saltpan areas to test the different management options of best practice for waders.

6.4 Habitat Restoration

RECOMMENDATION 8: Study the feasibility of coastal habitat restoration in technical and political terms (see Point Calimere, Kerala, India)

Many coastal habitats along the flyway have been converted, changed and degraded. Before we fully understand the habitat requirements of Spoon-billed Sandpiper many vital habitats and sites have already changed their character drastically and are no longer suitable for the species. For some areas, where we know that the species occurred historically restoration efforts can be an important activity in restoring lost habitats. However, at the moment little or no experience is available to base future restoration efforts on and a feasibility study is recommended to explore the potential and the constraints

- Identify short term and long term restoration projects

RECOMMENDATION 9: Revise and modify existing policies on the reclamation of inter-tidal areas to promote Spoon-billed Sandpiper conservation

At present almost all range countries, especially China and the Republic of Korea are undertaking smaller or larger reclamation projects. In South Korea, there are three main remaining areas for Spoon-billed Sandpiper: the Nakdong estuary, the Mangeyung and Dongjin estuaries (known collectively as Saemangeum), and the Geum estuary. While the Nakdong Estuary is protected under national legislation, parts of the estuary are still being reclaimed and others are being degraded by road construction; the outer parts of the estuary are highly disturbed. Saemangeum is being fully reclaimed, and government authorities have not initiated adequate monitoring of the site to determine impacts of the reclamation on shorebirds, despite a formal request (Ramsar Resolution 9.15, paragraph 10) to advise the

Secretary General of the impact of construction works “on the internationally important migratory bird populations dependent upon these wetlands”. The adjacent Geum estuary is also slated for reclamation, to be undertaken in two phases, with permission given to reclaim, despite its extreme international importance for shorebirds, including Spoon-billed Sandpiper.

RECOMMENDATION 10: Identify potential restoration sites and arrange study tours to learn about coastal restoration methods and learn from European pilots of managed coastal retreat

Although we still know very little about the use of stop over sites, duration and preference, we can list a number of key sites within the species flyway, where we can ensure maximum protection and encourage restoration activities. It is important to demonstrate again the link with human well-being and coastal livelihoods as another incentive for the implementation of the proposed measures. Each country and region needs to decide its priorities. However, the action plan can provide guidance and sets the framework for all participants.

In many cases it will be very difficult to restore once-degraded mudflats or retreat the coastline. At present the UK and some other European countries are deliberately opening sea walls in some places, as a managed retreat to re-constitute coastal wetlands as buffers on formerly reclaimed land. This approach has its limitations and many areas cannot be reversed and restored to their original character. Rather than focusing on restoration, more improvements for the Spoon-billed Sandpiper could be gained by investigating on a scheme, which allows the sustainable development of saltpans, and shrimp farms, which still provide suitable habitats for waders, including Spoon-billed Sandpiper.

6.5 Awareness Raising and Education

RECOMMENDATION 11: Increase the awareness of the Spoon-billed Sandpiper conservation needs through targeted campaigns at educational and federal institutions, local communities, through national and international media as well as among visiting birdwatchers and the general public

Despite some first successes and publications, the species' plight is still widely unknown and not widely publicised. It is important to introduce the story of the decline and link it with the degradation of coastal ecosystems to a wider community including the general public. It is

important that key information on Spoon-billed Sandpiper conservation needs will be available in many different languages: Russian, Chinese, Bengali, Thai and others.

The public awareness campaigns in India and Bangladesh demonstrated the high value of these activities. It is vitally important to accompany any action with an awareness and public relations campaign to secure the support of important stakeholders in the implementation process.

6.6 Capacity building

RECOMMENDATION 12: Facilitate and develop programmes to assist individuals and NGOs to have access to conservation awareness material, binoculars and telescopes for fieldwork

RECOMMENDATION 13: Provide training in wader bird identification and techniques in field surveys in the inter-tidal areas, with special focus on Spoon-billed Sandpiper habitats

RECOMMENDATION 14: Implement national activities for coastal managers and communities to increase awareness of Spoon-billed Sandpiper and coastal management options

Capacity building is necessary in many ways. Most importantly national organisations and institutions need to be sufficiently provided with the field and database capacity to compile and store the data required for conservation action and research. In addition training is important to raise the awareness of the species amongst the people involved in coastal planning and conservation activities. Wetlands International has set up training programmes in the region, which can be extended to target particular areas of conservation concern.

6.7 Research and Monitoring

6.7.1 Research

RECOMMENDATION 15: Continue to identify further key sites in the breeding, stopover and wintering grounds through inventory work, remote sensing techniques and

data logger technology to identify missing key breeding and stop over sites. (Russia, China, Bangladesh, Vietnam, Myanmar and Cambodia)

Without knowing the location of the critical sites for the species in its range we cannot do much for its conservation. About 75% of Spoon-billed Sandpiper non-breeding sites are still unknown or not properly monitored. We urgently need to improve our knowledge to more effectively plan the conservation actions. Inventory expeditions with involvement of volunteer birdwatchers from developed countries as well as trained local people should be continued. Participation of networks such as BirdLife, the Oriental Bird Club (OBC) and local nature conservation societies should be encouraged.

RECOMMENDATION 16: Continue research in the breeding areas with focus on breeding success and climate variability and changes over the last 20 years

Though good information on the breeding biology and the influence of negative factors has been collected in Chukotka, there are still open questions on the decrease in breeding success, the impact of climate change and related evolution of habitat as well as changing pressure of natural predators in relation to radical changes in trapping practices and other economic developments in the Russian Arctic after Perestroyka. Multidisciplinary projects focussing on different aspects of breeding biology and evaluation of population limiting factors are required.

RECOMMENDATION 17: Implement research in the non-breeding grounds for the identification of key coastal habitats and ecological requirements

The basic knowledge of the species ecology and habitat preferences provides the background information for the conservation of the species. The evolution and adaptive role of the spoon-shape bill in relation to its use in natural habitat is still largely unknown. Research on feeding ecology and habitat use will give a guide for selection of key sites for inventories and further conservation by extrapolation using satellite imagery. Ecological studies may also give answers to the question of key limiting factors in the non-breeding grounds and how conservation can target these factors. Detailed ecological projects are needed on the non-breeding grounds with good numbers of Spoon-billed Sandpiper and a variety of habitats used. The Saemangeum Shorebird Monitoring Program, a joint initiative of Birds Korea and the Australasian Wader Studies Group, is one example of a program where such data will be gathered, through direct observation of birds and by parallel studies of benthos.

RECOMMENDATION 18: Coordinate existing conservation activities of different international organisations to avoid duplication of effort and ensure most effective cooperation

The Spoon-billed Sandpiper Recovery team could link activities in the framework of BirdLife International's work portfolio, the East Asian-Australasian Flyway Partnership (Action item 5) and various national and international Shorebird (Wader) Working Groups and other state and NGO activities.

RECOMMENDATION 19: Complete DNA population differentiation analyses and stable isotope analyses for the needs of conservation planning

The continuation of research is vital to our understanding of the main causes for the decline. Although progress has been made, we still lack a full understanding of breeding success, adult survival and the potential impacts of predation and climate change on the population. We need to know if there is a single mixed population of the species or several subpopulations, which may be possible for a species with very high breeding site fidelity. DNA analyses in combination with analyses of ring recoveries may help in differentiating potentially different populations and thus help in site conservation planning. It also provides insight into the approximate total population size before the crash and when the crash might have started. Both are crucial in further understanding the reasons behind the decline. Furthermore we need to better understand where most of the population spend the non-breeding period and what are the main threats they are facing there. Modern research technologies, including radio tracking, stable isotope analyses and DNA analyses can provide some answers. The analyses of remote sensing will reveal further information on the gradual changes in the tundra vegetation as well as the changing conditions of the coastal habitats in the non-breeding areas.

RECOMMENDATION 20: Develop and agree on a code of conduct for researchers to minimise impact on the threatened population

It is important to continue research activities in order to reveal the needs of the species during the sensitive breeding period. However, the experience of previous years has demonstrated the need for a code of conduct for this research. Although not legally binding the researchers involved feel obliged to comply with a self-imposed code. This will include:

- Ringing activities at the nest only undertaken with great care
- Refrain from ringing further adult birds at the nest

- Reduce measurements to a minimum and aim to spend less than ten minutes near the nest
- Refrain from publishing detailed locations of the breeding sites

6.7.2 Monitoring

RECOMMENDATION 21: Establish and enhance regular monitoring at key sites on the breeding grounds and on the non-breeding grounds

RECOMMENDATION 22: Apply remote sensing and GIS techniques to mapping of remaining suitable habitats and their monitoring

RECOMMENDATION 23: Promote and populate the GIS based species database as a vital monitoring tool

The continuation and reinforcement of the existing monitoring is vital, but requires capacity building, training and resources (see action items 12-13). All of these need to be raised in the framework of this action plan, with support from the CMS and international conservation organisations.

Priorities for the monitoring work are the following:

- 1) For the moment the most effective monitoring is run in selected breeding locations where the high site-fidelity of the birds helps to evaluate trends with minimum influence of year-to-year variation between sites.
- 2) Monitoring is also needed in several key non-breeding areas in almost all range countries with reasonable numbers of birds regularly visiting the site. This will help with current trend evaluation.
- 3) Special monitoring effort should be focused on areas with ongoing habitat changes like Saemangeum in Korea. These observations may help in identifying the limiting parameters (water mineral content, mud flat composition and dynamics etc).

With the major threats identified to be on migration and in the wintering areas the main effort of the conservation activities needs to focus on these areas. However, action on the breeding grounds is still required. All monitoring activities need to be linked with AWC and IBA monitoring, but still keep the Spoon-billed Sandpiper survey as a separate enterprise, which requires special attention but uses and builds on the AWC network.

The coordination of counts is vital to avoid double counting (as for the coordinated international Black faced Spoonbill census).

Remote sensing and GIS based databases are vital supporting monitoring tools, which need to be further developed and regularly populated to provide additional services for the conservation activities.

6.8 Fund Raising

RECOMMENDATION 24: Raise funding from international and national sources to support the implementation of the action plan

Table 14: Proposed conservation activities by country, region and institution

Key: H= High, M=Medium priority

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
6.1 Species Protection				
Reconsider and potentially upgrade the threatened status on the global Red List and in all range countries	1) Publish an assessment of the potential change in status of the species from Endangered to Critically Endangered and upgrade in the IUCN Red List, globally and in all range countries	H	BirdLife International, IUCN, all range countries, ArcCona, Spoon-billed Sandpiper Recovery Team	2010
Stop and prevent species persecution by museums and private collectors for egg and skin collecting	2) Public awareness campaign, legal enforcement and the establishment of local guarding systems at key breeding sites Concerted action through local and national hunting organisations and museums	H	Russia and non- range countries, Hunting organisations in Russia, CITES, Museum Networks, Private Collectors	2010-2012
Stop and prevent species persecution by local hunters	3a) Upgrade the legal protection status for the species in all range states and prevent persecution by local hunters	H	All, in particular: Russia, Bangladesh, Myanmar, Vietnam, Thailand, China	2010-2014
	3b) Training and using local hunters as local species guardian while developing new ways of income	H	All, in particular: Russia, Bangladesh, Myanmar, Vietnam, Thailand, China	2010-2014

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
6.2 Habitat protection				
Increase the area of habitat protected of the important breeding and stopover sites.	4) Identify Key areas for the species and improve its legal site protection and management using national legal mechanisms and collaborative international mechanisms	H	All countries and Federal agencies. Priority in Russia, Bangladesh, China, DPRK, Republic of Korea, Japan and Myanmar. Ramsar, Waterbird site network.	By 2014
Improve site protection outside protected areas through Flyway strategies, partnerships and agreements.	5) Endorse the action plan and integrate the activities by the East Asian – Australian Flyway Partnership	M	All Countries, Wetlands International, BirdLife International, Ramsar and CMS Conventions, Asian Australian Shorebird Network, Spoon-billed Sandpiper Recovery Team	By 2014
6.3 Site management				
Enhance the sustainable management of the important stopover and wintering sites of the species. Promote the Integrated Coastal Zone Management (ICZM)	6) Implement and improve ICZM Management along the entire flyway. Take the Spoon-billed Sandpiper habitat requirements into consideration in ICZM, planning and development. Identify key sites to promote ICZM. Make aquaculture projects subject to strategic and environmental impact assessments and promote traditional non-intensive management of shrimp- and fish ponds to maximise their value to water birds, including certification schemes.	H	Governmental agencies responsible for coastal zone management, International Development Agencies e.g. ADB, World Bank, USAID, GTZ etc.	2014 and beyond

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
Secure the sustainable management of salt pans.	7) Develop model projects in three countries to showcase the integration of saltpan management and shorebird conservation.	M	Responsible government agencies in accordance with local people and the salt industry, particularly in Thailand.	2011-2012
6.4 Habitat and site restoration				
Restore coastal habitats where possible.	8) Carry out feasibility study on restoration in technical and political terms. Identify short term and long term restoration projects.	M	Ramsar Convention (to support and advise), Wetlands International, Bombay Natural History Society (BNHS), Aid Agencies	2011-2012
Stop further coastal reclamation	9) Revise and modify existing policies on the reclamation of inter-tidal areas	H	All responsible government agencies in accordance with the Ramsar Convention	By 2014
Restore Spoon-billed Sandpiper habitats and implement managed coastal retreat where suitable.	10) Identify potential restoration sites and arrange study tours to learn about coastal restoration methods and learn from European pilots of managed coastal retreat.	M	All responsible government agencies in accordance with the Ramsar Convention and support from donor agencies.	By 2014

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
6.5 Awareness Raising and Education				
Raise institutional and public awareness	11) Increase the awareness of Spoon-billed Sandpiper conservation needs through targeted campaigns at educational and federal institutions, local communities, national and international media as well as among visiting birdwatchers and the general public.	H	NGO's e.g. BirdLife Partners, ArcCona, JAWAN, OBC, Spoon-billed Sandpiper Recovery Team	2011 onwards
6.6 Capacity building				
Improve technical tool kits.	12) Facilitate and develop programmes to assist individuals and NGOs to have access to conservation awareness material, binoculars and telescopes for fieldwork.	M	All countries, RSPB Binocular Scheme.	2011 onwards
Improve field and survey skills	13) Provide training in wader bird identification and techniques in field surveys in the inter-tidal areas, with special focus on Spoon-billed Sandpiper habitats.	M	JAWAN, Birds Korea, AWSG, BCST, BNHS, HKBWS and other NGO's, Wetlands International	2011 onwards
Improve awareness of Spoon-billed Sandpiper amongst coastal zone managers	14) Implement national activities for coastal managers and communities to increase awareness of Spoon-billed Sandpiper and coastal management options.	M	JAWAN, Birds Korea, BCST, BNHS, HKBWS and other NGO's, Wetlands International	2011 onwards

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
6.7 Research & Monitoring				
Increase knowledge of species population dynamics	15) Continue to identify further key sites in the breeding, stopover and wintering grounds through inventory work, remote sensing techniques and data logger technology to identify missing key breeding and stop over sites.	H	All countries, sub-regions, Russian Academy of Science and equivalent institutions, BirdLife Partners and other NGO's, Wetlands International, ArcCona Consulting, JAWAN, AWSG, Bilateral agreements (in particular: Russia, China, Thailand, Vietnam, Bangladesh)	2011-2014
Increase knowledge of breeding biology	16) Continue research in the breeding areas with focus on breeding success and climate variability and changes over the last 20 years.	H	Russia, Russian Academy of Science and equivalent institutions	2001-2010
Increase knowledge of winter biology	17) Improvement of ecological knowledge in the non-breeding grounds for identification of key coastal habitats and specification of the influence of limiting factors.	H	BirdLife Partners, University and research institutions (e.g. RSPB and BCST partnership Inner Gulf of Thailand)	2007-2010
	18) Coordinate existing conservation activities of different international organisations to avoid duplication of effort and ensure most effective cooperation	H	Spoon-billed Sandpiper Recovery Team, BirdLife Partners, AWSG and all relevant agencies	2011-2014

International Objectives	Management Options and Activities	Priority	Country/region/ Institution	Time frame
Increase knowledge of winter biology	19) Complete DNA population differentiation analyses for the needs of conservation planning	M	BirdLife Partners and the Spoon-billed Sandpiper Recovery team in collaboration with universities and other research institutions	2011-2014
Avoid possible harm through research	20) Develop and agree on a code of conduct for research, to minimise impact on the threatened population.	M	Spoon-billed Sandpiper Recovery Team with Universities, museums and research institutions	2011
Provide accurate trend information	21) Establish and enhance regular monitoring at key sites on the breeding grounds and on the non-breeding grounds	H	Governmental agencies, Wetland International, BirdLife International, NGO's (Birds Korea, JAWAN etc.) and AWSG, Spoon-billed Sandpiper Recovery Team, and KFEM.	2010-2014
Support search for suitable habitats	22) Application of Remote Sensing and GIS to mapping of remaining suitable habitats	M	Governmental agencies, BirdLife International, ArcCona, Spoon-billed Sandpiper Recovery Team.	2011 onwards
Provide accurate trend information with geo-referenced information	23) Promote and populate the GIS based species database as a vital monitoring tool.	M	Governmental agencies, BirdLife International, ArcCona Consulting, Spoon-billed Sandpiper Recovery Team.	2010 onwards
6.8 Fund Raising				
	24) Raise funding from international and national sources to support the implementation of the action plan.	H	Donor agencies, governments, all relevant bodies	2010 onwards

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