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**International Single Species Action Plan
for the Conservation of
the Chinese Crested Tern
(*Sterna bernsteini*)**

Prepared by: S. Chan, S. H. Chen and H.W. Yuan



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for the Conservation of
the Chinese Crested Tern (*Sterna bernsteini*)**

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Milestones in the production of this action plan:

Inclusion of the Chinese Crested Tern 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 ranges and the habitats on which they depend.

Parties to CMS cooperate among themselves 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 Chinese Crested Tern (*Sterna bernsteinii*) 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 Chinese Crested Tern 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 between 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 Chinese Crested Tern, 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 of the status of the Chinese Crested Tern, 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 Dr. Lucia Liu Severinghaus
Academia Sinica (Taipei, Taiwan)**

It is rare when a species thought probably extinct reappears and gives people a chance to do something good for it. The rediscovery of Chinese Crested Tern breeding on Matsu must rank as one of the highlights of modern ornithological and conservation history. The importance of this discovery and the critical need for conservation action led to close cooperation between conservationists in Taiwan and mainland China, under the guidance of BirdLife International, and resulted in this action plan. Efforts to conserve this species could become another landmark in the history of avian conservation.

When Mr. C. T. Liang telephoned me from Matsu Tern Reserve in June 2000 to verify the identification of the nesting Chinese Crested Terns, we did not expect the international attention this discovery would attract. Tern experts in the USA and the UK responded to my inquiries with great excitement. When I joined Mr. Liang at Matsu Tern Reserve to check on the situation, I was both thrilled and dismayed by what I saw. As we sat on an island across from the breeding colony, the four pairs of Chinese Crested Terns appeared to be doing well. They were busy fishing and each pair was caring for one chick.

But on this one sweltering afternoon, I counted six fishing boats sequentially circling the tiny tern island with nine concentric walls of fishing nets, and two octopus boats laying down hundreds of tubular lobster traps around the island. It made me wonder if anything would be left for the nesting terns, and whether the fish stock could sustain such heavy harvesting pressure. We did not witness any attempts at collecting eggs, but we found piles of discarded tern eggs around the colony, evidence of eggging activities. There were signs that some fisherman also harvested shellfish from that island.

Chinese Crested Terns roam widely in South East Asia. Only through international cooperation and coordinated efforts can the terns' breeding and feeding grounds be protected and illegal fishing and egg collecting controlled. This species is giving us a second chance at its proper management. This Action Plan is a direct response to this opportunity, proposing measures to bring Chinese Crested Tern back from the brink of extinction.

**Lucia Liu Severinghaus
Biodiversity Research Center
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Taipei, Taiwan**

Executive Summary

With an estimated population of not more than 50 birds, the Chinese Crested Tern is one of the most threatened birds in Asia. Only three regular sites, two used for breeding (Mazu¹ and Jiushan Islands) and one for staging (Min Jiang Estuary), are known. There is no recent information on the migratory routes or wintering grounds.

The greatest threat to the survival of the Chinese Crested Tern is egg collection for food in southeastern China. The immediate priority is to strictly enforce the relevant conservation laws, followed by an education programme targeted at local communities, especially at fisheries communities. The breeding islands must be guarded from invasive predators such as rodents. Contingency plans for oil spills and other disasters should also be considered.

All range countries and regions should list the Chinese Crested Tern as a species of high conservation priority. Education and outreach material should be produced for the general public on the status of this species.

Study on the breeding biology and migration of the Chinese Crested Tern is important, as it is a species that has not been well studied in the past. However, great care must be taken not to disturb the birds, particularly during the breeding season.

International and regional cooperation and coordination is essential for the survival of this species, as the known breeding and potential wintering sites are mostly in internationally disputed territories.

1. Also known as Matsu.

Acknowledgement

The compilers want to express their gratitude to the following individuals and organisations for their contribution of information and ideas on conservation of the Chinese Crested Tern: BirdLife International Vietnam Programme Office, Cao Lei (University of Science and Technology of China), Chang Shou-hua (Wild Bird Society of Mazu), Verena A. Gill (U.S. Fish and Wildlife Service), Jiang Hangdong (Xiamen Birdwatching Society), Mike Kilburn (Hong Kong Bird Watching Society), Stephen Kress (National Audubon Society), Liu Yang (Beijing Birdwatching Society), Malaysian Nature Society Bird Conservation Council, William Rombang (Burung Indonesia), Yang Jin (Fujian Birdwatching Society), Victor Yu (Chinese Wild Bird Federation), Yu Yat-tung (Hong Kong Bird Watching Society), and Zheng Huaizhou (Fujian Normal University).

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The compilers would like to thank Mark Balman and Mike Crosby for preparation of the distribution map. The compilers also would like to give their special gratitude to Mike Crosby, Adrian Long, Nick Langley and Fion Cheung for proofreading the text of this action plan.

1. Introduction

The Chinese Crested Tern *Sterna bernsteini* (also known as *Thalasseus bernsteini* or *Sterna zimmermanni*) has long been one of the ornithological enigmas in eastern Asia. It was historically known from China, and by presumed non-breeding records from Thailand, the Philippines, East Malaysia and Indonesia. After twenty-one birds were collected on Muguan Dao², a group of islands near Qingdao, Shandong Province, eastern China in June and July 1937, it seemed to have all but disappeared apart from a few, mostly unconfirmed records from China, Thailand and Indonesia. It was therefore thought to be at the verge of extinction, and even feared extinct, until breeding birds were discovered on Mazu³ Islands, on the coast of Fujian Province, eastern China in June 2000. Subsequently another breeding population was found in coastal Zhejiang Province, eastern China. In recent years non-breeding Chinese Crested Terns have been recorded in Fujian and Shanghai between June and September. Birds apparently on migration were recorded in southern Taiwan (Budai on 17 April 1998 and Bazhang⁴River Estuary on 21 October 2000). Three birds were reported at the Xisha Islands⁵ in the South China Sea in April 2004. This species probably winters in the South China Sea.

The rediscovery of this species was great news but their survival was soon found to be under very severe pressure. The known population is very small, probably not more than 50 birds, and their eggs are very heavily exploited by fishermen from eastern China. Apart from removing the eggs of Chinese Crested Terns this activity also causes considerable disturbance, resulting in the breeding birds (at least the Zhejiang population) shifting their breeding sites every year. Until recently the Mazu islands had been safe from disturbance due to military tension at the Taiwanese Strait. However, in the last few years the tension has diminished, and at times mainland fishermen at times come and collect eggs from some of these islands too. This has become a threat to terns breeding on Mazu.

After the compilation of the *Threatened birds of Asia: the BirdLife International Red Data Book* (2001), which highlighted the Chinese Crested Tern as one of the species at highest risk of extinction in Asia, this species was added to Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in 2002, thereby designating it for concerted actions. BirdLife was invited to draft a conservation action plan for the Chinese Crested Tern under the auspices of the CMS.

2. Also written as Mukuantao.

3. Also written as Matsu or Matzu.

4. Also written as Pachang or Pachang Hsi (Hsi = River).

5. Also known as the Paracel Islands. Xisha is the Chinese name of the islands. The islands are also known as Hoang Sa Islands in Vietnam, which also claim sovereignty over them.

As all recent records of Chinese Crested Terns are from China (both mainland and Taiwan), a small meeting was organised in Hangzhou in May 2006 at which specialists from both sides of the Taiwanese Strait met to discuss the drafting of the action plan. Professor Yuen Hsiao-wei of National Taiwan University, Dr. Chen Shuihua of Zhejiang Natural History Museum and Simba Chan of BirdLife International Asia Division discussed conservation issues for this Critically Endangered species. Additional information was received from birdwatching societies of Fujian Province.

The Chinese Crested Tern is in a very critical situation, and if conservation actions are not taken immediately we will lose this species within a few years. It is important that government agencies at all levels across the Taiwanese Strait establish a channel of communication and coordination. At this stage it is probably best done through NGOs and academic institutions. The best long-term scenario is for both sides of the Taiwanese Strait to work together for the conservation of this species.

2. Distribution

All known records of Chinese Crested Terns are from eastern Asia. Apart from a few old specimens collected prior to the 1930s from Thailand, the Philippines, Malaysia (Sarawak) and Indonesia (Kao on Halmahera, where the type specimen was collected in 1861), and several unconfirmed sight records from the above countries, plus Cambodia and Singapore, all records are from Chinese waters. Historically the species was presumed to breed on the southern coast of the Shandong Peninsula while all recent known breeding records are from the coast of Fujian (Mazu Islands) and Zhejiang (Jiushan Islands), south of the Yangtze Estuary. A recent (2006) survey in Shandong did not find any evidence of the species on the islands surveyed.

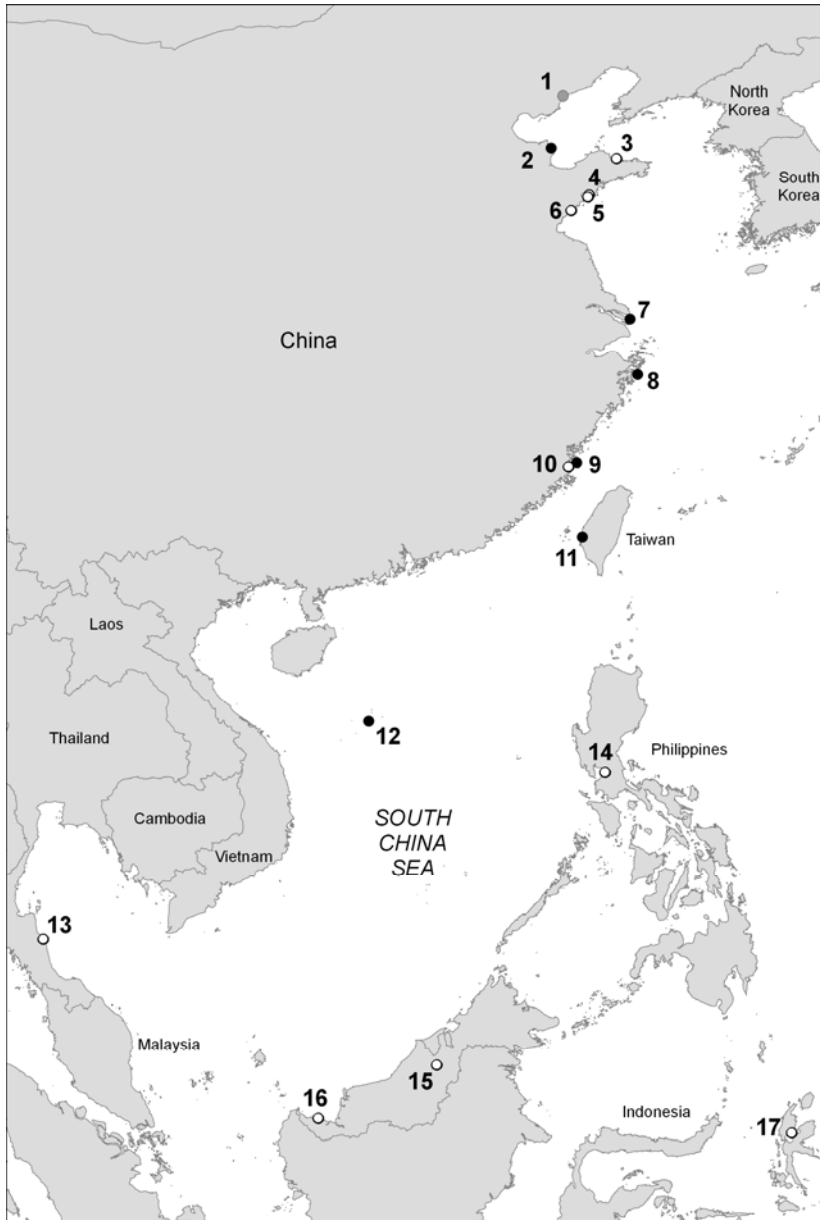
There are non-breeding records from Beidaihe in Hebei (June 1978), the Yellow River Delta in Shandong (September 1991), Chongming Dongtan in Shanghai (September 2004), Min Jiang Estuary, Fujian (August 2004, June – August 2005)⁶, and Bachang River Estuary in Chiayi, Taiwan (April 1998 and October 2000)⁷. One recent record of three birds in Xisha Islands⁸ in the South China Sea in April 2004, together with the historical records, suggests that the Chinese Crested Tern might winter in the South China Sea. It has not yet been recorded from Guangdong, Hainan or Vietnam.

Note : Since the compilation of the final draft of this action plan in 2007, a new breeding colony was discovered at Wuzhishan Islands of Zhoushan (121°50'E, 30°13'N) in the summer of 2008, when no breeding birds were found on Jiushan Islands. It is likely that the birds breeding on Wuzhishan belonged to the same population on Jiushan, and shifted their breeding sites due to human disturbance.

6. Reliable records supported with photographs.

7. Reliable record supported with photographs.

8. Known as Hoang Sa Islands in Vietnam.



Map1: Distribution map of Chinese Crested Tern

(1) Beidaihe⁹; (2) Yellow River delta; (3) Yantai; (4) Cangkou; (5) Qingdao; (6) Muguan Dao; (7) Chongming Dongtan; (8) Jiushan Islands; (9) Mazu Islands Tern Nature Reserve; (10) Min Jiang estuary; (11) Bachang River estuary; (12) Xisha Islands; (13) Pak Phanang; (14) Manila Bay; (15) Baram; (16) Buntal; (17) Kao.

Legend:

- Historical records (pre-1950)
- Recent records (1980 - present)

9. One adult bird was recorded at Tanggu, Tianjin on 5 September 2008. The location is not very far from Beidaihe.

3. Status

3.1 IUCN threatened status

The Chinese Crested Tern was listed as "Indeterminate" in the first international Red Data Book of birds (King 1981) as there was not enough data to evaluate its status. *Birds to watch: the ICBP¹⁰ world checklist of threatened birds* (Collar and Andrew 1988) listed it as a threatened species. It was regarded as Critically Endangered six years later in the revised edition of *Birds to watch* (Collar *et al.* 1994) because of its extremely low global population. This category remained unchanged in *Threatened birds of Asia: the BirdLife International Red Data Book* (2001) and in this Action Plan.

3.2 Protection status

3.2.1 International

3.2.1.1 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Chinese Crested Tern has been listed on Appendix I of the Convention of Migratory Species since 2002. This means that the status of the species being in danger of extinction is recognised by the CMS and CMS Parties which strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each

State joining the Convention, the CMS promotes concerted action among the Range States of many of these species.

3.2.1.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

It is not listed on the CITES appendices.

3.2.1.3 The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)

None of the sites where Chinese Crested Tern has been recorded are designated as Ramsar sites, apart from Chongming Dongtan, where a single bird was seen briefly on 5 September 2004.

3.2.2 National and local legislation

3.2.2.1 China

i. Mainland

The Chinese Crested Tern has been listed as a Nationally Protected Species (Second Class) since 1989. A province-level waterbird protected area of 2,921 ha was established at the Min Jiang Estuary in 2003. A marine ecosystem protected area of 114,950 ha was established at the Jiushan Islands in Zhejiang in 2003.

10. International Council for Bird Preservation, the name of BirdLife International prior to 1994.

ii. Taiwan

The Chinese Crested Tern is not listed as a Protected Species in Taiwan. However, the breeding site is located in the Mazu Islands Tern Protected Area which was established on 26 January 2000. Landing on the islands is prohibited, and they are patrolled by guards with support from the Wild Bird Society of Mazu during the breeding season.

3.2.2.2 Philippines

All birds on the IUCN Red List are protected in the Philippines, including the Chinese Crested Tern.

3.2.2.3 Thailand

With the exception of 60 species, all birds are protected by law in Thailand and hunting

them is forbidden. The Chinese Crested Tern is one of the protected species.

3.2.2.4 Malaysia

The Chinese Crested Tern is protected in Sabah under the Wildlife Conservation Enactment 1997 and in Sarawak under the Wildlife Protection Ordinance 1998. It is not protected in Peninsular Malaysia.

3.2.2.5 Indonesia

The Chinese Crested Tern is protected under the Government Regulations of the Republic of Indonesia Number 07 (1999), under the name *Sterna zimmermanni* (Reichenow 1903, a synonym of *Sterna bernsteini* Schlegel 1863).

4. Threat analysis

4.1 Habitat loss

The Chinese Crested Tern breeds on small uninhabited islands, and there is no imminent development pressure on its breeding sites. However, the disappearance of breeding colonies in northern China may have been caused by human settlement and development on the islands in Shandong. The coastal wetlands which the Chinese Crested Tern visits after the breeding season are under heavy development pressure as coastal south-eastern China is the region of fastest economic development in the country. These wetlands are being reclaimed for farmland, aquacultural ponds or industrial estates. Although a county-level protected area has been established at the Min Jiang Estuary, demand for industrial land and housing estates is very high and reclamation is still severe at this important site for the Chinese Crested Tern.

4.2 Habitat degradation and pollution

The booming industry and population in south-eastern China has resulted in a high level of pollution, both from domestic sewage and industrial effluent. According to a survey conducted by the Department of Oceanography and Fishery of Zhejiang Province in 2005, 64% of the coastal waters in Zhejiang are moderately or seriously polluted. Monitoring results from benthos such as mussels revealed high levels of

agrochemicals and heavy metals. The situation in the estuaries is even worse. The peak of "red tides" caused by toxic algal blooms in Zhejiang is May to June, and large quantities of fish are killed, so food availability to the breeding Chinese Crested Terns is reduced. At the Min Jiang Estuary, Fujian, sewage from nearby Changle City is discharged directly into the estuary. The landscape of the Min Jiang Estuary has also deteriorated as a result of various human activities and encroachments.

4.3 Exploitation

This is the biggest threat to this Critically Endangered species. At both known breeding grounds (Mazu Islands in Fujian and Jiushan Islands in Zhejiang), the collection of seabird eggs is reported to be serious. They are collected by local fishermen, who believe wild eggs have better nutritive value than poultry eggs. Egg collection forces Chinese Crested Terns to switch their breeding sites every year in Zhejiang. Until recently, the waters surrounding Mazu were a restricted zone because of the military tension between Beijing and Taipei. This has changed as economic ties have grown. Fishermen from nearby Fujian villages now frequently visit Mazu to collect seabird eggs, exploiting the situation that the soldiers based on Mazu do not want to risk political trouble by detaining mainland fishermen.

4.4 Disturbance

The most serious disturbance is caused by fishermen landing on breeding islands to collect eggs. Other fishery activities at or near the breeding grounds, such as shellfish collection, may also deter breeding birds from visiting their feeding grounds. At Mazu, tourism is another source of disturbance. As tourism and leisure photography on the mainland also increases, it might become a problem on the breeding ground in Zhejiang. Hainan Province is reported to have plans to develop Xisha into a tourist destination, which might cause increased disturbance to the Chinese Crested Terns that migrate or winter on these islands.

4.5 Predators

So far there have been no studies on the predators at the Chinese Crested Tern colonies. If the islands are infested with rats or feral cats these could negatively affect breeding success and even result in adult mortality.

4.6 Overfishing

Although China has announced laws to restrict fisheries at certain times of the year to conserve fish stocks, illegal fishing still occurs. Overfishing will reduce the food source for the Chinese Crested Tern

4.7 Natural Disasters

Strong typhoons pass Fujian and Zhejiang in the summer months. In August 2004 two big typhoons devastated the tern colonies on the Jiushan Islands.

5. Conservation actions recommended

Short-term objectives (2010-2015) after publication of this action plan

5.1 Legal status

As the continued existence of the Chinese Crested Tern was not positively proven until 2000, it had long been ignored or considered to be a species that was probably extinct. It is therefore not surprising to find that, despite its rarity, it has not generally been treated as a high conservation priority. Since its rediscovery, egg collection has been found to be the most serious threat to this species and urgent measures

to stop this need to be implemented without delay. The implementation of conservation measures will be strengthened when the Chinese Crested Tern is listed at the highest protection level. Laws and regulations should be imposed to address all possible threats, including the possibility of international trade to zoos or collectors.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions	Time-scale	Priority
Strengthen protection status	China Mainland: upgrade from Nationally Protected Species (Second Class) to First Class	Government agencies	List the Chinese Crested Tern at the highest protection level when the Protected Species List is revised		Short (2010-2015)	Moderate
	China Mainland: appropriate protection status and measures drafted by fishery agencies	Government agencies, local forestry and relevant government agencies in Fujian and Zhejiang	Hold a meeting to draft relevant regulations for fisheries, particularly for Fujian and Zhejiang. Regulations may include a stricter control of fishing near the known breeding colonies of Chinese Crested Terns and how to compensate for any economic losses to the fishing communities	Local governments and organisations must promote the regulation. Make sure all fishing communities understand what those regulations are for	Short (2010-2015)	High

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions	Time-scale	Priority
Strengthen protection status	Taiwan (Province of China): list as a protected species	Government agencies	Relevant government agencies: officially list the Chinese Crested Tern as a protected species		Short (2010-2015)	Moderate
	Vietnam: list as a protected species, and include on the national Red List	Government agencies	List the Chinese Crested Tern as a protected species		Short (2010-2015)	Moderate
Stop exploitation	Laws on prohibition of seabird egg collection must be enforced all over coastal eastern China	Government agencies (both central and local), research institutions, conservation NGOs	Government agencies: enforce the law to prohibit seabird egg collection Conservation organisations: promote the law especially to fishing communities. Conservation organisations at Mazu: coordination of information gathering on egg collection at Mazu International NGOs: assist in communication and information dissemination	All: produce printed material, television programmes, etc. to promote the regulation. Guard all known breeding grounds	Short (2010-2015)	High
	Prohibition of selling and consuming seabird eggs in eastern China	Government agencies (both central and local), research institutions, conservation NGOs	Government agencies: consider a ban on selling and consumption of seabird eggs in eastern China. This will contribute not just to the conservation of the Chinese Crested Tern, but also the globally threatened Black-faced Spoonbill and Chinese Egret	Research institutions and conservation organisations: educate the public using information displays, media and public events	Short (2010-2015)	High

5.2 Understanding the distribution and population

We know virtually nothing about the distribution of the Chinese Crested Tern except for the two breeding sites (Mazu and Jiushan islands) and a few recent non-breeding records. The wintering grounds of the Chinese Crested Tern are not known, but it seems likely that they are in the South China Sea. Thorough surveys should be conducted on the islands of Shandong, where colonies (probably breeding) were known until 1930s, and tern colonies should be checked for the species elsewhere in China and in South-East Asia. Records in the late 20th century in Hebei and Shandong suggest the possibility that breeding colonies still exist in Shandong. Xisha Islands should be thoroughly

studied: surveys in March-April 2003 and April-August 2004 by Dr. Cao of the University of Science and Technology of China located three birds briefly at Xishazhou on 4 April 2004, indicating that the species might not occur there in summer. Outreach material asking the public for information on the existence of colonies or flocks of tern species should be made available to fishing communities not only in China but also Vietnam, the Philippines, Malaysia (particularly East Malaysia) and Indonesia to help search for the wintering and staging grounds of the Chinese Crested Tern.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Search for breeding colonies	Detailed surveys on islands in Shandong, Zhejiang and Fujian	Government agencies (both central and local), research institutions, conservation NGOs	Government agencies: financial and legal support to the survey International organisations: financial support and international coordination Research Institutions: design and coordinate the surveys, provide training to the surveyors Local forestry bureaux and conservation organisations: conduct surveys	Research institutions: data analysis and legal protection measures Government agencies: establishment of nature reserve	Short (2010-2015)	High
	Survey islands in the South China Sea in the breeding season	Government agencies and research institutions in China mainland, Taiwan, Vietnam, Philippines and Malaysia	Government agencies: financial and legal support to the survey Research Institutions: design and coordinate the survey	Inter-governmental and International organisations: develop mechanisms for international cooperation	Long (2010-2020)	Moderate

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Migration studies	A meeting to develop a safe method of marking and studying migration of the Chinese Crested Tern	Government agencies (both central and local), research institutions, conservation NGOs and international experts on terns	All: discussion on appropriate marking methods or other techniques to study the migration	Test method on other tern species to select an appropriate and safe technique	Short (2010-2015)	Moderate
Survey for migration and wintering sites	Survey Xisha Islands for migrating/ wintering birds	Government agencies and research institutions	Government agencies: financial and legal support Research institutions: Conduct the survey		Short (2010-2015)	High
	Survey the islands and coastal regions in the South China Sea for wintering sites	Government agencies in China mainland, Taiwan, Vietnam, Philippines, Malaysia, Brunei, and Indonesia. Research institutions, and conservation NGOs	Government agencies around South China Sea: provide financial and legal support to the survey. Research institutions and conservation NGOs: coordinate and conduct the survey		Short (2010-2015)	Moderate to Low

5.3 The establishment and management of important sites

Of the important sites to the Chinese Crested Tern only Mazu is properly protected. At the other two sites that area known to be important to the Chinese Crested Tern, Jiushan Island and Min Jiang Estuary, only lower administrative level protected areas have been established, and almost no resources have been provided for their

management. The importance of these two sites must be addressed with more resources available to strengthen management, particularly in the Jiushan Islands and any breeding grounds discovered in the future. Egg collection and disturbance to the tern colonies should be strictly prohibited.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Establishment of protected area	Upgrade the status of the protected area in the Jiushan Islands	Government agencies, research institutions	Propose the protected area be upgraded to national level	Ensure good staffing and facilities for patrolling	Short (2010-2015)	High
	Upgrade the status of the protected area at the Min Jiang Estuary	State Forestry Administration (SFA), Fujian Forestry Bureau	Propose the protected area be upgraded to national level	Land use management plan for the Min Jiang Estuary	Short (2010-2015)	High
	Protected areas to be established when new breeding colonies or wintering sites are found	Relevant government agencies in all potential range countries	Designation of protected areas	Management planning for the new protected areas	Short (2010-2015)	High
Enforce ban on landing on the breeding islands	Making the ban known to fishing communities	Relevant government agencies	Making use of local public media and meetings. Notice boards to be displayed at seaports and the breeding islands		Short (2010-2015)	High
	Guard posts should be established near the islands with regular patrols	Relevant government agencies	Identify suitable sites to establish the guardposts for resident wardens during the breeding season. These should be close enough to watch over the colonies but not to cause disturbance to the birds	Allocate enough resources and ensure the post is well guarded (24 hours) during the breeding season	Short (2010-2015)	High
Prevention and elimination of invasive species on breeding islands	Predator and invasive species assessment on Mazu and Jiushan islands (and all other breeding sites discovered in the future)	Relevant government agencies, research institutions and conservation organisations	A thorough investigation on rodents, cats and other invasive species on the island, done during non-breeding season.	If traces of predators are found, plan for elimination before the breeding season starts	Short (2010-2015)	High
	Monitoring programme on predators and invasive species	Relevant government agencies, research institutions and conservation organisations	Annual monitoring of the islands during non-breeding season for occurrence of predators and invasive species		Long (2010-2020)	High
	Contingency plan on predators and invasive species	Relevant government agencies, research institutions and conservation organisations	Develop a plan in case of sudden invasion of predators (e.g. rats from shipwreck)		Long (2010-2020)	Moderate
Respond to disasters such as oil spills	Contingency plan on oil spills	Relevant government agencies, research institutions and conservation organisations	Develop a contingency plan in case of oil spill, to ensure all concerned parties understanding their roles in case of emergency	Regular seabird rescue exercise (e.g. once every two years)	Long (2010-2020)	Moderate
Provision of alternative breeding grounds	Identify islands with potential as breeding islands	Relevant government agencies, research institutions and conservation organisations	Study and compile information on islands near existing breeding colonies for their suitability as breeding sites	If the situation at the breeding islands becomes unfavourable, decoys and sound attraction can be used to attract terns to nest on these alternative islands	Long (2010-2020)	Moderate

5.4 Monitoring of Chinese Crested Tern and its habitats

Monitoring of population of this species and environmental factors at important sites will provide essential information for the conservation of this species. The two regular sites known (Mazu and Min Jiang

Estuary) should be well monitored to help evaluate the effectiveness of site management and the recovery of the population of this Critically Endangered species.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Monitoring the population of the Chinese Crested Tern	Breeding bird survey/census	National Bird Banding Center (NBBC), local forestry bureaux, birdwatching societies in China, Wild Bird Federation Taiwan, Wild Bird Society of Mazu	Agree on what data are to be collected during the census. Draft a standardised census form for the Chinese Crested Tern database Coordination of breeding bird census at all known sites Dissemination of the results of the census	Maintain a database of numbers and location of nests at the breeding sites every year	Long (2010-2020)	High
	Develop a database of Chinese Crested Tern records at non-breeding sites, particularly the Min Jiang Estuary	NBBC, local forestry bureaux, birdwatching societies in China	Collation of all reliable records	Maintain all records in the database	Long (2010-2020)	Moderate
Habitat monitoring	Monitor the environmental factors such as water quality and land use changes at sites frequently used by the Chinese Crested Tern, particularly at the Min Jiang Estuary	Local forestry bureaux, birdwatching societies in China	Agree on what data are to be collected and draft a monitoring plan for the Min Jiang Estuary. The monitoring should also cover habitats important to other globally threatened waterbirds such as Black-faced Spoonbills, Saunders's Gulls, Swan Geese and Dalmatian Pelicans at the Min Jiang Estuary. An annual report on the monitoring should be made available to government agencies and relevant conservation organisations	Report on the monitoring should contribute to the land management of the Min Jiang Estuary and other key sites	Long (2010-2020)	High

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Database and information dissemination system	Develop a central database and information centre for the Chinese Crested Tern. This might be expanded to a seabird database for the tropical and sub-tropical western Pacific	Government agencies, research institutions and conservation NGOs	Discuss how to establish a regional data centre for the Chinese Crested Tern and possibly other seabirds		Long (2010-2020)	Moderate

5.5 Education and outreach

Although the Chinese Crested Tern is one of the most threatened species in Asia, it is largely unknown to the public because it had not been recorded for many decades. Education on the status of the

Chinese Crested Tern of the general public, particularly in areas where it occurs or could occur, is urgently needed. It can be used as a flagship species for the conservation of sub-tropical seabirds in eastern Asia.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Production of illustrative materials	Produce outreach materials (e.g. posters and leaflets) targeting at Chinese fishing communities for information and to help prevent exploitation of and disturbance to breeding colonies	Conservation organisations	International NGOs: identify funding sources. Organise workshop on what materials should be produced Local NGOs: production and distribution of materials		Short (2010-2015)	High
	Posters and leaflets to provide information on the Chinese Crested Tern in potential wintering countries, particularly Vietnam, the Philippines, Malaysia and Indonesia	International conservation NGOs	Fundraising and production of materials in national languages on the importance of the Chinese Crested Tern and to ask for information	A focal person at each organisation to disseminate and collect information on Chinese Crested Terns	Short (2010-2015)	Moderate to Low

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Education Programme	Education Programme for the conservation of the Chinese Crested Tern in fishing communities in Fujian and Zhejiang	Government agencies (both central and local), research institutions and conservation NGOs	Government agencies: legal support and guidance Research institution and conservation NGOs: organise workshop on programme design and training of educators Local NGOs: conduct education programme in the fishing communities	A workshop to evaluate the effectiveness of the education work held two years after the programme starts	Short (2010-2015)	High
	Develop education programme, particularly for schools, using the Chinese Crested Tern as a flagship for seabird conservation	Government agencies (both central and local), research institutions and conservation NGOs	Workshops should be held to invite relevant research and conservation organisations to design detailed education programmes		Long (2010-2020)	High
Establish an education resource centre or centres	Discussion on developing an education resource centre for seabird/waterbird conservation in China mainland and/or Taiwan	Government agencies (both central and local) and conservation NGOs			Long (2010-2020)	Moderate

5.6 Biological studies on the Chinese Crested Tern

Almost nothing is known of the biology of the Chinese Crested Tern. This makes designing conservation measures for this species rather difficult as at present its behaviour and needs have to be assumed to be similar to other Crested Terns. Detailed biological studies on the behaviour of this species, particularly factors that might be contributing to its rarity, are urgently needed. Initially, the researchers should seek the advice of experts on other tern species to help design their studies. Because the population

is very small and fragile, efforts must be taken not to negatively affect the survival of this species during the studies.

Workers at Jiushan Island Nature Reserve found that after removal of fish nets in the nature reserve, the number of terns decreased. It has been suggested that some limited fishing activities may be beneficial to terns as it helps them to find food. The relationship is worth studying while at the same time the risk of fishing nets to terns must also be evaluated.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Study the breeding biology of the Chinese Crested Tern	Collect baseline information on breeding biology of the Chinese Crested Tern in Zhejiang, including nesting, food, foraging sites, clutch size etc.	Government agencies (both central and local), research institutions and conservation NGOs	Government agencies: provide legal support Research institutions and international NGOs: design studies Research institutions and conservation NGOs: collect information in the field	Workshops should be held to exchange information and experience with the Taiwanese counterparts regularly	Short (2010-2015)	High
	Conduct breeding biology study of the Chinese Crested Tern at Mazu	Council of Agriculture (COA), National Taiwan University (NTU), BirdLife and Partners, Wild Bird Society of Mazu	COA: legal and financial support NTU and other research institutions: design studies BirdLife and Partners: international advice on studies NTU, research institutes, Wild Bird Society of Mazu: collect information in the field	Workshops should be held to exchange information and experience with the mainland counterparts regularly	Short (2010-2015)	High
Study the feeding behaviour of terns near breeding colonies	Study the relationship between fishing nets and foraging success of terns (including other Crested Tern species) at the potential breeding sites of the Chinese Crested Terns	Government agencies (both Central and local), research institutions and conservation NGOs	Government agencies: legal and financial support Research institution and conservation NGOs: conduct study on the effects of fishing nets on tern species (particularly Crested Terns)	Evaluate whether there is a relationship between foraging success and fishing nets. Also evaluate the risk posed by fishing nets to the terns	Short (2010-2015)	High

5.7 Coordination of conservation activities and information exchange

Researchers from China mainland and Taiwan should establish an official channel of communication on conservation issues. This should be expanded to include other countries where the Chinese Crested Tern is found to occur. As some of the islands in the South China Sea are

claimed by more than one country, those concerned with the conservation of the Chinese Crested Tern should consult with their Foreign Affairs Department for advice on how to cooperate without raising unnecessary political issues.

Programme	Activity	Responsible organisation (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
Unofficial communication channels between China mainland and Taiwan	Establish the informal channels by regular meetings and focal points on both sides of the Taiwanese Strait	Relevant government agencies and organisations			Short (2010-2015)	High
Twining important sites of the Chinese Crested Terns	Taiwan, Fujian and Zhejiang should establish a close communication system. Mazu and Jiushan should be twinned protected areas with regular cross-visit to study the management of breeding areas. International experts on seabird/tern conservation should participate in design of management at the early stages	SFA, COA, China Ornithological Society (COS), local organisations and birdwatching/wild bird societies in mainland and Taiwan, BirdLife and Partners		Start discussion on how to establish informal links between important sites and organisations involved in Chinese Crested Tern conservation. This should include regular information exchange, site management, research and coordination in law enforcement	Long (2010-2020)	High
Regular meetings and exchange of information	Organisations from China mainland and Taiwan, and other Asian countries when important populations of Chinese Crested Terns are found, should hold regular meetings to exchange information and plan joint actions for the conservation of the Chinese Crested Tern	SFA, COA, COS, local organisations and birdwatching/wild bird societies in mainland and Taiwan, BirdLife and Partners			Long (2010-2020)	Moderate

Appendices

Appendix I : Important sites for the Chinese Crested Tern

Jiushan Islands, Xiangshan County, Zhejiang Province

Location: 29°20' - 29°28'N 122°0' - 122°15'E

Area: 730ha in total.

Simple description of the site: A group of 28 islands and 48 atolls in the East China Sea. The nearest point on the mainland is about 18.5 km away. The breeding colony found in 2004 was on a small uninhabited island of 1.5 ha. The main vegetation on the island is bushes and grass in a central concave area. The higher sides of the island (north-western and southern side) are mostly bare soil or rock. The tern colonies were mainly found in these exposed areas or in areas with dry vegetation.

Population estimate: About 10-20 Chinese Crested Terns in the entire area. Zhejiang Natural History Museum surveyed the 1.5 ha island mentioned above from 28 July to 2 August 2004. During this survey a total of 1,760 tern eggs were found (species unknown). Most (95%) of the tern nests had only one egg, a few had two and only 3 or 4 nests had 3 eggs. Eggs were not hatched during the survey.

Wetland type: Island and seacoast

Land ownership and land use: State owned and uninhabited

Contact details of management authority/authorities: Zhejiang Jiushan Archipelago Oceanic Ecosystem Provincial Nature Reserves Administration

Threats: Egg collection, overfishing and other human disturbance

Conservation measures taken: Zhejiang Jiushan Archipelago Oceanic Ecosystem Provincial Nature Reserve (Province level) was established in 2003.

Contact details of local researcher/conservation organisations: Dr. Chen Shuihua, Zhejiang Museum of Natural History

Min Jiang Estuary, Changle City, Fujian Province

Location: Approximately 26°01'N 119°38'E

Area: The entire estuary is about 730,000 ha. Protected area 2,921 ha.

Simple description of the site: Estuary of Min Jiang River

Population estimate: Three Chinese Crested Terns were found by Mr. Liu Bofeng (Fujian Wildlife Monitoring Center) and Mr. Yu Xi (Fujian Province Forestry Survey and Planning Institute) on 31 July 2004. Two birds were seen in 2005 and three birds on 16 July 2006.

Wetland type: River mouth, estuary

Land ownership and land use: State owned. Agriculture and fishery. Urban development has increased recently.

Contact details of management authority/authorities: Fujian Forestry Bureau

Threats: Reclamation and unplanned development. Jinfeng Town, which is adjacent to the Min Jiang Estuary, has a major and expanding textile industry. Pollution by water effluent from Changle City.

Conservation measures taken: A provincial protected area of 2,921 ha. was established in Changle City in 2003.

Contact details of local researcher/conservation organisations: Fujian Bird Watching Society.

Mazu Islands Tern Nature Reserve, Lianjiang County, Fujian Province¹¹

Location: 26°13'N 120°02'E

Area: 71.6ha (land area 11.9 ha)

Simple description of the site: Eight small barren islands with sparse vegetation, located at the convergence of warm and cold sea currents in an area with rich fish resources. The islands were 'protected' in a military restricted area until recent years. Thousands of terns (species other than the Chinese Crested Tern) breed on these islands. It was during one of the regular patrols to these islands that the breeding Chinese Crested Terns were found.

Wetland type: Island and sea coast

Land ownership and land use: State owned. No human settlement and now a nature reserve. The only economic activities around the islands are fishery and tourism.

Contact details of management authority/authorities: Lianjiang county government.

Threats: Used to be an army shooting practice ground. The most serious threat now is from illegal egg collection by fishermen based elsewhere in Fujian.

Conservation measures taken: Nature reserve established in January 2000.

Contact details of local researcher/conservation organisations: Wild Bird Society of Mazu

11. Also known as Matsu Islands. Under the administration of Taipei.

Appendix II : Records of the Chinese Crested Tern

Number of the Chinese Crested Tern observed on Mazu Island

Year	Adults	Nestlings
2000	Four pairs	Four chicks
2001	One bird	None
2002	Three pairs	Two chicks
2003	Two birds	None
2004	Six pairs	Three chicks
2005	Two pairs	None

(Data provided by Mr. Chang Shou-hua, Chairman of Wild Bird Society of Mazu)

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