



# Convention on the Conservation of Migratory Species of Wild Animals

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Rome, Italy, 27-28 November 2008

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### INTERNATIONAL SINGLE SPECIES ACTION PLAN FOR THE CONSERVATION OF THE CHINESE CRESTED TERN (*STERNA BERNSTEINI*)

*(Introductory note prepared by the Secretariat)*

1. The Seventh Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals (CMS), held in Bonn, Germany, in September 2002, added the Chinese crested tern (*Sterna bergsteini*) to Appendix I of the Convention, thereby designating it for Concerted Actions. The elaboration of an International Single Species Action Plan (ISSAP) for the species was identified as an appropriate initial step towards the development of the concerted Action.
2. The preparation of the ISSAP for the Chinese Crested Tern was commissioned to BirdLife International Asia Division. It has been compiled by Simba Chan, BirdLife International Asia Division (Editor-in-chief); Chen Shuihua, Zhejiang Museum of Natural History; and Yuan Hsiao-wei, School of Forestry and Resource Conservation, Taiwan University.
3. Drafts of the plan have been consulted extensively with experts and governmental officials at the range states. An advanced draft has been submitted for consideration to the 14<sup>th</sup> Meeting of the CMS Scientific Council (document CMS/ScC14/Doc.16). The meeting noted with satisfaction the progress on the preparation of the Action Plan, considered its content appropriate and looked forward to examining the final version.

#### **Action requested:**

The Scientific Council is requested to:

- a. review and endorse the Plan; and
- b. transmit the Plan to the Conference of the Parties for adoption.

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**International Action Plan for the Chinese Crested Tern**

**(logo of CMS)**

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

**(Photo of a Chinese Crested Tern)**

**(logo of BirdLife International)**

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# **International Action Plan for the Chinese Crested Tern**

## **Foreword**

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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 in 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.

## **International Action Plan for the Chinese Crested Tern**

### **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 (Mazu 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.

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### **Acknowledgement**

The compilers want to express their gratitude to the following individuals and organizations 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 (Wild Bird Federation Taiwan), Yu Yat-tung (Hong Kong Bird Watching Society), and Zheng Huaizhou (Fujian Normal University). We would also like to thank Mark Balman and Mike Crosby for preparation of the distribution map, and Mike Crosby for proofreading the text of this action plan.



# International Action Plan for the Chinese Crested Tern

## I. 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 being collected on Muguan Dao<sup>1</sup>, a group of islands near Qingdao, Shandong Province of eastern China in June and July 1937, it appeared 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 Mazu<sup>2</sup> 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 Bazhang<sup>3</sup>River Estuary on 21 October 2000). Three birds were reported at the Xisha Islands<sup>4</sup> 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 they are under very heavy exploitation of egg collection by fishermen from eastern China. Apart from removing 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 Mazu had been safe from disturbance due to military tension at the Taiwanese Strait. However, in the last few years the tension has diminished and mainland fishermen at times come and collect eggs on some of the islands and 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 an appendix of the Convention for Migratory Species (CMS) in 2002. BirdLife was invited to draft a conservation action plan for the Chinese Crested Tern under the auspices of the CMS.

As all recent records of Chinese Crested Terns are from China (both mainland and Taiwan), a small

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<sup>1</sup> Also transliterated as Mukuantao

<sup>2</sup> Also transliterated as Matsu or Matzu

<sup>3</sup> Also transliterated as Pachang or Pachang Hsi (Hsi = River)

<sup>4</sup> 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.

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meeting was organized in Hangzhou in May 2006 where 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.

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## II. 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, 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)<sup>5</sup>, and Bachang River Estuary in Chiayi, Taiwan (April 1998 and October 2000)<sup>6</sup>. One recent record of three birds in Xisha Islands<sup>7</sup> 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.

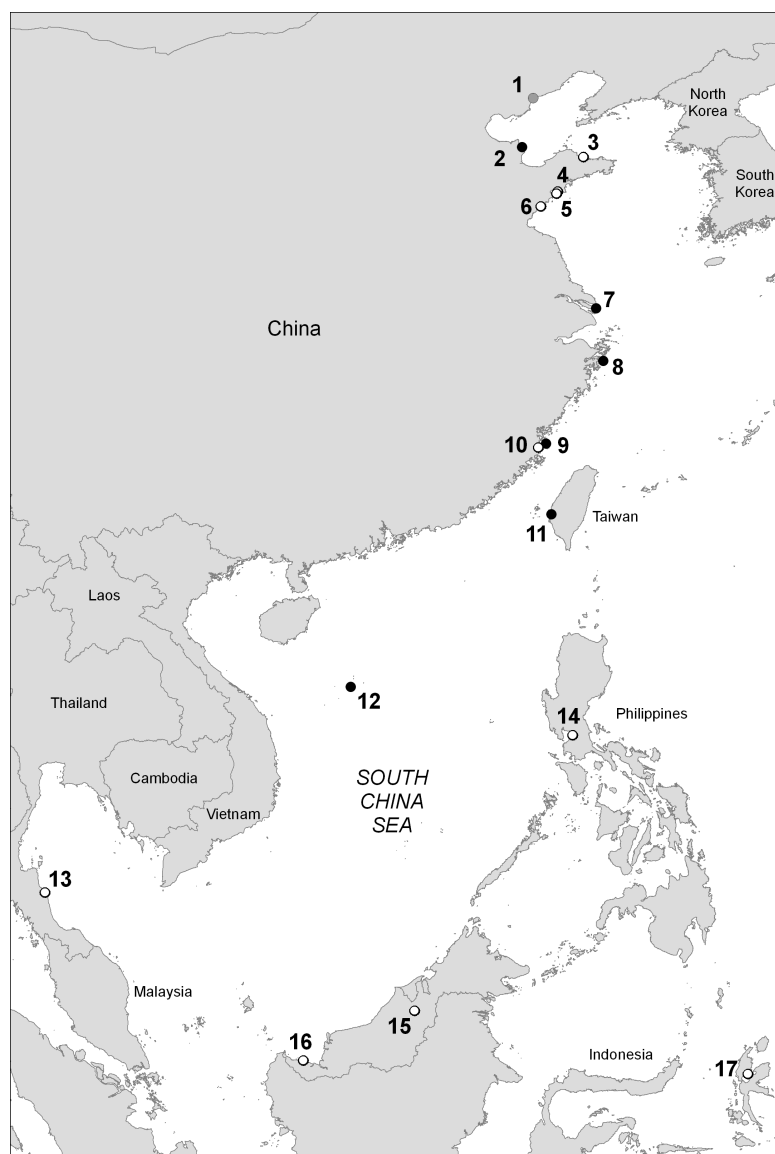
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<sup>5</sup> Reliable records supported with photographs.

<sup>6</sup> Reliable record supported with photographs.

<sup>7</sup> Known as Hoang Sa Islands in Vietnam.

## International Action Plan for the Chinese Crested Tern



Map1: Distribution map of Chinese Crested Tern

(1) Beidaihe<sup>8</sup>; (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)

<sup>8</sup> One adult bird was recorded at Tanggu, Tianjin on 5 September 2008. The location is not very far from Beidaihe.

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## III. Status

### A. International 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 ICBP<sup>9</sup> 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.

### B. Protection status

#### 1. International

##### a. Convention of Migratory Species (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.

##### b. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

It is not listed on the CITES appendices.

##### c. 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.

#### 2. National and local legislation

##### a. China

##### i. Mainland

Chinese Crested Tern has been listed as a Nationally Protected Species (Second Class) since 1989. A province-level waterbird protected area of

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<sup>9</sup> International Council for Bird Preservation, the name of BirdLife International prior to 1994

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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.

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 are prohibited, and they are patrolled by guards with support from the Wild Bird Society of Mazu during the breeding season.

b. Philippines

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

c. Thailand

With the exception of 60 species, all birds are protected by law in Thailand and hunting them is forbidden. Chinese Crested Tern is one of the protected species..

d. Malaysia

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 on the Peninsular Malaysia.

e. Indonesia

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

### IV. Threat analysis

#### A. Habitat loss

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.

#### B. 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 tide 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 directly discharged into the estuary. The landscape of the Min Jiang Estuary has also deteriorated as a result of various human activities and encroachments.

#### C. 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 nutritious value than poultry eggs. Egg collection forces Chinese Crested Terns to switch their breeding sites every

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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.

### **D. 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.

### **E. Predators**

So far there has 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.

### **F. 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

### **G. 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.



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### VI. Conservation actions recommended

#### Short-term objectives (within five years after publication of this action plan)

The following organizations have been involved in the drafting and consultation of this action plan and could be major implementation bodies to the action plan.

#### 1. Legal status

As the existence of Chinese Crested Tern had not been positively proven until 2000, it had long been ignored or considered to be a species that was probably extinct, and 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 organization (suggested)	Implementation progress	Further specific actions	Time-scale	Priority
Strengthen protection status	China Mainland: List as a First Class of Protected Species	Government agencies.	List the Chinese Crested Tern at the highest protection level when the Protected Species List is revised		Short (2008-2013)	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 losses by the fishing communities.	Local governments and organizations must promote the regulation. Make sure all fishery communities understand what those regulations are for	Short (2008-2013)	High
	Taiwan (Province of China): List as a	Government agencies	Relevant government agencies:		Short	Moderate

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	protected species		Officially list Chinese Crested Tern as a protected species		(2008-2013)	
	Vietnam: List as a protected species and on the national Red List	Government agencies	List Chinese Crested Tern as a protected species		Short (2008-2013)	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 organizations: Promote the law especially to fishery communities. Conservation organizations at Mazu: Coordination of information gathering on egg collection at Mazu International NGOs: Assisting in communication and information dissemination.	All: Produce printed material, television Programmes, etc. to promote the regulation. Guard all known breeding grounds	Short (2008-2013)	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 organizations: Educate the public using outreach: i.e. information displays, media and public events.	Short (2008-2013)	High

### 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 20<sup>th</sup> 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

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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 fishery communities not only in China but also Vietnam, the Philippines, Malaysia (particularly East Malaysia) and Indonesia to help search for the wintering and staging ground of the Chinese Crested Tern.

Programme	Activity	Responsible organization (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 organizations: Financial support and international coordination Research Institutions: Design and coordinate the surveys, provide training to the surveyors. Local forestry bureaus and conservation organizations: Conduct surveys	Research institutions Data analysis and legal protection measures Government agencies: Establishment of nature reserve	Short (2008-2013)	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 organizations: Developing mechanisms for international cooperation.	Long (2008-2013)	Moderate
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 terns to select an appropriate and safe technique.	Short (2008-2013)	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 (2008-2013)	High
	Survey the islands and coastal regions in the South China Sea for wintering sites	Government agencies in China mainland, Taiwan,	Government agencies around South China Sea: Provide financial and legal		Short (2008-2013)	Moderate to Low

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		Vietnam, Philippines, Malaysia, Brunei, Indonesia, research institutions, conservation NGOs.	support to the survey. Research institutions and conservation NGOs: Coordinate and conduct the survey			
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### 1. The establishment and safeguarding 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 organization (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 (2008-2013)	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 (2008-2013)	High
	Protected area to be establish when new breeding colonies or wintering sites are found	Relevant government agencies in all potential range countries	Designation of protection area	Management planning for the new protected areas	Short (2008-2013)	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 (2008-2013)	High
	Guard post 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 (2008-2013)	High

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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 organizations	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 (2008-2013)	High
	Monitoring Programme on predators and invasive species	Relevant government agencies, research institutions and conservation organizations	Annual monitoring of the islands during non-breeding season for occurrence of predators and invasive species.		Long (2008-2018)	High
	Contingency plan on predators and invasive species.	Relevant government agencies, research institutions and conservation organizations	Develop a plan in case of sudden invasion of predators (e.g. shipwreck)		Long (2008-2018)	Moderate
Respond to disasters such as oil spills	Contingency plan on oil spills	Relevant government agencies, research institutions and conservation organizations	Develop a contingency plan in case of oil spill, with all concerned party understanding their roles in case of emergency.	Regular manoeuvre (e.g. once every two years) on seabird rescue	Long (2008-2018)	Moderate
Provision of alternative breeding grounds	Identify islands with potential as breeding islands	Relevant government agencies, research institutions and conservation organizations	Study and compile information on islands near the 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 (2008-2018)	Moderate

### 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 organization (suggested)	Implementation progress	Further specific actions to undertake	Time-scale	Priority
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Monitoring the population of the Chinese Crested Tern	Breeding bird survey/census	National Bird Banding Center (NBBC), local forestry bureaus, 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 standardized 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 (2008-2018)	High
	Develop a database of Chinese Crested Tern records at non-breeding sites, particularly the Min Jiang Estuary	NBBC, local forestry bureaus, birdwatching societies in China	Collation of all reliable records.	Maintain all records in the database	Long (2008-2018)	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 bureaus, birdwatching societies in China	Agree on what data are to be collected and draft a monitoring plan for 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 organizations	Report on the monitoring should contribute to the land management of the Min Jiang Estuary and other key sites	Long (2008-2018)	High
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 (2008-2018)	Moderate

### 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 to the general public, particularly in areas where it

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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 organization (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 fisheries communities for information and help prevent exploitation and disturbance to breeding colonies.	Conservation organizations	International NGOs: Identify funding sources. Organizing workshop on what materials should be produced Local NGOs: Production and distribution of materials		Short (2008-2013)	High
	Posters and leaflet to provide information on 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 organization to disseminate and collect information on Chinese Crested Terns	Short (2008-2013)	Moderate to Low
Education Programme	Education Programme for the conservation of the Chinese Crested Tern in fisheries 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: Conducting education Programme in the fisheries communities	A workshop to evaluate the effectiveness of the education work held two years after the Programme starts.	Short (2008-2013)	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 organizations to design detailed education Programmes.		Long (2008-2018)	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 (2008-2018)	Moderate

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### 6. Biological studies on the Chinese Crested Tern

Almost nothing is known on 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 organization (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 institution and conservation NGOs: collecting information in the field.	Workshops should be held to exchange information and experience with the Taiwanese counterparts regularly	Short (2008-2013)	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: collecting information in the field.	Workshops should be held to exchange information and experience with the mainland counterparts regularly	Short (2008-2013)	High



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Study the feeding behaviour of terns near breeding colonies	Study the relationship between fishing nets and foraging success of terns (including other Crested Ternspecies) at the potential breeding sites of 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 with foraging success and fishing nets. Also evaluate the risk posed by fishing nets to the terns	Short (2008-2013)	High
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### 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 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 Chinese Crested Tern should consult with their Foreign Affairs Department for advice on how to cooperate without raising unnecessary political issues.

Programme	Activity	Responsible organization (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 organizations			Short (2008-2013)	High
Twining important sites of 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	SFA, COA, China Ornithological Society (COS), local organizations and birdwatching/wild bird societies in mainland and Taiwan, BirdLife and Partners	Start discussion on how to establish informal links between important sites and organizations involved in Chinese Crested Tern conservation. This should include regular information exchange, site management, research and coordination in law enforcement.		Long (2008-2018)	High

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	of management at the early stages					
Regular meetings and exchange of information	Organizations from China mainland and Taiwan, and other Asian countries when important populations of Chinese Crested Terns are found, should hold regular meetings on information exchange and joint actions for the conservation of the Chinese Crested Tern exchange and joint actions on conservation of the Chinese Crested Tern	SFA, COA, COS, local organizations and birdwatching/wild bird societies in mainland and Taiwan, BirdLife and Partners			Long (2008-2018)	Moderate

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## Appendices

### Appendix 1 Important sites for the Chinese Crested Tern

#### **Jiushan Islands, Xiangshan County, Zhejiang Province**

Location: 29° 20'30"- 29° 28'36"N 122° 0'18"-122° 15'24"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

Contacts of management authority/authorities: Zhejjiang Jiushan Archipelago Oceanic Ecosystem Provincial Nature Reserves Administration

Threats: Egg collection, overfishing and other human disturbance

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

Contacts of local researcher/conservation organizations: 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.

Contacts 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.

Contacts of local researcher/conservation organizations: Fujian Bird Watching Society.

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### **Mazu Islands Tern Nature Reserve, Lianjiang County, Fujian Province<sup>10</sup>**

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.

Contacts 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.

Contacts of local researcher/conservation organizations: Wild Bird Society of Mazu

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<sup>10</sup> Also known as Matsu Islands. Under the administration of Taipei

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### Appendix 2: Records of the Chinese Crested Tern

#### Number of Chinese Crested Tern observed on Mazu Island

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

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

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