

THE STATE
OF
TAIWAN'S BIRDS
2020

The 2020 State of Taiwan's Birds Report is the first comprehensive assessment of the distribution, trends, threats to, and conservation status of the bird species that regularly occur in Taiwan. It is also the product of the efforts of thousands of Taiwanese birdwatchers. We would like to express our deep gratitude and appreciation to all participants, volunteers, NGOs, donors, and sponsors without whom this work would not be possible.

This work, as recognition of birds and their ecological needs at the national level, is a significant step towards a more comprehensive approach to the monitoring and conservation of Taiwan's rich biodiversity.

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The taxonomy and English names of species in this report follow the eBird/Clements Checklist of Birds of the World Version 2019 (Clements et al. 2019).

Highlights

674

Bird species which occur in Taiwan

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Introduction

Da-Li Lin, Scott Pursner



Geography of a Biodiversity Hot Spot

Taiwan is located just off the southeastern coast of the Eurasian continent, north of the Philippines and southwest of Japan's Ryukyu island chain. An island nation, the South China Sea sits to its southwest, the Luzon Strait to its south, the Philippine Sea to its east, and the East China Sea to its north. Meanwhile, to its west, the Taiwan Strait plays home to its major outlying islands. Taiwan can best be described as being part East Asia and part Pacific.

Taiwan's territory is comprised of Taiwan proper and its adjacent islands, the Penghu and Matsu Archipelagos, Dongsha Atoll and the Kinmen Islands. It's total size is 36,197 km², similar to that of the Netherlands. Over 99% of its land area is found on Taiwan proper. Located along the Tropic of Cancer, the island's north experiences a subtropical climate after which the climate becomes more tropical further south. Winters in the north and northeast are mild and wet while being drier and warmer in central and southern parts of the country. Its mountainous regions, which are temperate zones, experience snowfall at this time. The whole island experiences hot, rainy summers. Though a rainy season starts around May, a typhoon season lasting from July to October brings strong winds and heavy rains, contributing to the average 2,590mm of precipitation every year. Rainfall distribution depends on seasonal monsoon wind patterns. Temperatures are moderated by the Kuroshio, or Japanese current, coming off the Pacific coast. Elevations also play an important role in this. The outlying islands have subtropical maritime climates influenced by their proximity to the Asian continent.

Mountains and foothills make up 70% of Taiwan proper's area, creating a defining characteristic of the land. The island has one of the highest densities of mountains in the world, with 268 peaks over 3,000m; the highest being Yu Shan (Jade Mountain) at 3,952m. All five of Taiwan's mountain ranges span north-northeast to south-southwest. The Central Mountain Range, which extends from Su'ao in the northeast to Eluanbi at the southernmost tip (Fig. 1), is not only the longest, but also the island's major watershed. Variations in climate created by differing elevations produce opportunities for a number of dynamic ecosystems to exist. The lowlands see mixed stands of bamboo, palm, tropical evergreens and Fig species. Meanwhile elevations of 500-1,800m are home to subtropical evergreen forests including camphor laurel. At 1,800-2,400m, broad-leaved evergreen forests made up mostly of trees in the family Fagaceae are prevalent. Then, from 2,400-3,600m, conifers reign. This includes endemics such as *Abies kawakamii* and Taiwan Spruce (*Picea morrisonicola*) as well as Taiwan Hemlock (*Tsuga chinensis* var. *formosanus*). Above 3,600m, bushy Himalayan Juniper (*Juniperus Squamata*) dominates before reaching the highest elevations which have a tundra-like quality. A multitude of micro-habitats exist amongst these ecosystems, supporting an array of unique and different species (Fig. 2). Meanwhile, the outlying islands do not have any mountains and are flatter and hillier.

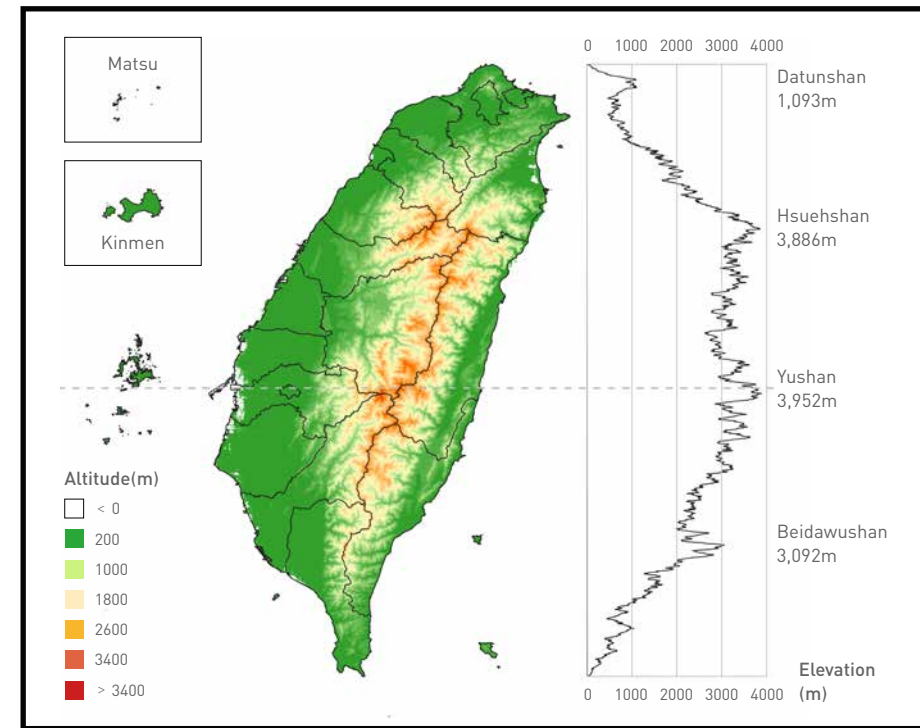


Figure 1. Contour map of Taiwan and major outlying islands (Source: Dr Cheng-Tao Lin).

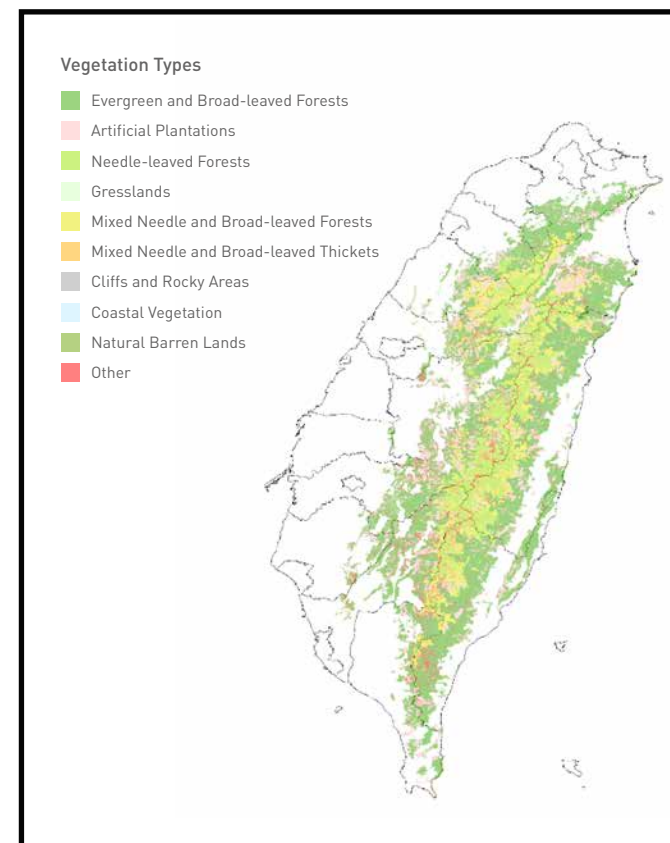
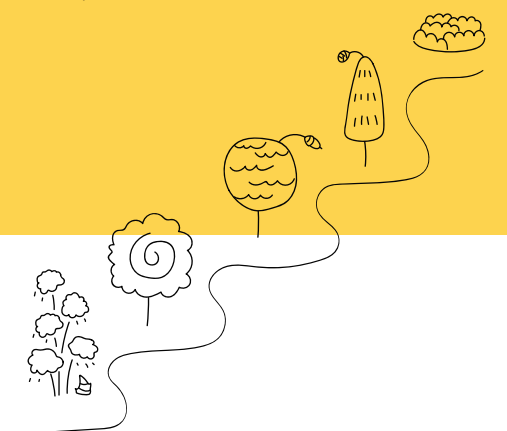


Figure 2. Vegetation map of Taiwan. (Source: Chiou et al. 2013).

The western one-third of Taiwan proper is home to fertile plains and basins, the coast there playing home to most of the country's important wetlands, lagoons, and mudflats. Central Changhua County has the largest concentration of mudflats on the island. Most of Taiwan's rice paddies and agricultural production can be found in this area as well, not to mention the bulk of its 23.5 million people. This makes for an extremely concentrated population. To illustrate the point, at just 0.0046% of its size, Taiwan has almost the same population as Australia! And with 648 people /km², it's the sixth most densely populated country in the world.



The Composition of Taiwan's Avifauna

Taiwan is a land rich in avian biodiversity. For such a small country, due to its isolation, geography, and diversity of ecosystems, it has a high number of endemic and resident species. However, species richness of breeding birds is less than that of most other countries in East Asia. Meanwhile, due to its location at the intersection of East and Southeast Asia, Taiwan occupies a central point along the East Asian-Australasian Flyway. Every year thousands of migratory birds come here for refueling, wintering, or breeding. In fact, new species are recorded every year. Taiwan is therefore one of the most important areas for both breeding and migratory birds.

In total, 674 species can be seen on Taiwan proper and its outlying islands. Included in that number are a total of 29 endemics and 55 endemic subspecies. This number is derived from the Checklist of the Birds of Taiwan. Updated every three years, it's the most complete and accurate checklist for the birds in Taiwan.

For this report, we classified bird species based on reproductive and migratory status into 10 groups (Fig. 3). Breeding birds account for about one quarter of the total with non-breeding and migratory birds making up the rest.

Taiwan's Birds By the Numbers:

● Endemic Species	29	● Transient Migrants	91
● Endemic Subspecies	55	● Seabirds	29
● Non-endemic Residents	69	● Vagrants	171
● Summer Visitors	14	● Outlying Island Species*	36
● Winter Visitors	162	● Invasive Species (with stable breeding population)	18

*Species with this designation more regularly occur on one or more Taiwan's outlying islands such as Kinmen, Matsu, and Orchid island.

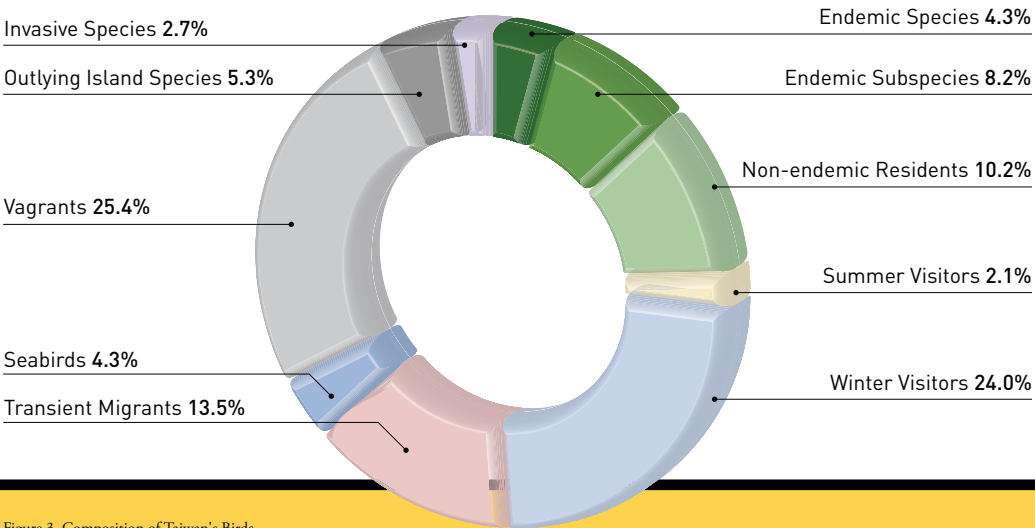


Figure 3. Composition of Taiwan's Birds.

Taiwan's Protected Areas and IBAs

Protected areas account for 32.94% (1,189,302ha) of Taiwan's total land area (Fig. 4, Table 2) and have five different classifications: nature reserve, wildlife refuge, major wildlife habitat, national park, and national forest reserve. Most protected areas are located in the dense natural forests of the mountains. Contiguous montane protected areas currently cover 17.5% (633,827 ha) of Taiwan.

Protected Area Types

- National Forest Reserve
- Major Wildlife Habitat
- National Park
- National Reserve
- Wildlife Refuge
- City & County Borders

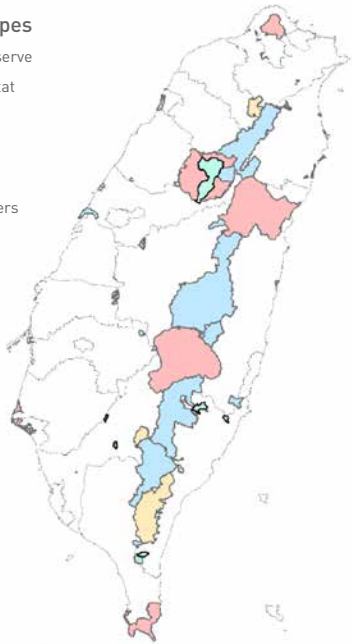


Figure 4. Map of Taiwan's Protected Areas (Source: Taiwan Forestry Bureau).

Table 1.
Protected Areas in Taiwan (Source: Taiwan Forestry Bureau)

Type	Number	Hectares	Land Coverage (%)
Nature Reserve	22	65,458	1.81
Wildlife Refuge	20	27,441	0.76
Major Wildlife Habitat	37	326,283	9.04
National Park	9	748,949	20.74
National Forest Reserve	6	21,171	0.59
Total	95	1,189,302	32.94

To better protect the critical habitat of Taiwan's bird species, in 2000 the Taiwan Wild Bird Federation (TWBF), in conjunction with its local partner organizations and other conservation groups, drafted a successful proposal to create 53 Important Bird and Biodiversity Areas . Ultimately successful, Taiwan is now home to 54 IBAs. The TWBF is working to propose two new IBAs in the future. This would bring the total number to 56 and cover 1/5 of Taiwan's area.

The purpose of IBAs is to promote the importance of habitat conservation by using birds as indicators of biodiversity. In the case of resident birds, this designation can lead to regional area protections. For migratory species, coordinated efforts extending beyond borders are needed. This not only helps establish comprehensive conservation networks necessary for maintaining migration routes, but also fosters international collaboration as well.

IMPORTANT BIRD AREAS in TAIWAN

Taiwan's Protected Areas and IBAs

TW001 Yeliu, Xinbei City
TW002 Waziwei, Xinbei City
TW003 Guandu, Taipei City
TW004 Huajiang, Taipei City
TW005 Hapen and Fushan
TW006 Dapingding and Xucuogang, Taoyuan City
TW007 Shimen Reservoir, Taoyuan City
TW008 North Section of Xueshan Mountain Range, Taoyuan City
TW009 Hsinchu City Coastal Area
TW010 Shei-Pa National Park
TW011 Gaomei Wetland, Taichung City
TW012 Daxueshan, Xueshankeng, Wushikeng, Taichung City
TW013 Dadu River Estuary Wetland
TW014 Hanbao Wetland, Changhua County
TW015 North Section of Baguashan, Changhua County
TW016 Zhuoshui River Estuary Wetland
TW017 Huben, Yunlin County
TW018 Upstream Section of Beigang River, Nantou County

TW019 Ruei-yan, Nantou County
TW020 Nengdan, Nantou County
TW021 Aogu Wetland, Chiayi County
TW022 Puzi River Estuary, Chiayi County
TW023 Budai Wetland, Chiayi County
TW024 Middle Section of Bazhang River, Chiayi County
TW025 Beimen, Tainan City
TW026 Qingkunshen, Tainan City
TW027 Qigu, Tainan City
TW028 Hulupi, Tainan City
TW029 Sicao, Tainan City
TW030 Yong'an, Kaohsiung City
TW031 Yellow Butterfly Valley, Kaohsiung City
TW032 Shanping, Kaohsiung City
TW033 Chuyunshan Nature Reserve
TW034 Yushan National Park
TW035 Fengshan Reservoir, Kaohsiung City
TW036 Dawushan Nature Reserve and Shuang-guei Lake Major Wildlife Habitat
TW037 Gaoping River, Pingtung County
TW038 Kenting National Park

TW039 Lanyu (Orchid Island), Taitung County
TW040 Zhiben Wetland, Taitung County
TW041 Middle Section of Coastal Mountain Range, Taitung County
TW042 Yuli Wildlife Refuge
TW043 Hualien River Estuary, Hualien County
TW044 Taroko National Park
TW045 Lizejian, Yilan County
TW046 Lanyang River Estuary, Yilan County
TW047 Zhu'an, Yilan County
TW048 Kinmen National Park and Nearby Wetlands
TW049 Northern Sea Islets, Penghu County
TW050 Northeastern Sea Islets, Penghu County
TW051 Mao Islet Seabird Refuge, Penghu County
TW052 Southern Sea Islets, Penghu County
TW053 Matsu Islands Tern Refuge
TW054 Qieding Wetland, Kaohsiung City
(TW055) Leshan, Taitung County
(TW056) Fangyuan Wetland, Changhua County



An Overview of the Status of Taiwan's Birds

The National Red List



The Red List of Birds of Taiwan, 2016



An Overview of the Status of Taiwan's Birds: The National Red List

Originally developed by the International Union for the Conservation of Nature in 1964, the Red List uses a set of science-backed criteria to evaluate the extinction risk for all species and taxon on the planet. It has become the international standard for evaluating extinction rates and provides a basis for prioritizing recovery programs and research, monitoring the adequacy of conservation measures, gaining support for habitat protection, and facilitating resource allocation. Using this criteria, in 2016 Taiwanese researchers compiled the first Red List of the Birds of Taiwan. A total of 674 candidate species were initially selected for assessment. Of that, 359 species were later excluded (categorized as Not Applicable) while 311 species were subject to further evaluation.

Species were examined based on their threat risk. Endemics and endemic subspecies were looked at first and second, respectively, as their populations are restricted and therefore require a higher level of attention to address their conservation needs. Breeding residents were examined next. Finally birds with migratory status were evaluated last.

Pages 14-19 represent a summary of the evaluation results. This information is an important tool for government agencies or any other stakeholder doing biodiversity conservation work in Taiwan. It not only provides the status of each species, but also lists those which are in need of action plans.

Summary of the Red List of Birds of Taiwan

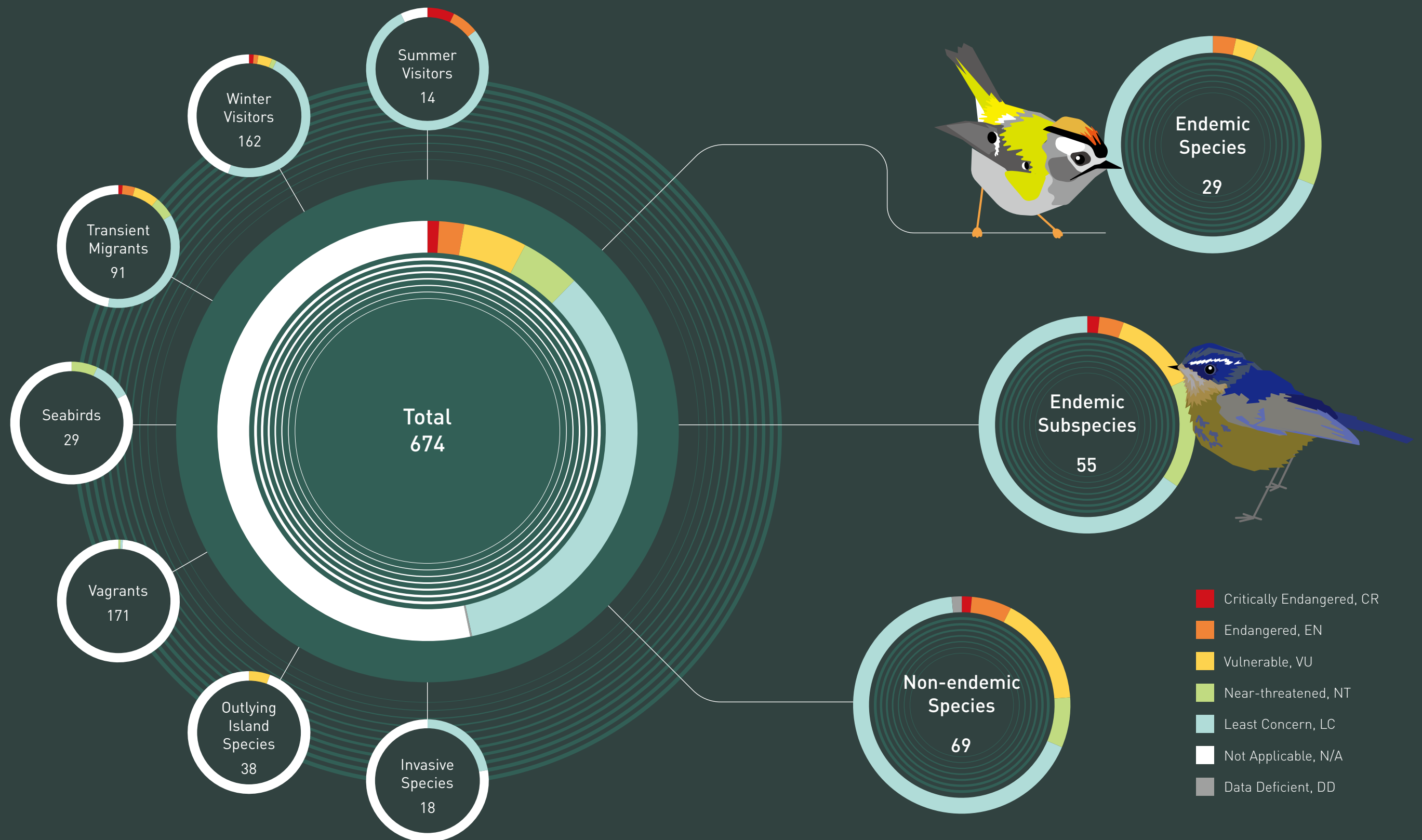


Table 2.
List of Taiwan's Threatened and Near-threatened Bird Species

Species Name	Scientific Name	Global Status	Taiwan Status	Population Trend	Distribution Range
Endemic Species: 9					
Taiwan Hwamei	<i>Garrulax taewanus</i>	EN	EN	Decline	Restricted
Styan's Bulbul	<i>Pycnonotus taivanus</i>	VU	VU	Decline	Restricted
Chestnut-bellied Tit	<i>Sittiparus castaneiventris</i>	LC	NT	DD	Restricted
Taiwan Yellow Tit	<i>Machlolophus holsti</i>	NT	NT	Increase	DD
Taiwan Bush Warbler	<i>Locustella alishanensis</i>	LC	NT	Unknown	Restricted
Taiwan Fulvetta	<i>Fulvetta formosana</i>	NT	NT	Stable	Restricted
Rufous-crowned Laughingthrush	<i>Ianthocincla ruficeps</i>	LC	NT	DD	DD
Taiwan Thrush	<i>Turdus niveiceps</i>	LC	NT	DD	DD
Taiwan Shortwing	<i>Brachypteryx goodfellowi</i>	LC	NT	Decline	Restricted
Endemic Subspecies: 19					
Ring-necked Pheasant	<i>Phasianus colchicus formosanus</i>	LC	CR	Decline	Restricted
Australasian Grass-Owl	<i>Tyto longimembris pithecops</i>	LC	EN	DD	Restricted
Crested Myna	<i>Acridotheres cristatellus formosanus</i>	LC	EN	Increase	Stable
Whistling Green-Pigeon	<i>Treron formosae formosae</i>	NT	VU	DD	Restricted
Collared Owlet	<i>Glaucidium brodiei pardalotum</i>	LC	VU	Decline	Stable
Eurasian Jay	<i>Garrulus glandarius taivanus</i>	LC	VU	unknow	Restricted
Eurasian Nuthatch	<i>Sitta europaea formosana</i>	LC	VU	Decline	Restricted
Little Forktail	<i>Enicurus scouleri fortis</i>	LC	VU	DD	Restricted
Alpine Accentor	<i>Prunella collaris fennelli</i>	LC	VU	Decline	Restricted
Gray-headed Bullfinch	<i>Pyrrhula erythaca owstoni</i>	LC	VU	Decline	Restricted
Slaty-breasted Rail	<i>Lewinia striata taiwanus</i>	LC	NT	DD	DD
Ryukyu Scops-Owl	<i>Otus elegans botekensis</i>	NT	NT	Stable	Restricted
Himalayan Owl	<i>Strix nivicolum yamadae</i>	LC	NT	Stable	Restricted
White-backed Woodpecker	<i>Dendrocopos leucotos insularis</i>	LC	NT	Unknown	Restricted
Green-backed Tit	<i>Parus monticolus insperatus</i>	LC	NT	Stable	Restricted

Species Name	Scientific Name	Global Status	Taiwan Status	Population Trend	Distribution Range
Striated Prinia	<i>Prinia crinigera striata</i>	LC	NT	Decline	Stable
Yellowish-bellied Bush Warbler	<i>Horornis acanthizoides concolor</i>	LC	NT	Stable	Restricted
Vinous-throated Parrotbill	<i>Sinosuthora webbiana bulomacha</i>	LC	NT	Decline	Restricted
Eurasian Wren	<i>Troglodytes troglodytes taivanus</i>	LC	NT	Decline	Restricted
Non-endemic Residents: 21					
Small Buttonquail	<i>Turnix sylvaticus</i>	LC	CR	Decline	DD
Blue-breasted Quail	<i>Synoicus chinensis</i>	LC	EN	Decline	Restricted
Mountain Hawk-Eagle	<i>Nisaetus nipalensis</i>	LC	EN	Unknown	Restricted
Tawny Fish-Owl	<i>Ketupa flavipes</i>	LC	EN	DD	Restricted
Russet Sparrow	<i>Passer cinnamomeus</i>	LC	EN	DD	Restricted
Mandarin Duck	<i>Aix galericulata</i>	LC	VU	DD	Restricted
Philippine Cuckoo-Dove	<i>Macropygia tenuirostris</i>	LC	VU	DD	Restricted
Watercock	<i>Gallicrex cinerea</i>	LC	VU	Decline	Restricted
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	LC	VU	Increase	Restricted
Black Kite	<i>Milvus migrans</i>	LC	VU	Decline	Restricted
Brown Wood-Owl	<i>Strix leptogrammica</i>	LC	VU	Decline	Stable
Gray-headed Woodpecker	<i>Picus canus</i>	LC	VU	Decline	Stable
Large Cuckooshrike	<i>Coracina macei</i>	LC	VU	Stable	Restricted
Black-naped Oriole	<i>Oriolus chinensis</i>	LC	VU	Decline	Restricted
Long-tailed Shrike	<i>Lanius schach</i>	LC	VU	Decline	Restricted
Chestnut Munia	<i>Lonchura atricapilla</i>	LC	VU	DD	Stable
Little Tern	<i>Sternula albifrons</i>	LC	NT	Decline	Restricted
Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	LC	NT	DD	Stable
Black Eagle	<i>Ictinaetus malaiensis</i>	LC	NT	Increase	expend
Gray-chinned Minivet	<i>Pericrocotus solaris</i>	LC	NT	Stable	Stable
Japanese Paradise-Flycatcher	<i>Terpsiphone atrocaudata</i>	NT	NT	DD	Restricted

Table 2. (Cont'd)
List of Taiwan's Threatened and Near-threatened Bird Species

Species Name	Scientific Name	Global Status	Taiwan Status	Population Trend	Distribution Range
Summer Visitors: 2					
Chinese Crested Tern	<i>Thalasseus bernsteini</i>	CR	CR	Increase	Restricted
Fairy Pitta	<i>Pitta nympha</i>	VU	EN	Decline	Restricted
Winter Visitors: 12					
Baer's Pochard	<i>Aythya baeri</i>	CR	CR	N/A	N/A
Saunders's Gull	<i>Saundersilarus saundersi</i>	VU	CR	Decline	Restricted
Nordmann's Greenshank	<i>Tringa guttifer</i>	EN	EN	N/A	N/A
Oriental Stork	<i>Ciconia boyciana</i>	EN	EN	N/A	N/A
Falcated Duck	<i>Mareca falcata</i>	NT	VU	Decline	Restricted
Green-winged Teal	<i>Anas crecca</i>	LC	VU	Decline	Stable
Eurasian Curlew	<i>Numenius arquata</i>	NT	VU	Stable	Stable
Temminck's Stint	<i>Calidris temminckii</i>	LC	VU	N/A	N/A
Red-necked Stint	<i>Calidris ruficollis</i>	NT	VU	Decline	Restricted
Dunlin	<i>Calidris alpina</i>	LC	VU	Decline	Restricted
Black-bellied Plover	<i>Pluvialis squatarola</i>	LC	NT	Decline	Restricted
Black-faced Spoonbill	<i>Platalea minor</i>	EN	NT	Increase	Expansion
Transient Migrants: 15					
Spoon-billed Sandpiper	<i>Calidris pygmaea</i>	CR	CR	N/A	N/A
Yellow-breasted Bunting	<i>Emberiza aureola</i>	EN	EN	Decline	Stable
Great Knot	<i>Calidris tenuirostris</i>	EN	EN	Decline	Restricted
Far Eastern Curlew	<i>Numenius madagascariensis</i>	EN	EN	N/A	N/A
Chinese Egret	<i>Egretta eulophotes</i>	VU	VU	N/A	N/A
Bar-tailed Godwit	<i>Limosa lapponica</i>	NT	VU	N/A	N/A
Black-tailed Godwit	<i>Limosa limosa</i>	NT	VU	Decline	Stable
Red Knot	<i>Calidris canutus</i>	NT	VU	Decline	Restricted
Ijima's Leaf Warbler	<i>Phylloscopus ijimae</i>	VU	VU	N/A	N/A

Species Name	Scientific Name	Global Status	Taiwan Status	Population Trend	Distribution Range
Yellow Bunting	<i>Emberiza sulphurata</i>	VU	VU	Stable	Stable
Greater Sand-Plover	<i>Charadrius leschenaultii</i>	LC	NT	Decline	Restricted
Little Curlew	<i>Numenius minutus</i>	LC	NT	N/A	N/A
Gray-tailed Tattler	<i>Tringa brevipes</i>	NT	NT	Decline	Stable
Chinese Sparrowhawk	<i>Accipiter soloensis</i>	LC	NT	Decline	Stable
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	NT	Stable	Restricted
Seabirds: 2					
Swinhoe's Storm-Petrel	<i>Oceanodroma monorhis</i>	NT	NT	--	--
Streaked Shearwater	<i>Calonectris leucomelas</i>	NT	NT	Decline	Stable
Vagrants: 1					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	NT	NT	Increase	Stable
Outlying Island Species: 2					
Pied Kingfisher	<i>Ceryle rudis</i>	LC	VU	Decline	Restricted
Collared Crow	<i>Corvus pectoralis</i>	NT	VU	Stable	Stable



Part 1.

The Status and Trends of Taiwan's Birds

- 1.1 Breeding Birds
- 1.2 Migratory Waterbirds
- 1.3 Migratory Raptors
- 1.4 Breeding Terns

Part 1. The Status and Trends of Taiwan's Birds



1.1 Breeding Birds

Jerome Chie-Jen Ko, Meng-Wen Fan, Ruey-Shing Lin, Shih-Peng Tsai, Pei-Fen Lee

Breeding and rearing is a critical part of a bird's life cycle. Yet do do so properly relies heavily on having healthy ecosystems. Thus, understanding the status of common breeding birds serves as a barometer for scientists keeping track of overall local environmental conditions. This important connection makes breeding birds a priority when doing conservation planning. Realizing this, Taiwanese researchers and conservationists have spent over 10 years working on ways to better understand their population dynamics.

In 2009, the Taiwan Wild Bird Federation (TWBF), and National Taiwan University's Institute of Ecology and Evolutionary Biology (IEEB) coordinated the first Taiwan Breeding Bird Survey (BBS Taiwan) with the goal of establishing a breeding bird population index (Fig. 1.1.1). Looking at a total of 160 species, it was not only the very first systematic national-level scheme done in Taiwan, but a pioneering project for the Asia-Pacific region as well.



The BBS Taiwan is a citizen science project that takes place annually from March to June. During this time, sites measuring 1 km² are selected and six to ten survey points are chosen. These points are then visited twice per breeding season, in the morning, and 6-minute stop-time point counts are conducted within a 100m radius of the point. To date, a total of 490 surveys have been done comprised of 4,167 survey points. The data collected over the years has allowed researchers to assess the population trends of 97 species, including 19 which experienced a population increase (Fig. 1.1.2) and 29 which experienced a population decline since the survey began (Fig. 1.1.3).

The Common Breeding Bird Index was developed to take a deeper look at the BBS Taiwan results (Fig. 1.1.4). The purpose of the index is to provide an easily digestible overview of trends surrounding Taiwan's breeding bird communities. It's calculated using the geometric mean of the population trends for 97 species surveyed during the BBS Taiwan. Interestingly, this analysis revealed a relatively stable trend over the last decade. Results also indicated that the habitats related to breeding bird communities may not have encountered any large-scale changes or status shifts over the last few years. However, it is still essential to continue monitoring these populations to remain aware of their status and trends.

Figure 1.1.1. Local birders attend a BBS Taiwan workshop to learn more about the project and how they can participate.

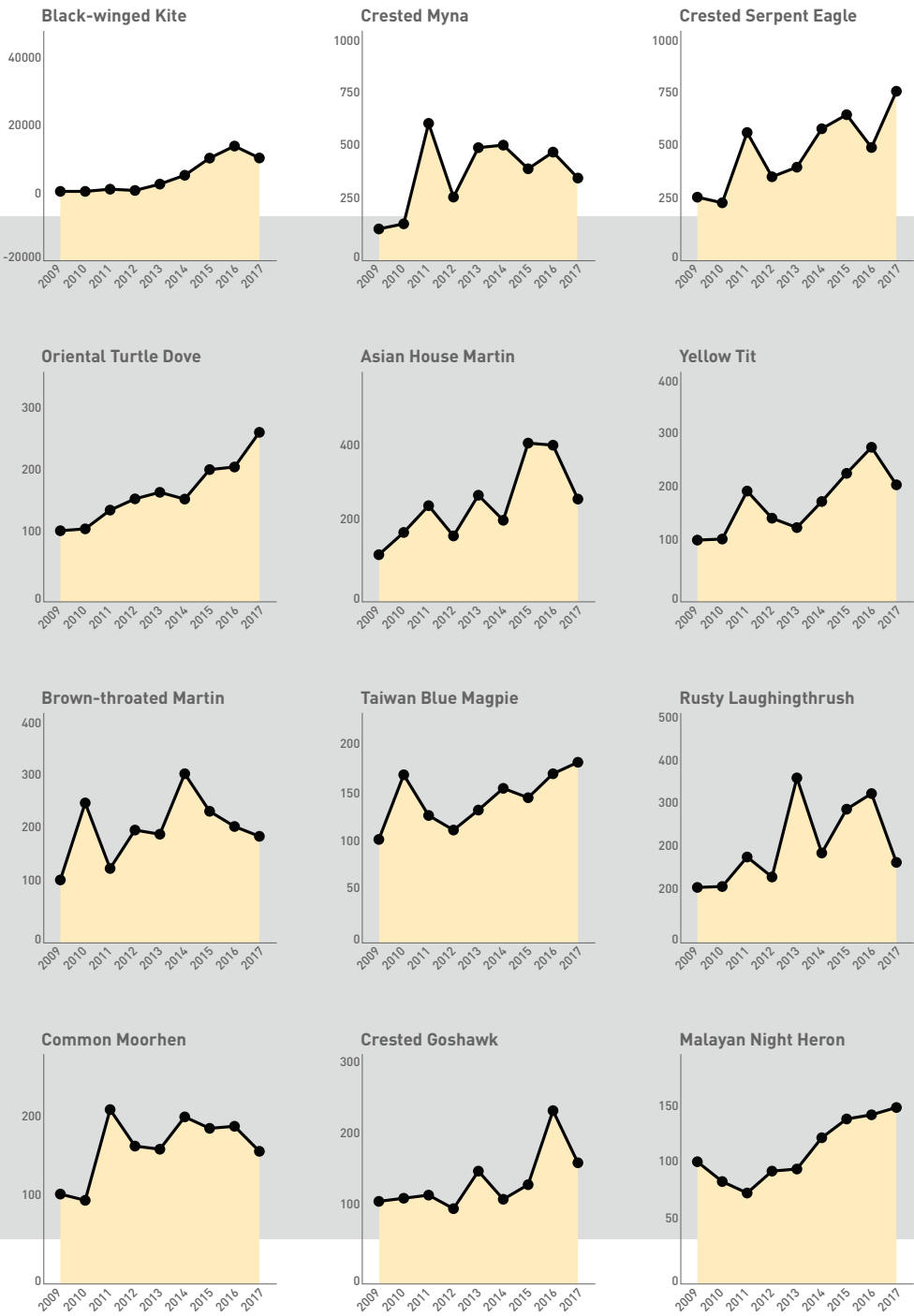


Figure 1.1.2. Trends for the top 12 species that showed significant population growth.

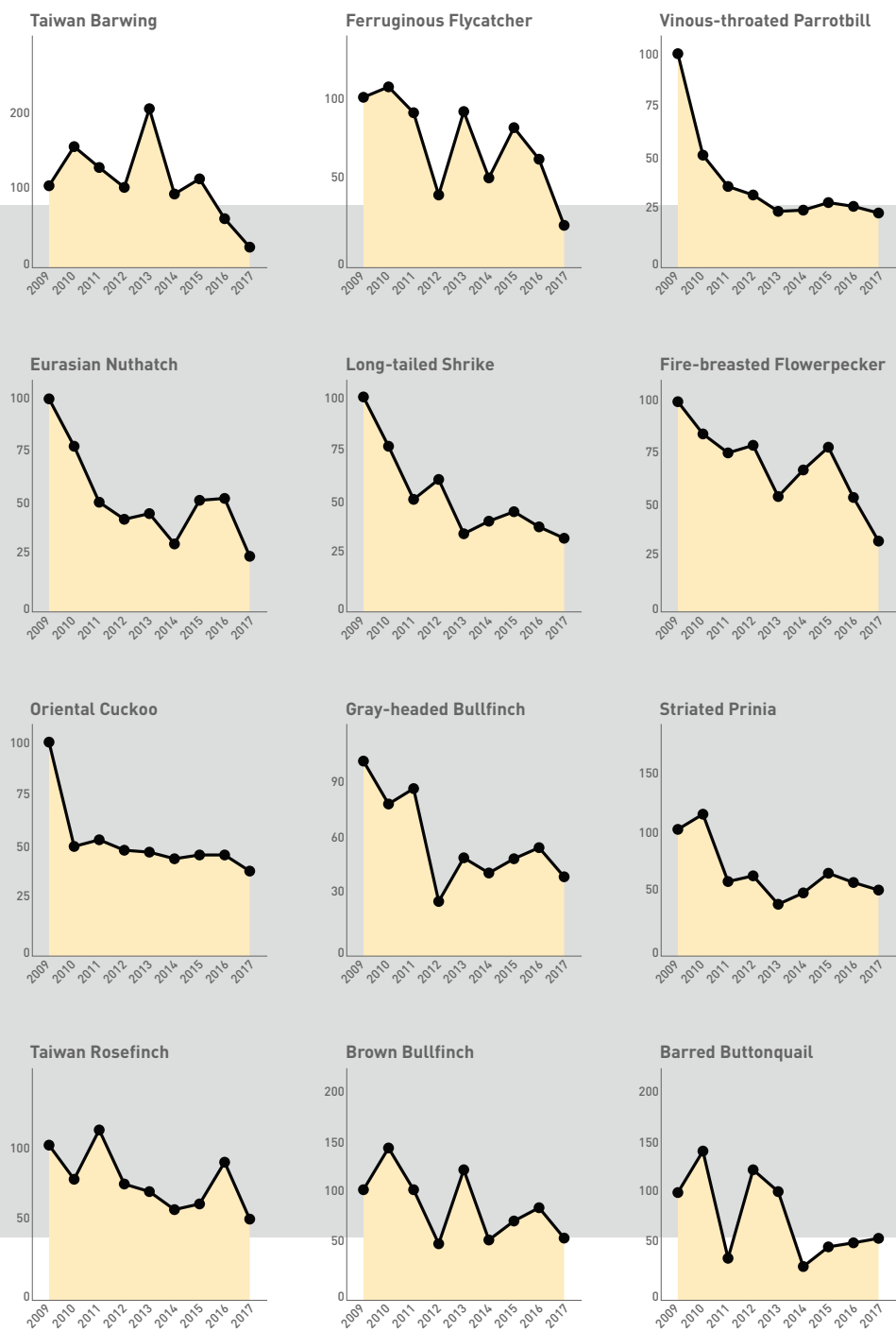


Figure 1.1.3. Trends for top 12 species that showed significant population decline.



Given that there are currently no large-scale threats impacting Taiwan's breeding bird communities, researchers and conservationists have focused on education and outreach to try and maintain that trend. The first action taken has been to keep the collected data open so that it can be viewed and used by a wider audience. BBS Taiwan survey results are published annually, with all data kept accessible on the Global Biodiversity Information Facility (GBIF), an international organisation that focuses on making biodiversity data available to the public. Another action is to do outreach on behalf of common bird species to raise public awareness about the potential risks they face. Such activities are generally well received as locals feel a stronger connection to birds they commonly see.

BBS Taiwan and its related work aim to remind people that even species which seem numerous and widespread could easily vanish within a generation. Its data also provides important clues to the possible impacts of anthropogenic environmental change, and a real-life assessment of how humans interact with their surroundings. "Keeping common birds common" encapsulates the spirit of this project to monitor and conserve common breeding birds.

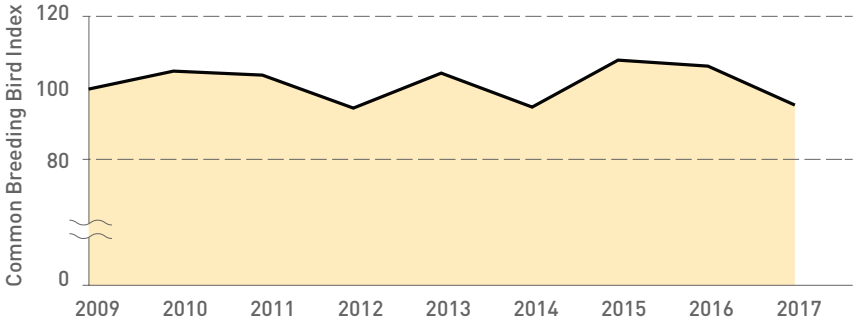


Figure 1.1.4. The Common Breeding Bird Index revealed a relatively stable trend over the last decade for Taiwan's breeding bird communities.

Part 1. The Status and Trends of Taiwan's Birds



1.2 Migratory Waterbirds

Da-Li Lin, An-Yu Chang, Cheng-Te Hsu, Scott Pursner, Hsuan Chang, Yong-Lun Lin, Allen Lyu, Kung-Kuo Chiang, Kun-Hai Lin, Ruey-Shing Lin

Taiwan is one of the most important stopover and wintering sites for thousands of migratory waterbirds along the East Asian-Australasian Flyway (EAAF). Yet in the past, although several waterbird surveys had been conducted in different parts of Taiwan, there was no nationwide monitoring scheme for migratory waterbirds. This all changed in 2014 when the first Taiwan New Year Bird Count (NYBC Taiwan) was held. This community-science driven event has been used to monitor the status and population trends of migratory waterbirds in Taiwan proper and its outlying islands. Initially launched by the TWBF, Wild Bird Society of Taipei (WBST), Kaohsiung Wild Bird Society (KWBS), and the Taiwan Endemic Species Research Institute (TESRI), its survey results provide valuable insight into the distribution and community composition of the wintering avifauna of Taiwan.

Monitoring methods for NYBC Taiwan are based on the basic principles set out in the Christmas Bird Count. Over the course of 23 days (with January 1st serving as a midpoint), volunteer teams choose one consecutive 24-hour period to count all the birds within a circle sample area whose radius is three kilometers. Routes are provided for teams by the organizers. Teams are composed of volunteers accompanied by a leader who is experienced in birdwatching and surveys. Group numbers could range

from as few as three to over 100. Survey methods vary and include line transect, counting flocks, and area searches.

NYBC data has been used to analyze population trends for waterbird species including waterfowl, shorebirds, and wintering terns (Table 1.2.2) in Taiwan. For the 2020 report, organizers also reviewed the population trends for the whole country as well as three migratory bird hot spots. Results showed that many shorebird species experienced significant declines in northeastern Taiwan. For researchers, this serves as a red flag and a call to action. It is extremely important to understand the cause or causes of the decline. One widely held theory is that the decline is a response to habitat degradation and loss, such as the reclamation of mudflats and rice paddies to land development. However, further research is required to properly answer this question.

Birds don't know borders, so it is of the utmost importance that population trends and site usage data for migratory birds are known and shared along flyways. Taiwan's NYBC results provide a key piece to the puzzle of understanding the situation on the ground for the EAAF. As partners in global conservation, Taiwan will continue to do its best to monitor, share information on, and conserve migratory bird species.



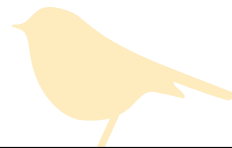
Table 1.2.1. Overview of the NYBC Taiwan from 2014-2019

Year	No. of Circle Sampling Areas	No. of Volunteers	No. of Species Recorded	No. of Individuals Counted	No. of Records Collected
2014	122	598	292	189,280	5,462
2015	134	967	319	205,319	20,627
2016	156	1,116	331	292,837	19,303
2017	175	1,258	340	316,928	11,197
2018	172	1,296	334	303,426	15,151
2019	179	1,365	325	312,948	15,388

Table 1.2.2. Population trends for waterbirds in Taiwan proper and three migratory bird hot spots. Only species whose population trends reached statistical significance are listed. Upward arrows indicate growth while downward arrows indicate decrease. The number of arrows indicate significance levels. One arrow: $p < 0.05$; two arrows: $p < 0.01$; three arrows: $p < 0.001$.

Species Name	Yilan Plain (Northeastern Taiwan)	Changhua Coast (Western Taiwan)	Chianan Plain (Southwestern Taiwan)
Eurasian Wigeon	↓↓↓	↑	
Northern Shoveler		↑	
Tufted Duck			↑↑↑
Eurasian Coot	↑↑↑		↑↑↑
Pacific Golden Plover	↓↓↓		
Lesser Sand Plover		↓↓↓	
Kentish Plover			
Little Ringed Plover	↓		
Common Sandpiper	↓		↓
Common Greenshank			
Marsh Sandpiper	↓		
Wood Sandpiper	↓↓	↓↓↓	
Common Redshank		↓↓	
Ruddy Turnstone			↓
Long-toed Stint	↓↓↓		
Red-necked Stint		↑↑	↑
Sanderling		↓↓↓	
Dunlin	↓↓↓		
Common Snipe	↓↓↓		

Part 1. The Status and Trends of Taiwan's Birds



1.3 Migratory Raptors

Raptor Research Group of Taiwan

Every fall, roughly 300,000 migratory raptors travel from their breeding grounds in Japan and Russia's Far East to wintering grounds in the Malay Archipelago. Taiwan is centrally located along the migration route of 25 different migratory raptor species. Many of these birds of prey will rest at Kenting National Park (KNP), congregating at the southernmost tip of Taiwan island. This area is one of the world's great migration bottlenecks. It is here that since 2004, the Raptor Research Group of Taiwan (RRGT) has conducted annual counts of migrating raptors. The group has also investigated just where these birds of prey go once they leave Taiwan.

From these counts, we now have a much better understanding of migrating Chinese Sparrowhawks (*Accipiter soloensis*). These smaller raptors, which begin arriving in early September, create the largest migratory raptor flocks in Taiwan. The RRGT has been tracking their numbers at KNP since 2004. Annual totals currently range from between 60,000-220,000 individuals with the average number of birds counted being roughly 140,000. However, 2020 saw the highest number ever recorded, with 270,669 counted (Fig. 1.3.1). From 2016-2017, the RRGT also placed radio transmitters on 12 individuals. This led to the discovery of certain individual migration routes (Fig. 1.3.2).

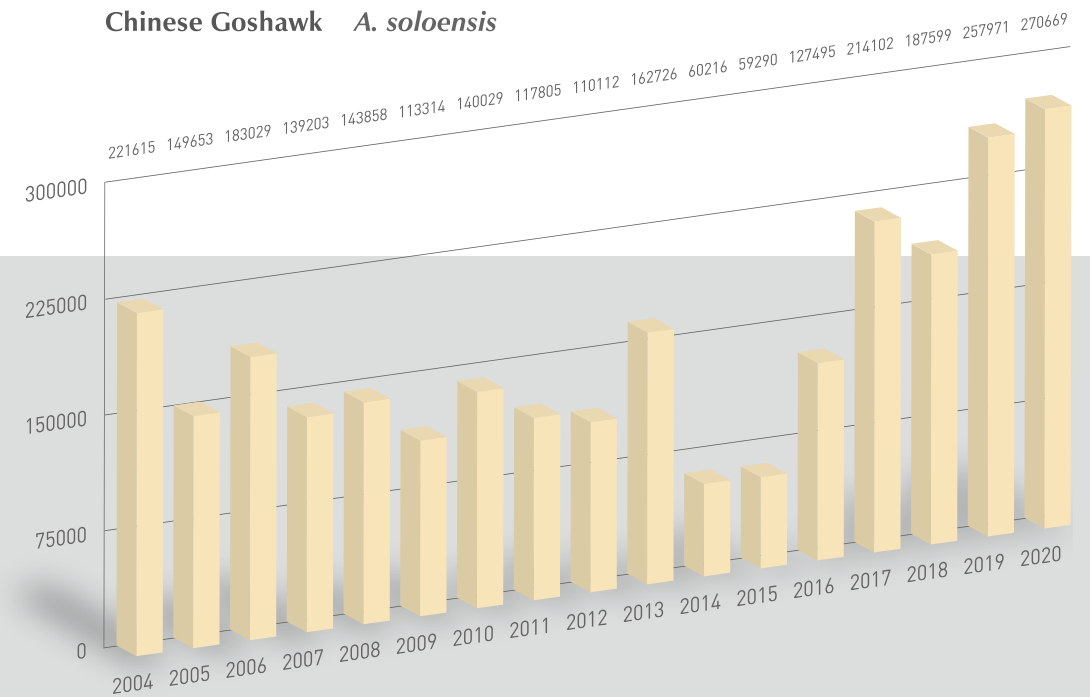
Taiwan is also one of the most important stopover sites during both fall and spring migrations for the Grey-faced Buzzard (*Butastur indicus*). Annual counts show that their numbers have increased gradually over the years (Fig. 1.3.1), with a current average of 50,000 birds recorded during the fall migration. The year 2020 saw a record 100,362 birds counted though (Fig. 1.3.1). To learn more about their migration behavior, from 2008-2011, the RRGT placed trackers on 13 individuals. Of those tagged

individuals, the fall migration routes of numbers 1, 2 and 5 (Fig. 1.3.3) and the spring migration routes for numbers 1, 2, 5, and 7 (Fig. 1.3.4) were recorded.

Illegal hunting, wind turbines, and habitat loss pose the biggest threats to Taiwan's migratory raptors. In the case of illegal hunting, though the number of hunting incidents recorded at KNP has declined greatly over the last 30 years, individual cases are still reported annually. In response, local authorities and law enforcement at the park have vowed to increase patrols, especially those done near nocturnal roosting sites. As for wind farms, although there has not yet been a recorded case of a raptor strike incident with a wind turbine in Taiwan, the RRGT plans to conduct research on the effects of wind turbines on migratory raptors. Lastly, as forest loss has reduced many nocturnal roosting sites for migrating raptors in Taiwan, the RRGT plans to work with authorities to develop tactics to protect the forests where they roost.



Chinese Goshawk *A. soloensis*



Grey-faced Buzzard *B.indicus*

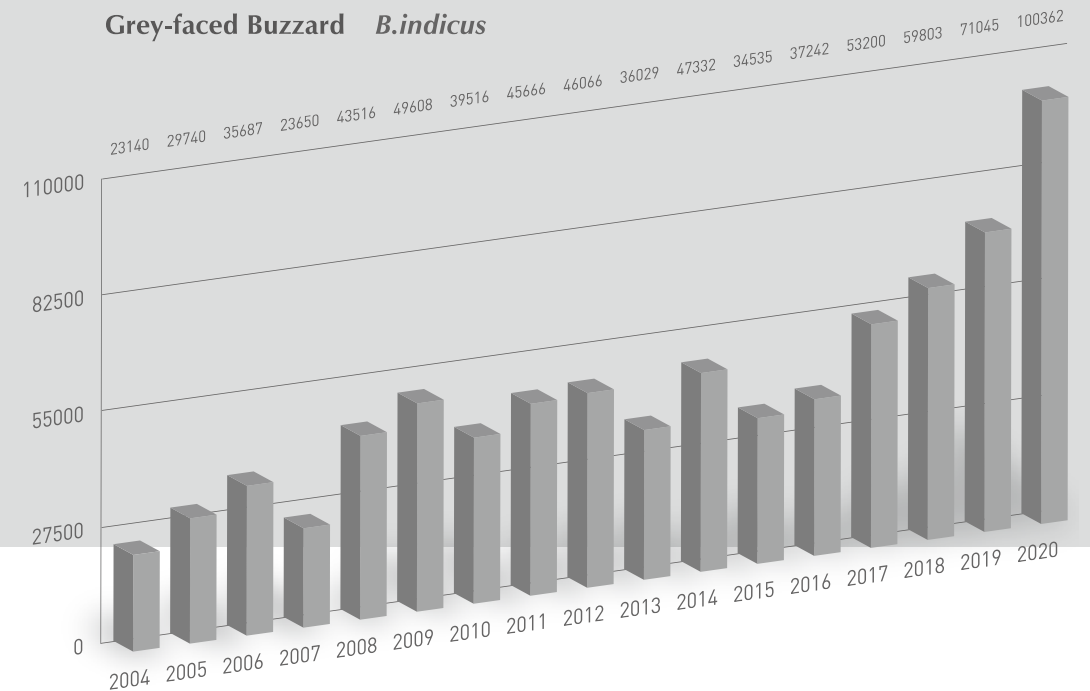


Figure 1.3.1. Population trends for migrating Chinese Goshawks and Grey-faced Buzzard during the fall migration from 2004 to 2020.

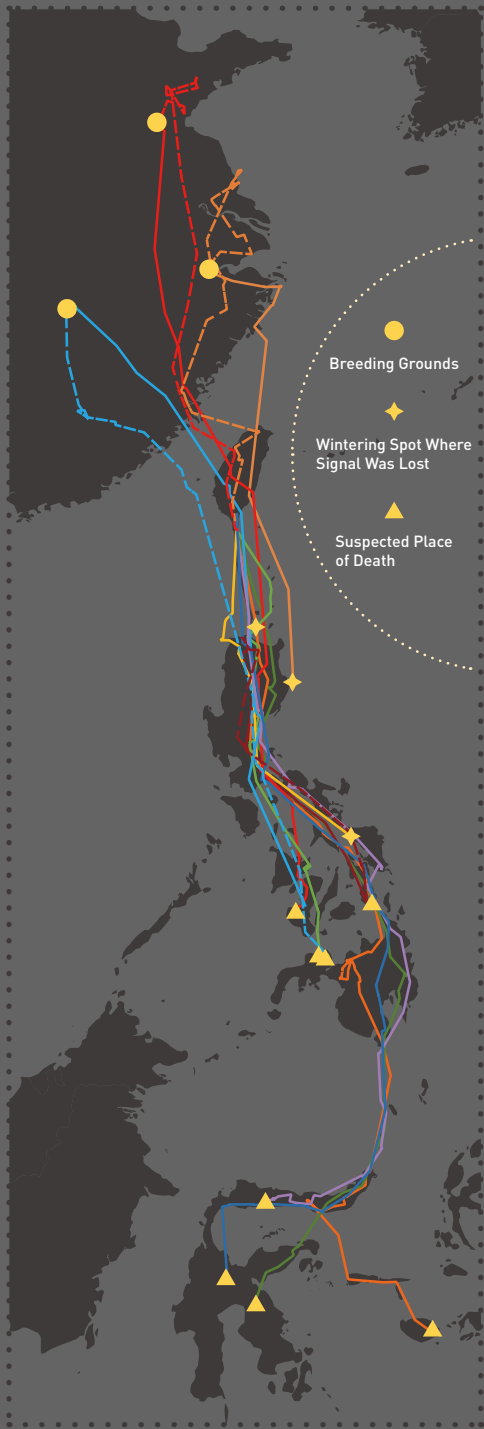


Figure 1.3.2. Migration routes for tagged Chinese Goshawks.

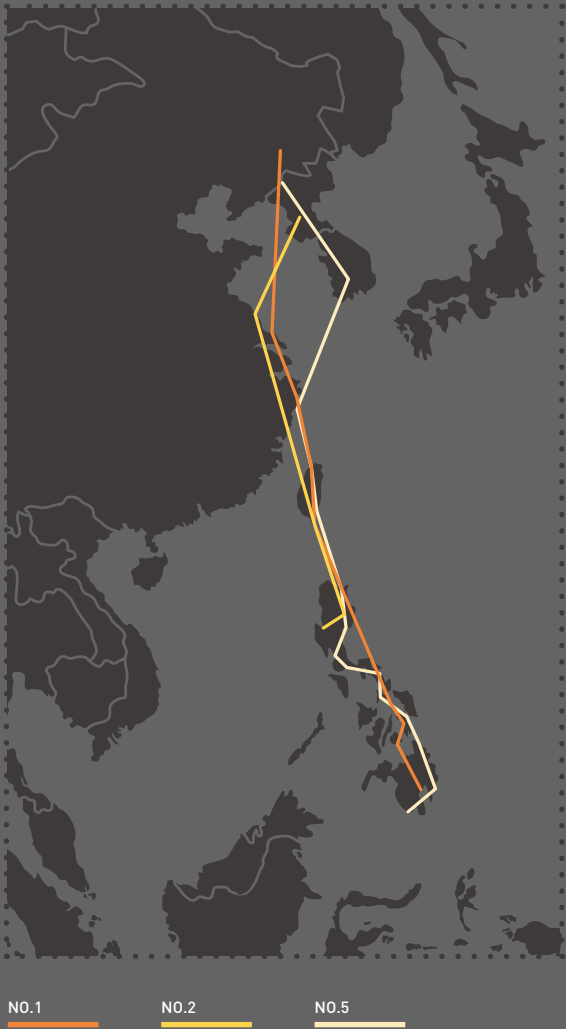


Figure 1.3.3. Fall migration routes for tagged Grey-faced Buzzards No. 1, 2 and 5.

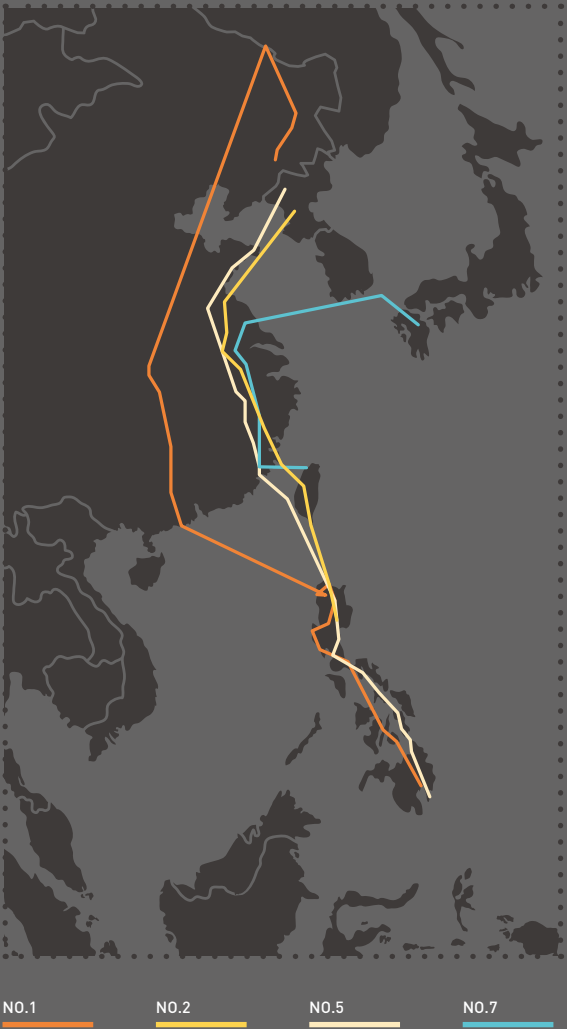


Figure 1.3.4. Spring migration routes for tagged Grey-faced Buzzards 1, 2, 5 and 7.

Part 1. The Status and Trends of Taiwan's Birds

1.4 Breeding Terns

Le-Ning Chang, Chien-Hsum Cheng, Chung-Yu Chiang

Although BBS Taiwan has been successful in monitoring the status and trends for most breeding birds in Taiwan, it is unable to be used for all breeding species. One group which is extremely difficult to count using the methods outlined in the BBS Taiwan is breeding terns. Hundreds of seabird colonies are located on Taiwan's outlying islands, and a different approach is necessary to assess their population trends.

Taiwan's breeding terns include the Brown Noddy (*Anous stolidus*), Little Tern (*Sternula albifrons*), Bridled Tern (*Onychoprion anaethetus*), Roseate Tern (*Sterna dougallii*), Black-naped Tern (*Sterna sumatrana*), Greater Crested Tern (*Thalasseus bergii*), and Chinese Crested Tern (*Thalasseus bernsteini*). Wintering in the tropics, they are regarded as summer visitors, with the uninhabited islands and islets of the Matsu and Penghu Archipelagos serving as the main sites of their breeding colonies (Fig. 1.4.1-3). Some of these areas have received protections from the central government, such as the Matsu Island Tern Refuge.

There are a number of issues facing breeding terns. One of the main threats comes in the form of breeding site degradation. Another is invasive rodents which threaten eggs and fledglings. Talks are currently underway on a rodent removal project for areas known to host breeding colonies. Researchers are also concerned that local fisheries may be reducing food availability. However, it is difficult to collect monitoring data on this. Further study is required to better understand the impact of local fisheries on Taiwan's breeding tern populations. Finally, in the past egg collection posed a risk, yet the creation of protected areas has effectively stopped the practice.



Table 1.4.1. Population sizes for breeding terns in the Matsu and Penghu Archipelagos (For Chinese Crested Tern data please see Part 2.2)

Species Name	Penghu	Trends	Matsu	Trends
Brown Noddy	2,000	Stable	N/A	N/A
Little Tern	200	Increase	N/A	N/A
Bridled Tern	6,000	Increase	2,000	Decline
Roseate Tern	7,500	Increase	300	Decline
Black-naped Tern	300	Decline	100	Decline
Greater Crested Tern	6,000	Increase	4,000	Increase

Part 1. The Status and Trends of Taiwan's Birds

1.4 Breeding Terns

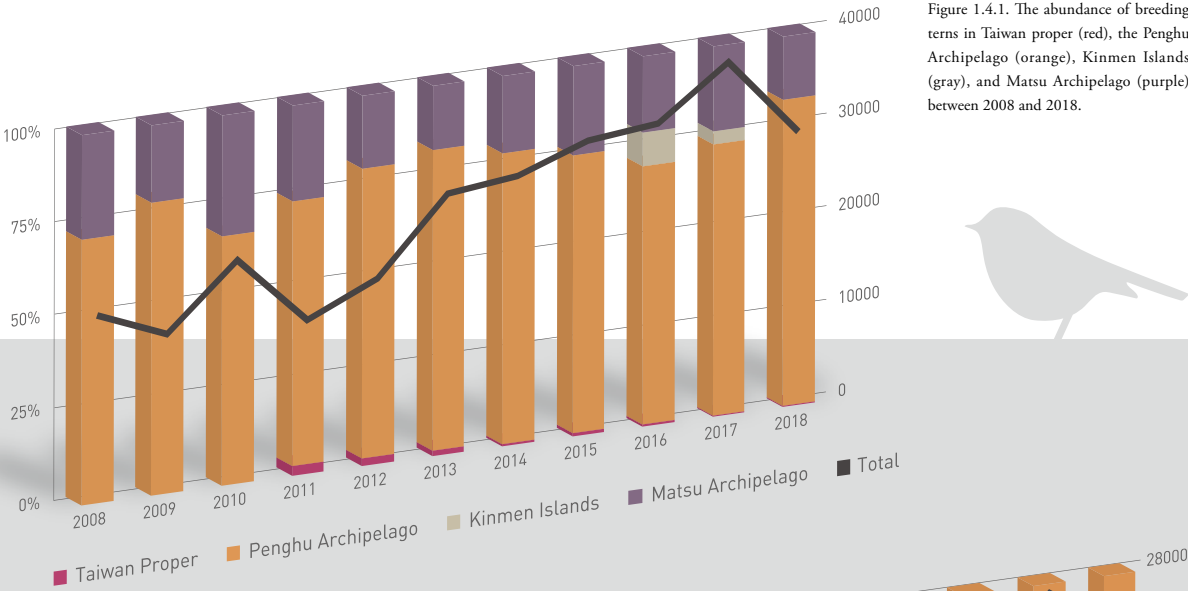


Figure 1.4.1. The abundance of breeding terns in Taiwan proper (red), the Penghu Archipelago (orange), Kinmen Islands (gray), and Matsu Archipelago (purple) between 2008 and 2018.

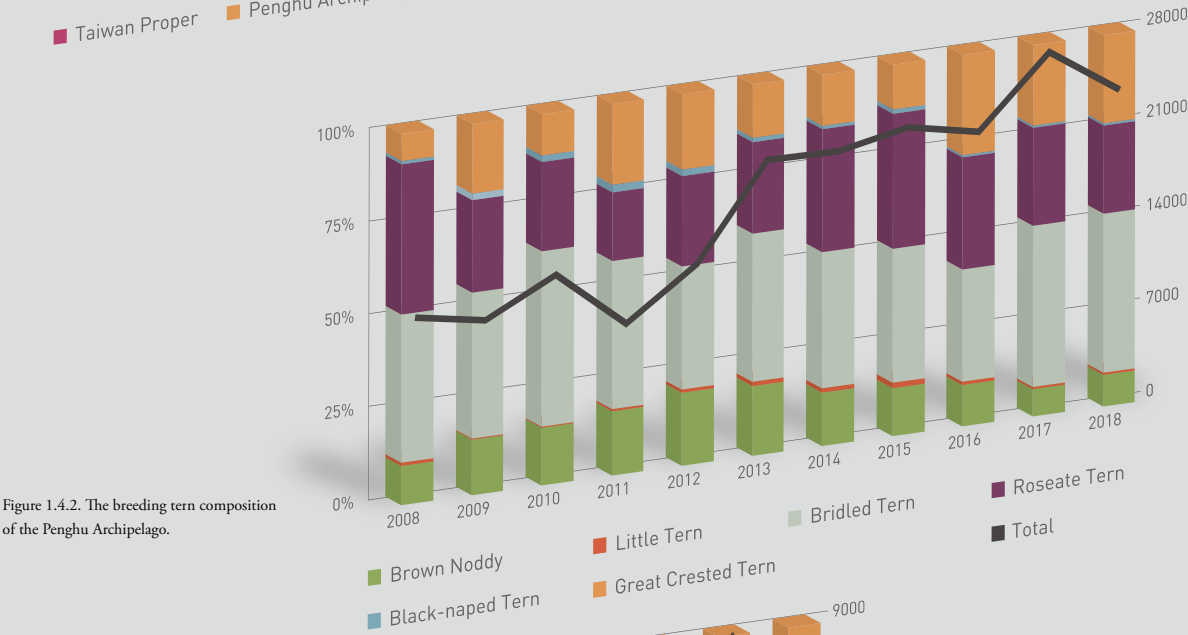


Figure 1.4.2. The breeding tern composition of the Penghu Archipelago.

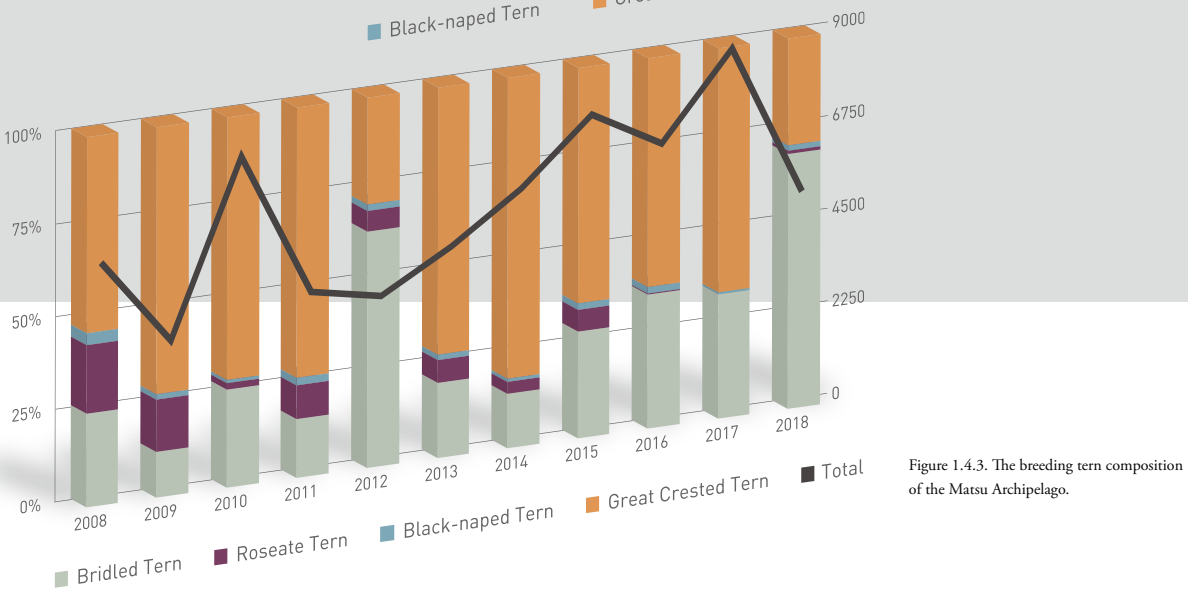


Figure 1.4.3. The breeding tern composition of the Matsu Archipelago.

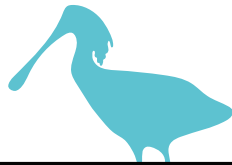


Part 2.

A Closer Look:
The Status and Trends of
Specific Bird Species

- 2.1 Black-faced Spoonbill
- 2.2 Chinese Crested Tern
- 2.3 Black Kite
- 2.4 Pheasant-tailed Jacana
- 2.5 Fairy Pitta
- 2.6 Russet Sparrow
- 2.7 Northern Lapwing
- 2.8 Australasian Grass-Owl
- 2.9 Mountain Hawk-Eagle

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.1 Black-faced Spoonbill

Shih-Hong Wu

The Black-faced Spoonbill (*Platalea minor*) is an endangered migratory waterbird native to East Asia. Breeding along the north and western coast of the Korean peninsula as well as northeastern China and Russia, they migrate to Japan, Taiwan, southeast Asia and southern China to winter (Fig. 2.1.1). Taiwan is home to the largest wintering population, with 2,407 individuals, or 54% of the global population, counted during the last International Black-faced Spoonbill Census in 2019.

In 1990, the Black-faced Spoonbill population numbered just 300 individuals. Threats to the species included habitat loss, industrial expansion, and infectious disease. Fortunately, thanks to international efforts, its numbers recovered and grew between 1994 and 2019 (Fig. 2.1.2). The annual population growth rate during this time was 1.1% on average (Fig. 2.1.3). In Taiwan, the population size of wintering Black-faced Spoonbills went from 206 in 1994 to 2,407 in 2019. The most popular place for the species is southwestern Taiwan's Zengwen River estuary, which sees 98% of the country's wintering population

congregate there. However, since 2010, it has expanded its range to include areas such as the Budai Wetlands in Chaiyi County and Qieding Wetland in Kaohsiung City (Fig. 2.1.4).

Though the population has increased substantially over the years, threats still exist. Road development and the creation of solar panel farms in southwestern Taiwan's wetlands have resulted in habitat loss. Also, the bacteria *Clostridium botulinum* affected a number of individuals between 2010 and 2018 with many of those cases resulting in death.

In the future, the Black-Faced Spoonbill Conservation Association, in coordination with other NGOs like the the Wild Bird Society of Tainan as well as local authorities, plan to keep monitoring the population status, work to improve habitat quality, and conduct management actions in protected areas to ensure the continued survival of Black-faced Spoonbills in Taiwan.



Figure 2.1.1. Black-faced Spoonbill distribution and migration routes (areas in orange=breeding grounds, areas in yellow=stopover sites, areas in blue=wintering grounds; solid lines=known flight paths, dashed lines=inferred flight paths).

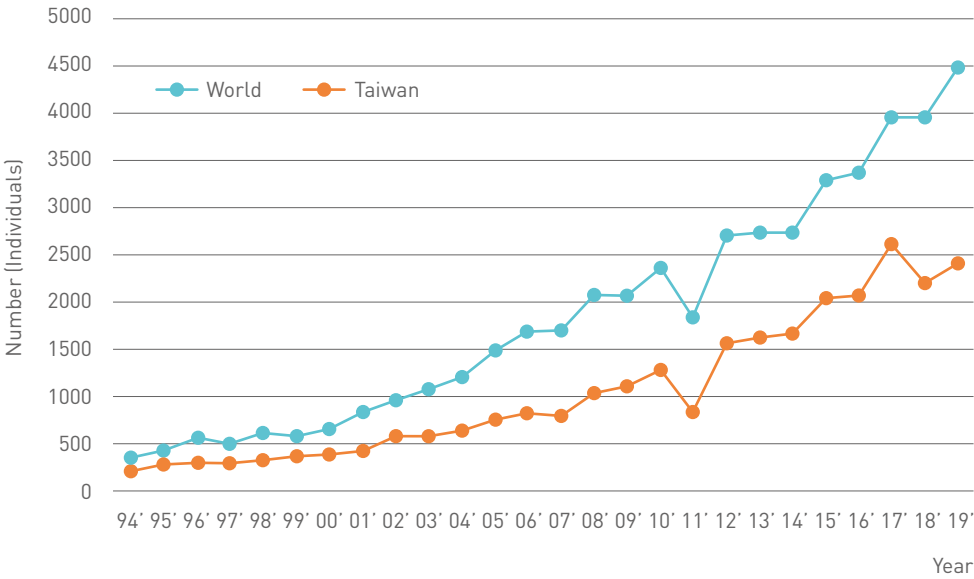


Figure 2.1.2. Population trends for the Black-faced Spoonbill globally and in Taiwan.

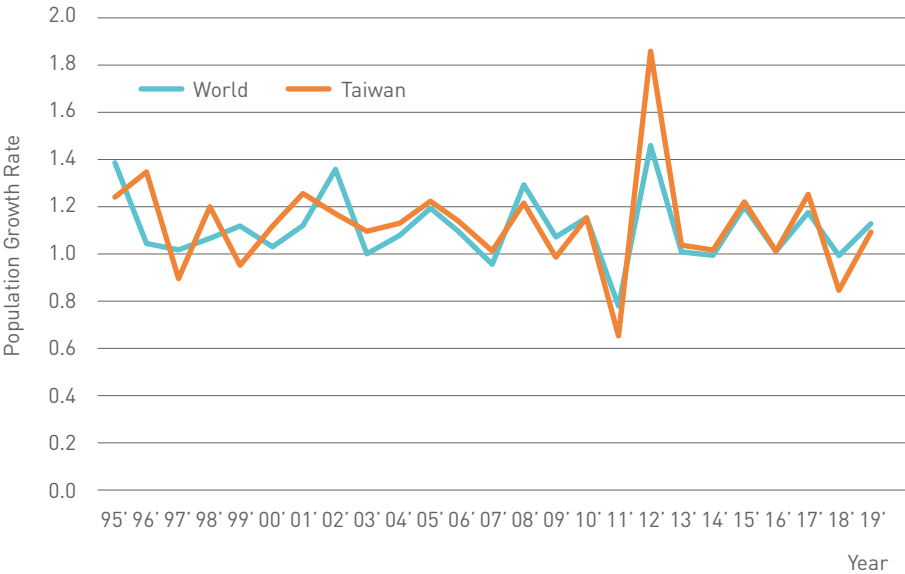


Figure 2.1.3. Annual population growth rate for Black-faced Spoonbills globally and in Taiwan.



Figure 2.1.4. Heat Map of Black-faced Spoonbill occurrences in Taiwan from 2003-2019. The smaller and whiter the circle, the smaller the occurrence. The larger and more orange the circle, the higher the occurrence.



Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.2 Chinese Crested Tern

Chung-Han Hung, Scott Pursner

Prior to the year 2000, the last time the Chinese Crested Tern (*Thalasseus bernsteini*) had a confirmed record was off the coast of China's Shandong province in 1937. Since then, scientists and researchers alike thought it had gone extinct, leading to its nickname, 'the mythical bird'. Yet 20 years ago, Taiwan's Matsu Archipelago played host to an ornithological miracle—the rediscovery of the Chinese Crested Tern after almost 70 years. Since then, Taiwanese conservationists and researchers have been fighting to save the world's most critically endangered seabird from vanishing for good.

The global population of Chinese Crested Terns currently stands at around 100 individuals. Breeding locations for pairs are currently known to exist on Taiwan's outlying islands just off the coast of southeastern China (Fig. 2.2.1). About 10 adults bred on the islands within the protected Matsu Island Tern Refuge between 2001 and 2018 (Fig. 2.2.2). Meanwhile others are known to breed in the Penghu Archipelago.

The fragile population faces a number of threats. These include typhoons, disturbance by humans or raptors, predation, ocean pollution, and food scarcity. Combined, these issues have led to a decrease in breeding success and slight population instability for the Taiwan breeding population.

A number of actions have been taken to conserve the species. Since 2011, National Taiwan University and the Wild Bird Society of Taipei have used decoys to attract Chinese Crested Terns to breed in areas deemed safe for them. These have proved highly effective. Rigorous monitoring of population numbers has also taken place.

More conservation actions are being discussed. Taiwanese researchers have recommended the use of drones to monitor population numbers and the environmental quality of the surrounding waters. Ways to encourage stronger cooperation with local residents are also being formulated. Such actions aim to improve the chances of conservation success for this legendary species.

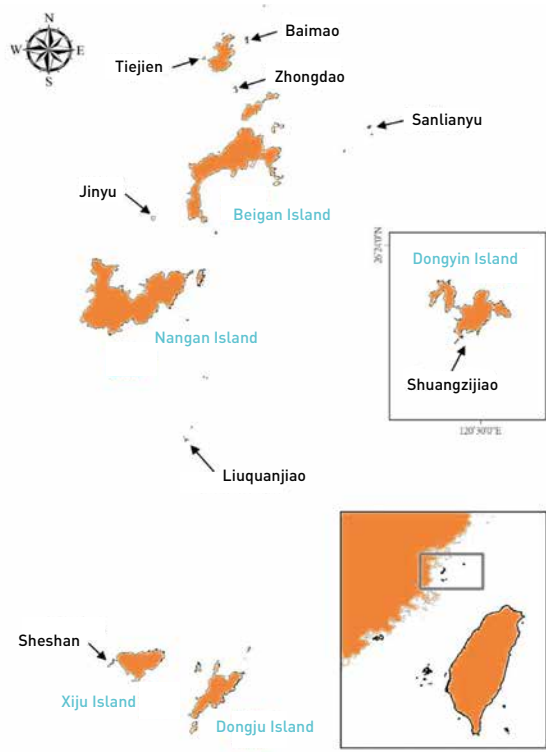


Figure 2.2.1. Taiwan and its major outlying islands with Matsu Archipelago highlighted (major island names in blue, Matsu Islands Tern Refuge island names in black).

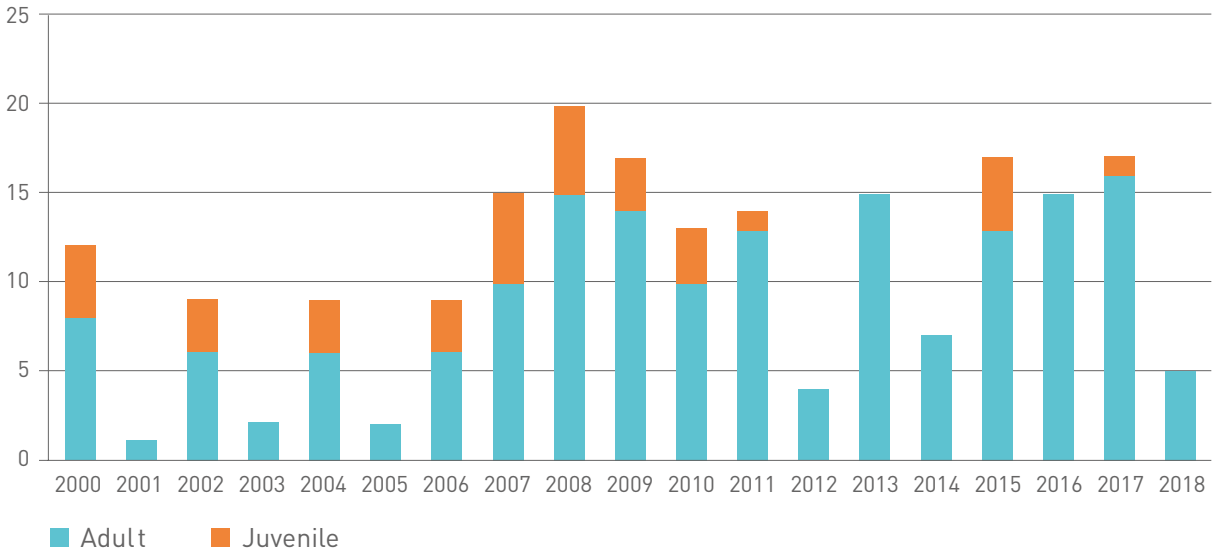


Figure 2.2.2. The number of adult and juvenile Chinese Crested Terns on Taiwan's outlying islands between 2000 and 2018.

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.3 Black Kite

Hui-Shan Lin, Yuan-Hsun Sun

The Black Kite (*Milvus migrans*) is a raptor species found in Eurasia, Africa, and Australia. A common sight in Taiwan up until the 1980s, its numbers have since decreased rapidly. According to records kept from 1996-2011, the population of Black Kites in Taiwan was estimated to be just 140-313 individuals. In 2013, the Raptor Research Group of Taiwan (RRGT) invited National Pingtung University of Science and Technology's Institute of Wildlife Conservation (IWC), and the Wild Bird Society of Keelung (WBSK) to jointly launch a project aimed at monitoring the Black Kite population at their nocturnal roosting sites in autumn and winter. Results showed a gradual population increase from 2013 (272 individuals) to 2017 (595 individuals; Fig. 3.3.1). The data also showed that most individuals were found in northern and southern Taiwan, with records in central Taiwan remaining scarce.

The main threat to Black Kites in Taiwan is the use of pesticides. IWC researchers have noted that the birds are quite vulnerable to secondary poisoning from insecticides such as carbofuran as well as rodenticides. From 2013-2017, many farmland birds died after ingesting carbofuran, including the Red-collared Dove and Eurasian Tree Sparrow. Black Kites, as mainly scavengers, are known to feed on farmland bird and rodent carcasses. From 2010-2017, there were 16 rescue cases involving Black Kites. Analysis revealed that five individuals showed traces of carbofuran in their systems, while another five had traces of rodenticides. Authorities are currently planning a conservation action plan for the Black Kite. Meanwhile, Taiwan's Council of Agriculture banned the use of higher-concentration carbofuran in 2017 and reviewed its policy of distributing free rodenticides. Meanwhile, the Black Kite monitoring project is still popular, with birdwatchers throughout Taiwan is still engaged with it.



Part 2. A Closer Look:
The Status and Trends of Specific Bird Species

2.3 Black Kite

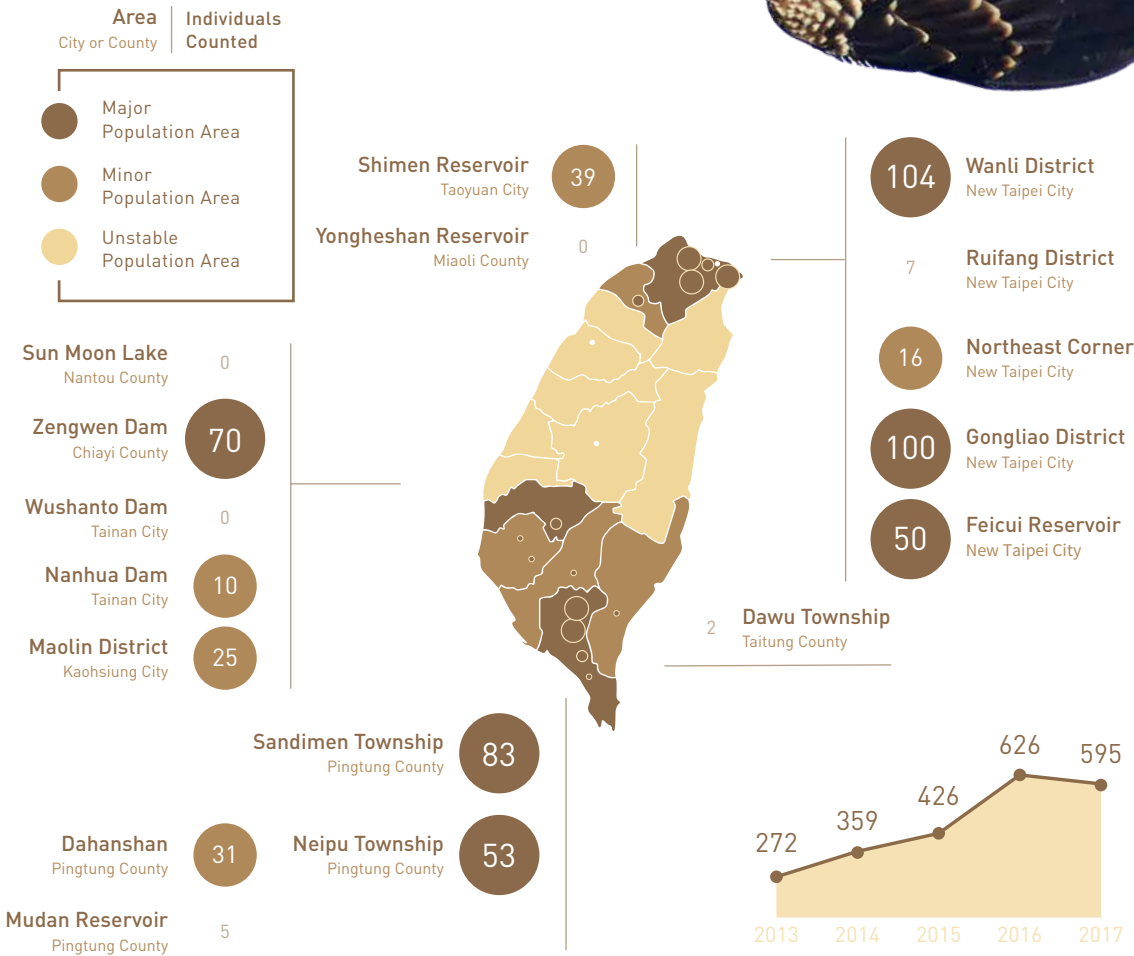
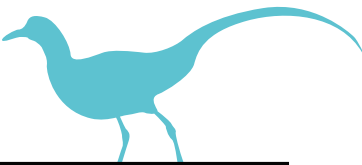


Figure 2.3.1. Black Kite distribution in 2017 and population trends from 2013-2017 (Source: RRGTT).

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.4 Pheasant-tailed Jacana

Wen-Chen Lee, Jung-Hsuan Weng



The Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) is common in many parts of South and Southeast Asia, yet is a threatened species in Taiwan. These long-toed waterbirds also have a rather specialized breeding requirement. They prefer to breed in the ponds which have *Trapa bispinosa*, *Euriale ferox*, *Nymphoides coreana*, or *Pistia stratiotes* growth. All are aquatic plants with floating leaves which the jacanas use for building nests and rearing their young.

Major threats to the jacana include habitat degradation and loss. Another is poisoning, as certain local farmers hold the belief that the jacanas will eat their rice seed. During the period of 2009-2011, 500 jacanas died of poisoning.

In 1998, there were only 50 Pheasant-tailed Jacanas left in Taiwan, with most being located in the agricultural ponds of the southwest (Fig. 2.4.1). However, in 2000 the Forestry Bureau launched a number of conservation actions for jacanas. This included improving the quality of breeding habitat, compensating landowners with jacanas on their property, and creating a protected breeding area at the Pheasant-tailed Jacana Conservation Park. Due to these efforts as well as those of local conservationists, numbers have been on the rise since 1998 (Fig. 2.4.2). The number of nests in the park also increased significantly from 2000 to 2017. Conservation action has clearly benefited the local population, yet more still remains to be done. Therefore, in the near future, stakeholders including NGOs and local authorities will work to create a more jacana-friendly agricultural environment which improves agricultural production and protects biodiversity.

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species

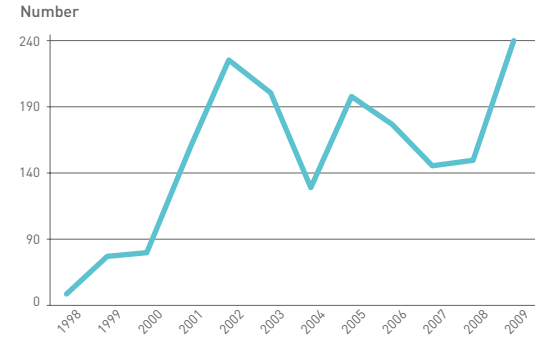


Figure 2.4.2. Population trends for the Pheasant-tailed Jacana from 1998-2017.

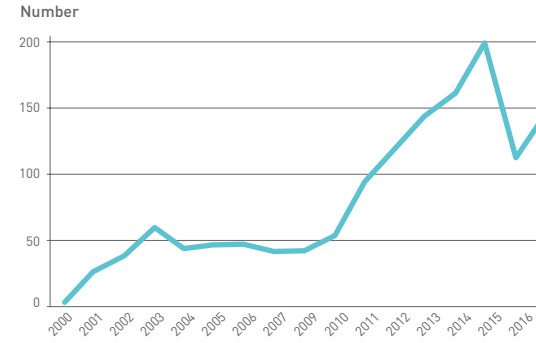


Figure 2.4.3. Number of Pheasant-tailed Jacana nests recorded in the Pheasant-tailed Jacana Conservation Park from 2000-2017.

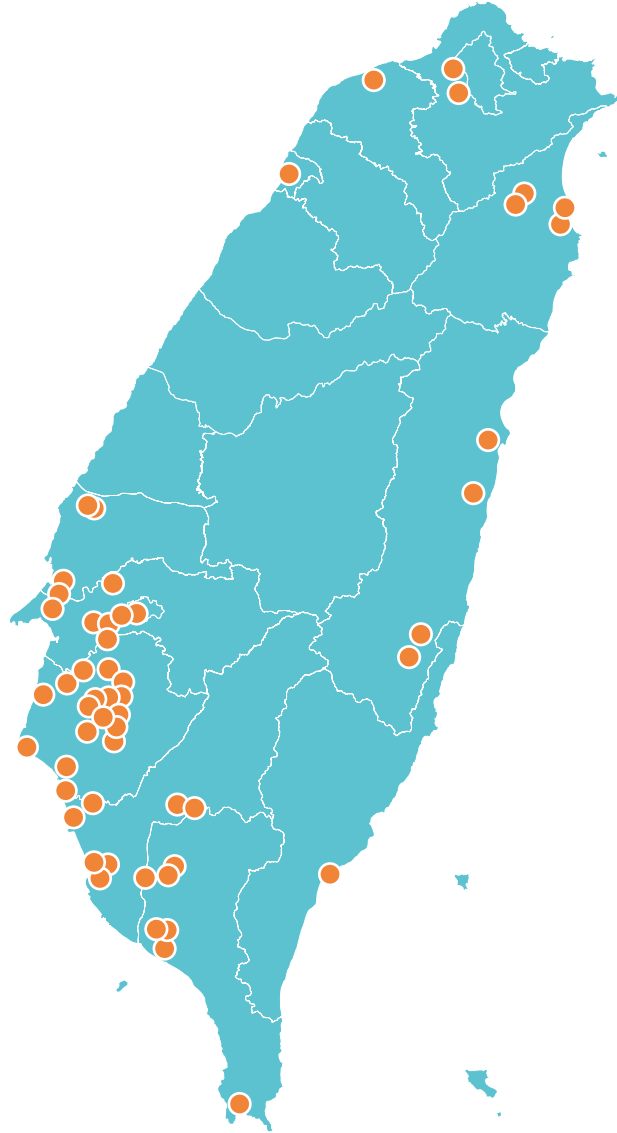


Figure 2.4.1. Distribution of Pheasant-tailed Jacanas in Taiwan.

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species

2.5 Fairy Pitta

Ruey-Shing Lin, Jerome Chie-Jen Ko, Wen-Chie Chih,
An-Yu Chang, Cheng-Te Hsu

Known locally as “the little angel”, the Fairy Pitta (*Pitta nympha*) is a brightly colored passerine which migrates along the EAAF, breeding in East Asia and wintering in Southeast Asia. It is a summer visitor in Taiwan, breeding in the understory of broad-leaved forests (Fig. 2.5.1).

In 2005, the TESRI launched a monitoring project at a Fairy Pitta breeding site in central Taiwan's Yunlin County to better understand its population dynamics. An islandwide survey was later launched in 2010. These are some of the longest running Fairy Pitta surveys in Asia and also some of the most robust studies on the species. Results showed that Taiwan's breeding Fairy Pitta population decreased rapidly from 2005-2018 (Fig. 2.5.2), with habitat loss and deforestation possibly posing the largest threats to them in Taiwan.

Also, though unconfirmed, it is speculated that the main threat to Taiwan's breeding Fairy Pittas comes from habitat loss at its wintering site in Borneo. However, more international collaboration is needed to better understand the situation.

Future conservation actions in Taiwan will focus on preserving its forest habitat, monitoring population numbers, and working with other countries along its range to better develop collaborative conservation plans.



Figure 2.5.1. Distribution range of the Fairy Pitta (breeding area=orange, wintering area=blue).

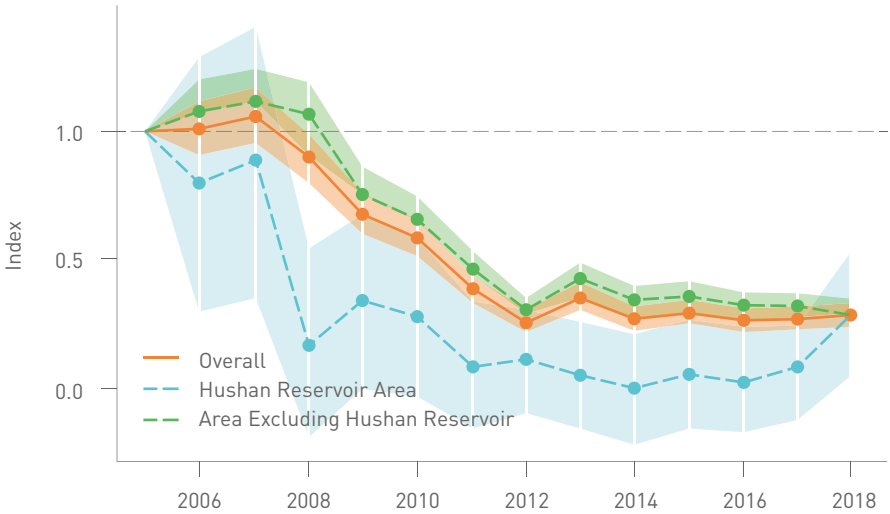


Figure 2.5.2. Fairy Pitta population trends for the area around Linnei Township and Douliu City in Yunlin County, Taiwan.

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.6 Russet Sparrow

Wei-Jia Wen, Jia-Jia Lyu, Jo-Szu Tsai

The Russet Sparrow (*Passer cinnamomeus*) is a small passerine with a distribution that ranges from East Asia to the Himalayas. At the global level, it is listed as “Least Concern” by the IUCN. However, within Taiwan it is considered “Endangered”, with the local population initially estimated to be less than 1,000 individuals.

To address this, researchers from National Chiayi University (NCYU) and TESRI jointly launched a monitoring program and a number of conservation actions on behalf of the Russet Sparrow. The team first collected historical population data from the TWBF Bird Database and eBird for the period spanning 1972-2017. From this data, researchers noticed that most Russet Sparrow observations took place at elevations of 1,000-2,000m in central and southern Taiwan (Fig. 2.6.1). Also, most recorded sightings took place between March and July (Fig. 2.6.2).

To estimate the population status of the Russet Sparrow, the research team did occupancy modeling based on the findings of a systematic playback survey around the Zengwen Dam in Chiayi County. Results indicated that the number of birds in the area may have decreased gradually (Fig. 2.6.3) over time. Later, the survey area was altered to include all of Taiwan island. Based on those results, it was estimated that the population size stood at about 1,433 individuals.

Currently, it is speculated that species such as the Eurasian Tree Sparrow (*Passer montanus*), Green-backed Tit (*Parus monticolus*), and Rufous-faced Warbler (*Abroscopus albogularis*), as well as the invasive Javan Myna (*Acridotheres javanicus*), compete for nesting space with Russet Sparrows. To encourage breeding, the NCYU and TESRI team set up 291 nest boxes in 2015, 67 of which were later used by Russet Sparrows. In the future, researchers will continue monitoring the population and working with nest boxes with the goal of improving their reproductive status.

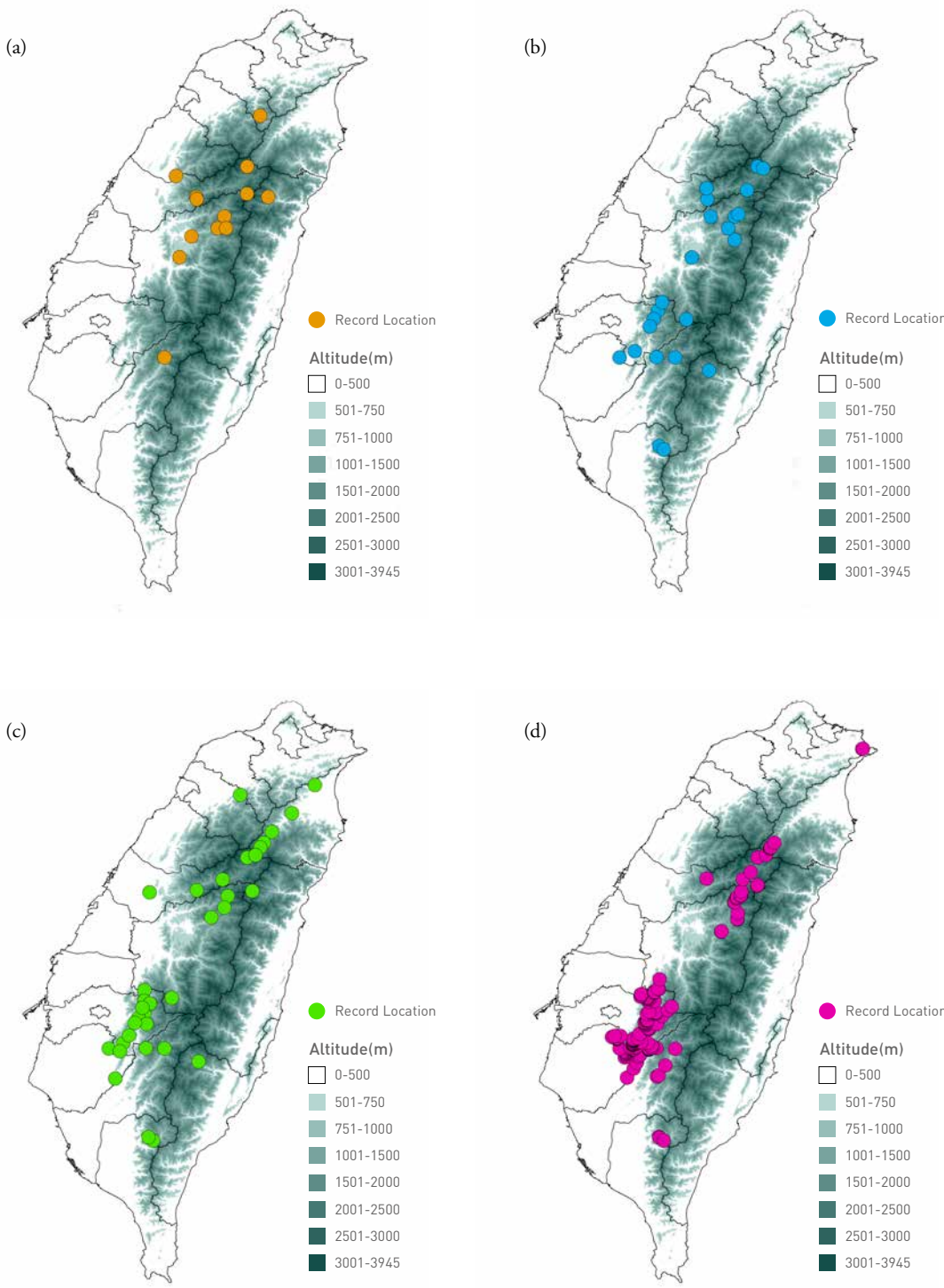


Figure 2.6.1. Historical distribution of the Russet Sparrow during the period of (a) 1972-1987 (b) 1988-1997 (c) 1998-2007 and (d) 2008-2017.



Figure 2.6.2. Monthly distribution for Russet Sparrow during the period of 1972-2017.

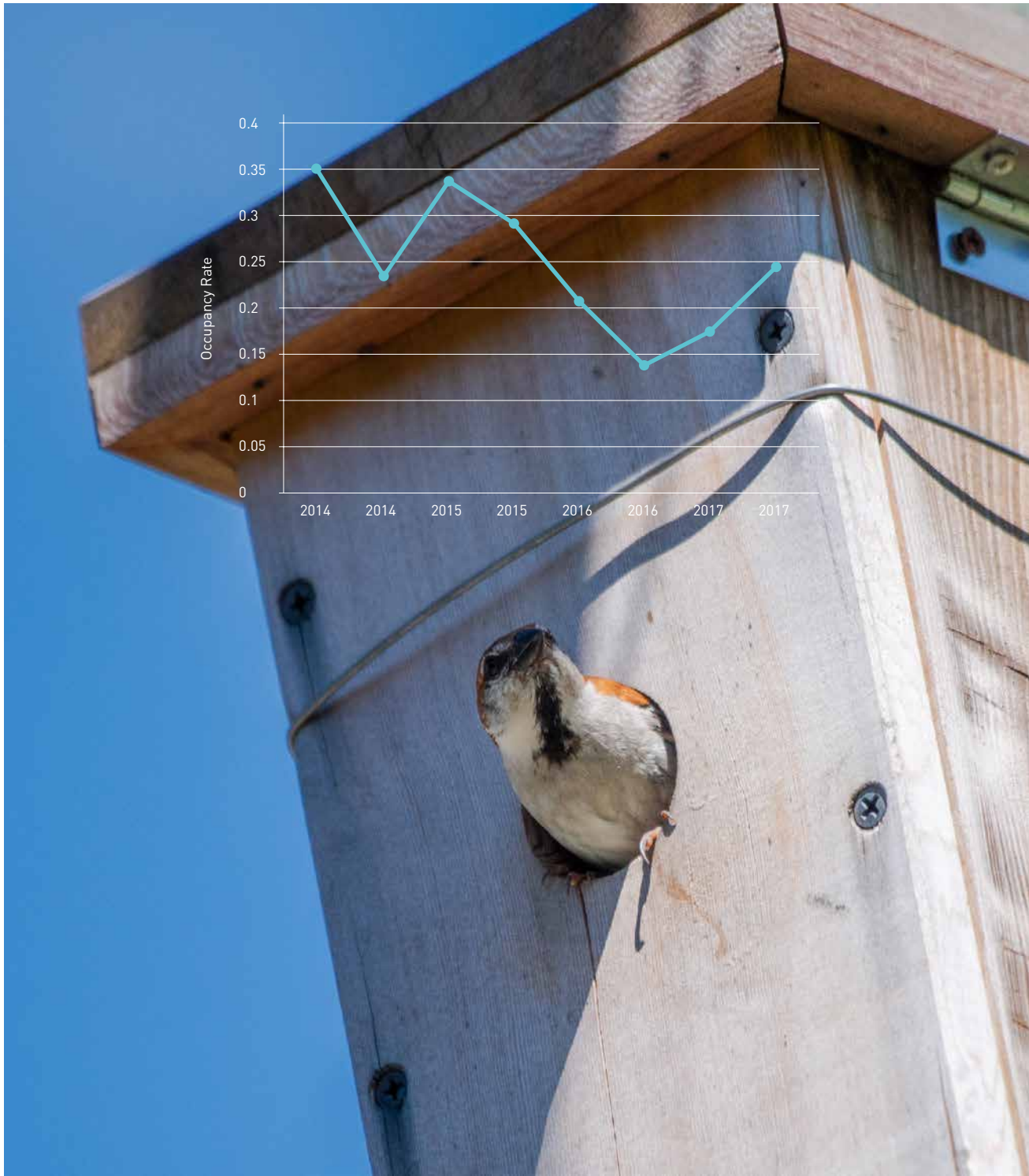


Figure 2.6.3. Probability modeling of Russet Sparrow population trends at the Zengwen Dam.

Part 2. A Closer Look: The Status and Trends of Specific Bird Species



2.7 Northern Lapwing

Mei-Ru Su, Jhen-Fang Wang, Hsueh-Chin Chen

The Northern Lapwing (*Vanellus vanellus*) is considered an uncommon wintering bird in Taiwan. However, southwestern Taiwan's Yunlin County serves as a major wintering site, with thousands heading there each year to forage in local peanut farms. It is speculated that this could constitute one of the largest wintering populations of Northern Lapwings in East Asia. Recorded observations from the TWBF Bird Database and eBird also confirm that the Yunlin section of the Chianan Plain is a hotspot for the Northern Lapwing (Fig. 2.7.1).

To better understand the population dynamics of the wintering Northern Lapwings, the Wild Bird Society of Yunlin (WBSY) and TESRI launched the Lapwing Survey Yunlin in 2009. In this citizen science-driven project, every January over 100 researchers and volunteers count the Northern Lapwings in Yunlin County. Based on the results, it is now known that abundance levels have fluctuated over the years, with 4,131 individuals counted in 2013 but only

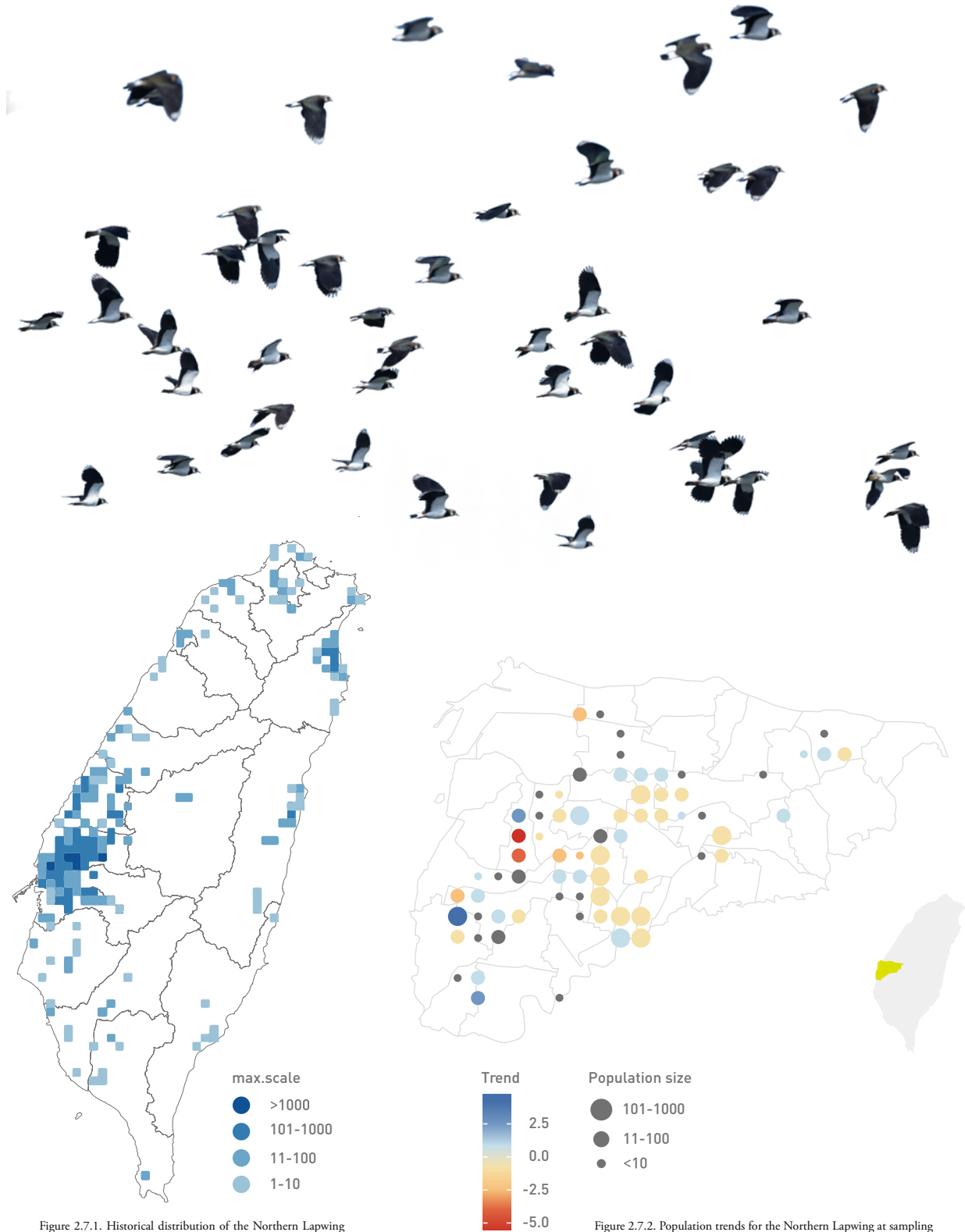
2,184 counted in 2018. In general, the overall population has decreased gradually between 2013 and 2018 (Fig.2.7.2).

The Northern Lapwing relies on open spaces and agricultural ecosystems. Studies from Europe revealed that soil quality and farming methods affect the presence of Northern Lapwings significantly because they influence the availability of its major food source, earthworms. The agricultural makeup of Yunlin County consists mainly of farms which rotate between the cultivation of rice and peanuts. This may be the reason so many Northern Lapwings are attracted to the area. Monitoring the changes in local land use is therefore considered one of the most important actions for protecting the wintering Northern Lapwing population in Taiwan.



Part 2. A Closer Look: The Status and Trends of Specific Bird Species

2.7 Northern Lapwing



Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.8 Australasian Grass-Owl

Shun-Yun Chang, Jia-Jia Lyu,
Kun-Hai Lin, Jo-Szu Tsai

Tyto longimembris pithecopis is a protected endemic subspecies of Australasian Grass-Owl in Taiwan. It prefers open non-forest habitats such as grasslands and farmlands. However, this means that their favored habitat is often located within close proximity of areas prone to human disturbance. The main threats to the species are habitat loss, rodenticides, and bird traps. Also, with their large home ranges and the fact that they are nocturnal, it has been difficult to design a nationwide monitoring scheme to better understand their population trends. To date, Taiwanese researchers are still unable to confidently estimate the total number of Australasian Grass-Owls in the wild.

Australasian Grass-Owls are commonly observed in the plains of southwestern Taiwan. Because of this, the area was chosen by a research team from NCYU to survey the Australasian Grass-Owl population from 2015-2017. Though the team used a total of 47 sampling sites, the owls were only present at 19 of them. They were generally observed as individuals, dominating large patches of grassland along river banks (Fig. 2.8.1). Survey results helped researchers create a projection map of the potential distribution of Australasian Grass-Owls in Taiwan (Fig. 2.8.2).

There are a number of conservation actions underway to help conserve the Australasian Grass-Owl. The KWBS hosted several environmental education events regarding grass-owl conservation in schools and communities throughout southern Taiwan. Also, the Forestry Bureau has provided funding towards research and monitoring projects for grass-owl conservation. Finally, the NCYU research team will continue to monitor the population by performing surveys and tracking a certain number of individuals using satellite technology.



Part 2. A Closer Look:
The Status and Trends of Specific Bird Species

2.8 Australasian Grass-Owl

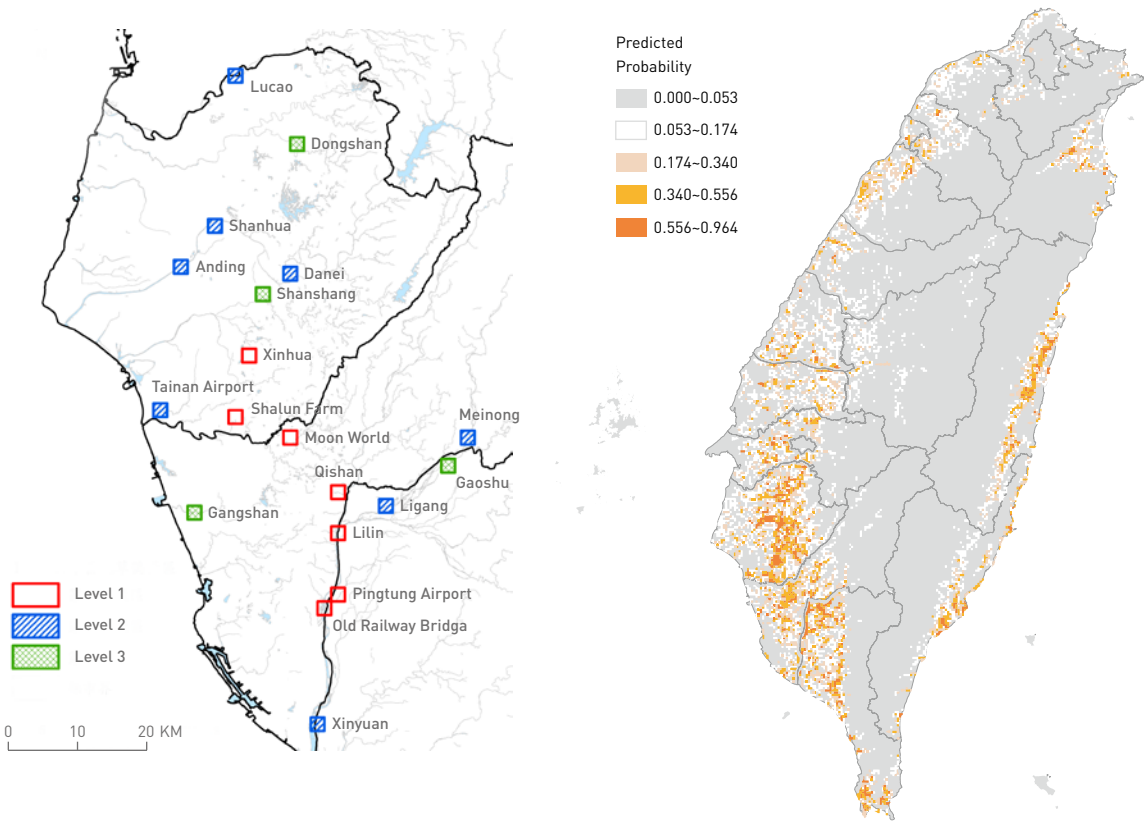


Figure 2.8.1. Survey sites where at least one Australasian Grass-Owl was observed between 2015 and 2017.

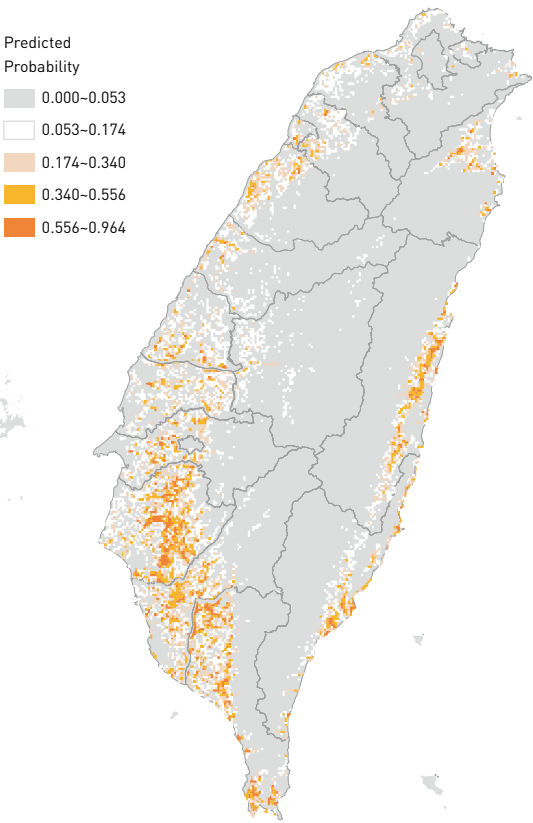


Figure 2.8.2. Projection map showing the potential distribution of Australasian Grass-Owls in Taiwan.

Part 2. A Closer Look:
The Status and Trends of Specific Bird Species



2.9 Mountain Hawk-Eagle

Yong-Kun Huang, Yuan-Hsun Sun

The Mountain Hawk-Eagle (*Nisaetus nipalensis*) is considered an endangered species in Taiwan and is protected under the Wildlife Conservation Act. The country's largest raptor, it predominantly resides in primary forests at elevations of 500-3,000m, yet have been recorded in artificial forests as well. Tracking data has shown that the home range for an adult Mountain Hawk-Eagle tends to be about 5 km², yet for immature birds it could be up to 607.7km².

Past research put the estimated population of Mountain Hawk-Eagles in Taiwan at 1,400 individuals (Fig. 2.9.1). However, recent studies have shown that the population is threatened and currently showing signs of decline. This is a result of both poaching and habitat loss. Poaching pressure is mainly the result of demand for feathers used to adorn headdresses worn during ceremonies and festivals held by both the Paiwan and Rukai tribes (Figure 2.9.2). In the past, rigorous regulations were in place regarding the use of such feathers. Yet recent changes in relation to the custom have created this new stress on the population.

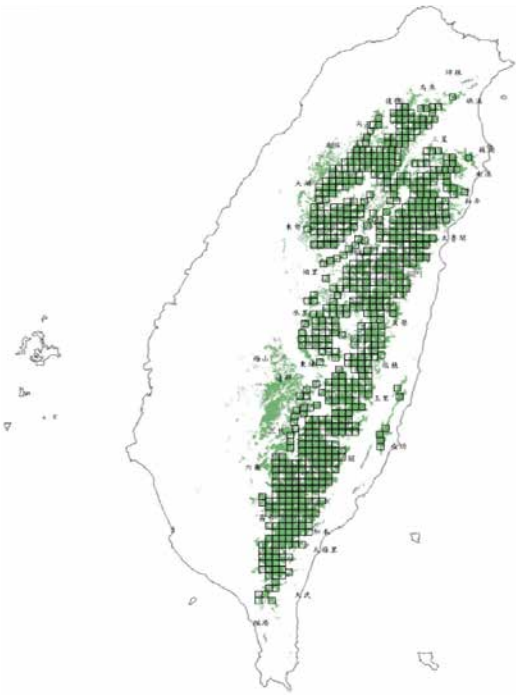


Figure 2.9.1. A distribution projection for Taiwan's Mountain Hawk-Eagle population.

Researchers are working on numerous conservation strategies to strike a balance between traditional culture and conservation. They include doing further research on Mountain Hawk-Eagle life history, habitat needs and population monitoring as well as continuing to monitor the hunting pressure. There is also an experiment currently underway which tries to use painted domestic goose feathers as a substitute. Another idea is to establish a "Mountain Hawk-Eagle Feather Repository" to collect the molted feathers of captive or rescued birds to address indigenous traditional needs. Finally, researchers are also looking to hold regular and open discussions with tribal leaders of both the Paiwan and Rukai tribes to better understand the feather wearing specifications and tour township schools to hold conservation education events.



Figure 2.9.2. Certain aboriginal tribes in Taiwan will use Mountain Hawk-Eagle feathers to adorn traditional garments for ceremonies and festivals.

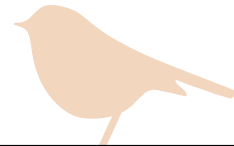
The State of Taiwan's Birds 2020



Part 3.

Major Conservation Issues

- 3.1 Climate Change
- 3.2 Wetland Loss and Degradation
- 3.3 Wild Bird Trade in Taiwan
- 3.4 Invasive Bird Species
- 3.5 Urbanization
- 3.6 Poisoning
- 3.7 Seabird Bycatch



3.1 Climate Change

Wen-Chien Wang, Tzu-Chien Kuo,
Hau-Jie Shiu, I-Ching Chen

Significant knowledge gaps exist related to bird responses and adaptations to climate change in Taiwan. This includes physiological and evolutionary adaptations, phenology shifts, impacts of extreme events, and disease risks. Taiwan's average yearly temperature has risen by about 1.3°C for over the last century, with accelerated warming and increased climatic variability both being recorded. Also, over the last 20 years, a northward shift in the distribution of birds and an expansion of low altitude bird communities has been observed. Researchers are now assessing the vulnerability of Taiwan's birds to climate change and working to formulate appropriate conservation strategies.

Climate Change Vulnerability Assessments (CCVA) examine vulnerability to climate change using three measurement criteria: (1) exposure—the extent to which a species is exposed to future climate stress; (2) sensitivity—the extent to which population dynamics respond to climate change; (3) adaptive capacity—the ability of a species to eliminate climate threats through its own adjustments, such as migration or evolutionary adaptation. Researchers used data from BBS Taiwan and the Taiwan Climate Change Projection and Information Platform (TCCIP) to evaluate these topics. To investigate climate exposure, five spatial indexes of distribution change were developed according to projections of current and future bird distributions. Meanwhile, to evaluate sensitivity, an analysis of whether bird population dynamics are sensitive to temperature or precipitation changes was performed. Finally, adaptive capacity was evaluated by examining clutch sizes and the foraging strategies of various bird species.

Climate vulnerability was calculated for 83 species of bird in Taiwan. Analyzing interactions between the three measurement criteria, four groups of species and their differing conservation needs were identified:

(1) Highly Vulnerable (13 species)—These species are highly sensitive, highly exposed, and have low adaptive capacity. Urgent conservation actions are required for species in this group, which includes the Oriental Cuckoo (*Cuculus optatus*).

(2) Potential Adapters (4 species)—These species are highly sensitive and highly exposed but have high adaptive capacity. Monitoring schemes and the development of approaches to assist their adaptive behaviors should be considered while developing conservation strategies for species in this group, which includes the Large-billed Crow (*Corvus macrorhynchos*).

(3) Potential Persisters (19 species)—These species are not sensitive to climate change yet are highly exposed with low adaptive capacity. They may be able to withstand climate change without changing their traditional distribution patterns. Long term monitoring will be needed though to ensure population resilience. This group includes species such as the Ashy Wood Pigeon (*Columba pulchricollis*).

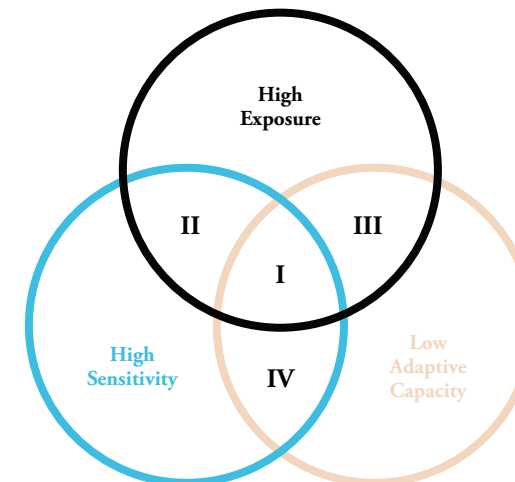
(4) High Latent Risk (11 species)—These species are highly sensitive with low adaptive capacity but are not exposed to climate change. They are not of immediate concern yet climate monitoring is required to ensure population dynamics remain stable. This group includes species such as the Striated Prinia (*Prinia crinigera*).

I. Highly Vulnerable

Oriental Cuckoo
Brown Bullfinch
Taiwan Whistling Thrush
Gray Treepie
Taiwan Scimitar Babbler
Taiwan Bush Warbler
Yellow-bellied Prinia
Gray-throated Martin
Black-naped Monarch
Crested Goshawk
Taiwan Barbet
Taiwan Partridge
Light-vented Bulbul

II. Potential Adapters

Large-billed Crow
Coal Tit
Barred Butontail
Scaly-breasted Munia



IV. High Latent Risk

Striated Prinia
Black Drongo
White-whiskered Laughingthrush
Collared Finchbill
White-bellied Erpornis
White-bellied Pigeon
Japanese White-eye
Asian Emerald Dove
Plain Prinia
Plumbeous Redstart
Dusky Fulvetta

III. Potential Persisters

Ashy Wood Pigeon
Fire-breasted Flowerpecker
Rusty Laughingthrush
White-backed Woodpecker
Besra
Large Hawk-Cuckoo
Grey-chinned Minivet
Golden-headed Cisticola
Oriental Skylark
Taiwan Cupwing
Striated Swallow
Asian House Martin
Pacific Swallow
Red Collared-Dove
Yellowish-bellied Bush-Warbler
Vivid Niltava
White-tailed Robin
Taiwan Barwing
Lesser Coucal

Only five of the climatically vulnerable species were listed as Nationally Near-Threatened (NNT) in the Red List of Birds of Taiwan: Taiwan Bush Warbler (*Locustella alishanensis*), White-backed Woodpecker (*Dendrocopos leucotos*), Grey-chinned Minivet (*Pericrocotus solaris*), Yellow-bellied Bush Warbler (*Horornis acanthizoides*) and Striated Prinia (*Prinia crinigera*).

Taiwanese researchers are concerned that the potential threat of climate change still remains largely underestimated in the country. In addition, nearly half of Taiwan's breeding birds are data deficient, so they were unable to be included in the study. Migratory birds have also yet to be evaluated and should be prioritized in future assessments. In the future, countering the synergistic effects between climate change and other pressures such as urbanization, habitat fragmentation, interactions with invasive species, pesticide use and pollution will prove to be one of the most pressing issues for birds and biodiversity conservation in Taiwan.

Part 3. Major Conservation Issues



3.2 Wetland Loss and Degradation

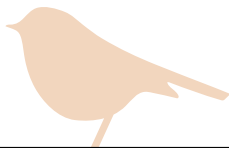
Allen Lyu, Chien-Jung Peng,
Yi-Chiao Li, Wan-Jyun Chen,
Adam Lee, Shih-Peng Tsai



In recent years, wetland loss has developed into one of the most serious threats to migratory waterbirds along the East Asian-Australasian Flyway. In Taiwan, the situation is no less severe. Between 1995 and 2015, Taiwan saw a loss of 4,720.35ha of wetlands, namely agricultural wetlands, mudflats, and water bodies (Fig. 3.2.1-3). Meanwhile the wetlands which still remain annually see a number of globally threatened species, including Nordmann's Greenshank, Great Knot, Red Knot, Saunders's Gull, Spoon-billed Sandpiper, and around 60% of the global wintering population of Black-faced Spoonbills. Over the years, local NGOs and civic groups have worked to protect these internationally important wetlands. Currently, there are 30 wetlands which have earned the label of Important Bird and Biodiversity Areas (IBAs), a designation given to areas vital to bird species based on international standards.

Even so, due to issues related to illegal land-use, habitat loss, and human pressure, these remaining wetlands have decreased rapidly, and their ecosystem services have also declined. Over the last 15 years, land competition among different sectors has become intense, and illegal land-use is unfortunately common. As an example, about 38,000 factories and luxury houses have been illegally built in central and northeast Taiwan since 2010, most of which were located within or adjacent to paddy fields. Pollution from illegal factories has also affected these fragile ecosystems. Now, there is new concern stemming from a number of green energy projects planned for these already squeezed areas.

Part 3. Major Conservation Issues



3.2 Wetland Loss and Degradation

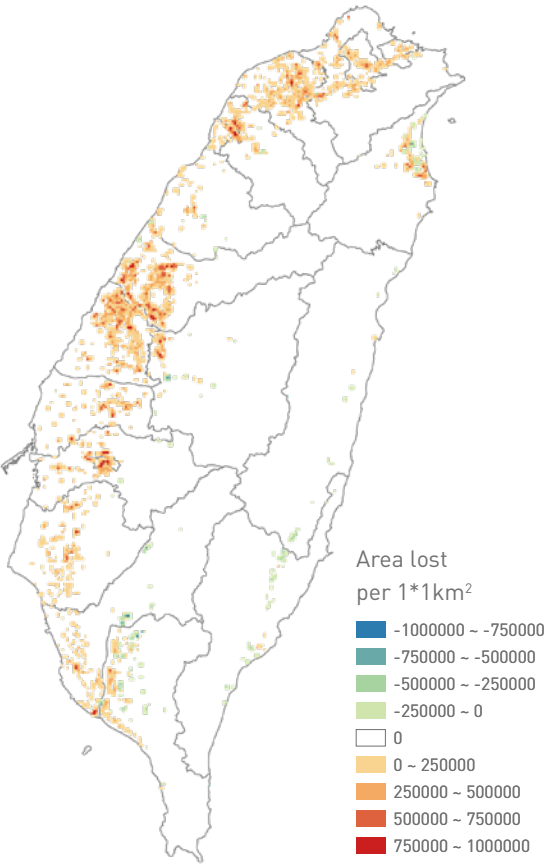


Figure 3.2.1. Loss of agricultural wetlands in Taiwan between 1995 and 2015. Red indicates wetland loss, while blue indicates wetland expansion.

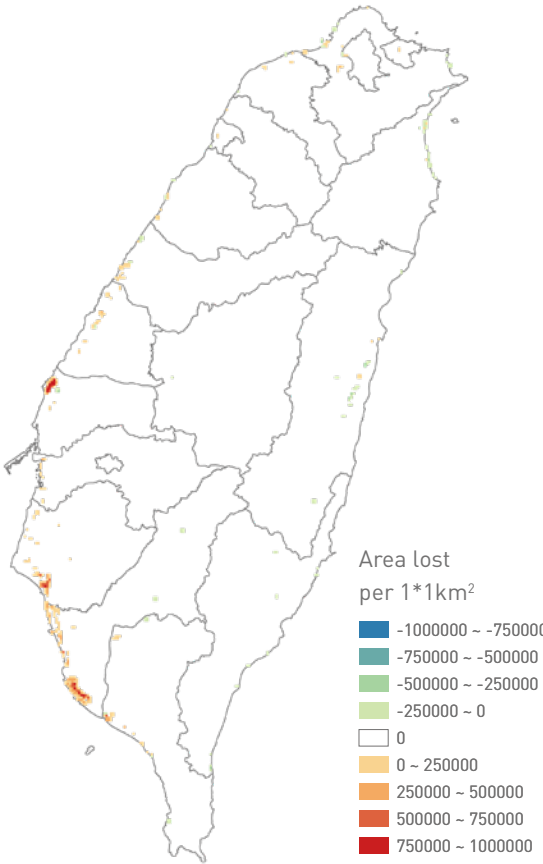


Figure 3.2.2. Mudflat loss in Taiwan between 1995 and 2015. Red indicates wetland loss, while blue indicates wetland expansion.

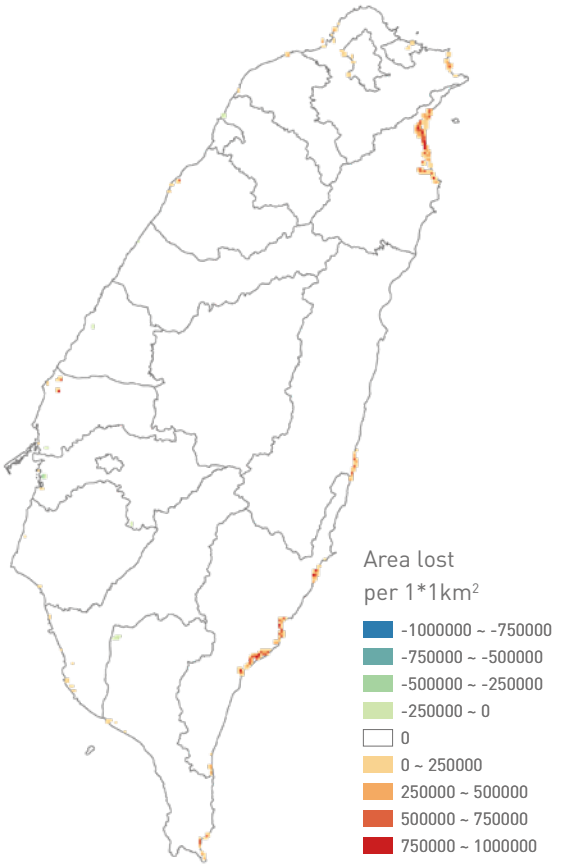


Figure 3.3.3. Water body loss in Taiwan between 1995 and 2015. Red indicates wetland loss, while blue indicates wetland expansion.

Part 3. Major Conservation Issues



3.3 Wild Bird Trade in Taiwan

Tzung-Su Ding

The illegal bird trade is currently a relatively small field of study in Taiwan. In the past hunting was a major threat to bird species, however after the passage of the Wildlife Conservation Act in 1989, the number of illegal hunting cases decreased dramatically. Now, demand for wild-caught birds comes from the pet trade and those looking to use the birds in religious ceremonies, primarily the Buddhist practice of “mercy release”. In recent years, over 80% of wild-caught birds were used for religious ceremonial purposes. Most transactions for these birds are made secretly, while in the case of the pet trade, transactions usually take place at pet shops. Social media has also become a major platform for both sellers and buyers of wild birds. Due to limited information, it is hard to know the exact number of birds being removed from Taiwan’s forests, yet it is estimated that the number of captured and for sale individuals may be anywhere from 200,000 to one million. A total of 247 bird species from 65 families are known to have been caught and sold in Taiwan. Most are terrestrial residents, including some protected species. For religious ceremonies, the most sought after bird is the Eurasian Tree Sparrow (*Passer montanus*), followed by the Light-vented Bulbul (*Pycnonotus sinensis*), Red Collared-Dove (*Streptopelia tranquebarica*), Spotted Dove (*Streptopelia chinensis*), Scaly-breasted Munia (*Lonchura punctulata*), and White-rumped Munia (*Lonchura striata*). For the pet trade, the most traded bird is the Swinhoe’s White-Eye (*Zosterops simplex*), followed by the Siberian Rubythroat (*Calliope calliope*), Crested Myna (*Acridotheres cristatellus*), Blue Rock-Thrush (*Monticola Solitarius*), Daurian Redstart (*Phoenicurus auroreus*), and Oriental Skylark (*Alauda gulgula*).



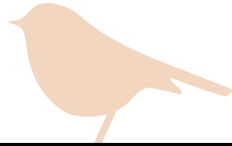
Figure 3.3.1. Fairy Pittas displayed in a bird shop around Sun Moon Lake in central Taiwan in the 1960s (Liu 1987).

Although there has been a decrease in the number of illegal pet trade cases over the last 20 years, there is still much work that needs to be done. In the future, researchers plan to do more studies to better understand the situation surrounding Taiwan’s wild bird trade as well as its effects on the country’s wildlife. Meanwhile, conservationists plan to continue working on environmental education and conservation law implementation to protect Taiwan’s wild birds from illegal capture and trade.



Figure 3.3.2. Bird shops in Taipei City, Taiwan.

Part 3. Major Conservation Issues



3.4 Invasive Bird Species

Jo-Szu Tsai, An-Yu Chang, Ruey-Shing Lin

Invasive species pose a serious threat to biodiversity around the world, including in Taiwan. To assess the status and trends of invasive birds in Taiwan, researchers analyzed observations of invasive species from the TWBF Bird Database and eBird Taiwan between 1972 and 2017, excluding species with both native and invasive populations, such as the Mallard (*Anas platyrhynchos*) and the Common Pheasant (*Phasianus colchicus*). Invasive bird species richness increased rapidly during the 1980s and Taiwan currently hosts 40 different invasive bird species (Fig. 3.4.1). Furthermore, they are distributed throughout the country (Fig. 3.4.2). However, most were found in urban areas such as the cities of Taipei, Taichung, and Kaohsiung. This implies that certain invasive species escaped from enclosures and made their way into local ecosystems. Results also indicate that the distribution of invasive birds has expanded dramatically.

The most abundant invasive bird species in Taiwan is the African Sacred Ibis (*Threskiornis aethiopicus*) followed by the Javan Myna (*Acridotheres javanicus*) and Common Myna (*Acridotheres tristis*). These species have expanded their ranges over time (Fig. 3.4.3-4).

Data analysis also showed that over the last 20 years, invasive bird numbers have been increasing rapidly. With that in mind, various groups are working to address the threats posed by these alien species. Researchers are engaged in plans to remove invasives, such as the Village Weaver (*Ploceus cucullatus*), before they can expand their ranges. Meanwhile, in 2019, Taiwan's Forestry Bureau began a project to remove African Sacred Ibis in an attempt to control their population numbers. Finally, a dialogue is underway between the conservation and research communities to create a communications platform helping stakeholders take the necessary steps towards removing invasive species before they can expand their ranges.

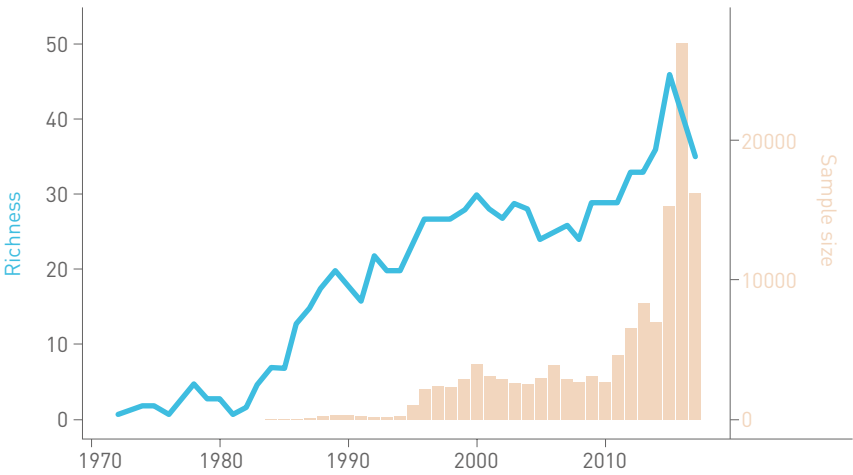


Figure 3.4.1. Trends in invasive bird species richness between 1972 and 2017.



Part 3. Major Conservation Issues

3.5 Poisoning

Shiao-Yu Hong

The Poisoning facing Taiwan's birds can be traced back to the first proven case of a Black Kite (*Milvus migrans*) dying after ingesting the insecticide carbofuran in 2012. This was followed by another Black Kite whose death was the result of secondary poisoning from second-generation anticoagulant rodenticides (SGARs) just a year later. In October 2014, a Facebook group called "Bird Poison Report, Taiwan" was created as a citizen science-led platform for sharing information about suspected poisoning incidents. By September of 2018, there were 250 posts outlining incidents in agricultural areas which had resulted in the deaths of at least 5,957 farmland birds (not including kites). Field-types most often associated with such events were direct-seeded rice (*Oryza sativa*), rice soon to be harvested, and red beans (*Vigna angularis*).

Tissue samples were later taken from 40 dead birds, each representing a different incident, and tested for traces of pesticides. Thirty eight samples contained carbofuran, and two contained terbufos. Both are highly toxic insecticides. Further investigation led to the conclusion that most cases represented intentional poisoning by farmers attempting to control avian pests and rats (Fig. 3.6.1-2). These results led the Taiwanese government to ban the use of high concentration carbofuran in 2017.

Meanwhile, in testing samples taken from 12 Black Kites which died over the period of 2012 to 2018, five contained carbofuran, six contained SGARs, and one contained both. They were likely the victims of inadvertent secondary poisoning. A dramatic decrease in Taiwan's Black Kite population in the 1980s coincides with a rapid increase in areas planted with direct-seeded rice and the widespread use of carbofuran and rodenticides. It was also at this time that the Taiwanese government began holding annual anti-rodent campaigns, providing up to 900 tons of SGARs (mainly brodifacoum, flocoumafen and bromadiolone) to farmers and residents for free each year (Fig. 3.6.3).

Prompted by the first proven Black Kite poisoning case, 221 liver samples from 21 raptor species which died between 2010 and 2018 were tested for AR residue. Most birds were recovered from rescue organizations, but some free-ranging individuals were obtained from airports. ARs were detected in 10 species and more than half of the total samples. The rodent-eating Black-winged Kite (*Elanus caeruleus*) had the highest prevalence (89.2%) and highest

Figure 3.6.1. Carbofuran mixed in with rice. This method of pest control was taught by agricultural authorities in the 1980s as a way to control avian pest and rat populations.



Figure 3.6.2. Large numbers of farmland birds fall prey to intentional poisoning in Taiwan. Around 95% of dead birds tested had traces of carbofuran in their systems.

average concentration (0.211 ± 0.219 mg/kg) of ARs. Black Kites and Crested Serpent-Eagles (*Spilornis cheela*) had the second highest prevalence and concentration, respectively (Fig. 3.6.4). In total, seven different AR compounds were detected, of which brodifacoum was the most common and had the highest average concentration, followed by flocoumafen and bromadiolone. The frequency of occurrence in the three most numerous species (Black-winged Kite, Crested Goshawk (*Accipiter trivirgatus*), and Collared Scops-Owl (*Otus lettia*)) was significantly higher in autumn than in summer, consistent with the timing of the Taiwanese government supplying free ARs to farmers. Regional differences in the detection of individual compounds also tended to reflect differences in human population density and use patterns (agriculture vs. urban-dominated ecosystems). Clinical poisoning was confirmed in Black Kites with concentrations as low as 0.026 mg/kg; however, further study of interspecific differences in AR sensitivity and potential population effects are needed (Fig. 3.6.5). The Taiwanese government has also modified its farmland rodent control policy, gradually reducing free ARs since 2015.

Researchers have developed four policy suggestions to address the crisis. First, gradually phase out high-risk insecticides which can harm wildlife. Second, strengthen regulations surrounding the purchase and use of SGARs. Third, research environmentally friendly bird and rodent control methods. Fourth, begin a nationwide effort to monitor the risks and effects of chronically hazardous pesticides and other environmental pollutants on bird health.



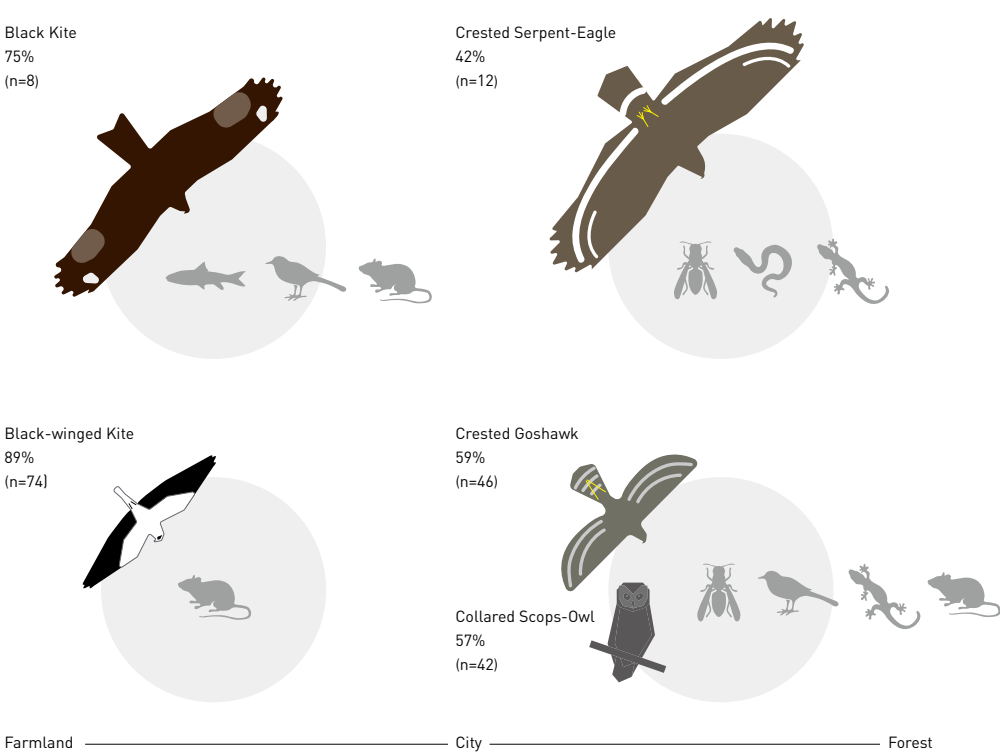


Figure 3.6.4. This chart shows five common raptor species in Taiwan, their primary prey species, and SGAR detection rate between 2010 to 2018.

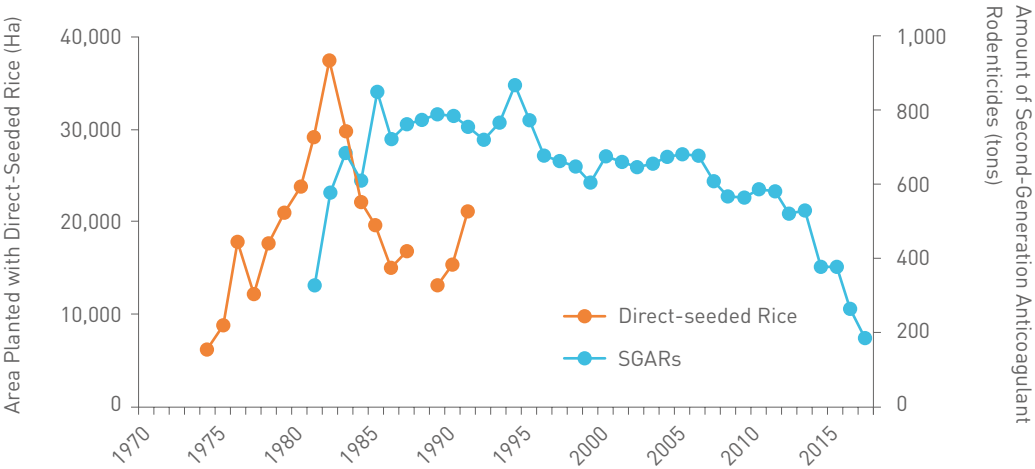
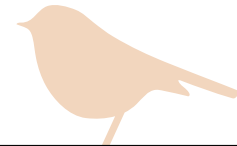


Figure 3.6.3. Quantity (in tons) of second-generation anticoagulant rodenticides (SGARs) that the Taiwanese government provided free to farmers each year from 1970-2018 compared to the area (in hectares) planted with direct-seeded rice from 1974-1993. The 1980s saw a spike in both numbers.



Figure 3.6.5. A Black Kite that died of internal bleeding caused by anticoagulant rodenticides.

Part 3. Major Conservation Issues



3.6 Seabird Bycatch

Julia Hsiang-Wen Huang, Yu-Min Yeh, Scott Pursner

Taiwan is a major longline fishing nation with an interest in proactive conservation measures. Sharing global concerns about the incidental bycatch of seabirds such as albatross and petrels, it has focused on bycatch issues since the 2000s. Over the past ten years, Taiwan has continued to work as an international partner towards mitigating against seabird bycatch in many ways. This includes the establishment of the Fishery Agency's vessel observer program, the government's adoption of a national plan of action, and the publication of regulations on mitigation measures. It also created and disseminated outreach and educational materials as well.

At the same time, local NGOs such as the TWBF have worked with academics and international groups such as the Royal Society for the Protection of Birds to try and raise public awareness on the issue. To this end, with the support of the Taiwan Fisheries Agency (FA) they held two rounds of educational outreach in Port Louis, Mauritius with Taiwanese vessel owners and captains, learning about their thoughts and actions regarding the use of seabird bycatch mitigation measures. Results and subsequent discussions with various stakeholders led to the 2019 Taiwan International Bird Scaring Line Workshop in Kaohsiung, Taiwan. The event brought together representatives from government, industry, the NGO sector, and civil society to discuss creating a better bird scaring line for Taiwanese vessels. The bird-scaring line (BSL) or tori line, is one of the three main mitigation measures promoted internationally as well as by the Taiwan FA to mitigate against seabird bycatch. It is essentially a rope with streamers which goes down past the back of the vessel, deterring birds from being able to get to sinking bait which could catch and drown them. The other two methods are branch line weighting, or weighting the baited line heavier, and night setting, which is to set

the fishing line completely between nautical dusk and nautical dawn. Through prior work with the FA and Taiwanese vessel captains, it was understood that the BSL is the most popular mitigation measure for captains. However, there were concerns about materials available and the ability for the BSL to properly work on a Taiwanese vessel. The meeting ended with a commitment to explore options for creating a BSL which might be better specifically for Taiwanese longliners.

Overall, continuing and improving the national observer program, ensuring the compliance of mitigation measures, and encouraging information exchange and international cooperation will contribute to the very important work of seabird conservation.



Citizen Science

Da-Li Lin, Scott Pursner



Citizen science is a form of participatory science where scientific research is conducted by local people who are usually volunteers. Taiwan, with its strong focus on the sciences and active civil society has been at the forefront of developing this field in Asia. Since 2009, numerous organizations have cooperated to launch and conduct different citizen science projects. A number of these have been critical in collecting the data used to create the State of Taiwan's Birds Report and are listed here. They have also led to the accumulation massive amounts of open data and contribute to the country having the second largest biodiversity database in Asia. This information is open to the public and on the website for the Taiwan Biodiversity Network (TBN). Via this open spatial-temporal database, anyone can look through Taiwan's nearly 7.8 million occurrence records for birds.

Domestically, this information has been used by academic institutions such as National Taiwan University and government agencies such as the Ministry of the Interior and the Council of Agriculture For developing collaborations or developing conservation strategies. Also, the Forestry Bureau has used this data to evaluate the threat risks to vertebrates in Taiwan, aiding in the publication of Taiwan's National Red List reports. Internationally, survey results done on migratory shorebirds help create a full picture of the situation faced by many threatened species along the East Asian-Australasian Flyway. Such data is regularly distributed to groups such as Wetlands International to assist these organizations in their conservation planning.

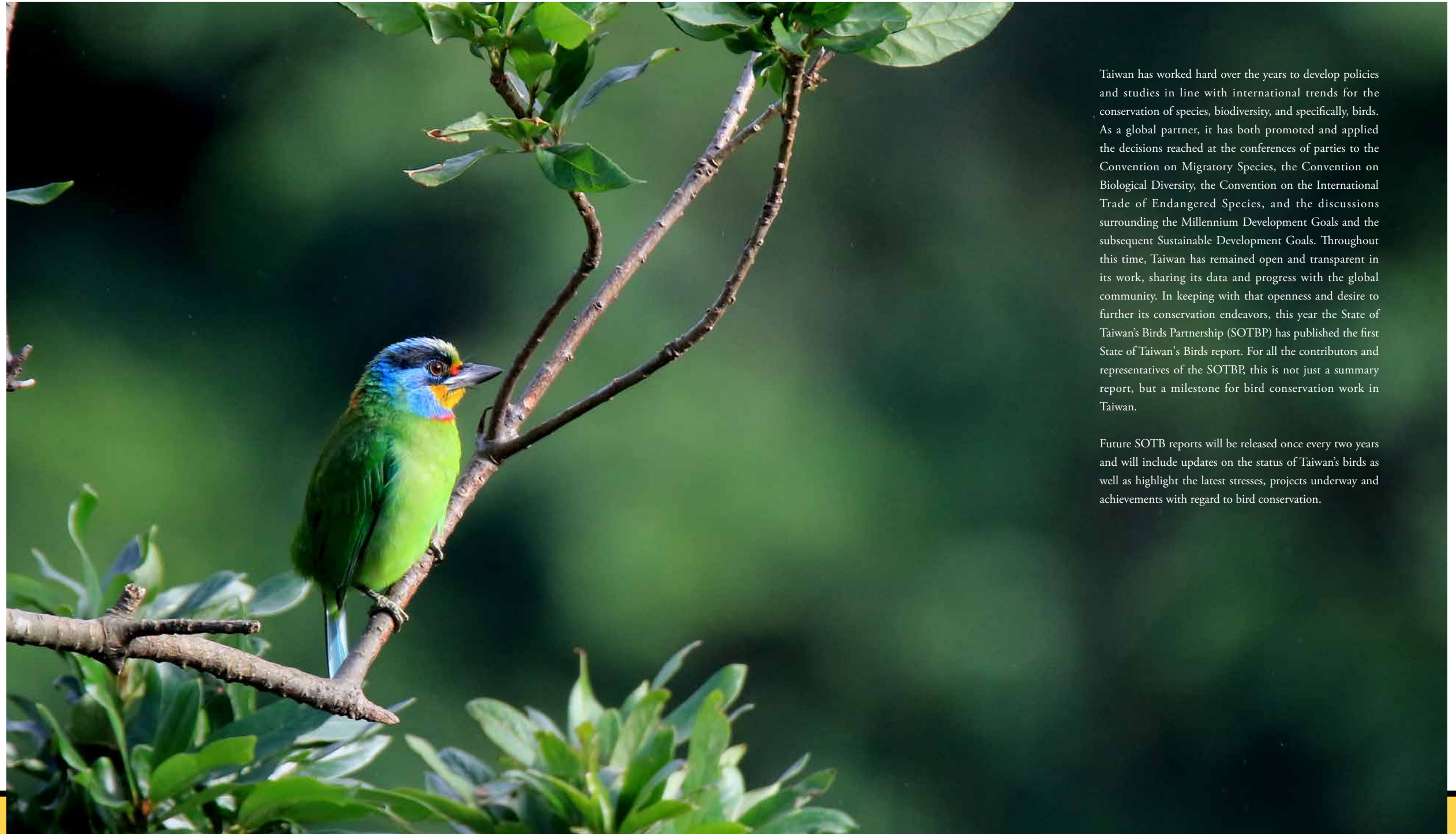
Citizen science projects not only allow volunteers to participate and conduct projects which are of interest, it also allows for them to learn more on individual species, conservation topics, ecological survey methods and more. It is a multi-functional tool for biodiversity conservation. The current biodiversity monitoring network of Taiwan will maintain these current projects and plans to do more outreach in the future. It is the hope of Taiwan's citizen scientists that they can better connect with the global community and share experiences, open data, and the power of civil society.

- Breeding Bird Survey Taiwan (BBS Taiwan)
- The Monitoring Avian Productivity and Survivorship program, Taiwan (MAPS Taiwan)
- New Year Bird Count Taiwan (NYBC Taiwan)
- eBird Taiwan
- Taiwan Bird Record Database
- Lapwing Survey Yunlin
- Jacana Survey Tainan
- Black-faced Spoonbill Conservation Network
- Window Collision
- Bird Poison Report (Taiwan)



Looking Ahead

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Taiwan has worked hard over the years to develop policies and studies in line with international trends for the conservation of species, biodiversity, and specifically, birds. As a global partner, it has both promoted and applied the decisions reached at the conferences of parties to the Convention on Migratory Species, the Convention on Biological Diversity, the Convention on the International Trade of Endangered Species, and the discussions surrounding the Millennium Development Goals and the subsequent Sustainable Development Goals. Throughout this time, Taiwan has remained open and transparent in its work, sharing its data and progress with the global community. In keeping with that openness and desire to further its conservation endeavors, this year the State of Taiwan's Birds Partnership (SOTBP) has published the first State of Taiwan's Birds report. For all the contributors and representatives of the SOTBP, this is not just a summary report, but a milestone for bird conservation work in Taiwan.

Future SOTB reports will be released once every two years and will include updates on the status of Taiwan's birds as well as highlight the latest stresses, projects underway and achievements with regard to bird conservation.

List of Abbreviations

BBS	Breeding Bird Survey
EAA	East Asian-Australasian Flyway
ESR	ESRI-Endemic Species Research Institute
GBIF	Global Biodiversity Information facility
IBA	Important Bird and Biodiversity Area
IEEB	Institute of Ecology and Evolutionary Biology (NTU)
IUCN	International Union for the Conservation of Nature
IWC	Institute of Wildlife Conservation (NPUST)
KNP	Kenting National Park
KWBS	Kaohsiung Wild Bird Society
MITF	Matsu Island tern Refuge
NPUST	National Pingtung University of Science and Technology
NTU	National Taiwan University
NYBC	New Year Bird Count
RRGT	Raptor Research Group of Taiwan
SOTBP	State of Taiwan Birds Partnership
TWBF	The Taiwan Wild Bird Federation
WBST	Wild Bird Society of Taipei
WBSY	Wild Bird Society of Yunlin



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