

Dataset of bird communities at Budai salt pans

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Abstract

In this data paper, a dataset is described of the bird community in the Budai salt pans of Chiayi County, Taiwan. Through monthly flock counting, bird species richness and abundance in 51 salt pans were recorded. In the survey period of 2016-2017, 1,291 sampling event records were accumulated. To date, 118 species which can be classified into 31 bird families have been recorded. Among the records, 11 are protected species of Taiwan, and 18 are in The Red List of Birds of Taiwan.

Keywords: sampling event, Aves, salt pan, species composition, abundance

布袋鹽田鳥類群集資料集

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摘要

本資料集為在臺灣嘉義縣布袋鹽田進行的每月鳥類調查資料。調查方式為群集計數法 (counting flocks)，記錄鹽田中的鳥種及數量。調查樣區包含 51 塊鹽田，於 2016-2017 年共累積了 1,291 筆取樣事件紀錄。目前共記錄到 31 科 118 種鳥類，其中有 11 種屬於臺灣保育類野生動物，18 種名列臺灣鳥類紅皮書名錄 (The Red List of Birds of Taiwan)。

關鍵詞: 取樣事件、鳥類、鹽田、物種組成、豐度

Introduction

As the areas of natural wetlands around the world have been sharply decreasing, the conservation value of artificial wetlands for waterbirds has been increasingly emphasized. Studies have revealed that seaside salt pans can be an alternative habitat for waterbirds (Warnock *et al.* 2002; Masero 2003; Sripanomyom *et al.* 2011; Dias *et al.* 2014) and reduce the impact caused by the loss of natural wetlands. For example, the abandoned salt pans in San Francisco are a breeding site for some waterbirds (Meckstroth and Miles 2005; Demers and Robinson-Nilsen 2012). Also, some salt pans are rich with invertebrates, providing a food source for shorebirds and diving ducks (Takekawa *et al.* 2009; Band *et al.* 2014).

The Budai salt pans are located in Chiayi County, Taiwan. Since the salt pans were abandoned in 2001, they have become one of the Important Bird Areas in Taiwan and an important winter habitat for migratory waterbirds. According to the Taiwan New Year Bird Count, which is held every winter, the Budai salt pans are the sample plot with the largest number of birds in Taiwan (Lin *et al.* 2014, 2015, 2016, 2017).

However, the Budai salt pans face environmental degradation problems. After the salt pans ceased to be used for production, the lack of human management, damaged water facilities, and progressive land subsidence caused the salt pans to become unsuitable habitats for waterbirds. In addition, the Budai salt pans consist of 102 ha of land that will be developed into a ground-mounted solar photovoltaic (PV) system. The development will considerably reshape the original wetland landscape.

To assess the influence that environmental changes have had on birds and propose possible habitat improvement measures, we conducted a monthly systematic bird survey at the Budai salt pans. The survey started in January, 2016. Until December, 2017, 1,291 sampling events have been recorded, documenting 118 species of birds and 388,456 bird individuals. Months with peak bird abundance ranged from November to February, consisting of over 20,000 birds each month (Fig. 1). The survey is expected to continue until 2019.

Project details

Project title: A preliminary study on enhancing waterbird habitats of Budai salt pan

Funding: Current funding from the Endemic Species Research Institute, Council of Agriculture, Executive Yuan, R.O.C. (Taiwan).

Study area descriptions: The study site of this project is Budai town, located in the southwestern coast of Taiwan (23°22'24.9"N to 23°18'39.1"N, 120°08'57.9"E to 120°11'23.4"E, Fig. 2). The Budai town is a land subsidence area (WRPI 2007), and the salt pans are below sea level (elevation -1.8 to -0.5 m, Kuo and Wang 2018). The temperature and rainfall data from 2010 to 2017 were obtained from the Chiayi weather station, located 30 km northeast of the sample plot; on average, the month with the lowest temperature is January (16.7 °C), and the month with highest temperature is July (20.1 °C). The year with the lowest recorded rainfall was 2011 with a total of 1021.7 mm of rain; the year with highest recorded rainfall was 2013, with 2580.5 mm of rain. The Budai salt pans are brackish wetlands. According to the field investigation

records of this study, the salinity was highest in May (30.9 ± 7.9 psu) and lowest in August (8.4 ± 2.0 psu).

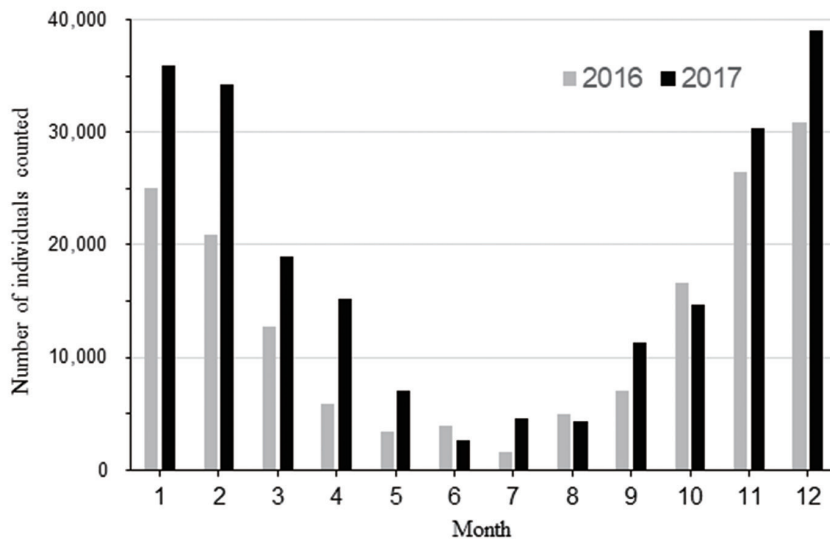


Fig. 1. Seasonal variation in total bird abundance in study salt pans from 2016 to 2017. Repeated bird surveys in five salt pans were conducted during high tide and low tide of the same day from March to May and September to December, 2017 (see Methods). To avoid double counting, only the data during high tide was used.

圖 1. 布袋鹽田的鳥類數量於 2016-2017 年間的月分變化。其中 5 個鹽田於 2017 年 3-5 月與 9-12 月在當月同 1 天漲潮及退潮各進行 1 次鳥類調查 (參見方法)，為避免重複計算，只分析漲潮時的資料。

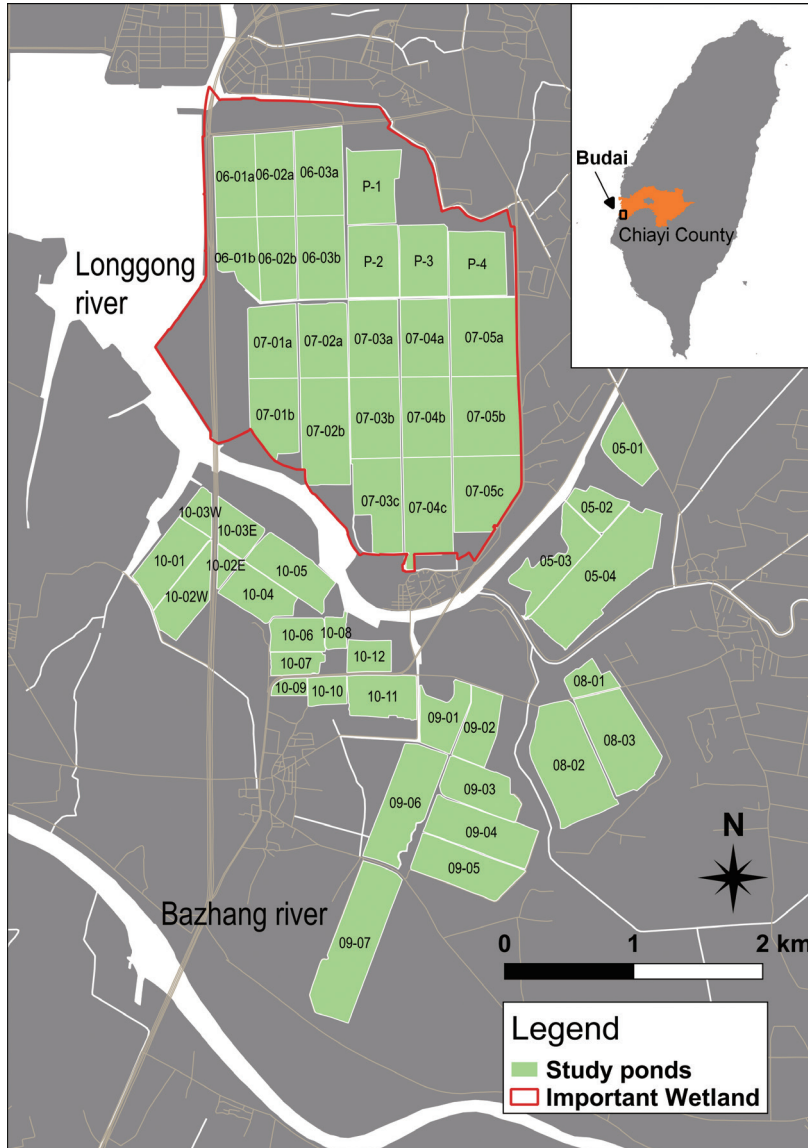


Fig. 2. Location of Budai salt pans.

圖 2. 布袋鹽田位置圖。

Taxonomic coverage

General taxonomic coverage description: From 2016 of 2017, the survey recorded 118 species of Aves from a total of 31 families (Table 1). A total of 19 species had a maximum abundance of over 1,000 individuals in a single survey (Fig. 3). Species that had a maximum abundance of over 4,000 individuals in a single survey are as follows: whiskered tern (*Chlidonias hybrida*), northern shoveler (*Spatula clypeata*), Eurasian wigeon (*Mareca penelope*), and Kentish plover (*Charadrius alexandrine*). Within the records, 11 species are protected species of Taiwan: 2 were

endangered species, 6 were rare and valuable species, and 3 were other conservation-deserving species. A total of 18 species recorded are listed in The Red List of Birds of Taiwan (Lin *et al.* 2016), which consisted of 2 nationally critical species, 2 nationally endangered species, 9 nationally vulnerable species, and 5 nationally near-threatened (Table 2).

Taxonomic ranks

Class: Aves

Common names: Bird

Temporal Coverage

January, 2016-December, 2017.

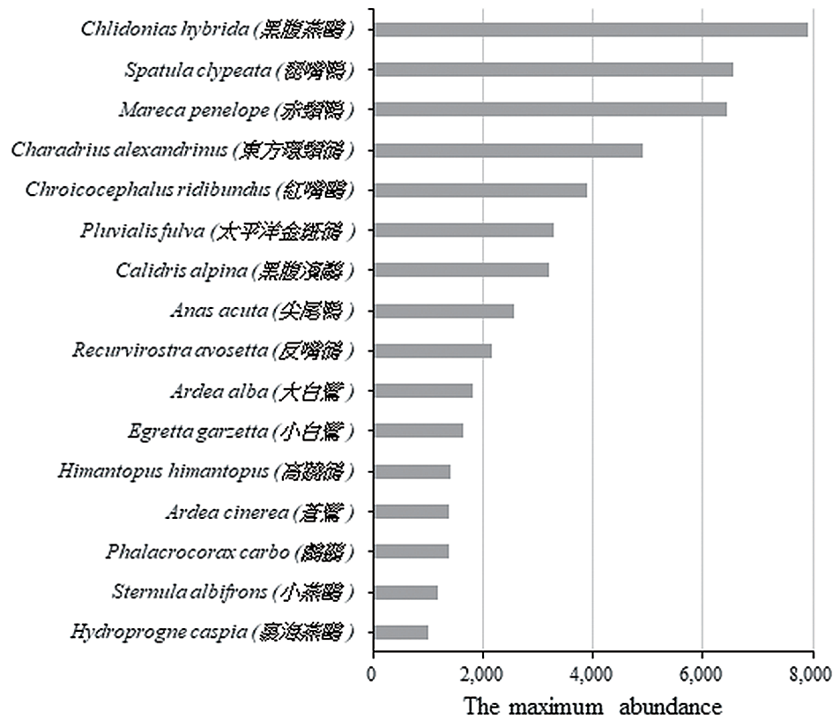


Fig. 3. The maximum abundance of dominant species in a single survey.

圖 3. 優勢鳥種在單次調查出現的最大數量

Table 1. List of bird orders and families recorded in the dataset

表 1. 資料集涵蓋的鳥類目別與科別

Order	Family	Family English Name
Anseriformes	Anatidae	Ducks, Geese, and Waterfowl
Podicipediformes	Podicipedidae	Grebes
Phoenicopteriformes	Phoenicopteridae	Flamingos
Suliformes	Phalacrocoracidae	Cormorants and Shags
Pelecaniformes	Ardeidae	Hérons, Egrets, and Bitterns
Pelecaniformes	Threskiornithidae	Ibises and Spoonbills
Accipitriformes	Pandionidae	Osprey
Accipitriformes	Accipitridae	Hawks, Eagles, and Kites
Gruiformes	Rallidae	Rails, Gallinules, and Coots
Charadriiformes	Recurvirostridae	Stilts and Avocets
Charadriiformes	Charadriidae	Plovers and Lapwings
Charadriiformes	Scolopacidae	Sandpipers and Allies
Charadriiformes	Laridae	Gulls, Terns, and Skimmers
Columbiformes	Columbidae	Pigeons and Doves
Coraciiformes	Alcedinidae	Kingfishers
Falconiformes	Falconidae	Falcons and Caracaras
Passeriformes	Laniidae	Shrikes
Passeriformes	Dicruridae	Drongos
Passeriformes	Corvidae	Crows, Jays, and Magpies
Passeriformes	Alaudidae	Larks
Passeriformes	Hirundinidae	Swallows
Passeriformes	Pycnonotidae	Bulbuls
Passeriformes	Scotocercidae	Bush Warblers and Allies
Passeriformes	Cisticolidae	Cisticolas and Allies
Passeriformes	Zosteropidae	White-eyes, Yuhinas, and Allies
Passeriformes	Muscicapidae	Old World Flycatchers
Passeriformes	Sturnidae	Starlings
Passeriformes	Motacillidae	Wagtails and Pipits
Passeriformes	Emberizidae	Old World Buntings
Passeriformes	Passeridae	Old World Sparrows
Passeriformes	Estrildidae	Waxbills and Allies

Table 2. Conservation status of the species included in this dataset

表 2. 資料集中鳥類的保育狀態

Scientific Name	Vernacular Name	Protected Species ^a	Red List of Taiwan ^b
<i>Mareca falcata</i>	羅文鴨		NVU
<i>Anas crecca</i>	小水鴨		NVU
<i>Aythya baeri</i>	青頭潛鴨		NCR
<i>Platalea leucorodia</i>	白琵鷺	II	
<i>Platalea minor</i>	黑面琵鷺	I	NNT
<i>Pandion haliaetus</i>	魚鷹	II	
<i>Elanus caeruleus</i>	黑翅鳶	II	
<i>Pluvialis squatarola</i>	灰斑鶺		NNT
<i>Charadrius leschenaultii</i>	鐵嘴鶺		NNT
<i>Numenius madagascariensis</i>	鵞鶩		NEN
<i>Numenius arquata</i>	大杓鶩	III	NVU
<i>Limosa lapponica</i>	斑尾鶩		NVU
<i>Limosa limosa</i>	黑尾鶩		NVU
<i>Calidris tenuirostris</i>	大濱鶩		NEN
<i>Calidris canutus</i>	紅腹濱鶩		NVU
<i>Calidris ruficollis</i>	紅胸濱鶩		NVU
<i>Calidris alpina</i>	黑腹濱鶩		NVU
<i>Limnodromus semipalmatus</i>	半蹼鶩	III	
<i>Tringa brevipes</i>	黃足鶩		NNT
<i>Saundersilarus saundersi</i>	黑嘴鷗	II	NCR
<i>Sternula albifrons</i>	小燕鷗	II	NNT
<i>Falco tinnunculus</i>	紅隼	II	
<i>Falco peregrinus</i>	遊隼	I	
<i>Lanius cristatus</i>	紅尾伯勞	III	
<i>Lanius schach</i>	棕背伯勞		NVU

a. Schedule of Protected Species: Council of Agriculture, Executive Yuan, Taiwan (2017 amended). I: Endangered Species; II: Rare and Valuable Species; III: Other Conservation-Deserving Species

b. The Red List of Birds of Taiwan, 2016 (Lin *et al.* 2016). NNT: Nationally Near-threatened; NVU: Nationally Vulnerable; NEN: Nationally Endangered; NCR: Nationally Critical

Methods

Method step description: Monthly bird surveys were conducted between 2016 and 2017. Each survey lasted two days and employed the counting flock method. We scanned each sample plot with a monocular telescope and recorded the bird species, abundance, and behavior (foraging/non-foraging). For this dataset, waterbirds were completely inspected in each survey; complete records of landbirds were only created for January-March, 2016 and January and December, 2017 (see DwC event “samplingProtocol”). Waterbirds include shorebirds, waterfowls, wading birds (herons, egrets, storks, spoonbills and ibises), gulls, terns, cormorants, grebes, coots, moorhens and kingfishers. To understand whether the rise and fall of the tide influenced birds in salt pans, further surveys were conducted from March-May and September-December, 2017. Five salt pans (10-01, 10-02W, 10-03W, 10-11, 10-12) were selected, and bird surveys were conducted during high tide and low tide of the same day (see DwC event “eventRemarks”). High tide was defined as three hours before and after high tide, and low tide as three hours before and after low tide.

Study extent description: The sample plot included the seven main areas of the Budai salt pans (old area 5, area 6, area 7, area 8, area 9, area 10, and area P), consisting of a total of 51 salt pan sampling sites. Within the sample plot, area 6 and area 7 are currently listed as Important Wetlands in Taiwan by the Wetland Conservation Act (Fig. 2). The area of every salt pan is between 2.7-48.4 ha. The total sample plot is about 1,030 ha.

Quality control description: To maintain survey quality, two experienced investigators carried out the surveys. In January, 2016, and January and December, 2017, in accordance with the Taiwan New Year Bird Count, other volunteers took part in the survey. To reduce errors while documenting the recorded data, if the bird species was rarely observed or the quantity recorded was abnormal, we reconfirmed the details with the investigators. The classification system employed was the eBird Taxonomy (Clements *et al.* 2018), and the Chinese names of the birds were referenced from the Checklist of the Birds of Taiwan (Ding *et al.* 2017). We imported all the field name descriptions of the dataset into the metadata, for which the GBIF Integrated Publishing Toolkit was used to describe the field names for global sharing purposes. The GBIF node and portal in Taiwan is the Taiwan Biodiversity Information Facility.

Datasets

Dataset description

Object name: Darwin Core Archive Bird survey of Budai salt pans in Taiwan

Character encoding: UTF-8

Format name: Darwin Core Archive format

Format version: 1.0

Distribution: http://ipt.taibif.tw/archive.do?r=bird_survey_of_budai_salt_pan_in_taiwan (Darwin Core Archive)

<https://www.gbif.org/dataset/3f9cd7e5-6d7b-40a8-8062-a18d2f2ca599> (GBIF)

<https://doi.org/10.15468/b7om21> (DOI)

Publication date of data: 2018-12-25

Language: English

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Metadata language: English

Date of metadata creation: 2018-09-17

Hierarchy level: Dataset

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