SINGAPORE BIRDS DATABASE

A Digital Museum of Local Bird Information

Record keeping with the future in mind

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Contents

Cover Image

Chinese Blue Flycatcher *Cyornis glaucicomans*, 11 October 2020, Jurong Lake Gardens

Photo by SIN Yong Chee Keita.

Recommended citation

Sin, Y.C.K. & Ng, D. (2021). Singapore Birds Database: A Digital Museum of Local Bird Information. *Singapore Birds Project*. Retrieved [DATE] from singaporebirds.com

Acknowledgements

Local ornithology would not have reached the stage it is at today if not for the efforts of all who have contributed thus far, and we are highly grateful for the hard work by our predecessors. While our acknowledgement list is in no way exhaustive, we would like to thank the following in particular:

For the amazing wizardry in creating from scratch, and in a short time frame of just three months, a public interface that transformed our excel spreadsheet to a fully-fledged database: Raghav Narayanswamy and Francis Yap.

For testing the functionality and providing excellent feedback to us: Adrian Silas Tay, Goh Cheng Teng, Lester Tan, Martin Kennewell, Richard White, See Toh Yew Wai.

For the assistance in reviewing and greatly improving this document: Elize Ng, Geraldine Lee, Movin Nyanasengeran, Sandra Chia, Tan Hui Zhen, Twang Fang Qi.

For helping out with the design of this document: Twang Fang Qi

For housekeeping primary resources relating to numerous historical records: Bird Ecology Study Group, Lee Kong Chian Natural History Museum, Nature Society (Singapore) Bird Group, Oriental Bird Club.

For curating digital information: Martin Kennewell, Singapore's eBird reviewer, for his prodigious efforts in moderating countless local eBird data, and all past and present administrators of key Facebook groups (Bird Sightings, Birder's Group, Singapore Birders) we collated information from.

Finally, to everybody who has shared their records, rare or otherwise, via the various platforms available, without which our community would be a very different one today.

Introduction

The migratory season of the 2019/2020 winter was exceptional for Singapore and its immediate region—a total of six national firsts were discovered for Singapore, four for Malaysia, at least one for Java (Indonesia), and several species that were typically uncommon to rare occurred in abundance. Memorable records included Taiga Flycatchers *Ficedula albicilla* along with multiple Daurian Redstarts *Phoenicurus auroreus* and Fairy Pittas *Pitta nympha* in the region, accompanied by a deluge of Yellow-browed *Warblers Phylloscopus inornatus* among others. A quick inspection of the list of unexpected species revealed that many of these birds usually wintered in the Indochinese region, and we suspected we were witnessing the effects of some form of ecological pressure pushing the birds further south than usual. Due to the lack of reliable long-term data, we were unable to conduct a detailed analysis to test our hypothesis. Nevertheless, we were immediately aware that there was a need to properly document the local community's collective experiences. This invigorated us to compose a thorough account of the season's events which culminated in our publication, written together with Singapore's eBird reviewer, Martin Kennewell (Sin et al., 2020).

In our efforts to get basic information about a rare species in Singapore (for instance, the number of times it has been formally recorded), we realised that major improvements were needed for how bird records were managed locally. Not only was information inconsistent among authors, it was also incongruent across documents prepared by the same authors at times. Much primary literature was also unavailable, rendering it close to impossible for us to make objective decisions when verifying claims.

To support future ornithological work, and to provide fellow birdwatchers in the community a convenient avenue to learn about the local avifauna, we created a database of locally rare birds. Our project began in January 2020 and after much hard work, we are finally able to share that our **Singapore Birds Database** is online.

Aims

The Singapore Bird Database has a simple aim—to compile all relevant information associated with rare bird sightings in Singapore and display the data in an easily searchable format. There are several guiding principles that we have established based on our experiences.

1) Be future-proof

As mentioned, comprehensive resources for searching through local ornithological data are sparse. Here, we are not referring to complicated population demographics or statistics, but basic information on where, when and what species was found. Such information has been and continues to be shared across a myriad of platforms locally—a positive and highly welcome development. However, the problem with having such diversity is that information often gets shared without citing the appropriate reference, or worse, without any supporting evidence. The older the sighting, the more difficult it is to track down the associated information. Given the rapid expansion of the local birdwatching community and an avalanche of bird sightings over the past few years, the problem will only be exacerbated with time. Furthermore, digital sources are not permanent and can be removed or crash at any time. For our project, we worked to back-up important documents and data to serve as reference for future generations and as insurance if online records are lost.

2) Be comprehensive

During our compilation process, we noticed the presence of many "legacy" records. These comprise historical records of rarities that were accompanied by little to no descriptions and were essentially unverifiable. We found ourselves stuck in a position where we struggled to accept the veracity of many sightings even though we hoped to believe that most of them were true.

Records are not traditions; claims that originate from anyone, including the most reputable birdwatcher, need to be backed up by sufficient information (such as accurate descriptions of the bird observed, sketches, pictures, or audio recordings) for others to verify and confirm the record. Archived information are key sources that can be reviewed again as conclusions derived from available evidence might change in the future when knowledge gaps are bridged (e.g. improved understanding of subtle ID features between similar species). Hence to ensure that our project can function as an independent database, we made efforts to compile data in a way that information would be immediately understandable to any reader. To achieve this aim, we provide key background information from primary documents in detail.

3) Be transparent

Errors in writing are not uncommon and the same mistakes can be perpetuated across different sources. However, finding and picking out these errors is unnecessarily tedious, and the onus should not be on readers to "proofread" published material. Since our objectives required us to check through every available primary source, we also documented the errors we noticed to save others the trouble of conducting the same verification exercise.

Traditionally, literature was shared in hard copy but this is no longer the case in today's digital society. We have noticed, multiple times, that major errors in online posts thought to be from reputable sources have been edited without any corrigendum. Often, such posts serve as important primary resources for the wider nature community, sometimes even drawing the attention of overseas readers. Consequently, authors that refer to these sources cannot be sure if what they cited previously was accurate due to the lack of any edit histories. In our work we also include information on these inconsistencies that we picked up.

4) Publicly, freely, and easily accessible

Newer records are often shared through social media; however, the flood of posts in recent years makes it very difficult to track down original posts of rarities within a matter of days. Moreover, many historical records are listed in difficult to find documents. To allow easy referencing for users, our database contains details on specific bird records and includes crucial links to primary sources so that users can verify information independently.

While we do our best to include links uploaded online, they are sometimes located behind paywalls/memberships. A minority of historical sources are from literature that has not been digitised, or in highly obscure documents. Some are physically available in libraries and for these, we include information in our reference page on where we managed to find them. We will be happy to assist with access upon reasonable request.

5) Be up-to-date

Our database will be hosted on a digital platform, which provides us the flexibility to rapidly adapt to our community's ever-improving understanding of the avian world. We envision regular releases to reflect new records, edits, and improved ornithological knowledge. This allows us to maintain our database as the most updated and accurate one for the nation.

Data Collection and Review Process

There are several key manuscripts that describe the ornithological works of Singapore. Examples include Hume (1879a; 1879b), Chasen (1923), Bucknill & Chasen (1927), Gibson-Hill (1950), and Wang & Hails (2007). Documents from this (non-exhaustive) list serve as country checklists and provide insights into Singapore's avian diversity at different points in history.

After we familiarised ourselves with these publications, we realised that it was simply unfeasible to key in and verify every single piece of information for our database. Hence, there was a need to narrow our scope and we decided to focus on species that were locally rare.

Why the obsession with rare records?

Information can be grouped into two broad categories, qualitative and quantitative. Often, qualitative information can be useful in making broad assessments on avian biodiversity and ecology. For instance:

- White-bellied Woodpecker *Dryocopus javensis* is no longer a resident breeder in Singapore
- Spoon-billed Sandpiper *Calidris pygmaea* and Spotted Redshank *Tringa erythropus* are both very rare in Singapore
- White-throated Needletail *Hirundapus caudacutus* seems to be more common in Singapore compared to the past

However, when we dive deeper, we can see that such qualitative statements are derived from existing quantitative data. When did the last White-bellied Woodpecker population go extinct? How rare are the Spoon-billed Sandpiper and Spotted Redshank? Who are the birdwatchers detecting the increase in White-throated Needletails and where are these records from? These questions are more difficult to answer without adequate documentation.

There are several characteristics that make records of rare species unique. First, such records must clear a high bar for acceptance. For example, if someone claims an Olive-winged Bulbul *Pycnonotus plumosus* in the Central Catchment Nature Reserve, the record can be accepted with ease as the chances of it being true is high. On the flip side, if someone claims a Black-and-white Bulbul *Microtarsus melanoleucos* instead, the information will be put under scrutiny and ample evidence would be required to confirm its authenticity; rare records have to be properly assessed to reduce false positives. Second, since rare records have fewer data points by definition, the amount of information that needs to be compiled can be reduced. As such it would be much more feasible to compile a database that only contains rare species, as opposed to one that also includes common species such as Yellow-vented Bulbul *P. goiavier*. These factors allowed us to compile an accurate yet practicable set of information.

Once a properly verifiable set of rare bird sightings is compiled, we can start to make qualitative assessments to tease apart broader trends to understand the local avifauna. The White-bellied Woodpecker has not been recorded for 16 years despite the high density of birdwatchers on the island, strongly implying its extinction. The Spoon-billed Sandpiper and Spotted Redshank have not been seen this century, but the causes could differ—global population decline, national habitat loss, and a general difference in wintering area. The White-throated Needletail sightings are mostly by repeated observers from similar locations, but counts from further north in Thailand seem to be relatively consistent, hinting that our increased sightings are likely a result of improved equipment, community knowledge, and observer effort.

What is "rare", really?

Now that we have established the importance of creating a rare bird database, we can start to explore the meaning of the word "rare".

Rare birds can be classified into several categories:

a) Birds that have very few local records throughout history (total number of records < x)

b) Birds that occur in small numbers annually (number of records per year < y).

c) Birds that used to be common in the past but are now rare (average number of records per year over the last ten years < z)

d) Birds that used to be rare in the past that are now common (recent colonisers like Red-wattled Lapwing)

The first two points might appear intuitive to most as they are often the species that birdwatchers are excited by. The last two points, perhaps not so, and only when reviewing them did we realise that we have been subject to the shifting baseline syndrome. For example, certain migratory species such as Asian Dowitcher *Limnodromus semipalmatus* used to be more common in the past than it is today. Other birds like Scarlet Minivet *Pericrocotus speciosus* used to be resident in the past but are now gone. The local avifauna has changed quite rapidly over the past few decades and will continue to do so. The same way it is no longer possible to observe over a hundred Bar-tailed Godwits *Limosa lapponica* in Singapore today, birdwatchers 50 years from now might struggle to find seemingly common birds like Pacific Golden Plovers *Pluvialis fulva* in the same magnitude as we do today. There is a need to ensure such information is captured precisely.

Asian Dowitcher *Limnodromus semipalmatus* at Sungei Buloh Wetland Reserve, on 21 August 2016. Photo by SIN Yong Chee Keita. *[When I found this bird in 2016, never did I imagine that it was going to be last chaseable Asian Dowitcher for the next five years, and sadly, quite possibly for many years to come - Keita]*

For our database, we focus on birds belonging to the first three categories, with special attention paid to the third. At a certain point in the near future, a species common today may slowly fade away into oblivion, and we have to ensure that proper documentations of these birds are kept once that happens. Keeping such records will allow us to be cognizant of species trends and the context surrounding each species.

When curating the list of species to be entered into the database, we started off by asking ourselves "what species would we be excited to see in Singapore?". Having ample experience in local birdwatching over the past few years and from our conversations with other birdwatchers, we created a list of species based on the Singapore Birds Project checklist that we believed were valuable to keep track of.

Our process

Our project was split into two main phases. We first worked to simply compile the location and sighting dates of our selected rare bird species in Singapore. Following that, we verified the authenticity of every single record by looking through countless texts, photographs, and audio recordings.

The two main sources that we collected our historical bird data from was "An annotated checklist of the birds of Singapore", a publication by Wang & Hails (2007) and "Singapore Avifauna" a book by Lim (2009) published through Nature Society (Singapore). After cross-checking two sources, we pored through all available primary documents cited. In our process of reviewing historical documents, we uncovered multiple records that were not included in both Wang & Hails (2007) and Lim (2009), which we also included in our database.

Following that, we checked through "modern" records (from ~2010 onwards) that were mostly shared through online platforms such as social media (primarily Facebook) and blogs, where information sharing in the local birding community has shifted towards.

Our main sources comprised of the following:

1) Journal publications and bulletins
    a) Bulletin of the Raffles Museum, Singapore Biodiversity Records, Nature in Singapore (online)
    b) Malayan Nature Journal, Malaysian Naturalist (not online)
    c) Bulletin of the Oriental Bird Club (~2003; online), BirdingASIA (2004~; mostly not available online): Typically in "From The Field"
    d) Other historical publications (mostly online on Biodiversity Heritage Library)
2) Online sources
    a) Blogs
    b) eBird (usership in Singapore has been gradually increasing since 2016~)
    c) Facebook groups (primarily Bird Sightings, Birder's Group, Singapore Birders)
    d) WildBirdSingapore Yahoo Group (1999–2018; now defunct and no longer accessible, but archived material kept by us)
3) Organisations
    a) Bird Ecology Study Group (formerly under Nature Society (Singapore), now with National University of Singapore Lee Kong Chian Natural History Museum)
        i) Blog (2007~)
    b) Nature Society (Singapore), Bird Group
        i) IORA (1994; online), Singapore Avifauna (1987–2010; online)
        ii) Blog (2014~)
        iii) Original rare bird reports (online)

Verifying data

After compiling information, we read through all primary literature to check for descriptions of the birds recorded. Most primarily literature consisted of "bird reports" by compilers that documented significant sightings across a period of time, generally within a year or month. In cases where descriptions were provided, we worked to verify if the texts accurately ruled out other similar species. We did not accept any heard-only records for rare species unless audio recordings were available or were mentioned to be verified by the compiler. In our process we learnt that 1) the majority of original rare bird reports have been lost over the course of time, and 2) many records contained no justifications at all when reported in documents.

We initially hoped to uphold strict standards (see Leukering, 2004; Bakewell, 2020) and planned to reject all records with no or poor descriptions. We soon realised that this was simply unfeasible it would have meant throwing out over 60% of historical records. We had to make a judgement call, and we did so using several frameworks.

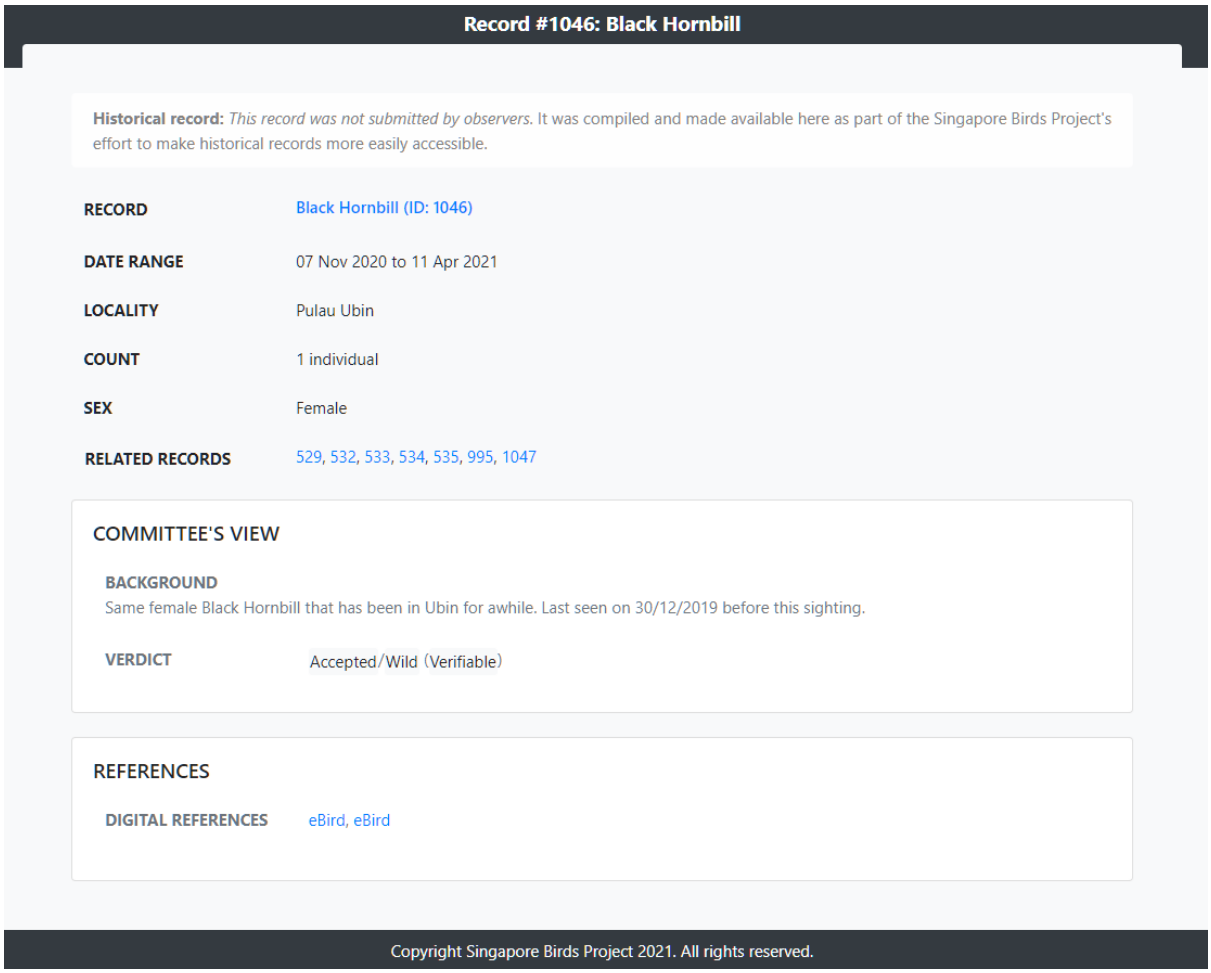
Many waders and waterbirds were more frequently reported in the past but are no longer regular today. However, the shifting baseline syndrome described above suggests that observers back then likely saw no need to provide detailed descriptions because they encountered the species often enough. As such, these records were likely accurate and we accepted them.

We also made our judgements based on the apparent documentation received by the compilers of the rarity reports. For example, if the bird was not described properly in the literature itself, but the author mentioned that they accepted the record based on a (unpublished) photograph or thorough description that was sent to them, we chose to accept it. On the contrary, if the authors themselves were uncertain of a record, or if there were conflicting decisions regarding the same record made by different authors, we adopted a more conservative stance.

Some records were accepted by both Wang & Hails (2007) and Lim (2009), but we were unable to find any primary evidence due to the lack of citations or descriptions in the references. These records were quite uncomfortable to accept, but unless they referred to cases that we found highly unlikely (e.g. see Eurasian Woodcock *Scolopax rusticola* records), we chose to defer to their decisions.

Additionally, Wang & Hails (2007) spent massive efforts checking through museum specimens in their publication. SYCK had the opportunity to visit the National University of Singapore Lee Kong Chian Natural History Museum for work purposes and spent extra time checking through the specimens as well. Wang & Hails (2007) also included specimens from the American Museum of Natural History, British Natural History Museum, and University of Washington Burke Museum. While we were unable to look through these specimens, some data were uploaded to their online catalogues (AMNH, BNHM, UWBM) where we cross-checked information with. Verifying modern data was generally easier, as many of them were accompanied with photographs (which also took us months to track down).

How to read the database



Record #1046: Black Hornbill

Historical record: *This record was not submitted by observers.* It was compiled and made available here as part of the Singapore Birds Project's effort to make historical records more easily accessible.

RECORD	Black Hornbill (ID: 1046)
DATE RANGE	07 Nov 2020 to 11 Apr 2021
LOCALITY	Pulau Ubin
COUNT	1 individual
SEX	Female
RELATED RECORDS	529, 532, 533, 534, 535, 995, 1047

COMMITTEE'S VIEW

BACKGROUND
Same female Black Hornbill that has been in Ubin for awhile. Last seen on 30/12/2019 before this sighting.

VERDICT Accepted/Wild (Verifiable)

REFERENCES

DIGITAL REFERENCES eBird, eBird

General information

Record ID: Every record is accompanied by a unique identification number

Date range: First and last date of the record

Locality: Location where the bird was sighted

Count: Number of individuals associated with the record. For example, if a flock of five birds were seen concurrently, the count would be five. If multiple independent rarities are found at a similar location, we might treat them as separate birds. Such information will generally be reflected in the background.

Sex: Sex of the bird if the information was available

Related records: In cases where we think that multiple records refer to the same individual (e.g. a rare species sporadically seen over a few years), the other records will be indicated here. However, if we are fairly confident that a rarity seen at the same site after a short period of absence refers to the same individual (especially if the individuals have unique plumage/morphological features), we lump them as the same record via the first and last seen dates (e.g. Green Broadbill Record #1012).

Committee's View

Background: Details associated with the record. If no descriptions were provided in the primary literature, it will be stated here. In cases where detailed descriptions were provided, we either reproduce them here or direct users to the primary source. Any conflicts/errors we noticed in Wang & Hails (2007) or Lim (2009) are also reflected here.

Verdict:

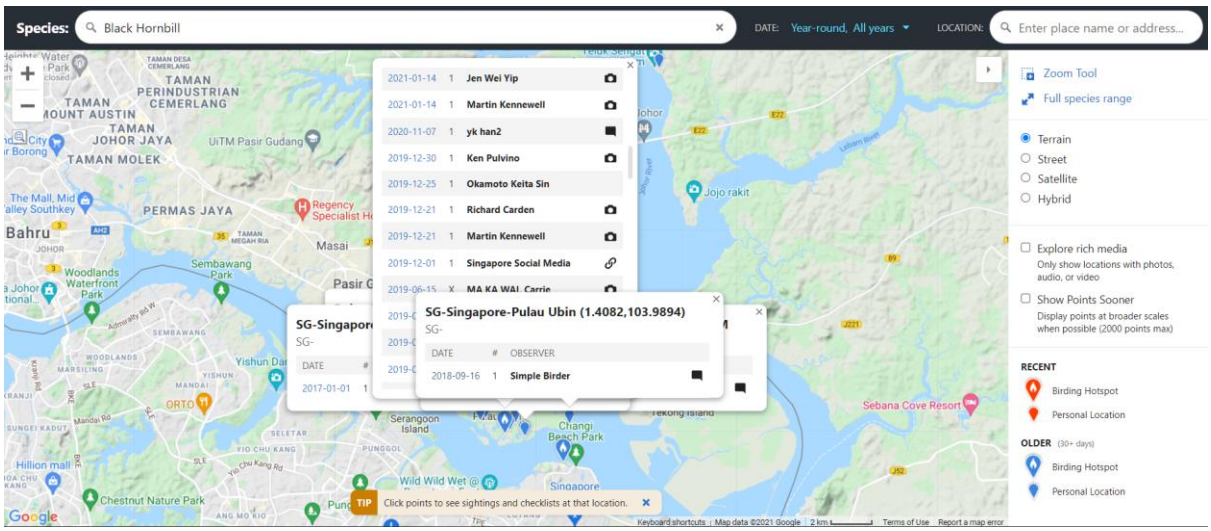
Accepted/Rejected	
Accepted	Sin & Ng (2021) agree with the veracity of the record
Not accepted	Sin & Ng (2021) disagree with the veracity of the record
Verifiable/Unverifiable	
Verifiable	Primary documentation or media available for inspection
Unverifiable	Primary documentation or media not available for inspection
Status	
Wild	Record thought to be of a wild bird
Escapee	Record thought to be of an escaped bird
Limbo	Provenance of bird ambiguous
Annex 1	Record thought to be of a wild bird, but recorded outside of Singapore's national boundaries (i.e. we keep track of rare pelagic species recorded from boat trips departing from Singapore, but birds encountered in international waters/other nation's borders belong in this category)
Annex 2	Record thought to be of a wild bird, but status within national boundaries unconfirmed (i.e. if carcasses of rare birds are found at ambiguous locations such as shorelines, those records belong in this category)
NIL	Rejected record with no status

References: Here we provide references to the primary sources of the record. They will be clickable if online links are present. When multiple online links are present, especially for modern records, we select either the first post by the original observer or the links with the best photographs available for identification purposes. Note that they do not necessarily link to the posts with the exact first and last dates. For historic records (before 2009), in cases where there are any conflicts between the decisions by us, Wang & Hails (2007) and/or Lim (2009), we will state each source's treatment of the record.

How do we improve data from eBird?

eBird is a fantastic platform for submitting bird records and the two of us are among the biggest local users. However, there are several shortcomings with eBird. At present, it is not possible to attribute multiple records to the same individual bird (understandably so as this would require too much effort to track!). Consequently, users are unable to easily find information such as the number of times a species has been formally recorded. This can potentially lead to an inflation of records in the future when users unfamiliar with the current context look through historical data. Let's explain this using several examples.

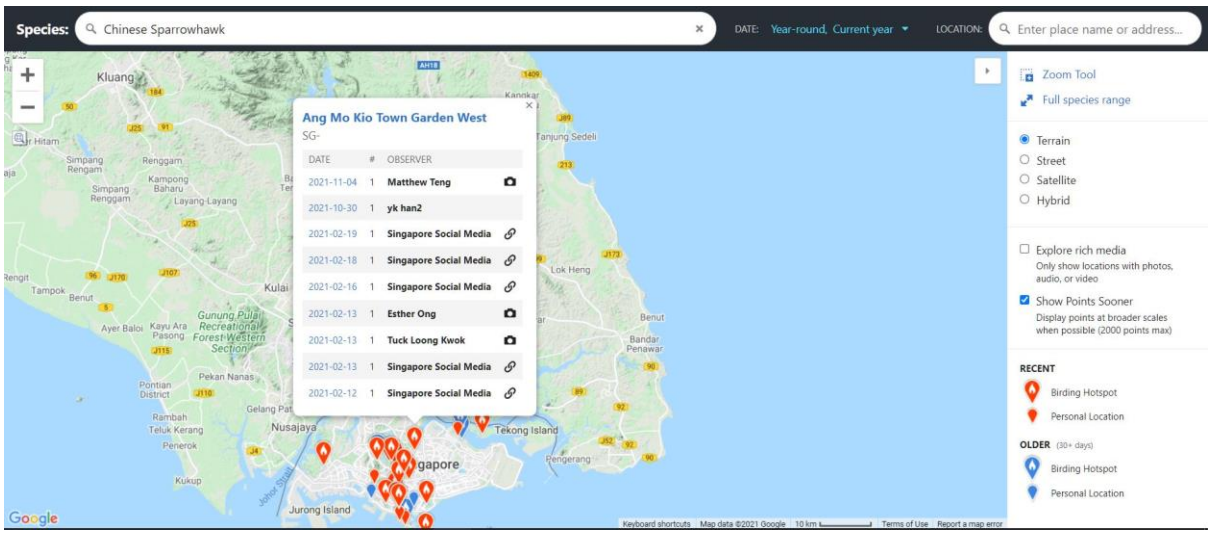
The Black Hornbill *Anthracoceros malayanus* on Pulau Ubin



At present, this is what the eBird map for Black Hornbill looks like at Pulau Ubin. Dozens of records are from Pulau Ubin, ranging from 2015 till 2021. Without any prior context, it would be difficult to interpret this data. Are there multiple lone Black Hornbills roaming around Ubin? Does one regularly visit Pulau Ubin from Johor every time there is a fruiting event?

In truth, there are likely only two individuals. A single male that was seen from July to August 2015 and a lone female that has been sighted sporadically since June 2016. While we cannot be absolutely sure that the same female has been seen consistently over the course of five years (since it is neither tagged nor ringed), the best explanation would be that there is likely only one bird. In our database, we link the records of the female Black Hornbill between 2016 and 2021 so that users are able to connect the dots.

Wintering Chinese Sparrowhawk *Accipiter soloensis* in Ang Mo Kio



Another example would be the Chinese Sparrowhawk that has been known to winter at the Ang Mo Kio Town Garden for several years in a row as of 2021. This is a common passage migrant in Singapore and most other sightings usually refer to birds observed in migration. However, the multiple Ang Mo Kio records refer to a single bird wintering at the park, and the data does not indicate that people are observing single Chinese Sparrowhawks migrating over Ang Mo Kio every other day. Although this species is not a rarity, this is a good reflection of how eBird data can be improved, with our database filling in this gap by merging multiple records for a single individual.

How you can be involved

We would be grateful if you submit records of rare species via an easily fillable form at this link. The Singapore Birds Project Records Committee will evaluate them and get back to you regarding the outcome of the votes. Identification requests are welcome too, either by getting in touch with us directly or via Facebook. We also strongly encourage users to use eBird to further the understanding of our local avifauna.

Given the massive number of records we had to assess, it is inevitable that mistakes might slip in. Please let us know if you notice any and we will fix them as soon as possible with the proper acknowledgements. Please also inform us if there are any historical records that we have missed out and we will add them in. It would help if you could provide us with the references when doing so. Do also ensure that you refer to the primary sources if using data for research. While we have put in the best of efforts to minimise errors, to err is human after all.

Feel free to contact us via the Singapore Birds Project if you have any queries or feedback. We are happy to collaborate on any projects that can make use of our database; our raw data can also be shared upon reasonable request.

Finally, if our efforts have been useful for you in any way, we appreciate you citing this document along with the database and dropping us a short message. The support and encouragement we have received during the course of this work and through the Singapore Birds Project have been tremendous, and we hope to continue contributing to the understanding and conservation of our local and regional avifauna.

Moving forward

Our database will serve as the backbone of the Singapore Birds Project, where we operate in an objective, constructive, and collaborative manner. The details will help guide our decision for the checklist and species accounts, as well as future endeavours. We are inspired to include more information in the database as we dive deeper into the trends describing our local avifauna.

Our user submission system acts as a complement to the historical records that have already been digitised on our database and we strongly encourage birdwatchers to send in their records to us. The voting system of our Singapore Birds Project Record Committee ensures that we operate transparently with all decisions made public. Given the diversity of online platforms that are used today by birdwatchers, we will also continue to be vigilant in looking out for rarities shared via various online platforms to warrant that crucial data will not be lost. The modern interface that we have implemented will act as a reliable source of information for future generations.

We will be continuing to liaise with Singapore's eBird reviewer Martin Kennewell to synchronise the data from our database to increase the precision of local eBird data. Using our database, combined with eBird data, we also aim to include quantitative measures for defining a rare bird. Through such metrics we can better capture species that we might have missed out on or species that are not included but may warrant inclusion in the near future. For one, the Black-capped Kingfisher *Halcyon pileata* has experienced a 95% decline in occupancy over the past two decades in breeding sites like Korea (Kim et al., 2021), and this dramatic decrease is sure to impact the number of Singaporean records.

The Singapore Birds Project also focuses on subspecies records that are locally rare. For example, the Black-naped Oriole *Oriolus chinensis diffusus* has been neglected over the past few decades, partly because of the challenge in identifying adults (Wang & Hails, 2007). However, we now understand that they are likely a different species from the local Black-naped Orioles and there is a need to properly capture their data (Jønsson et al., 2019). Likewise, other taxa such as the Oriental Dwarf Kingfisher *Ceyx erithaca rufidorsa* have gone extinct from Singapore (Wang & Hails, 2007). Although it is presently treated as a subspecies, there is a need to keep track of their sightings as well as there is a possibility that the species could be split in the future. Moreover, even if it remains as one species, the data is still important as it reflects the changes in our local avifauna from the past.

In the past, birds used to be shot and their history was retained through museum specimens. As guns became phased out, the age of pens came, where crucial observations were documented in writing. We are now entering an age where birds are once again being shot but with cameras instead, and with their history stored as digital specimens. The Singapore Bird Database aims to serve as a digital museum for such data, and we hope that our work will continue to be useful in the future, whether in 10, 50 or 100 years from now.

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