Creating an Urban Wetland Ecosystem:

A Case Study of Shanghai Disney Resort Wishing Star Park

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自然保护
CONSERVATION
基金 FUND

Executive Summary

Since July 2015, a monthly bird monitoring program has been carried out at Wishing Star Park in the Shanghai Disney Resort. In what was once an agro-industrial landscape that provided minimal habitat for wildlife, an approximately 50 hectare urban wetland park was created where 61,653 birds of 132 species have been documented as of February 2026. This site is particularly important because it is one of the few urban wetlands in one of the largest metropolitan areas on the planet along a key flyway for migratory birds. It provides essential habitat for species to rest and refuel on their journeys while also allowing local communities and visitors to connect with nature in a unique way.

Wishing Star Park is comprised of an approximately 40 hectares lake surrounded by 2.5 km of walking paths through wetlands, shrublands, and woodlands. During site development, soil and water management were modified and landscaping was added to create quality habitats for wildlife and people to enjoy. While portions of the shrublands and wetlands around the park are regularly managed, much of the park is only trimmed once a year to minimize impacts to wildlife. There is also an island in the middle of the lake set aside for wildlife use. Collectively, these design and management practices create quality habitats where wildlife can thrive.

The frequency of surveys and duration of the project mean that Wishing Star Park is one of the best studied urban restoration projects in the region from an avifauna perspective. When surveys first began while Wishing Star Park was under construction, there was uncertainty around whether wildlife would be observed during and following development. However, from the first survey on, at least 12 species have been observed on every survey, and in 2025 an average of 30 species were documented per survey. This increase reflects the fact that new species continue to be found each year, and the pattern of those discoveries suggests that more are likely to be found in the years ahead. Most of these new species do not nest at Wishing Star Park, which highlights the value of Wishing Star Park to nonbreeding birds.

The birds of Wishing Star Park can be separated into residents and three different groups of migrants: winter, summer, and transitory. Residents are birds that are found in the Shanghai region throughout the year (33 species). Some of these, like the Light-vented Bulbul and Little Grebe, may be found throughout the year at Wishing Star Park and have been present since the bird monitoring survey began. Others have colonized the park and have increased through time to the point that they can now be seen throughout the year, like the Crested Myna. Finally, there are residents in the region that currently only utilize Wishing Star Park for part of the year. For example, Grey Herons are commonly seen in the winter but go elsewhere in Shanghai to breed. These species may be in the process of expanding their utilization of Wishing Star Park and may one day be found at the park year-round.

Winter migrants are birds that migrate south from their breeding grounds to spend the nonbreeding season in the Shanghai region (50 species). This is the most species-rich group and reflects the importance of Wishing Star Park to migratory species. Several of these species form large groups at the park in winter, particularly waterfowl like the Mallard, Tufted Duck, and Falcated Teal. These species are threatened by illegal hunting, particularly the teal which is declining in number, so Wishing Star Park provides much needed safe habitat during the winter. Other birds that reach particularly high numbers in the winter include the Common Coot and the Chinese Spot-billed Duck. Summer migrants are birds that journey north from their wintering grounds to breed in the Shanghai region (20 species). Some of these have been confirmed as breeding at Wishing Star Park, like the Yellow Bittern, but the nests of other commonly

observed species have yet to be discovered, such as the Barn Swallow. These species nest in the landscape surrounding Wishing Star Park and may begin nesting at the park itself in the years to come. Transitory migrants journey through the Shanghai region between breeding and nonbreeding grounds in the spring and fall each year (29 species). They depend on places like Wishing Star Park for safe habitats where they can rest and eat before continuing their journey. These stopover habitats are particularly important in heavily developed regions like Shanghai where there are few remaining natural areas.

Of the 132 bird species that have been found at Wishing Star Park, 40 were documented frequently enough to analyze changes in their abundance through the years. Of these, 90% exhibited stable or increasing population trends. Increasing trends were particularly evident for winter migrants; 79% of analyzed species have increased in number through the years. These analyses suggest that as the habitats of Wishing Star Park have matured, they have supported growing populations of birds in addition to a more diverse community of birds.

In addition to providing quality habitat for wildlife, Wishing Star Park was designed to connect people and nature. Experiences for both local communities and guests have been created to facilitate this connection. A bird map helps visitors find and identify the more common species of the park, local organizations have incorporated visits to Wishing Star Park into their programming, and other offerings enhance the experience of guests. These efforts collectively leverage the habitats and wildlife of Wishing Star Park to educate visitors and surrounding communities about the importance and wonder of nature in a fun and novel way. Because of its value for people and wildlife, Shanghai Disney Resort has been recognized by the Shanghai Forestry Society as a Shanghai Natural Education Destination, part of a program called the Shanghai Natural Education School since 2020.

This program report was prepared to summarize learnings from over a decade of monitoring Wishing Star Park in the hopes that they will benefit other urban wetland parks in the Shanghai region. These learnings include elements of park design and management, their impacts on birdlife, and the benefits of both to visitors and surrounding communities.

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1. Introduction

Urbanization is rapidly changing our planet, and the scale of that change has been particularly dramatic in China. From a biodiversity perspective, the consequences of urban growth are often habitat fragmentation and degradation that can lead to the gradual loss of native biodiversity. From a human perspective, urbanization isolates people from nature and its processes, leading to potentially negative outcomes for economies and ecosystems. Fortunately, increasing attention across public and private sectors is leading to actions to address the challenges of urbanization.

The People's Republic of China is committed to harmonious coexistence between humanity and nature through green development, focusing on reducing pollution and carbon emissions, improving environmental quality, ensuring ecosystem diversity, and shifting to greener, low-carbon economic development in the context of the Beautiful China Initiative.

Despite these promising developments, there are still disconnects between how urban green spaces are managed, how they benefit biodiversity, and how people are engaged through them. Addressing these disconnects has the potential to enhance urban biodiversity and the benefits people gain from it. In Shanghai, green spaces are particularly important for both birdlife and people because of Shanghai's location along a key migratory route for birds (the East Asian-Australasian Flyway) and the growing community of people that enjoys birdwatching. To date, 527 species have been documented in the metropolitan area, making Shanghai a birding hotspot. This case study has been prepared to explore the learnings from a green space in Shanghai called Wishing Star Park at the Shanghai Disney Resort.

Wishing Star Park is an urban park located in Shanghai Disney Resort that opened to the public in 2016. It was designed as a space where people could connect with nature and includes an artificial lake, wetlands along the shorelines, and shrublands and woodlands along a pathway that surrounds the lake. Management practices vary in the different habitats of the park, but they were designed to benefit both wildlife and people. Since the park was under construction, a monthly bird monitoring survey has been conducted beginning in July of 2015 to quantify changes in the community of birds as the habitats of the park have developed. As this birdlife community has grown and matured, the park and its wildlife have also been used to engage guests and the surrounding community with nature, particularly those interested in birding.

Consequently, the past ten years represent a case study of how:

- Urban wetland restoration projects can be designed and managed to benefit wildlife and people
- Birdlife communities develop in response to urban wetland restoration projects in this part of the world
- Community engagement and guest programming can be designed to advance informal environmental education and enhance guest experiences

This document 1) describes the geographic and historical context surrounding the development of Wishing Star Park, 2) outlines the design and management practices used to create and maintain the park, 3) details the avian monitoring program and its findings, and 4) describes the outreach and education activities that have been attempted at the park. Learnings from these efforts are summarized and recommendations are shared for the benefit of managers and educators associated with other urban green spaces in the region.

2. Site Overview

2.1 Shanghai

Shanghai is located at the mouth of the Yangtze River, which shapes the geography and climate of the city. The Yangtze River is the longest river in Asia, which has produced the vast alluvial plain of the Yangtze River Delta. The Municipality of Shanghai is located on the eastern tip of this plain, bordered on the north by the Yangtze River where it empties into the East China Sea and to the south by the Hangzhou Bay. Because of this, the geography of the Shanghai region is characterized by little elevation change, alluvial soils, and abundant surface water. The climate of the region falls within the northern subtropical monsoon zone, which is a humid and mild oceanic climate. In summer, the average temperature is 25.9 °C (78.6 °F) with an average relative humidity of 81% and 688 mm (25 in) of average rainfall. In winter, the average temperature is 6.03 °C (42.9 °F) and humidity and rainfall averages drop to 72.3% and 179 mm (5 in) respectively.

For 6000 years, people have lived in Shanghai, and it has grown from a fishing village to one of the world's major centers of economic activity and the most populous urban area of China. This has led to the development of most habitats for agricultural, industrial, and urban uses and an extensive network of canals and lakes to manage water. However, Shanghai is working to conserve and connect undeveloped habitats through the Shanghai Urban Master Plan (Figure 1), which will create and protect ecological corridors, buffers, and green belts.

These areas provide critical habitat for wildlife, particularly for birds. The continuous addition of new observation records has increased the number of wild bird species documented in Shanghai to 534 (covering 22 orders, 82 families, and 259 genera), accounting for 35.2% of China's total bird species, as officially announced at the launch ceremony of Shanghai's 44th "Bird Week" on April 12, 2025. This is because Shanghai is part of the East Asian-Australasian migration flyway and a crucial stopover site for migratory birds. This migratory route spans Northeast Asia to Australia and is one of the main migration paths for millions of birds.

Figure 1. Ecological corridors, waterways, green belts, and buffers as depicted from the *Shanghai Ecological Space Plan (2021-2035)* (https://ghzyj.sh.gov.cn/zxgh/20231009/129e4b3c04104159bc2d424d5e24c1bb.html).

2.2 Shanghai Disney Resort

The Shanghai Disney Resort is located in the Core Zone of the Shanghai International Resort. Sitting at the southeast edge of the Main City Area of Shanghai, it currently covers an area of about 3.9 square kilometers, surrounded by a mixture of agricultural land, ecological zones and ongoing urbanization. This area will continue to experience land use conversion to urban development in the coming years, but it is also an important location from an ecological connectivity perspective. The northern and western boundaries of the Shanghai International Resort are Green Belts and the southern and eastern boundaries are Ecological Corridors according to the *Shanghai Ecological Space Plan (2021-2035)*. Consequently, the Shanghai Disney Resort will function as a biodiversity hub in the years to come in the interconnected network of Shanghai's green spaces. This will mean that thriving populations of wildlife at the Shanghai Disney Resort will bolster populations in neighboring green spaces and it will make it easier for new species to discover and colonize the resort.

Prior to the development of the resort, the land was used for agriculture and industrial sites. Vegetation primarily consisted of agricultural crops and patches of unmanaged vegetation, which created an opportunity for restoration to enhance both the quantity and quality of vegetation through large-scale functional landscaping. As an initial step toward developing more diverse ecosystems on property and to achieve long term ecological functionality, a comprehensive soil investigation and mitigation project was conducted for the whole site. In addition, a new system of canals and an artificial lake were installed to improve water management, both in terms of water quality and stormwater control. Finally, wetland and upland habitats were created to provide spaces for wildlife and people to thrive.

The resulting development consists of resort offerings that are strategically located around a central lake called Wishing Star Lake to create a fantasy world with diversified resort experiences (Figure 3). As of February 2026, the anchor attraction of the resort is Shanghai Disneyland, a theme park featuring eight themed lands with its ninth themed land under construction. Lodging offerings include two Disney themed hotels, Shanghai Disneyland Hotel and Toy Story Hotel, plus a new themed hotel currently under construction. In addition, the resort is home to a shopping and dining area called Disneytown, and a lakefront public park called Wishing Star Park that surrounds Wishing Star Lake (see next section for more detail).

The supporting facilities of the resort reduce resource use while also improving habitat quality for wildlife. Key facilities include a combined cooling-heating energy plant, an integrated lake water treatment plant, and perimeter canals. The Distributed Energy Center makes use of the heat produced during the generation of natural gas-powered electricity to provide hot water and compressed air for the daily operation of the resort. This system drastically reduces energy waste compared with traditional energy production. The water treatment plant maintains the water level of Wishing Star Lake and provides treated lake water for use in irrigation, cleaning, and toilet flushing across the whole resort, thereby saving a great amount of municipal water. The water treatment plant also maintains the lake water quality at a very high level, which helps to support aquatic ecosystems for wild animals like migratory waterbirds (see next section for more details).

In terms of environmentally friendly transportation, the resort has a subway station, two public transportation hubs, and a ferry service between Shanghai Disneyland and Disneytown on the north side of the lake and Shanghai Disneyland Hotel on the south. As a result, both guests and the public can access all portions of Wishing Star Park to connect with nature and the wildlife there.

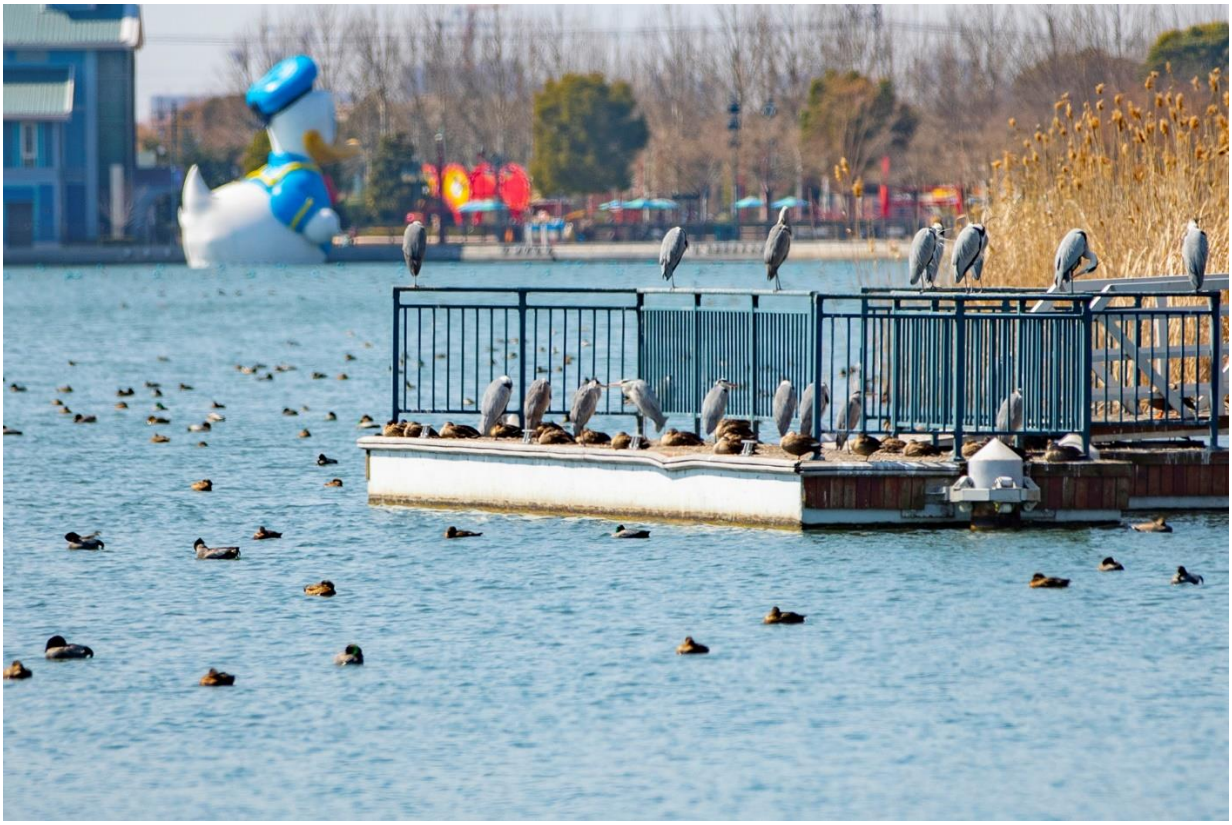

Figure 2. Avian guests enjoying Wishing Star Park

Figure 3. Wishing Star Lake and Wishing Star Park

3. Wishing Star Park and Wishing Star Lake

Wishing Star Park and Wishing Star Lake form a 50-hectare recreational area for the public and wildlife to enjoy (Figure 3). Wishing Star Lake was created as part of the development of the Shanghai Disney Resort and is currently the largest lake within the Main City Area of Shanghai. The water body is 38.7 hectares and includes an island of 0.6 hectares that is designated as green space rather than for development. Except for the northern border, a green landscape belt extends around the lake edge to form the 11.0-hectare Wishing Star Park.

3.1 Aquatic and Wetland Habitats

The design and management of the lake supports a diverse ecosystem of plants and animals. The lake was designed to maintain water levels between 150 mm above and 300 mm below the design water level. Water comes from the perimeter canals through the water treatment plant and is then fed into the lake. Water quality is monitored on an ongoing basis to ensure nutrients such as phosphorus and nitrogen meet local quality standards for surface water. The fountains and water treatment plant also increase dissolved oxygen and mix the water of the lake to support healthy communities of microorganisms. The result is quality aquatic habitat that supports a diverse biotic community.

While a formal biodiversity assay has not been conducted, multiple species have been observed. Aquatic vegetation is primarily comprised of Hydrilla (*Myriophyllum aquaticum*) and *Spirogyra* spp. These species are manually collected as needed, which creates underwater variation in vegetative structure for wildlife. A variety of wildlife uses these aquatic habitats, including fish, amphibians, and reptiles, as well as numerous waterbirds discussed in the next section.

Shoreline substrates are comprised of a diversified mixture of seawalls, boulders, cobblestone and submerged aquatic planters to match the styles of the nearby buildings and atmosphere at different parts of the resort. Most of the shoreline wetlands are comprised of monocultures of the following species planted in submerged aquatic planters: Common Reed (*Phragmites australis*), Narrowleaf Cattail (*Typha angustifolia*), Great Bulrush (*Scirpus validus*), Thalia (*Thalia dealbata*), and Purple Loosestrife (*Lythrum salicaria*). The southern and western shorelines are cut back annually in December and January, the eastern shorelines are cut in April and May, and the island shoreline is not cut back. This maintenance serves the dual purpose of creating structural variation throughout the year, which provides a greater variety of shoreline habitats for wildlife and maintains a well-managed appearance. There are also three areas of forested wetlands where the Wishing Star Park pathways extend over the water as boardwalks. The canopy in these areas is comprised of *Taxodium distichum*, *Taxodium mucronatum*, and *Taxodium ascendens*. Emergent vegetation from submerged planters in these wetlands includes a variety of iris species, Parrot Feather (*Myriophyllum aquaticum*), and Pickerelweed (*Pontederia cordata*).

3.2 Upland Habitats

The upland portion of Wishing Star Park is comprised of a series of habitats and recreation features that border pathways on the western, southern, and eastern sides of the lake. Habitats range from highly manicured and open in front of the Shanghai Disneyland Hotel to closed-canopy woodlands, though most of the park consists of a broad pathway bordered by shrubs and trees that passes through a series of grass and perennial meadows. Structural and species diversity are high due to plant selection and variable management. Over 200 species of plants can be found throughout the park, including 44 trees and 55 shrubs; 16 are rare plant species from around China that were included in the landscape design as part of

a collaborative project with The Nature Conservancy and the Kunming-based Seed or Germplasm Bank of Wild Species.

Management and plant selection are tailored to benefit wildlife species. During the design phase of the project, particular plant species were selected with wildlife in mind (Appendix A), and a pollinator garden was planted specifically to benefit this important group of species. Pesticide use is minimal around the pollinator garden and a Camphor forest that supports a particular species of butterfly called the Common Bluebottle (*Graphium sarpedon*). Finally, the island in Wishing Star Lake is set aside for nature, and the vegetation is not managed apart from a pathway through the island's interior.

This case study focuses on the avian community as an indicator of overall wildlife community health and development (see next section), but numerous other wildlife species have also been observed. The Siberian Weasel (*Mustela sibirica*), Amur Hedgehog (*Erinaceus amurensis*), unidentified bat species, and nearly 60 species of insects have also been documented (Appendix B).

4. Bird Monitoring Program

4.1 Program Design and History

The Bird Monitoring Program at Wishing Star Park began while construction of the park was still underway. The largest trees had been planted, but pathways, buildings, and bridges were still under construction and shrubs and groundcover were not yet planted in many areas. The intent was to begin the survey before wildlife began to colonize the site and then document how the bird community developed as vegetation matured and different species discovered the park.

To monitor this developing community, a monthly bird survey was initiated in July 2015. The survey was designed to identify birds by sight on the lake and lake island and to identify birds by sight or sound in the air, over the park, and near the lake path and shoreline (see sample datasheet in Appendix C). The lake path was divided into five distinct routes for monitoring birds along the path, and one point count location was selected within each route to monitor an area of the lake (Figure 4).

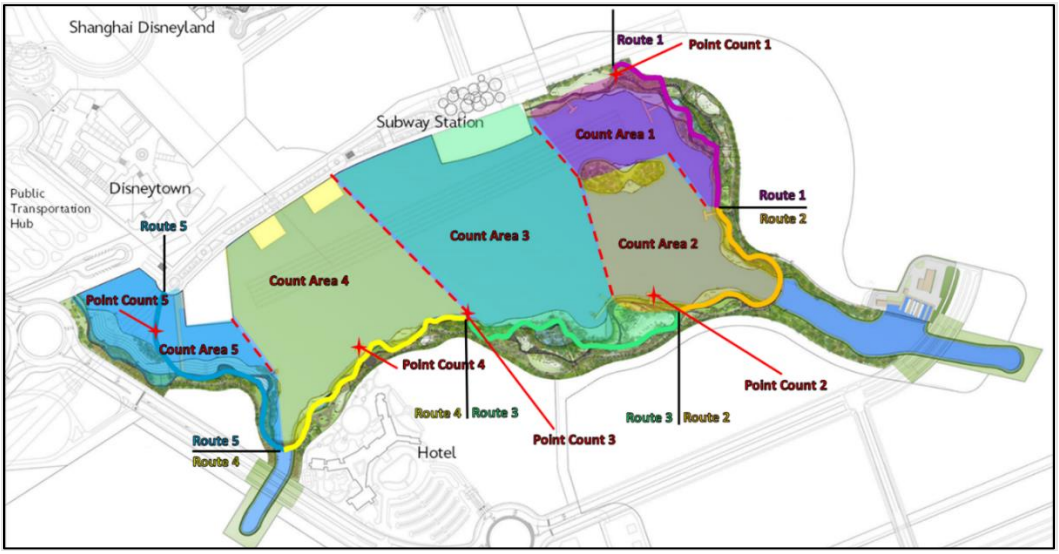

Figure 4. Survey routes and point counts for the Wishing Star Park Bird Monitoring Program

Surveys began between 7:40am and 8:30am and were only conducted on days without strong winds, heavy precipitation, or thick fog. Surveyors began at Route 1 or Route 5 and proceeded sequentially to the other routes, with the direction of the survey switching each month. This was done to reduce bias in the data, as more birds are typically detected earlier in the morning. At the beginning of each route, the start time, temperature, and cloudiness were noted, as well as the presence of fog or light rain. A route count was conducted by walking the path in a single direction at an average speed of 1-2 km/hr. All species seen or heard in the vegetation along the shoreline and on the path were recorded, along with the number of each species observed flying over the path or lake. At the end of each route, the stop time was recorded, and surveyors noted how difficult it was to hear birds during the survey due to background noise. As part of each route, a 5-minute point count for waterbirds was conducted. The open water of a portion of the lake was scanned, and the number of each waterbird species seen was recorded. At Point Counts 1 and 2, the vegetation of the island was also scanned, and the number of each species observed was noted. To the maximum extent possible, birds were not double counted (i.e., birds counted in one route or point count were not also counted in another). Survey length, weather, background noise, visitor number, and air quality were recorded so that analyses could be conducted to assess whether these factors affected the number of birds found during surveys.

4.2 Program Partnerships

Surveys were conducted through a partnership with the Shanghai Wild Bird Society throughout this study. Each month, two to three people from the Shanghai Wild Bird Society led the survey. At least one was an expert at avian identification (able to identify all birds seen and heard), and others were able to identify all birds by site and most birds by sound. At least one cast member joined each survey to help with data collection, and frequently larger groups joined to learn more about birds. Some cast members came to improve their bird identification skills, others joined to learn more about the birds of Wishing Star Park, and some came to photograph or film birds as part of the survey. Regardless of their motivation, through the bird monitoring program, the Shanghai Wild Bird Society and Wishing Star Park served to connect staff of the Shanghai Disney Resort to nature in a way many had not experienced before.

4.3 Program Findings

Since the Wishing Star Park Bird Monitoring Program began in July 2015, the survey has been conducted monthly for a total of 123 surveys as of February 2026. Only 5 surveys have been missed (July 2016, March to May 2022, and December 2022). Over the 10+ years of the survey, 61,653 birds of 132 species have been documented (Appendix D). A community science website for reporting bird observations (birdreport.cn) has documented a similar number of species at Wishing Star Park, which suggests the bird monitoring program has been effective at detecting the diversity of bird species making use of the park.

Of the 132 species spotted, 11 have been found over 1000 times, and these species make up 81% of the birds found at Wishing Star Park. In order of decreasing number, these species are the Eastern Spot-billed Duck, Falcated Duck, Eurasian Coot, Light-vented Bulbul, Eurasian Tree Sparrow, Little Grebe, Eurasian Moorhen, Spotted Dove, Chinese Blackbird, Tufted Duck, and Crested Myna.

The lake was used by a variety of waterbirds including grebes, rails, and ducks, though where these species were found varied. The most common duck species (i.e., species with over 500 individuals observed) were typically found in the open waters of the lake (83% or more of detections depending on the species) compared to the lakeshore, and were particularly abundant around the island in Count Areas 1 and 2. This was presumably due to less boat traffic, as the ferry between Disneytown and the Shanghai Disneyland Hotel operated in Count Areas 3 and 4. The Eurasian Coot and Little Grebe were also more common in the

open waters of the lake (64% and 55%, respectively) compared to the lakeshore, but the Eurasian Moorhen was more likely to be found along the lakeshore (59%). All three of these species were most abundant in Count Area 5.

Common upland species (i.e., species with over 500 individuals observed) also varied in where they were most frequently found. Some species like the White Wagtail and Eurasian Tree Sparrow preferred the highly managed vegetation of Route 4 in front of the Shanghai Disneyland Hotel. Other species like the Chinese Blackbird, Spotted Dove, and Long-tailed Shrike were most frequently found along Routes 1, 3, and 5 where forested areas were wider and a portion of the walkway traveled through forested wetlands. Still others were more common along a particular route, such as the Oriental Turtle-dove on Route 1, the Light-vented Bulbul and Yellow-billed Grosbeak on Route 3, and the Crested Myna on Route 5. No species was most common along Route 2, presumably because the habitat along the pathway was narrower along this route.

Most common species were seen most often in the vegetation along the pathways of the park or on the waters of the lake. However, the Gray Heron was most frequently found roosting on the trees of the island (64%) and the Barn Swallow was almost exclusively observed flying and foraging over the lake (98%).

4.3.1. Patterns of Species Discovery

Through time, the avian community has continued to grow as new species discover and become established at Wishing Star Park. The average number of species found per survey has nearly doubled from 16 in the first year (July 2015 to June 2016) to 30 in the most recent year (July 2024 to June 2025). A species accumulation curve (Figure 5), which shows the increase in the number of bird species found through time, indicates that while the pace of new species discoveries has slowed, it has not yet plateaued. If the pattern of discovery continues following the current trajectory, the number of species will peak around 159 (+/-12 species). This suggests new species will likely continue to be discovered at Wishing Star Park in the years to come.

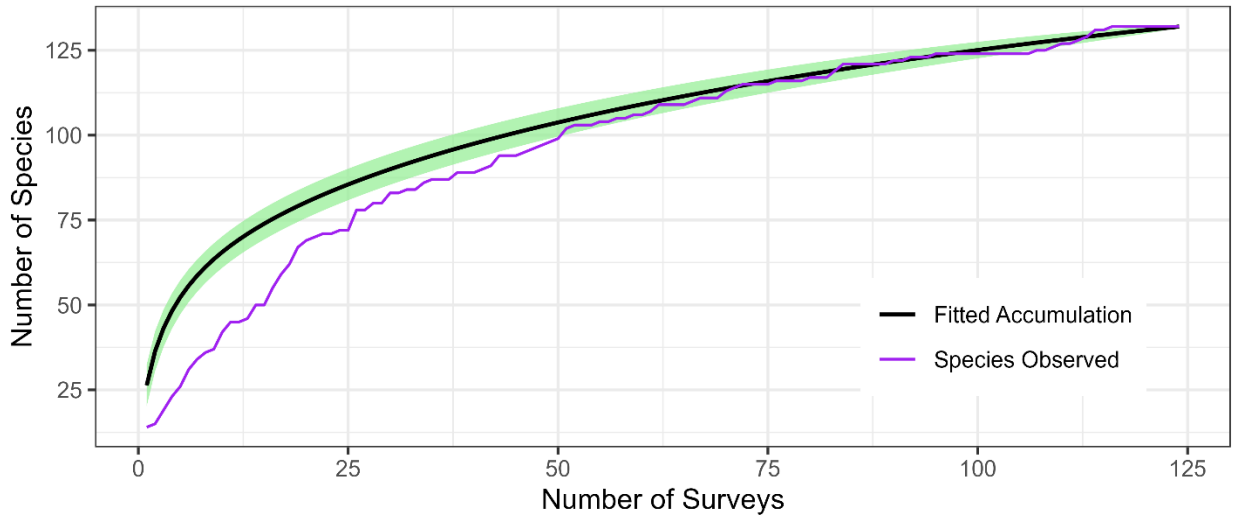

Figure 5. Species accumulation curve for Wishing Star Park. Lines include observed species accumulation (jagged purple) and a fitted accumulation line (smooth black with green error bars shown).

The reason for the faster pace of new species discoveries in the first few years of the program is likely a combination of three factors. First, Wishing Star Park was new habitat when the survey began. Both wetlands and uplands were created where an agro-industrial complex once stood, so species had to discover the new habitats. Second, vegetation has grown and matured in the years following the park's opening, creating a more complex environment that supports a greater array of animals with different habitat needs. Third, as birdlife has increased in number and variety, the growing community has provided new niches for additional species.

While the number of species found has increased through the years at Wishing Star Park, within each year the number of species also varies from season to season (Figure 6). This is because different species use Wishing Star Park in different ways at different times of year. Numbers are lowest in the summer and higher in the winter when birds that breed elsewhere travel to Wishing Star Park for the nonbreeding season. Species numbers are also high during spring and fall migration when birds stop at Wishing Star Park to rest and refuel before continuing their journeys farther to the north or south. Based on these differences in behavior, the birds of Wishing Star Park can be broken up into four different groups: residents, summer migrants, winter migrants, and transitory migrants. These categories and the classification of each species into each group was provided by the Shanghai Wild Bird Society (Appendix D).

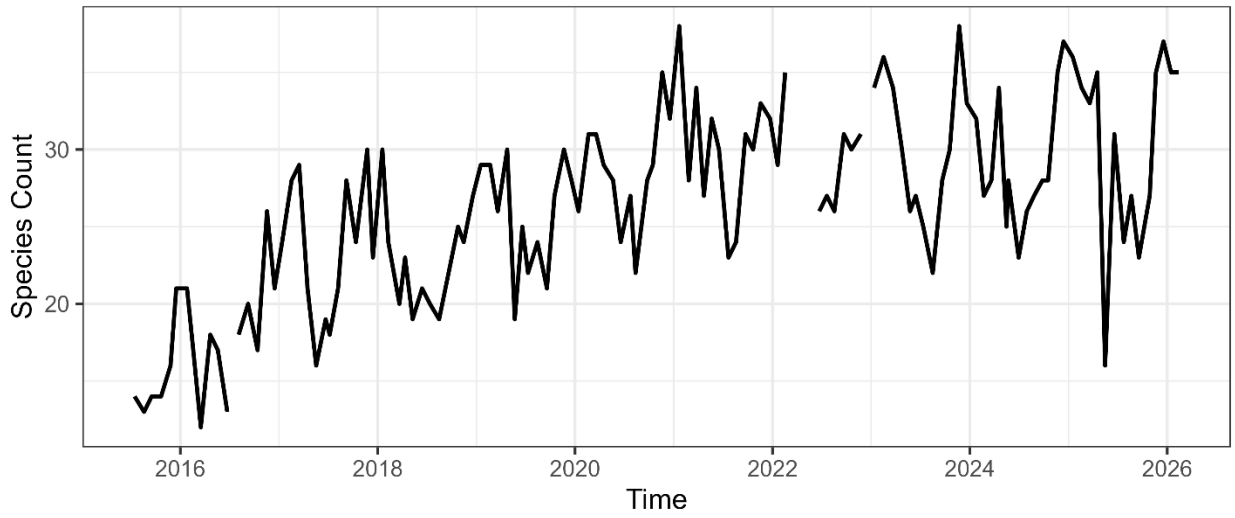

Figure 6. Number of species per survey from July 2015 to February 2026. Gaps between lines indicate missed surveys.

Residents (33 species) are birds that are found in the Shanghai region throughout the year. Some of these, like the Light-vented Bulbul and Little Grebe, have been present at Wishing Star Park since the bird monitoring program began. Others were absent initially but have been seen more and more frequently to the point that they can now be found at the park throughout the year, like the Crested Myna. Finally, there are residents that currently only utilize Wishing Star Park for part of the year. For example, Grey Herons are commonly seen in the winter but go elsewhere in Shanghai to breed; conversely, Zitting Cisticolas are present throughout the summer but are rarely detected during the winter months. In the case of the heron, a habitat need of a particular species during a particular season may not currently be present at Wishing Star Park. Grey Herons nest in rookeries (i.e., groups of nesting birds) that require clumps of large, mature trees to support their nests, and the trees of Wishing Star Park may not have grown large enough yet. In the case of the cisticola, this species may leave the area or be difficult to detect because they call

infrequently outside of the breeding season. Regardless of the reason, residents of the Shanghai region that are not yet found in Wishing Star Park throughout the year may be in the process of expanding their use of the park so that one day they may be year-round residents.

The remaining three groups of birds are all migrants that are only present at Wishing Star Park for part of the year. Summer migrants (20 species) are birds that journey north from their wintering grounds to breed in the Shanghai region. Some of these have been confirmed as breeding at Wishing Star Park such as the Yellow Bittern, but the nests of other commonly observed species have yet to be discovered, such as the Barn Swallow. A combination of residents and summer migrants make up the bird community found at Wishing Star Park in the summer. Winter migrants (50 species) are birds that migrate south from their breeding grounds to spend the nonbreeding season in the Shanghai region. This is the most species-rich group and thus reflects the importance of Wishing Star Park to migratory species in the nonbreeding season. Transitory migrants (29 species) journey through the Shanghai region between breeding and nonbreeding grounds in the spring and fall each year. They depend on places like Wishing Star Park for safe habitats where they can rest and eat before continuing their journey. These stopover habitats are particularly important in heavily developed regions like Shanghai where there are few remaining patches of nature.

The species accumulation curves for the four groups show that while the frequency of new species found has slowed in recent years, new species have still been documented in all four categories in the last year (Figure 7). For resident species, there are birds that are present year-round in the Shanghai region that have yet to be found at Wishing Star Park. These species have not yet colonized the park, either because they are rarer or because movements from currently occupied habitats to Shanghai Disney are infrequent. Regardless of the reason, some of these species are likely to discover and colonize Wishing Star Park in the years ahead.

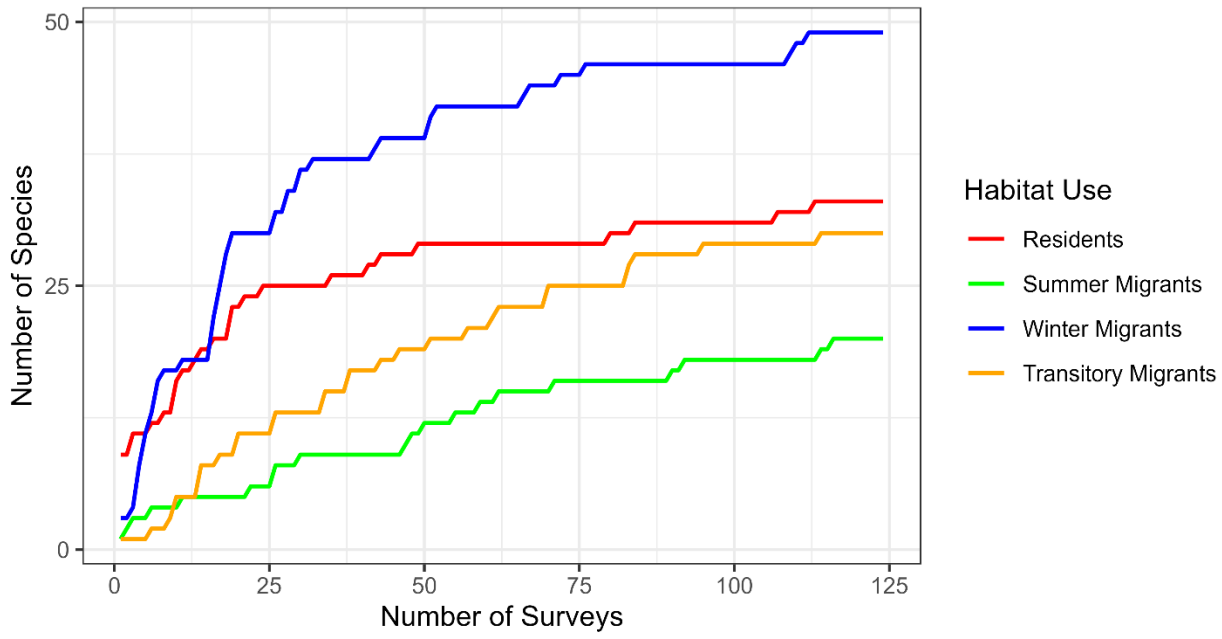

Figure 7. Species accumulation curves for categories of birds at Wishing Star Park.

For winter and summer migrants, climate change could facilitate new discoveries in the years to come. In recent years, higher temperatures have been recorded in the summer and lower temperatures have been

recorded in the winter in Shanghai. If these trends continue, avian ranges could shift as well. Birds also typically have less specific habitat needs during the nonbreeding season, which means a greater variety of birds may find Wishing Star Park's habitats more suitable during the nonbreeding season.

For transitory migrants, many species migrate along the East Asian-Australasian flyway and through the Shanghai region. Their habitat needs vary widely, and Wishing Star Park provides better habitat for some, which have likely already been observed, than for others. For example, many shorebirds prefer to forage on mudflats or beaches, neither of which can be found at Wishing Star Park. However, some of these species have occasionally and briefly stopped at the park en route to more suitable habitats (e.g., Black-tailed Godwit), and this could continue to happen with new transitory migrants in the future.

4.3.2 Patterns of Changing Abundance

In addition to the increasing number of bird species at Wishing Star Park, the abundance of particular species has changed through time as well. To assess patterns of abundance change, species-specific analyses were done for all species detected at least 50 times. Analyses focused on winter (December-February) and summer (June-August) and were conducted for all species found on at least 10 surveys in each season. If a species was detected on fewer than 10 surveys in winter or summer, analyses were conducted for only one season. Further analytical details and results can be found in Appendices E-I.

Of the 40 species analyzed, 90% exhibited stable or increasing populations as only 4 species declined (Table 1, Appendix D). Of these, winter only analyses were conducted for 14 species, summer only analyses were carried out for 8 species, and analyses included both seasons for 18 species. Most groups of birds varied in terms of the number of species with stable versus increasing trends, but all of the duck species that were analyzed have increased in number. Some duck species reached the highest species-specific numbers observed for any species on a single survey at Wishing Star Park (e.g., Eastern Spot-billed Duck= 721, Falcated Duck= 1339).

Table 1. Species-specific abundance analysis of Wishing Star Park birds from winter and summer. All trends shown are statistically significant (see Appendices E and F for analytical details).

English Name	Overall Trend*	Seasonal Differences
Winter & Summer Analysis		
Asian Tit	Increased	No significant differences
Chinese Blackbird	Increased	Abundance increased more rapidly in winter than summer
Common Kingfisher	Stable	No significant differences
Crested Myna	Increased	Abundance was higher in winter than summer
Eastern Spot-billed Duck	Increased	Abundance was higher and increased more rapidly in winter than summer
Eurasian Coot	Stable	Abundance was higher in winter than summer
Eurasian Magpie	Increased	Abundance was higher and increased more rapidly in winter than summer
Eurasian Moorhen	Stable	No significant differences
Eurasian Tree Sparrow	Decreased	No significant differences
Light-vented Bulbul	Increased	Abundance increased more in summer than winter

English Name	Overall Trend*	Seasonal Differences
Little Egret	Stable	Abundance decreased in the summer and increased in the winter
Little Grebe	Stable	No significant differences
Long-tailed Shrike	Decreased	Abundance was higher in summer than winter
Oriental Turtle Dove	Increased	No significant differences
Plain Prinia	Increased	No significant differences
Spotted Dove	Increased	No significant differences
White Wagtail	Decreased	No significant differences
Yellow-billed Grosbeak	Stable	Abundance was higher in winter than summer
Winter Only Analysis		
Black-collared Starling	Increased	Insufficient data for summer analysis
Black-faced Bunting	Increased	Insufficient data for summer analysis
Common Pochard	Increased	Insufficient data for summer analysis
Daurian Redstart	Stable	Insufficient data for summer analysis
Eurasian Siskin	Increased	Insufficient data for summer analysis
Falcated Duck	Increased	Insufficient data for summer analysis
Gadwall	Increased	Insufficient data for summer analysis
Gray Heron	Stable	Insufficient data for summer analysis
Mallard	Increased	Insufficient data for summer analysis
Olive-backed Pipit	Decreased	Insufficient data for summer analysis
Oriental Greenfinch	Increased	Insufficient data for summer analysis
Pale Thrush	Increased	Insufficient data for summer analysis
Pallas's Leaf Warbler	Increased	Insufficient data for summer analysis
Tufted Duck	Increased	Insufficient data for summer analysis
Summer Only Analysis		
Barn Swallow	Stable	Insufficient data for winter analysis
Black-crowned Night-heron	Increased	Insufficient data for winter analysis
Cattle Egret	Stable	Insufficient data for winter analysis
Eurasian Hoopoe	Increased	Insufficient data for winter analysis
Oriental Magpie-robin	Increased	Insufficient data for winter analysis
Vinous-throated Parrotbill	Increased	Insufficient data for winter analysis
White-cheeked Starling	Stable	Insufficient data for winter analysis
Yellow Bittern	Increased	Insufficient data for winter analysis

For the Winter Only analysis, nearly four times as many species increased (n=11) as remained stable (n=2) or declined (n=1). All but three of these species were winter migrants, which shows that the importance of Wishing Star Park to this group of birds has increased through time. The remaining species are residents in the region that have also been detected at Wishing Star Park in the summer, albeit more rarely (Black-collared Starling, Gray Heron, and Oriental Greenfinch). Increasing numbers in the winter coupled with

summer detections could be early signs of the establishment of breeding populations that would lead to further increases in the future.

For the Summer Only analysis, the number of increasing species was almost double (n=5)the number of stable species (n=3), and no species declined. Increasing trends could indicate the establishment or growth of breeding populations at the park. For species with stable trends, two of the three nest in easy-to-find locations (Cattle Egrets nest in rookeries and Barn Swallows nest on buildings), and no nesting has been documented at the park for these birds to date. Consequently, these species likely make use of Wishing Star Park as foraging habitat only. If nesting were to begin, then numbers would likely begin to increase in the summer.

Species with trend analyses that included both summer and winter data were residents of the Shanghai region and exhibited a range of different trends (Figure 8). For some species, trends were stable and numbers were similar in winter and summer (Common Kingfisher, Eurasian Moorhen, and Little Grebe), but for others winter numbers were higher than summer numbers (e.g., Eurasian Coot and Yellow-billed Grosbeak). This is possibly because birds from the surrounding region utilized Wishing Star Park in the winter when foraging ranges are larger and territoriality is reduced. In some instances, birds from farther north may also be migrating south to Wishing Star Park to join residents for the winter.

Half of the species exhibited population increases in both winter and summer. Increases could be due to birds born on site or colonization, or a combination of the two as birds are often attracted to areas where other birds have successfully raised young. For some species, population increases were similar in summer and winter (Asian Tit, Oriental Turtle Dove, Plain Prinia, and Spotted Dove), while for others numbers were higher in the winter (Chinese Blackbird, Crested Myna, Eastern Spot-billed Duck, and Eurasian Magpie). For some of these species, the rate of increase was much greater in the winter than in the summer (Eastern Spot-billed Duck and Eurasian Magpie). These patterns could be due to a delay between initial utilization of habitat in the winter and when individuals attempt to breed at a new location in the summer. Population growth can also be driven by different factors in different seasons, leading to different rates of change. For example, territoriality is reduced in the winter so populations have the potential to grow more rapidly as birds move around the landscape more and can reach higher densities during the nonbreeding season.

One species showed the opposite pattern with increasing numbers in summer compared to winter (Light-vented Bulbul). Summer numbers have gradually increased to be similar to or greater than winter numbers. This may indicate the population has reached the upper limit of what Wishing Star Park is able to support for this species.

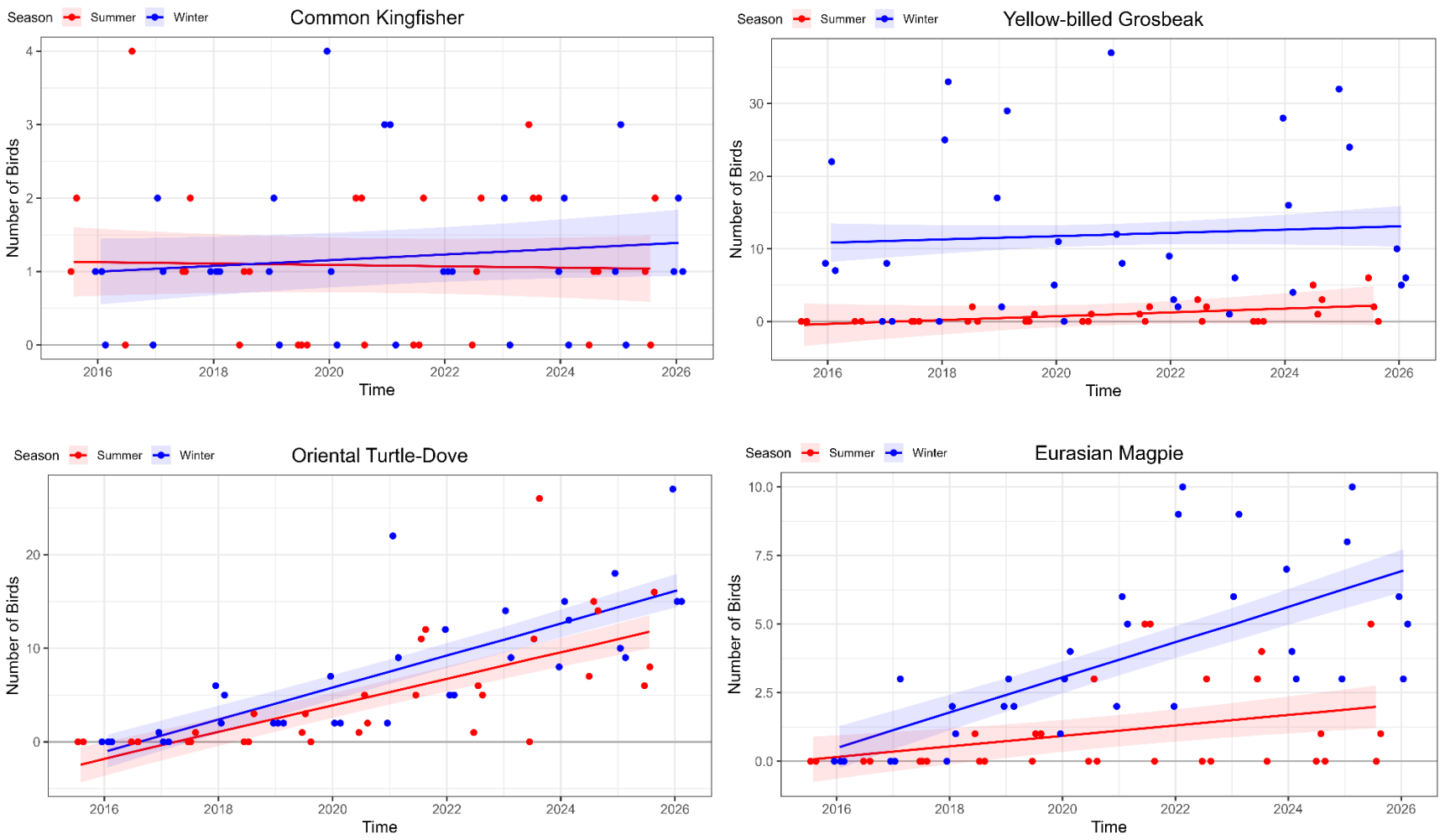

Figure 8. Examples of different species-specific patterns of stable or increasing abundance from 2015-2026. Trendlines are given for winter (blue) and summer (red) with confidence intervals shown in shading. Observed changes in abundance include stable numbers that are similar between seasons (Common Kingfisher), stable numbers that differ between seasons (Yellow-billed Grosbeak), similar rates of increase in winter and summer (Oriental Turtle-dove), and different rates of increase between seasons (Eurasian Magpie).

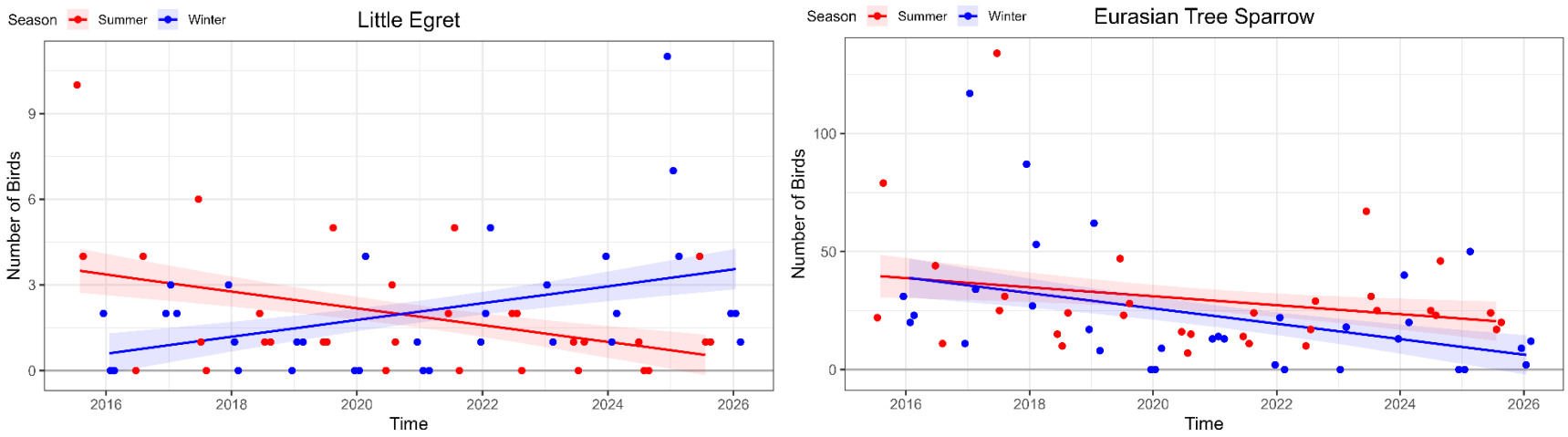

Figure 9. Patterns of abundance change in winter and summer for species that declined in at least one season. Trendlines are given for winter (blue) and summer (red) with confidence intervals shown in shading. Observed changes in abundance include a decline in summer only (Little Egret) and a similar decline in both summer and winter (Eurasian Tree Sparrow).

Five species have decreased in abundance at Wishing Star Park during at least one season (Figure 9). Little Egrets exhibited decreasing numbers in the summer compared to increasing numbers in the winter. This species typically nests in tree rookeries with other heron and egret species. No rookeries were present at Wishing Star Park, so Little Egrets are only visiting the park to forage in the summer. It is unlikely that the quality of foraging habitat is declining, as no other waterbird populations are decreasing, and it is unlikely that Little Egrets are declining in the surrounding region given that winter numbers at Wishing Star Park are increasing. Consequently, the reduction in summer numbers likely reflects reduced foraging activity at Wishing Star Park, though the cause of this is unclear.

The remaining species were two resident species that declined in both seasons (Eurasian Tree Sparrow and Long-tailed Shrike) and a migrant that declined in winter (Olive-backed Pipit). The Eurasian Tree Sparrow, Olive-backed Pipit and Long-tailed Shrike prefer open woodlands or shrublands, while the White Wagtail prefers more open habitats. All four of them can be readily found in human-modified habitats.. Vegetation at Wishing Star Park has matured through time, which would likely make habitats more attractive for woodland species and lawns have been maintained for species that prefer open space.. Consequently, decreases in Eurasian Tree Sparrows, Olive-backed Pipits, Long-tailed Shrikes, and White Wagtails may be due to declines in the region or reductions in utilization of Wishing Star Park, potentially due to the changing community of birds at the site.

4.3.3 Species of Conservation Concern

Many species found within the East Asian-Australasian Flyway are declining, some of which have been found at Wishing Star Park. The International Union for Conservation of Nature (IUCN) maintains a Red List that is the global standard for the classification of conservation status of all species. In order of increasing endangerment, these classifications are Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild, and Extinct. At Wishing Star Park, five species of international conservation concern have been found (Table 2). Two of these were observed once or twice at the park and are not discussed here further, one is a songbird that utilizes the shrublands of the park, and two are waterfowl that make use of Wishing Star Lake. One of these waterfowl species was changed from Near Threatened to Least Concern in 2024. All species are migratory.

Table 2. Species of international conservation concern found at Wishing Star Park

Latin Name	Chinese Name^	English Name*	IUCN Status	Shanghai Habitat Use^	Number Detected
Mareca falcata	罗纹鸭	Falcated Duck	Near Threatened until 2024	Winter Migrant	11735
Aythya ferina	红头潜鸭	Common Pochard	Vulnerable	Winter Migrant	55
Emberiza rustica	田鹀	Rustic Bunting	Near Threatened	Winter Migrant	40
Aythya nyroca	白眼潜鸭	Ferruginous Duck	Near Threatened	Transitory Migrant	2
Limosa limosa	黑尾塍鹬	Black-tailed Godwit	Near Threatened	Transitory Migrant	1

^ Chinese names and regional habitat use provided by the Shanghai Wild Bird Association
* English names sourced from Birds of the World Online (https://birdsoftheworld.org); alternative English names sometimes used in China are listed in Appendix D

The Rustic Bunting is a small sparrow that breeds throughout Northern Asia and winters in Eastern China, including Wishing Star Park. Across its range, populations of this species have declined by 75–87% in the last 30 years, leading to its listing of Vulnerable in 2016 that was changed to Near Threatened in 2025. At Wishing Star Park, numbers of Rustic Buntings have mirrored rapid declines observed elsewhere. In the first two years of the study it was detected 38 times, but only twice more in recent years. The cause of declines is suspected to be hunting pressure in rural China, so the safe habitats of Wishing Star Park are important overwintering habitat for this species.

The Common Pochard is a widely distributed diving duck that breeds throughout northern Eurasia and winters in Africa, southern Europe, southern Asia, and Japan. Despite this widespread distribution, reports of widespread decline led to a listing of Vulnerable in 2015. Causes for declines include hunting and eutrophication of wetland habitats, which reduces water clarity and the growth of the water plants on which the species feed. This makes Wishing Star Park doubly important, as it provides safe winter habitats and the management of Wishing Star Lake supports growth of aquatic vegetation. At least two Common Pochards have been seen every year but three at Wishing Star Park, and in January 2025, 15 individuals were spotted.

The Falcated Duck is the greatest conservation success story of Wishing Star Park. This species breeds in the northern portion of Eastern Asia and winters in Southeast Asia, Eastern China, Japan, and the Koreas. Numbers have declined in China due to hunting, leading to the listing of Near Threatened in 2006. Despite these declines, numbers have increased dramatically at Wishing Star Park over the last decade. In the first two years of the study, Falcated Ducks were only seen once a year, but numbers have increased every year since, with 1,339 being observed in January 2026. In recent years, the range-wide population trend has stabilized, leading to a change from Near Threatened to Least Concern in 2024.

The People's Republic of China also categorizes wildlife species based on degree of imperilment according to the directory of wild animals under national major conservation (Table 3). Animals in the directory are categorized as under 1st class protection and 2nd class protection based on their rarity or extinction risk, which is determined by scientific assessment every five years. The 1st class level of protection is higher than 2nd class. At Wishing Star Park, 11 species categorized as 2nd class have been documented. All of these are rare at Wishing Star Park. Most are migratory species that infrequently stop at Wishing Star Park and/or are raptors that require large home ranges much larger than the park.

Table 3. Species of Conservation Concern in China Found at Wishing Star Park

Scientific Name	Chinese Name^	English Name*	China Status	Shanghai Habitat Use^	Number Detected
Alauda arvensis	云雀	Eurasian Skylark	2nd class	Winter Migrant	14
Falco tinnunculus	红隼	Eurasian Kestrel	2nd class	Winter Migrant	11
Buteo japonicus	普通鵟	Eastern Buzzard	2nd class	Winter Migrant	10
Podiceps nigricollis	黑颈鹛鹛	Eared Grebe	2nd class	Winter Migrant	5

Scientific Name	Chinese Name^	English Name*	China Status	Shanghai Habitat Use^	Number Detected
Accipiter gentilis	苍鹰	Northern Goshawk	2nd class	Transitory Migrant	3
Centropus bengalensis	小鸦鹃	Lesser Coucal	2nd class	Resident	2
Falco peregrinus	游隼	Peregrine Falcon	2nd class	Resident	2
Sibirionetta formosa	花脸鸭	Baikal Teal	2nd class	Winter Migrant	1
Aix galericulata	鸳鸯	Mandarin Duck	2nd class	Winter Migrant	1
Pandion haliaetus	鹗	Osprey	2nd class	Winter Migrant	1
Pernis ptilorhynchus	凤头蜂鹰	Oriental Honey-buzzard	2nd class	Transitory Migrant	1
Zosterops erythropleurus	红胁绣眼鸟	Chestnut-flanked White-eye	2nd class	Winter Migrant	1
Accipiter nisus	雀鹰	Eurasian Sparrowhawk	2nd class	Winter Migrant	1
Falco amurensis	阿穆尔隼	Amur Falcon	2nd class	Transitory Migrant	1

^Chinese names and regional habitat use provided by the Shanghai Wild Bird Association
*English names sourced from Birds of the World Online (https://birdsoftheworld.org); alternative English names sometimes used in China are listed in Appendix D

5. Community Outreach, Guest Experiences, and Recognition

From its initial conception, Wishing Star Park was designed to connect people with nature. Recreational features include five gazebos where visitors can rest in the shade, an amphitheater, two glass-bottom bridges for nature viewing, and a playground. Access to the park is free to all visitors, but the park and its wildlife have also been leveraged to engage both the community and guests through targeted programming.

5.1 Community Outreach

5.1.1 Bird Map

During the launch ceremony of the 42nd Shanghai Bird Loving Week hosted by the Shanghai Disney Resort at Wishing Star Park in April 2023, Shanghai Disney Resort introduced a new Wishing Star Park Bird Watching Map. The map, which was created in partnership with Disney's Animals, Science and Environment, Shanghai Forestry Station and Shanghai Wild Bird Society, provides guests with a guide to explore the wide range of bird species and their habitats in the park. And the map provides urbanites the opportunity to connect with nature by discovering more about these birds and being immersed in their habitats.

5.1.2 Wishing Star Park Nature Book

In 2017, Shanghai Disney Resort collaborated with the World Wide Fund for Nature ("WWF") China to create a nature book. This self-guided nature-education book aims to help children and their families

towards self-exploration, while learning about the park's rich natural resources and diverse habitats, developing a lifelong appreciation for nature and conservation.

5.1.3 Wishing Star Park Fun Environment Class

From 2016 to 2019, Shanghai Disney Resort collaborated with several community partners to develop a series of environmental education classes based on the various habitats, plants and animals found in Wishing Star Park. Primary school students were invited to act as natural detectives and explore the park, while various professional teams from Shanghai Disney Resort guided the students by sharing their professional expertise. The aim of the "Fun Environment Class" was to encourage children to develop a lifelong affinity for nature, while placing value on wildlife protection and environmental stewardship.

5.1.4 Young Nature Trainer Program

From 2018 to 2020, Shanghai Disney Resort supported the Youth Nature Trainer Education program through the Disney Conservation Fund. In collaboration with the Shanghai Wildlife Conservation Association, children and their families were invited to Wishing Star Park and multiple locations in Yangtze River Delta throughout the year to learn about nature from experts. With their newfound understanding, students were encouraged to go back to their local communities to spread their knowledge as a certified Youth Nature Trainer.

5.2 Guest Experiences

5.2.1 Spring Stroll and Botany Class

The Spring Stroll and Botany Class is the predecessor of the current Disneytown Wishing Star Park Adventure program. During the class, kids were invited to walk around Wishing Star Park to learn about secrets of nature, plants, and the ecological design of the park. Kids could also plant their own seeds in little pots in a hands-on gardening experience. A Certificate of Participation was awarded to every kid after completing this class. The program operated from 2018 to 2020 and a total of 600 kids participated, many of which gave positive feedback.

5.2.2 Disney Green Experience – Disneytown Wishing Star Park Adventure

The Disneytown Wishing Star Park Adventure is a series of nature-exploring events that welcome children with their families to have an adventure and learning experience in Wishing Star Park. The latest series incorporates themes from the 24 Solar Terms (i.e., half month intervals) of the Traditional Chinese Calendar and invites guests to immerse themselves in the ecological changes of Wishing Star Park with the changing seasons. In spring, "All Things Come Back to Life" introduces bird reproduction, flower structure, and plant toxicity. In summer, "Summer Insects Chirp" is a nighttime exploration activity that focuses on exploring the diversity of insects. During autumn to winter, "Bird Prepares for Winter" offers an opportunity for kids to learn about the birds' winter survival strategies. Since the launch of the Wishing Star Park Adventure in July 2020, the program has been updated with new themes on an annual basis and has maintained strong popularity among guests. As of December 2025, more than 375 activities have been carried out, serving nearly 9,000 guests. Feedback on guest satisfaction has remained at a high level.

5.2.3 Delightful Gardening in Shanghai Disneyland

Delightful Gardening launched in 2024 is a nature edutainment event focused on gardening. Guests can learn about the design concepts and plant selections used in the gardens and see how gardening plays an important role in Disney storytelling through the efforts of our gardeners. A Certificate of Participation

would be awarded to every kid after completing this fun event, and some plant seeds will be distributed to encourage families to try gardening for themselves.

5.2.5 Celebrate Earth – Earth Month Fair

"Celebrate Earth – Earth Month Fair" is an annual Earth Month tradition, where a vibrant environmental fair is hosted at Disneytown. Guests explore various booths hosted by nonprofit organizations and learn about sustainable products and practices from the fair that showcase the resort's dedication to promoting environmentally conscious choices.

5.3 Recognition

Because of the breadth and depth of environmental programming offered at the Shanghai Disney Resort, the resort was honored in 2020 as one of the initial 10 organizations recognized as a Shanghai Natural Education Destination, as part of a new program called the Shanghai Nature Education School.

6. Learnings and Recommendations

***Green space attracts wildlife*.** When the Bird Monitoring Program began when Wishing Star Park was still under construction, many expressed skepticism that the park would attract many species given the degree of development in Shanghai and the paucity of wildlife in those developed areas. However, 132 bird species have discovered in the Wishing Star Park, and avian biodiversity continues to increase. This may be due in part to the diversity of habitats represented at the park, which include wetlands, open water, meadows, woodlands, and shrublands. In addition, there is little lawn at Wishing Star Park, which provides minimal value for wildlife.

Green space along flyways is particularly valuable for migratory species. Migratory species make up over 70% of the birds at Wishing Star Park and are especially abundant in the winter. This highlights the importance of green space for these species, particularly in urban areas where green spaces act as habitat islands where birds can stop to rest and refuel. Wishing Star Lake was especially important for migratory waterbirds in the winter. This may be because water was managed to reduce algal growth and fast-growing aquatic plants like Hydrilla were harvested. The result was clearer and more open water where foraging may have been easier for waterbirds. In addition, the proximity to the ocean may make Wishing Star Park an attractive stopover site for species that migrate along shorelines, but the park is far enough inland that it may provide some protection from intense storms.

Design elements can increase biodiversity. Certain native plant species were selected specifically for their value as food sources for wildlife, whether for fruits or seeds eaten by birds or as host plants for particular caterpillar species. The diversity of plant species at the park also provides a variety of habitats for foraging, roosting, and nesting. Not all design features have successfully attracted birds as of yet. Bird houses of three different designs were put up on the island in Wishing Star Lake, but they have not yet been used. However, new nesting habitats must be "discovered" by particularly bold individuals of a given species, and bird houses are not common in Shanghai. Once birds nest successfully in bird houses, other individuals learn from their success and are more likely to try the new nesting habitat in subsequent seasons. There is a diverse group of species that nest in cavities at Wishing Star Park, so there is the potential for nest box use to spread rapidly once it begins. Other features that could be added in the future to benefit birds include perching features in the water (e.g., rocks or wooden structures) and platforms on poles on the island that could attract nesting herons or hawks.

Management matters. Water management practices at Wishing Star Park create water conditions that likely contribute to higher biodiversity compared to adjacent waterways, and portions of Wishing Star Park are specifically managed to benefit birdlife. Some portions of the park were not treated with pesticides to benefit butterflies and other insects that are a food source for birds. Many areas of wetland were only cut annually and outside of the breeding season to minimize impacts to birds. Some habitats were not managed at all (e.g., the island) to allow vegetation maturation to maximize structural complexity. Finally, in terrestrial habitats, management ranged from frequent to infrequent in different portions of the habitats. Consequently, there was a range of vegetation structure and complexity in each habitat type depending on time since management. Collectively, these practices created habitats that likely supported a greater variety and abundance of species.

Intentional design and management can provide excellent wildlife viewing opportunities. The Shanghai Wild Bird Society has said that Wishing Star Park is one of the best places to see birdlife in the Shanghai region. Pathways at the park wind through corridors of habitat that surround the lake. Because the corridors are not too wide, the birdlife present is concentrated in areas adjacent to the pathways. These birds get used to the presence of people, which makes finding, watching, and enjoying these species much easier. The portion of the lake between the island and the shoreline has no recreational boat traffic, and waterfowl have learned it is a minimally disturbed refuge. As a result, waterfowl densities are highest in this area and easily viewable by the public.

Appendices

Appendix A. Wildlife-friendly Plants at Wishing Star Park

Scientific Name	Chinese Name	English Name	Plant part eaten by wildlife	Host plant for butterflies
Typha minima	小香蒲	Dwarf Cattail	roots	
Typha angustifolia	水烛	Narrowleaf Cattail	roots	
Elaeagnus pungens	胡颓子	Thorny Olive	fruits	
Pyracantha fortuneana	火棘	Chinese Firethorn	fruits	
Orychophragmus violaceus	诸葛菜	Chinese Violet Cress	leaves, seeds, flower	Pieridae, Lycaenidae
Rosa multiflora	多花蔷薇	Multiflora Rose	fruits, flower	
Celtis julianae	珊瑚朴	Julian Hackberry	fruits	Nymphalidae
Cinnamomum camphora	香樟	Camphor Tree	fruits, leaves	Nymphalidae, Papilionidae
Ligustrum lucidum	大叶女贞	Chinese Privet	fruits	
Photinia serrulata	石楠	Chinese Hawthorn	fruits	
Acer buergerianum	三角枫	Trident Maple	fruits	
Acer mono	五角枫	Painted Maple	fruits	
Acer palmatum	鸡爪槭	Japanese Maple	fruits	
Acer truncatum	元宝枫	Shangtung Maple	fruits	
Albizia julibrissin	合欢	Silk Tree	fruits	Pieridae, Nymphalidae
Sapium sebiferum	乌桕	Chinese Tallow Tree	fruits	
Cercis chinensis	紫荆	Chinese Redbud	fruits, flower	
Cercis gigantea	巨紫荆	Giant Redbud	fruits, flower	
Choerospondias axillaris	南酸枣	Nepali Hog Plum	fruits	
Elaeocarpus decipiens	杜英	Japanese Blueberry Tree	fruits	
Ilex latifolia	大叶冬青	Lusterleaf Holly	fruits	
Koelreuteria bipinnata	黄山栾树	Chinese Golden Rain Tree	fruits	
Lagerstroemia indica	紫薇	Crepe Myrtle	fruits, flower	

Scientific Name	Chinese Name	English Name	Plant part eaten by wildlife	Host plant for butterflies
Liquidambar formosana	枫香	Liquidambar Formosana	fruits	
Magnolia denudata	白玉兰	Jade Lily	leaves, fruits, flower	Papilionidae
Malus halliana	垂丝海棠	Hall Crabapple	fruits, flower	
Ginkgo biloba	银杏	Maidenhair Tree	fruits	
Podocarpus macrophyllus	罗汉松	Buddhist Pine	fruits	
Prunus cerasifera f. atropurpurea	紫叶李	Purple-Leaf Cherry Plum	fruits	
Melia azedarach	楝树	Chinaberry Tree	fruits, flower	
Metasequoia glyptostroboides	水杉	Dawn Redwood	fruits	
Osmanthus fragrans 'Semperflorens'	四季桂	Fragrant Olive	fruits	
Prunus x *yedoensis*	‘染井吉野’樱	Yoshino Cherry	fruits	
Punica granatum	石榴	Pomegranate	fruits, flower	
Quercus acutissima	麻栎	Sawtooth Oak	fruits	
Quercus nuttallii	娜塔栎	Nuttall Oak	fruits	
Taxodium ascendens	池杉	Pond Cypress	fruits	
Taxodium distichum	落羽杉	Bald Cypress	fruits	
Taxodium mucronatum	墨西哥落羽杉	Montezuma Bald Cypress	fruits	
Trachycarpus fortunei	棕榈	Windmill Palm	fruits	
Ulmus parvifolia	榔榆	Lacebark Elm	fruits, leaves	Nymphalidae
Zelkova serrata	榉树	Japanese Zelkova	fruits	
Callicarpa japonica	日本紫珠	Japanese Beautyberry	fruits	
Clerodendrum trichotomum	海州常山	Harlequin Glorybower	fruits, flower	
Euonymus alatus 'Compactus'	密冠卫矛	Burning Bush	fruits	
Euonymus japonicus	大叶黄杨	Japanese Euonymus	fruits	
Gardenia jasminoides	栀子花	Cape Jasmine	fruits, leaves, flower	

Scientific Name	Chinese Name	English Name	Plant part eaten by wildlife	Host plant for butterflies
Lonicera fragrantissima	郁香忍冬	Winter Honeysuckle	fruits, flower	
Rhaphiolepis umbellata	厚叶石斑木	Yeddo Hawthorne	fruits, flower	
Thalia dealbata	再力花	Powdery Alligator Flag	fruits, flower	
Viburnum odoratissimum var. *awabuki*	法国冬青	Sweet Viburnum	fruits	
Panicum virgatum 'Heavy Metal'	‘重金属’柳枝稷	Blue Switch Grass	seeds	
Citrus reticulata	柑橘	Mandarin Orange	fruits, leaves, flower	Papilionidae
Zanthoxylum armatum	竹叶花椒	Winged Prickly Ash	flower	Papilionidae
Aristolochia debilis	马兜铃	Dutchman’s Pipe	leaves	Papilionidae
Citrus medica	香泡	Citron	leaves, flower	Papilionidae
Setaria viridis	狗尾草	Green Foxtail	leaves	Hesperiidae
Humulus scandens	葎草	Japanese Hops	leaves	Nymphalidae
Salix babylonica	垂柳	Weeping Willow	leaves	Nymphalidae
Viola spp.	堇	Violets	leaves	Nymphalidae
Wisteria sinensis	紫藤	Chinese Wisteria	flower, leaves	Lycaenidae

Appendix B. Terrestrial Insects Found at Wishing Star Park

Scientific Name	Chinese Name	English Name
Anoplophora chinensis	星天牛	Citrus Long-Horned Beetle
Anoplophora glabripennis	光肩星天牛	Asian Long-Horned Beetle
Batocera horsfieldi	云斑白条天牛	White-Striped Long-Horned Beetle
Apriona germari	桑天牛	Mulberry Longhorn Beetle
Aromia bungii	桃红颈天牛	Red-Necked Longhorn Beetle
Acalolepta sublusca	双斑锦天牛	
Megopis sinica	薄锯齿天牛	Chinese Long-Horned Beetle
Acanthotomicus suncei	枫香刺小蠹	Sweetgum Inscriber
Deporaus bicolor	二色切叶象	Birch Leaf Roller
Plagiodera versicolora	柳蓝叶甲	Imported Willow Leaf Beetle
Chrysochus chinensis	中华萝摩肖叶甲	
Allomyrina dichotoma	双叉犀金龟	Japanese Rhinoceros Beetle
Harpalus sinicus	中华婪步甲	Ground Beetle
Pieris rapae	菜粉蝶	Small Cabbage White
Graphium sarpedon	青凤蝶	Common Bluebottle
Graphium chironides	碎斑青凤蝶	Veined Jay
Papilio polytes	玉带凤蝶	Common Mormon
Papilio xuthus	柑橘凤蝶	Chinese Yellow Swallowtail
Eurema hecabe	宽边黄粉蝶	Common Grass Yellow
Argynnis hyperbius	斐豹蛱蝶	Indian Fritillary
Charaxes bernardus	白带螯蛱蝶	Tawny Rajah
Polygonia c-aureum	黄钩蛱蝶	Asian Comma
Parnara guttata	直纹稻弄蝶	Common Straight Swift
Vanessa indica	大红蛱蝶	Indian Red Admiral
Papilio bianor	碧凤蝶	Chinese Peacock
Apatura ilia	柳紫闪蛱蝶	Lesser Purple Emperor
Holcocerus insularis	小线角木蠹蛾	Carpenterworm Moth
Thosea sinensis	扁刺蛾	Slug Caterpillar Moth
Parasa consocia	褐边绿刺蛾	
Cnidocampa flavescens	黄刺蛾	Oriental Moth
Parasa lepida	丽绿刺蛾	Blue-Striped Nettle Grub
Calliteara pudibunda	丽毒蛾	Pale Tussock Moth
Cephonodes hylas	咖啡透翅天蛾	Coffee Bee Hawkmoth
Orthaga achatina	樟巢螟	
Phyllocnistis citrella	柑橘叶潜蛾	Citrus Leafminer

Scientific Name	Chinese Name	English Name
Cydalima perspectalis	黄杨绢野螟	Box Tree Moth
Algedonia coclesalis	竹织叶野螟	Bamboo Leaf Roller
Cystidia couaggaria	小蜻蜓尺蛾	Plum Cankerworm Moth
Plutella xylostella	小菜蛾	Diamondback Moth
Prodenia litura	斜纹夜蛾	Cotton Moth
Brithys crini	葱兰夜蛾	Amaryllis Borer
Sidemia depravata	淡剑灰翅夜蛾	Lawn Grass Cutworm
Enmonodia vespertilio	变色夜蛾	
Eumeta minuscula	茶蓑蛾	Tea Bagworm
Erthesina fullo	麻皮蝽	Yellow-Spotted Stink Bug
Corythucha ciliata	悬铃木方翅网蝽	Sycamore Lace Bug
Stephanitis pyrioides	杜鹃冠网蝽	Azalea Lace Bug
Apolygus lucorum	绿盲蝽	Green Plant Bug
Selenothrips rubrocinctus	红带网纹蓟马	Red-banded Thrip
Cinara pinitabulaeformis	松大蚜	Pine Aphid
Periphyllus koelreuteriae	栾多态毛蚜	Golden Rain Tree Aphid
Aleurocanthus spiniferus	黑刺粉虱	Orange Spiny Whitefly
Poratrioza sp.	上海无齿木虱	
Ricania sublimbata	柿广翅蜡蝉	
Clovia punctata	刻点铲头沫蝉	
Ceroplastes rubens	红蜡蚧	Red Wax Scale
Acanthococcus lagerstroemiae	紫薇绒蚧	Crapemyrtle Bark Scale
Ictinogomphus pertinax	霸王叶春蜓	Common Flangetail

Appendix C. Wishing Star Park Bird Monitoring Program Datasheet

星愿湖鸟类观察数据记录表
Wishing Star Park Bird Monitoring Data Sheet

观察员 **Observer 1**: **_____**
技能级别 **Skill level:**
☐专业级（可听/看见所有鸟类）**Professional (all seen/heard)**
☐专家级（可看见所有/听见多数鸟类）**Expert (all seen/most heard)**
☐中级 （可听/看见多数鸟类）**Intermediate (most seen/heard)**

观察员 **Observer 2: _____**
技能级别 **Skill level:**
☐专业级（可听/看见所有鸟类）**Professional (all seen/heard)**
☐专家级（可看见所有/听见多数鸟类）**Expert (all seen/most heard)**
☐中级 （可听/看见多数鸟类）**Intermediate (most seen/heard)**

多云与否 **Cloudiness**：☐万里无云 **100% blue sky** ☐34%多云 **Up to 66% blue sky** ☐67%多云 **Up to 33% blue sky** ☐阴天 **No blue sky** ☐雾天 **Foggy** ☐小雨 **Light rain**

日期 **Date: _____** 路径 **Route: _____** 起始时间 **Start Time: _____** 结束时间 **Stop Time: _____**

种类（拉丁学名）**/ Species (Latin names)**	观察到的数量（小径）/ **Observed near path Counts**	观察到的总数（小径）/ **Observed path Total**	听到的数量（小径）/ **Heard near path Counts**	听到的总数（小径）/ **Heard path Total**	数量（飞越湖面）/ **Flyover Counts**	总数（飞越湖面）/ **Flyover Total**	区域 X 中观察到的数量 **/ Observed in zone**	湖中小岛观察到的数量/ **Observed on island**
由于背景噪声听辨鸟啼的程度 Difficulty hearing bird calls because of background noise： ☐可听到 100% **100% heard** ☐可听到 75% **75% heard** ☐可听到 50% **50% heard** ☐可听到 25% **25% heard** ☐0% 完全听不清 **0% heard**								
备注 Comments：								

Appendix D. Bird Species Documented at Wishing Star Park

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Anas zonorhyncha	斑嘴鸭	Chinese Spot-billed Duck	Eastern Spot-billed Duck	Winter Migrant	13384
Mareca falcata	罗纹鸭	Falcated Duck	Falcated Duck	Winter Migrant	11735
Fulica atra	骨顶鸡	Common Coot	Eurasian Coot	Winter Migrant	8369
Pycnonotus sinensis	白头鹎	Light-vented Bulbul	Light-vented Bulbul	Resident	3537
Passer montanus	[树]麻雀	Eurasian Tree Sparrow	Eurasian Tree Sparrow	Resident	3229
Tachybaptus ruficollis	小䴙䴘	Little Grebe	Little Grebe	Resident	2433
Gallinula chloropus	黑水鸡	Common Moorhen	Eurasian Moorhen	Resident	1765
Streptopelia chinensis	珠颈斑鸠	Eastern Spotted Dove	Spotted Dove	Resident	1647
Turdus mandarinus	乌鶇	Eurasian Blackbird	Chinese Blackbird	Resident	1599
Aythya fuligula	凤头潜鸭	Tufted Duck	Tufted Duck	Winter Migrant	1475
Acridotheres cristatellus	八哥	Crested Myna	Crested Myna	Resident	1212
Ardea cinerea	苍鹭	Grey Heron	Gray Heron	Resident	901
Eophona migratoria	黑尾蜡嘴雀	Yellow-billed Grosbeak	Yellow-billed Grosbeak	Resident	883
Lanius schach	棕背伯劳	Long-tailed Shrike	Long-tailed Shrike	Resident	785
Motacilla alba	白鹡鸰	White Wagtail	White Wagtail	Winter Migrant	775
Mareca strepera	赤膀鸭	Gadwall	Gadwall	Winter Migrant	758
Streptopelia orientalis	山斑鸠	Oriental Turtle-Dove	Oriental Turtle-Dove	Resident	734
Hirundo rustica	家燕	Barn Swallow	Barn Swallow	Summer Migrant	629
Anas platyrhynchos	绿头鸭	Mallard	Mallard	Winter Migrant	498
Prinia inornata	褐头鹪莺	Plain Prinia	Plain Prinia	Resident	413
Emberiza spodocephala	灰头鹀	Black-faced Bunting	Black-faced Bunting	Winter Migrant	333
Pica pica	喜鹊	Black-billed Magpie / Common Magpie	Eurasian Magpie	Resident	329

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Spinus spinus	黄雀	Eurasian Siskin	Eurasian Siskin	Winter Migrant	287
Egretta garzetta	白鹭	Little Egret	Little Egret	Resident	247
Spodiopsar cineraceus	灰椋鸟	White-cheeked Starling	White-cheeked Starling	Resident	229
Ixobrychus sinensis	黄苇鳽	Yellow Bittern	Yellow Bittern	Summer Migrant	206
Parus cinereous	大山雀	Japanese Tit	Asian Tit	Resident	197
Bubulcus ibis	牛背鹭	Cattle Egret	Cattle Egret	Summer Migrant	196
Alcedo atthis	普通翠鸟	Common Kingfisher	Common Kingfisher	Resident	183
Sinosuthora webbiana	棕头鸦雀	Vinous-throated Parrotbill	Vinous-throated Parrotbill	Resident	176
Fringilla montifringilla	燕雀	Brambling	Brambling	Winter Migrant	174
Chloris sinica	金翅[雀]	Grey-caped Greenfinch / Oriental Greenfinch	Oriental Greenfinch	Resident	162
Turdus pallidus	白腹鸫	Pale Thrush	Pale Thrush	Winter Migrant	156
Zosterops japonicus	暗绿绣眼鸟	Japanese White-eye	Warbling White-eye	Resident	144
Phoenicurus auroreus	北红尾鸲	Daurian Redstart	Daurian Redstart	Winter Migrant	143
Nycticorax nycticorax	夜鹭	Black-crowned Night-heron	Black-crowned Night-heron	Resident	114
Gracupica nigricollis	黑领椋鸟	Black-collared Starling	Black-collared Starling	Resident	99
Turdus eunomus	斑鸫	Dusky Thrush	Dusky Thrush	Winter Migrant	90
Anthus hodgsoni	树鹨	Oriental Tree Pipit / Olive-backed Pipit	Olive-backed Pipit	Winter Migrant	78
Phylloscopus proregulus	黄腰柳莺	Pallas's Leaf Warbler	Pallas's Leaf Warbler	Winter Migrant	75
Copsychus saularis	鹊鸲	Oriental Magpie-robin	Oriental Magpie-robin	Resident	70
Lonchura punctulata	斑文鸟	Scaly-breasted Munia	Scaly-breasted Munia	Resident	68
Podiceps cristatus	凤头䴙䴘	Great Crested Grebe	Great Crested Grebe	Winter Migrant	61
Upupa epops	戴胜	Eurasian Hoopoe / Common Hoopoe	Eurasian Hoopoe	Resident	60
Aythya ferina	红头潜鸭	Common Pochard	Common Pochard	Winter Migrant	55

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Lonchura striata	白腰文鸟	White-rumped Munia	White-rumped Munia	Resident	50
Mareca penelope	赤颈鸭	Eurasian Wigeon	Eurasian Wigeon	Winter Migrant	48
Remiz consobrinus	中华攀雀	Chinese Penduline Tit	Chinese Penduline Tit	Winter Migrant	47
Emberiza pusilla	小鹀	Little Bunting	Little Bunting	Winter Migrant	47
Acrocephalus orientalis	东方大苇莺	Oriental Reed Warbler	Oriental Reed Warbler	Summer Migrant	47
Motacilla flava	黄鹡鸰	Yellow Wagtail	Western Yellow Wagtail	Transitory Migrant	46
Phylloscopus inornatus	黄眉柳莺	Yellow-browed Warbler	Yellow-browed Warbler	Transitory Migrant	45
Ardeola bacchus	池鹭	Chinese Pond-heron	Chinese Pond-heron	Summer Migrant	44
Anas crecca	绿翅鸭	Common Teal	Green-winged Teal	Winter Migrant	43
Phasianus colchicus	雉鸡	Common Pheasant	Ring-necked Pheasant	Resident	43
Emberiza rustica	田鹀	Rustic Bunting	Rustic Bunting	Winter Migrant	40
Spodiopsar sericeus	丝光椋鸟	Red-billed Starling / Silky Starling	Red-billed Starling	Resident	37
Cisticola juncidis	棕扇尾莺	Zitting Cisticola	Zitting Cisticola	Resident	32
Turdus hortulorum	灰背鸫	Grey-backed Thrush	Gray-backed Thrush	Winter Migrant	30
Amaurornis phoenicurus	白胸苦恶鸟	White-breasted Waterhen	White-breasted Waterhen	Summer Migrant	29
Chroicocephalus ridibundus	红嘴鸥	Common Black-headed Gull	Black-headed Gull	Winter Migrant	28
Ardea alba	大白鹭	Large Egret	Great Egret	Summer Migrant	23
Tarsiger cyanurus	红胁蓝尾鸲	Orange-flanked Bush-robin	Red-flanked Bluetail	Winter Migrant	17
Spatula clypeata	琵嘴鸭	Shoveler	Northern Shoveler	Winter Migrant	15
Alauda arvensis	云雀	Eurasian Skylark	Eurasian Skylark	Winter Migrant	14
Spatula querquedula	白眉鸭	Garganey	Garganey	Transitory Migrant	13
Falco tinnunculus	红隼	Common Kestrel	Eurasian Kestrel	Winter Migrant	11
Regulus regulus	戴菊	Goldcrest	Goldcrest	Winter Migrant	11

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Coccothraustes coccothraustes	锡嘴雀	Hawfinch	Hawfinch	Winter Migrant	10
Buteo japonicus	普通鵟	Common Buzzard / Japanese Buzzard	Eastern Buzzard	Winter Migrant	10
Phylloscopus coronatus	冕柳莺	Eastern Crowned Warbler	Eastern Crowned Warbler	Transitory Migrant	9
Anas acuta	针尾鸭	Northern Pintail	Northern Pintail	Winter Migratory	9
Motacilla cinerea	灰鹡鸰	Grey Wagtail	Gray Wagtail	Winter Migrant	8
Phylloscopus borealis	极北柳莺	Arctic Warbler	Arctic Warbler	Transitory Migrant	8
Apus pacificus	白腰雨燕	Fork-tailed Swift	Pacific Swift	Transitory Migrant	8
Actitis hypoleucos	矶鹬	Common Sandpiper	Common Sandpiper	Transitory Migrant	7
Phalacrocorax carbo	[普通]鸬鹚	Great Cormorant	Great Cormorant	Winter Migrant	7
Gallinago gallinago	扇尾沙锥	Common Snipe	Common Snipe	Winter Migrant	6
Acrocephalus bistrigiceps	黑眉苇莺	Black-browed Reed Warbler	Black-browed Reed Warbler	Transitory Migrant	6
Aerodramus brevirostris	短嘴金丝燕	Himalayan Swiftlet	Himalayan Swiftlet	Resident	6
Podiceps nigricollis	黑颈䴙䴘	Black-necked Grebe	Eared Grebe	Winter Migrant	5
Lanius cristatus	红尾伯劳	Brown Shrike	Brown Shrike	Transitory Migrant	5
Anthus richardi	理氏鹨	Richard's Pipit	Richard's Pipit	Transitory Migrant	5
Oriolus chinensis	黑枕黄鹂	Black-naped Oriole	Black-naped Oriole	Summer Migrant	5
Cecropis daurica	金腰燕	Red-rumped Swallow	Red-rumped Swallow	Summer Migrant	5
Ardea intermedia	中白鹭	Intermediate Egret	Intermediate Egret	Summer Migrant	5
Aythya marila	斑背潜鸭	Greater Scaup	Greater Scaup	Winter Migrant	4
Turdus naumanni	红尾鸫	Naumann's Thrush	Naumann's Thrush	Winter Migrant	3
Tadorna ferruginea	赤麻鸭	Ruddy Shelduck	Ruddy Shelduck	Winter Migrant	3
Gelochelidon nilotica	鸥嘴噪鸥	Gull-billed Tern	Gull-billed Tern	Transitory Migrant	3
Charadrius dubius	金眶鸻	Little Ringed Plover	Little Ringed Plover	Transitory Migrant	3

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Accipiter gentilis	苍鹰	Northern Goshawk	Northern Goshawk	Transitory Migrant	3
Emberiza tristrami	白眉鹀	Tristram's Bunting	Tristram's Bunting	Transitory Migrant	3
Himantopus himantopus	黑翅长脚鹬	Black-winged Stilt	Black-winged Stilt	Summer Migrant	2
Tringa ochropus	白腰草鹬	Green Sandpiper	Green Sandpiper	Winter Migrant	2
Muscicapa dauurica	北灰鹟	Asian Brown Flycatcher	Asian Brown Flycatcher	Transitory Migrant	2
Cyanoptila cyanomelana	白腹蓝鹟	Blue-and-white Flycatcher	Blue-and-white Flycatcher	Transitory Migrant	2
Phylloscopus reguloides	冠纹柳莺	Blyth's Leaf-Warbler	Blyth's Leaf Warbler	Transitory Migrant	2
Sterna hirundo	普通燕鸥	Common Tern	Common Tern	Transitory Migrant	2
Muscicapa griseisticta	灰纹鹟	Grey-streaked Flycatcher	Gray-streaked Flycatcher	Transitory Migrant	2
Horornis fortipes	强脚树莺	Brownish-flanked Bush-Warbler	Brownish-flanked Bush-Warbler	Summer Migrant	2
Cuculus canorus	大杜鹃	Eurasian Cuckoo	Common Cuckoo	Summer Migrant	2
Cuculus micropterus	四声杜鹃	Indian Cuckoo	Indian Cuckoo	Summer Migrant	2
Ardea purpurea	草鹭	Purple Heron	Purple Heron	Summer Migrant	2
Centropus bengalensis	小鸦鹃	Lesser Coucal	Lesser Coucal	Resident	2
Falco peregrinus	游隼	Peregrine Falcon	Peregrine Falcon	Resident	2
Aythya nyroca	白眼潜鸭	Ferruginous Duck	Ferruginous Duck	Transitory Migrant	2
Phylloscopus fuscatus	褐柳莺	Dusky Warbler	Dusky Warbler	Winter Migrant	2
Sibirionetta formosa	花脸鸭	Baikal Teal	Baikal Teal	Winter Migrant	1
Elanus caeruleus	黑翅鸢	Black-winged Kite	Black-winged Kite	Resident	1
Pericrocotus cantonensis	小灰山椒鸟	Swinhoe's Minivet	Brown-rumped minivet	Summer Migrant	1
Saxicola rubicola	黑喉石鸭	Common Stonechat	European Stonechat	Winter Migrant	1
Eophona personata	黑头蜡嘴雀	Japanese Grosbeak	Japanese Grosbeak	Winter Migrant	1
Aix galericulata	鸳鸯	Mandarin Duck	Mandarin Duck	Winter Migrant	1
Pandion haliaetus	鹗	Osprey	Osprey	Winter Migrant	1

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
Ficedula parva	红胸姬鹟	Red-breasted Flycatcher	Red-breasted Flycatcher	Winter Migrant	1
Emberiza elegans	黄喉鹀	Yellow-throated Bunting	Yellow-throated Bunting	Winter Migrant	1
Falco amurensis	阿穆尔隼	Amur Falcon	Amur Falcon	Transitory Migrant	1
Riparia riparia	崖沙燕	European Sand Martin	Bank Swallow	Transitory Migrant	1
Dicrurus macrocercus	黑卷尾	Black Drongo	Black Drongo	Transitory Migrant	1
Limosa limosa	黑尾塍鹬	Black-tailed Godwit	Black-tailed Godwit	Transitory Migrant	1
Zosterops erythropleurus	红胁绣眼鸟	Chestnut-flanked White-eye	Chestnut-flanked White-eye	Transitory Migrant	1
Eurystomus orientalis	三宝鸟	Dollarbird	Dollarbird	Transitory Migrant	1
Vanellus cinereus	灰头麦鸡	Grey-headed Lapwing	Gray-headed Lapwing	Transitory Migrant	1
Pernis ptilorhynchus	凤头蜂鹰	Oriental Honey-buzzard	Oriental Honey-buzzard	Transitory Migrant	1
Chlidonias leucopterus	白翅浮鸥	White-winged Tern	White-winged Tern	Transitory Migrant	1
Ixobrychus flavicollis	黑鳽	Black Bittern	Black Bittern	Summer Migrant	1
Horornis canturians	远东树莺	Manchurian Bush-warbler / Korean Bush-warbler	Manchurian Bush-warbler	Summer Migrant	1
Streptopelia tranquebarica	火斑鸠	Red Collared Dove	Red Collared Dove	Summer Migrant	1
Butorides atricapilla	绿鹭	Striated Heron	Little Heron	Resident	1
Accipiter nisus	雀鹰	Eurasian Sparrowhawk	Eurasian Sparrowhawk	Winter Migratory	1
Chlidonias hybrida	须浮鸥	Whiskered Tern	Whiskered Tern	Resident	1

Appendix E: Data Analysis Methods

All statistics were run using R Studio® v4.3.1 (R Core Team 2023). Species accumulation curves were created using the vegan package (Oksanen et al. 2022) in R Studio® v4.3.1 (R Core Team 2023). Using the specaccum function (method = "collector"), species accumulation graphs of the entire dataset were created, as well as subsets of the data based on habitat utilization categories: residents, summer migrants, winter migrants, and transitory migrants. An estimate of maximum species richness based on the species accumulation curve was calculated using the specpool function using the Chao estimate.

```
specaccum(data, "collector")
specpool(data)
```

To analyze changes in species-specific abundance in winter and summer, each survey was assigned a "seasonal year" and a "season". Seasonal years accounted for changes in calendar year during the same functional season. Seasons included Summer (June, July, August) and Winter (December, January, February). Spring and Fall surveys were removed from the dataset. The dataset was subsetted to remove avian species with less than 50 detections since the start of surveying, and species were also removed if they were detected fewer than 10 times in the summer or winter. Outliers were removed if the number of a particular species counted in a single survey was more than two times the next highest count in another survey.

Using the package LME4 (Bates et al. 2015), a linear model (LMER function) was run to assess changes in species-specific abundance through time, using season year, season and the interaction between these variables as fixed effects and month as a random effect. The summary function was used to call out model output, and statistical significance of fixed effects was assessed using $p < 0.05$. See sample code below for a single species.

```
model=lmer(abundance~seasonal_year*season+(1|month),data=data)
summary(model)
```

For those species with only enough detections for analysis of winter or summer, the season with sufficient data was subsetted out and the only fixed effect used in the model was season year.

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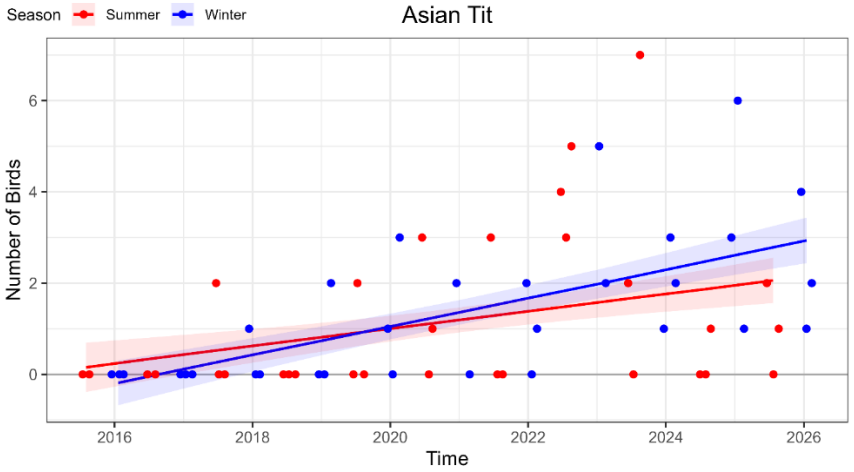
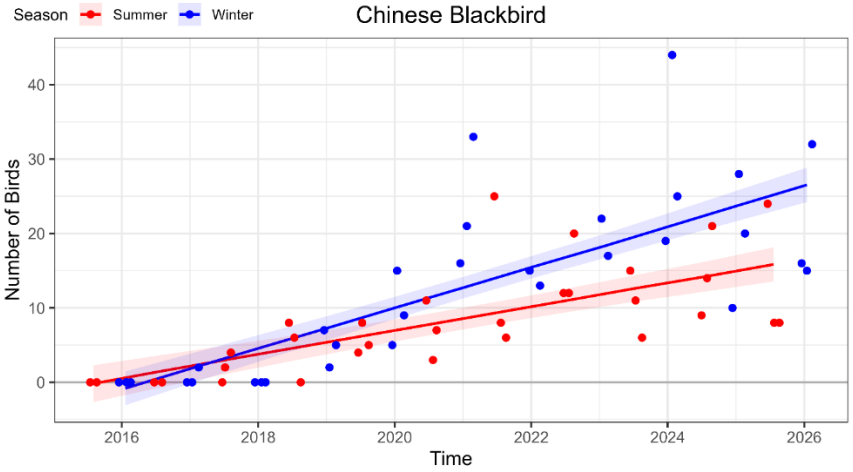
Appendix F. Statistical Model Results for Species-specific Abundance Analyses

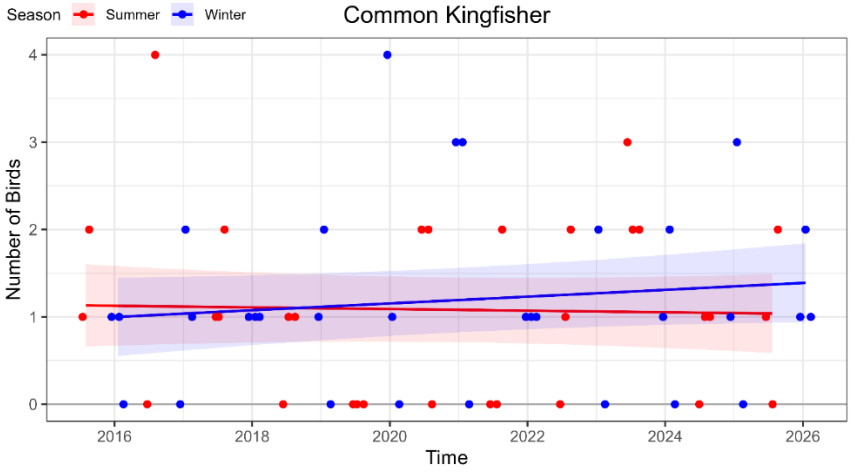
Species	Intercept Estimate (t-value)	P Value	Year Estimate (t-value)	P Value	Season Estimate (t-value)	P Value	Interaction Estimate (t-value)	P Value
Winter & Summer Analyses								
Asian Tit	1.24 (6.508)	<0.001	0.251 (4.158)	<0.001	-0.016 (-0.084)	0.933	-0.061 (-1.006)	0.318
Chinese Blackbird	10.324 (10.111)	0.001	2.169 (8.384)	<0.001	-1.496 (-1.465)	0.218	-0.566 (-2.186)	0.033
Common Kingfisher	1.13 (4.332)	0.012	0.015 (0.394)	0.695	-0.05 (-0.193)	0.856	-0.024 (-0.641)	0.524
Crested Myna	8.672 (7.631)	<0.001	1.047 (2.882)	0.006	-3.286 (-2.891)	0.005	-0.459 (-1.264)	0.211
Eastern Spot-billed Duck	126.284 (10.053)	<0.001	23.74 (5.912)	<0.001	-100.617 (-8.01)	<0.001	-20.24 (-5.04)	<0.001
Eurasian Coot	83.484 (11.278)	<0.001	2.805 (1.319)	0.193	-74.427 (-10.054)	<0.001	-1.932 (-0.909)	0.368
Eurasian Magpie	2.317 (5.736)	0.005	0.418 (5.444)	<0.001	-1.171 (-2.9)	0.044	-0.226 (-2.947)	0.005
Eurasian Moorhen	13.217 (11.287)	<0.001	-0.409 (-1.136)	0.261	-1.842 (-1.573)	0.191	-0.1 (-0.279)	0.782
Eurasian Tree Sparrow	26.301 (8)	0.002	-2.585 (-2.573)	0.013	2.556 (0.777)	0.483	0.678 (0.675)	0.503
Light-vented Bulbul	29.507 (13.992)	<0.001	1.375 (2.039)	0.046	1.738 (0.824)	0.413	2.806 (4.162)	<0.001
Little Egret	1.904 (7.017)	<0.001	0 (0.001)	0.999	-0.065 (-0.24)	0.811	-0.295 (-3.4)	0.001
Little Grebe	18.704 (15.862)	<0.001	-0.349 (-1.198)	0.236	-1.886 (-1.599)	0.183	0.32 (1.099)	0.277
Long-tailed Shrike	6.176 (15.036)	<0.001	-0.261 (-1.985)	0.052	1.649 (4.014)	<0.001	-0.175 (-1.331)	0.188
Oriental Turtle-dove	6.243 (6.769)	0.002	1.569 (8.981)	<0.001	-0.7 (-0.759)	0.49	-0.147 (-0.844)	0.402
Plain Prinia	3.351 (6.024)	0.004	0.501 (3.597)	0.001	1.139 (2.047)	0.111	0.206 (1.478)	0.145
Spotted Dove	14.117 (8.147)	<0.001	1.854 (3.347)	0.001	-2.144 (-1.237)	0.221	-0.269 (-0.486)	0.629
White Wagtail	5.38 (7.332)	0.002	-0.415 (-2.833)	0.006	-0.707 (-0.963)	0.389	-0.142 (-0.967)	0.338
Yellow-billed Grosbeak	6.458 (6.258)	<0.001	0.245 (0.737)	0.464	-5.436 (-5.268)	<0.001	0.019 (0.058)	0.954
Winter Only Analyses								
Black-collared Starling	0.787 (2.797)	0.108	0.2 (3.259)	0.003				
Black-faced Bunting	5.206 (6.576)	0.025	0.779 (3.746)	0.001				
Common Pochard	1.069 (2.92)	0.097	0.206 (2.43)	0.022				

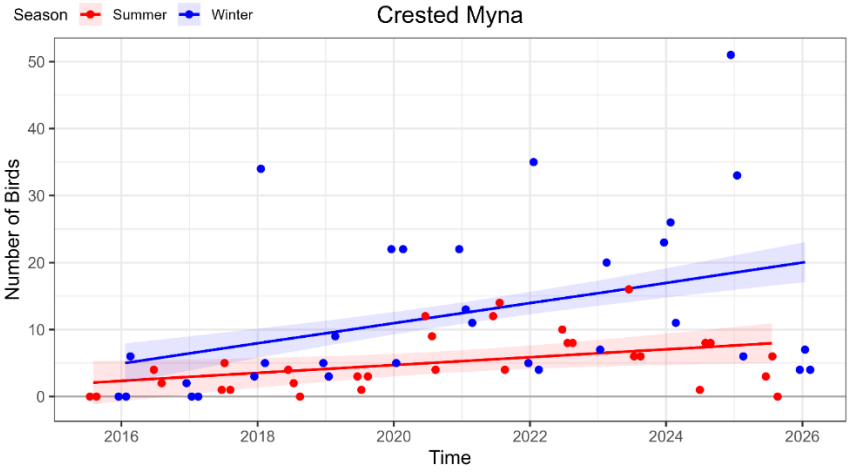
Species	Intercept Estimate (t-value)	P Value	Year Estimate (t-value)	P Value	Season Estimate (t-value)	P Value	Interaction Estimate (t-value)	P Value
Daurian Redstart	2.599 (7.475)	0.017	-0.093 (-1.139)	0.264				
Eurasian Siskin	8.153 (2.856)	0.008	1.972 (2.215)	0.034				
Falcated Duck	240.176 (6.78)	<0.001	93.456 (8.461)	<0.001				
Gadwall	12.702 (3.799)	0.001	3.488 (3.345)	0.002				
Gray Heron	18.087 (5.332)	<0.001	1.492 (1.41)	0.169				
Gray-backed Thrush	0.52 (3.191)	0.085	0.142 (3.428)	0.002				
Mallard	8.888 (3.333)	0.084	1.438 (2.197)	0.037				
Olive-backed Pipit	1.166 (3.931)	0.061	-0.2 (-3.029)	0.005				
Oriental Greenfinch	2.792 (2.681)	0.012	1.047 (3.226)	0.003				
Pale Thrush	2.911 (4.05)	0.056	0.404 (2.952)	0.006				
Pallas's Leaf Warbler	0.893 (3.734)	0.001	0.239 (3.208)	0.003				
Tufted Duck	30.395 (15.917)	<0.001	5.039 (8.462)	<0.001				
Summer Only Analyses								
Barn Swallow	15.79 (4.016)	0.058	0.153 (0.215)	0.832				
Black-crowned Night-heron	0.852 (4.538)	<0.001	0.139 (2.26)	0.032				
Cattle Egret	2.581 (3.215)	0.085	-0.063 (-0.449)	0.657				
Chinese Pond-heron	0.655 (2.452)	0.13	-0.071 (-1.534)	0.137				
Eurasian Hoopoe	0.559 (3.136)	0.091	0.135 (3.095)	0.005				
Oriental Magpie-robin	1.102 (3.347)	0.079	0.329 (4.397)	<0.001				
Red-billed Starling	0.811 (2.957)	0.006	0.013 (0.146)	0.885				
Vinous-throated Parrotbill	1.246 (2.493)	0.132	0.275 (2.53)	0.018				
White-breasted Waterhen	0.547 (3.353)	0.002	-0.003 (-0.061)	0.952				
White-cheeked Starling	1.345 (2.28)	0.148	0.23 (1.493)	0.147				
Yellow Bittern	4.598 (10.664)	<0.001	0.427 (3.067)	0.005				

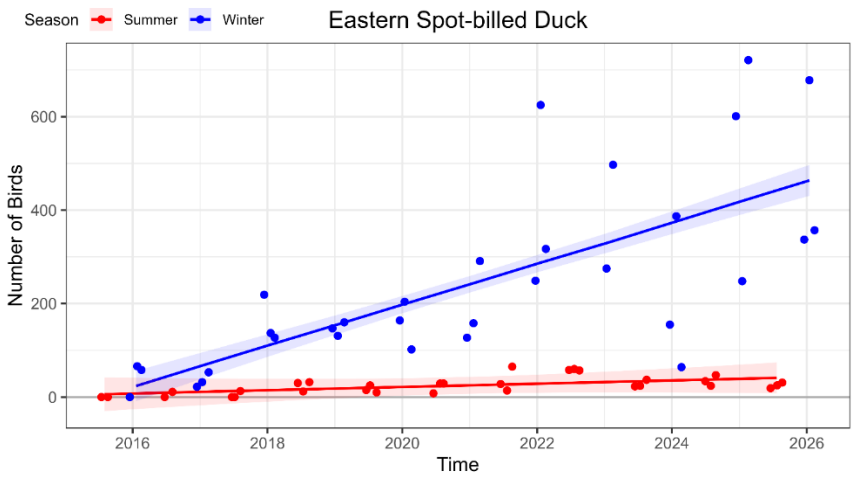
Appendix G. Species-specific Relationships in Abundance Through Time for Winter and Summer Analysis

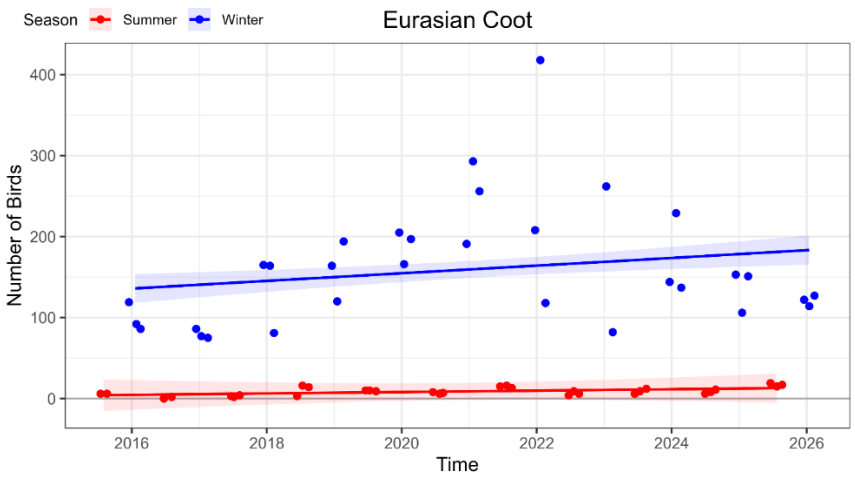


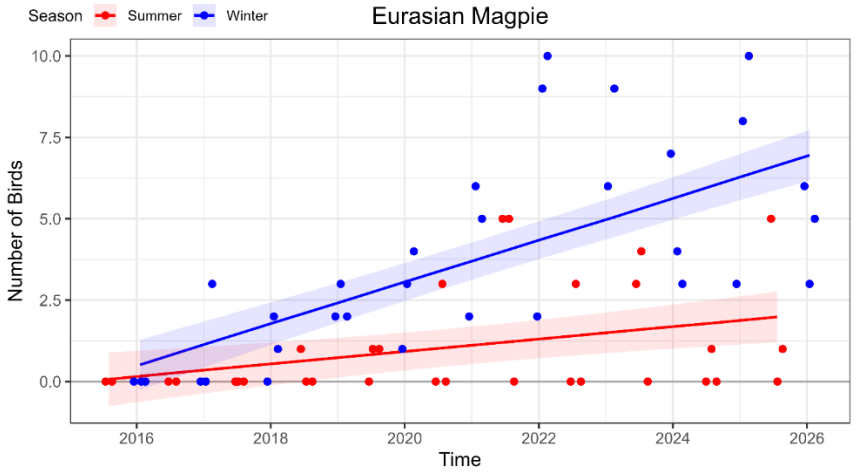


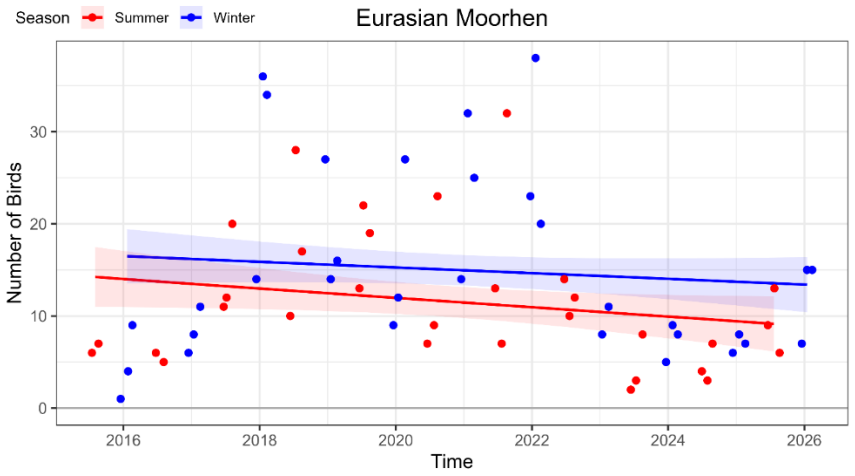


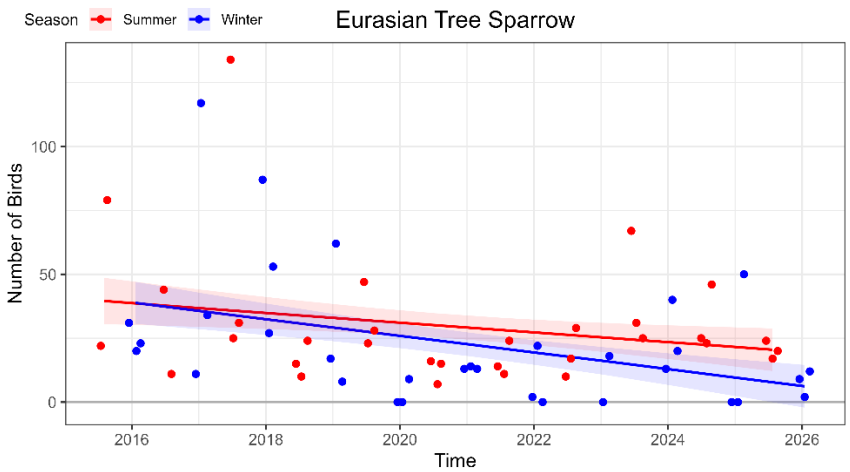


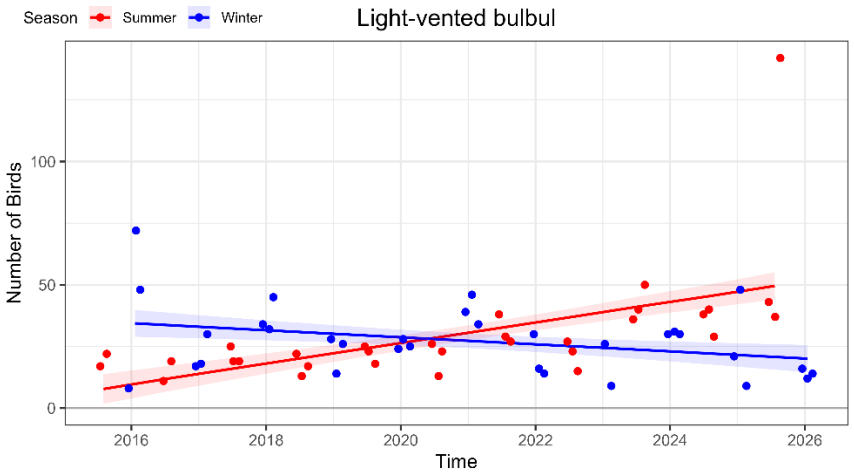

Season
Summer
Winter
Eastern Spot-billed Duck
Number of Birds
0
200
400
600
2016
2018
2020
2022
2024
2026
Time

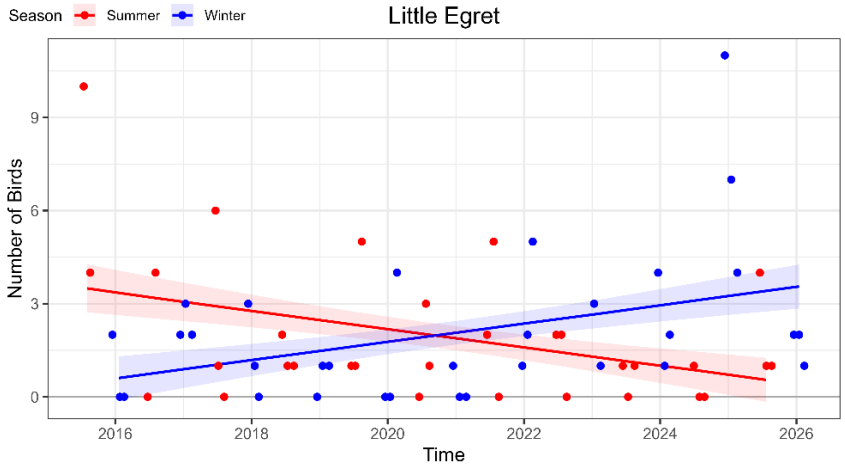

Season
Summer
Winter
Eurasian Coot
Number of Birds
0
100
200
300
400
2016
2018
2020
2022
2024
2026
Time

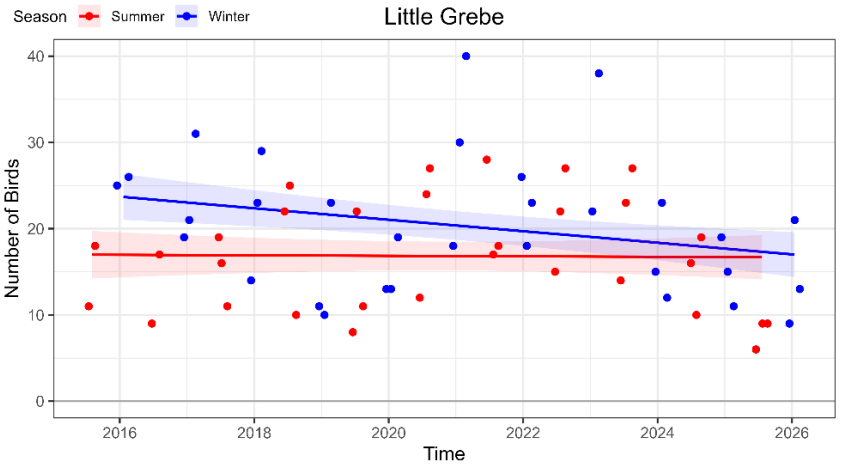

Season
Summer
Winter
Eurasian Magpie
Number of Birds
0.0
2.5
5.0
7.5
10.0
2016
2018
2020
2022
2024
2026
Time

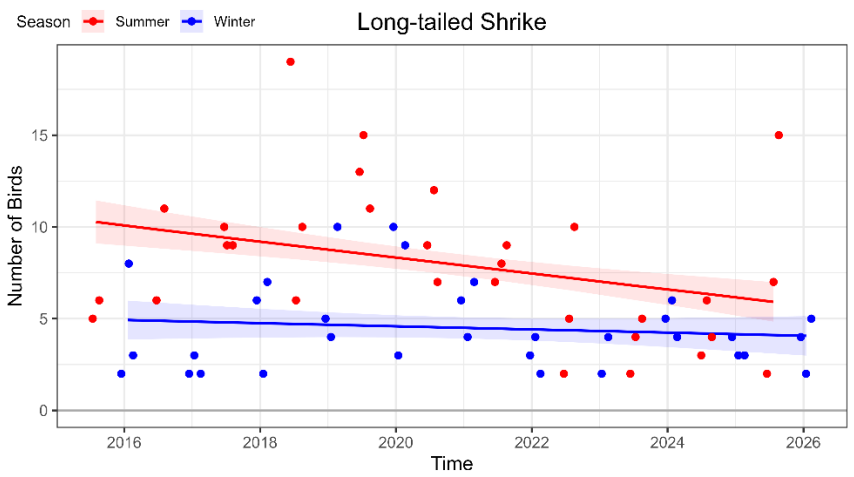

Season
Summer
Winter
Eurasian Moorhen
Number of Birds
0
10
20
30
2016
2018
2020
2022
2024
2026
Time

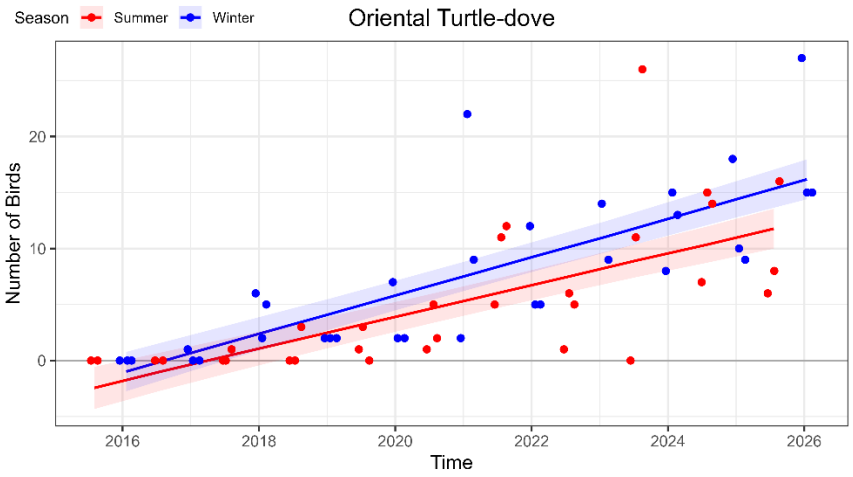

Season
Summer
Winter
Eurasian Tree Sparrow
Number of Birds
Time
0
50
100
2016
2018
2020
2022
2024
2026

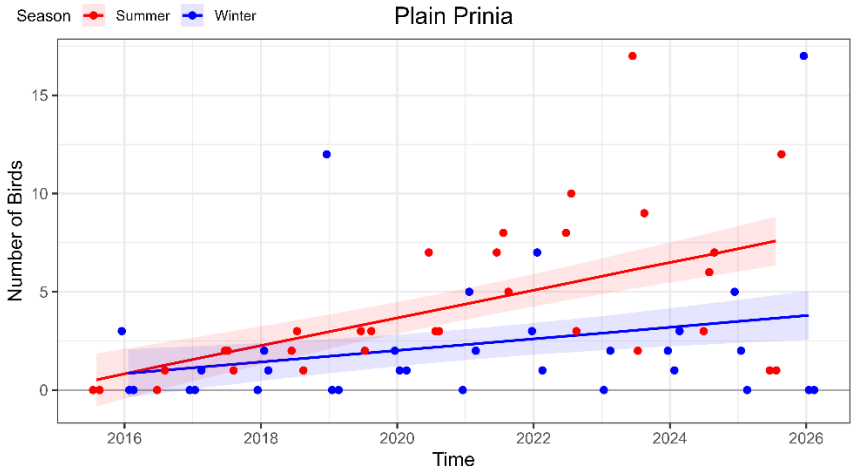

Season
Summer
Winter
Light-vented bulbul
Number of Birds
Time
0
50
100
2016
2018
2020
2022
2024
2026

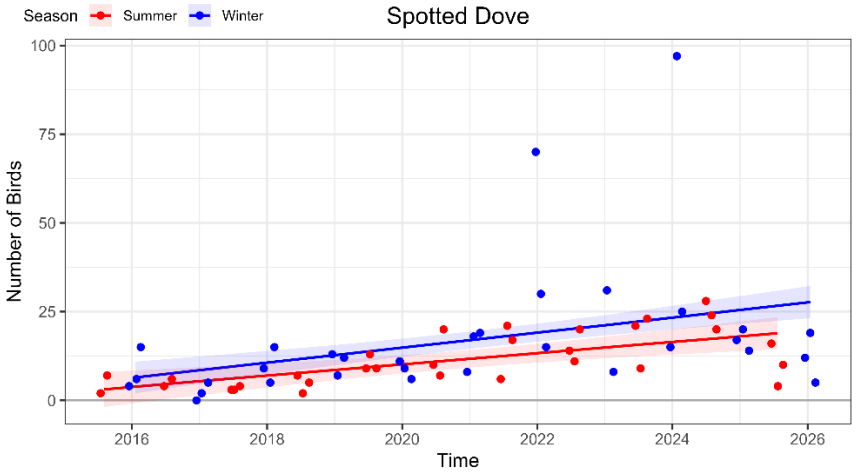

Season
Summer
Winter
Little Egret
Number of Birds
Time
0
3
6
9
2016
2018
2020
2022
2024
2026

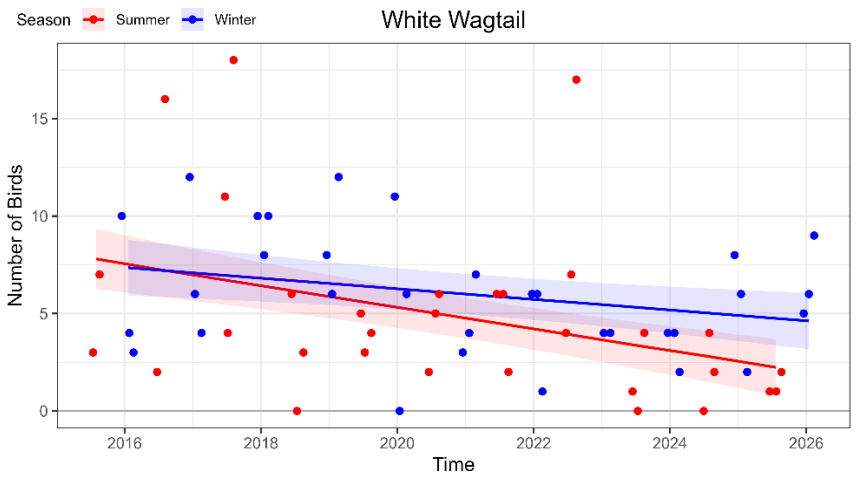

Season
Summer
Winter
Little Grebe
Number of Birds
Time
0
10
20
30
40
2016
2018
2020
2022
2024
2026

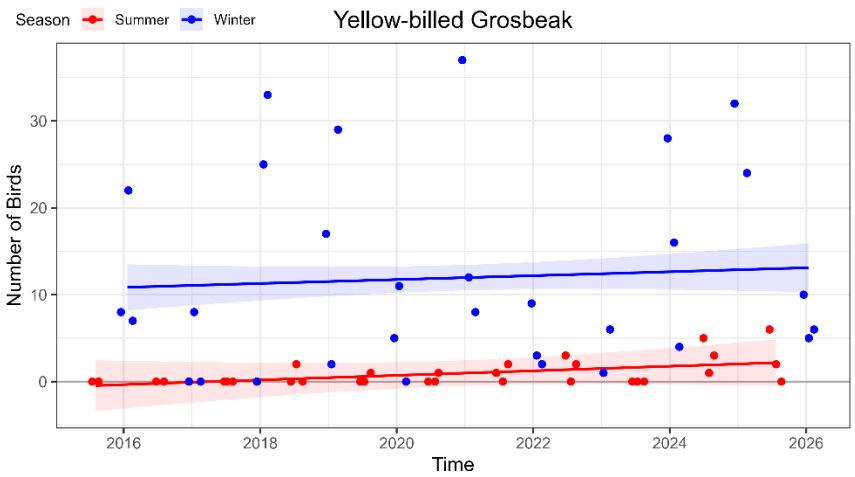

Season
Summer
Winter
Long-tailed Shrike
Number of Birds
Time
0
5
10
15
2016
2018
2020
2022
2024
2026


Season
Summer
Winter
Oriental Turtle-dove
Number of Birds
Time
0
10
20
2016
2018
2020
2022
2024
2026

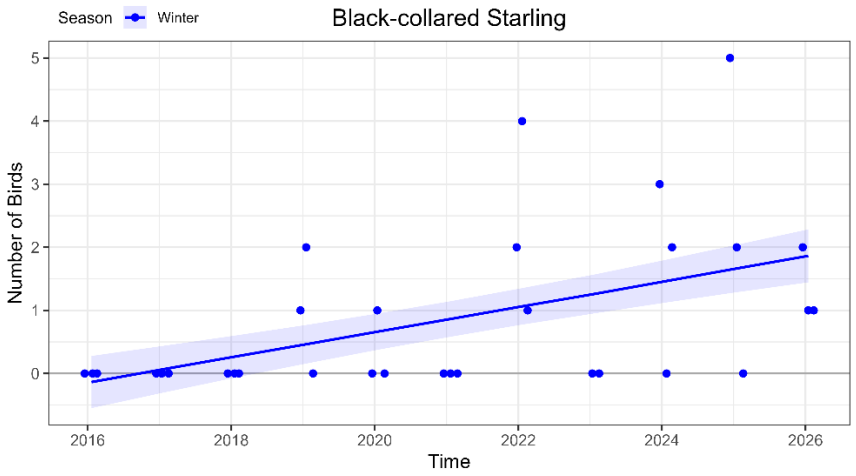

Season
Summer
Winter
Plain Prinia
Number of Birds
Time
0
5
10
15
2016
2018
2020
2022
2024
2026

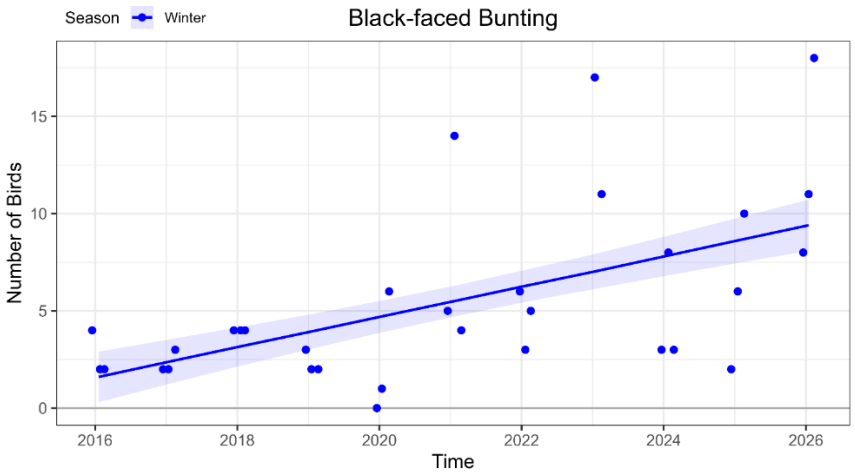

Season
Summer
Winter
Spotted Dove
Number of Birds
Time
0
25
50
75
100
2016
2018
2020
2022
2024
2026

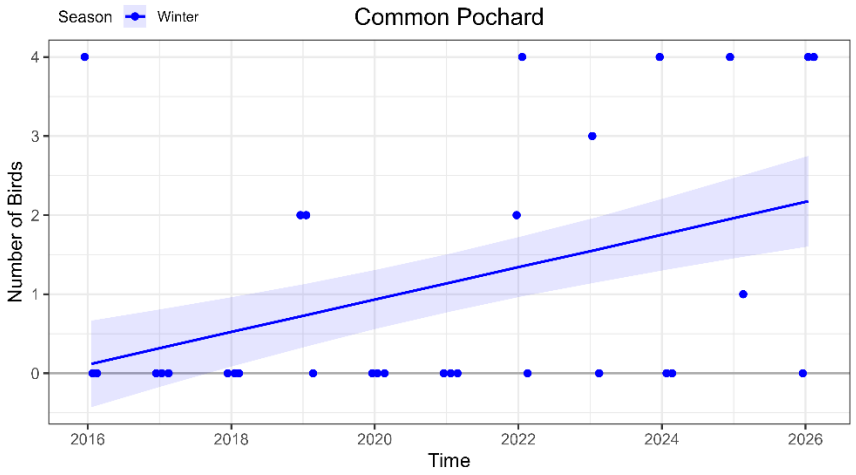

Season
Summer
Winter
White Wagtail
Number of Birds
Time
0
5
10
15
2016
2018
2020
2022
2024
2026

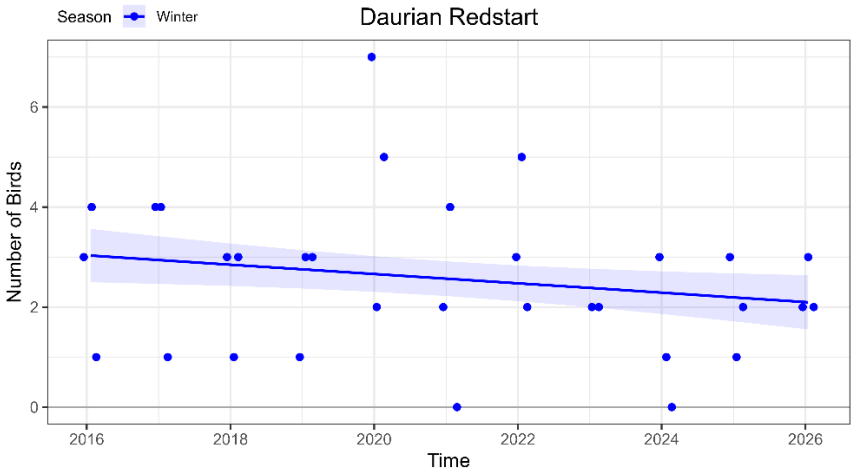

Season
Summer
Winter
Yellow-billed Grosbeak
Number of Birds
Time
0
10
20
30
2016
2018
2020
2022
2024
2026

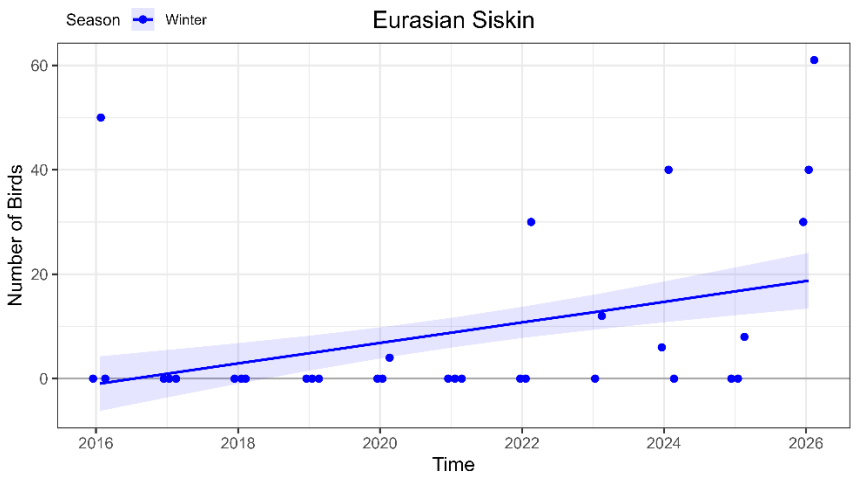
Appendix H. Species-specific Changes in Abundance Through Time for Winter Only Analysis

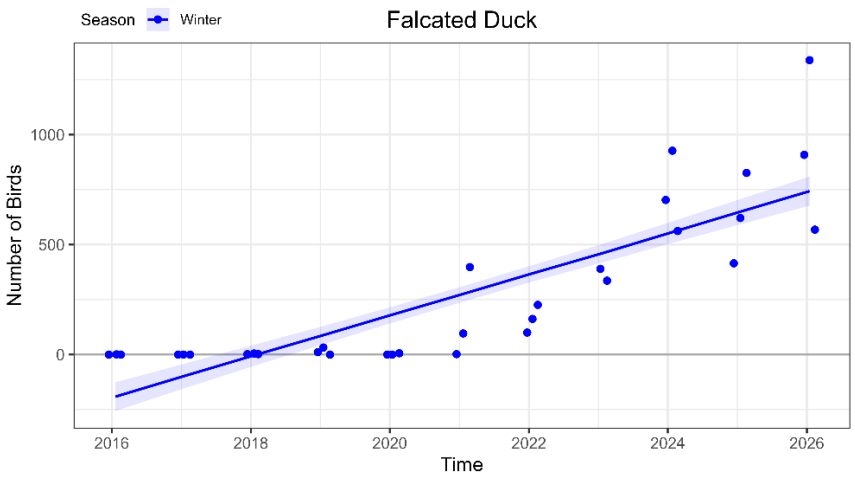


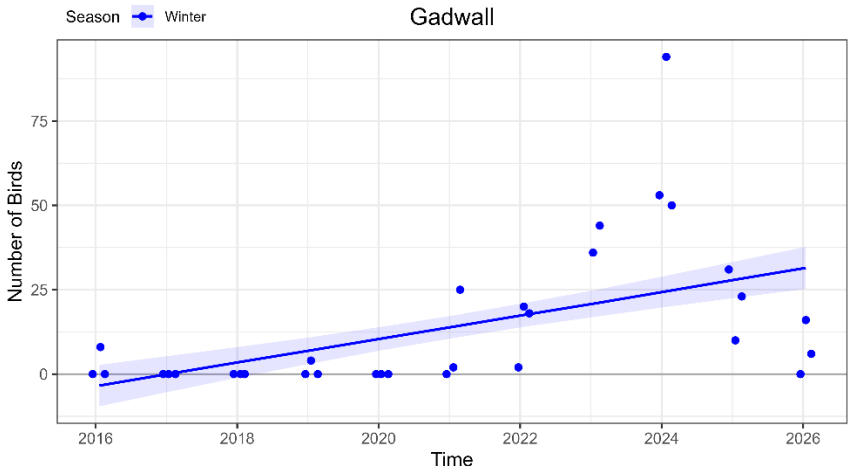


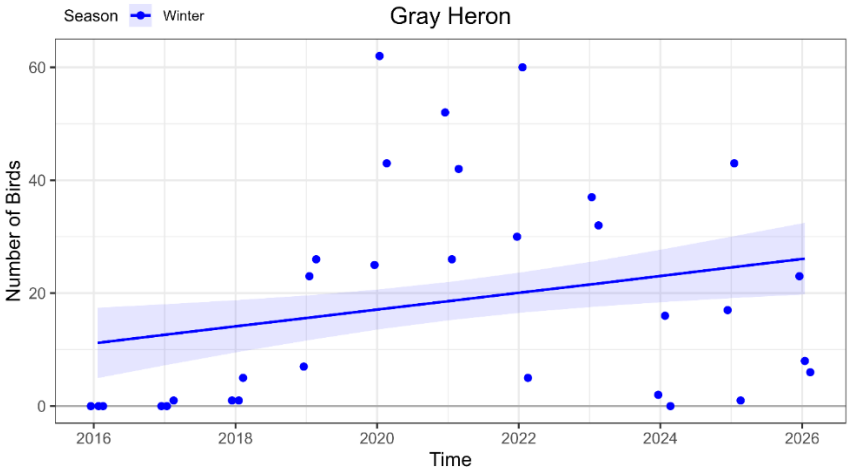


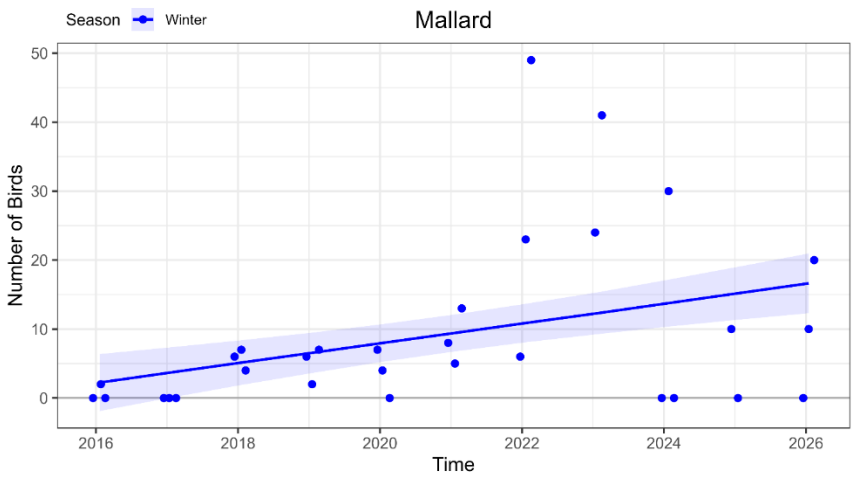


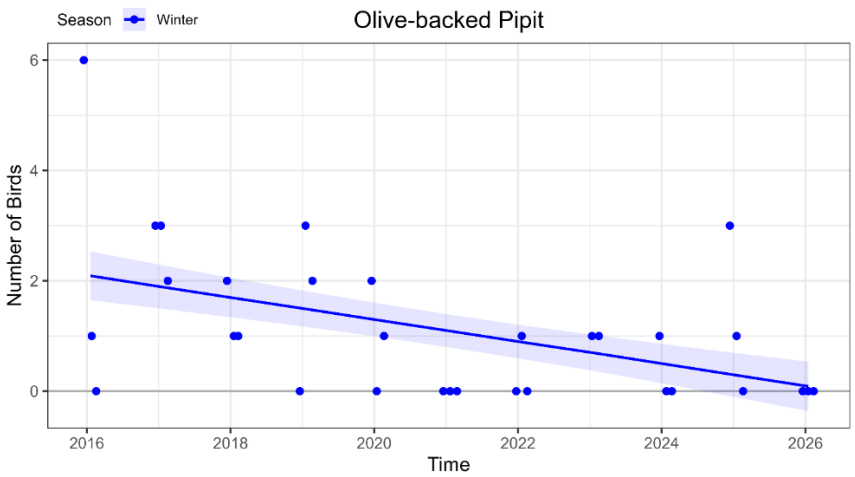

Season
Winter
Eurasian Siskin
Number of Birds
Time
0
20
40
60
2016
2018
2020
2022
2024
2026

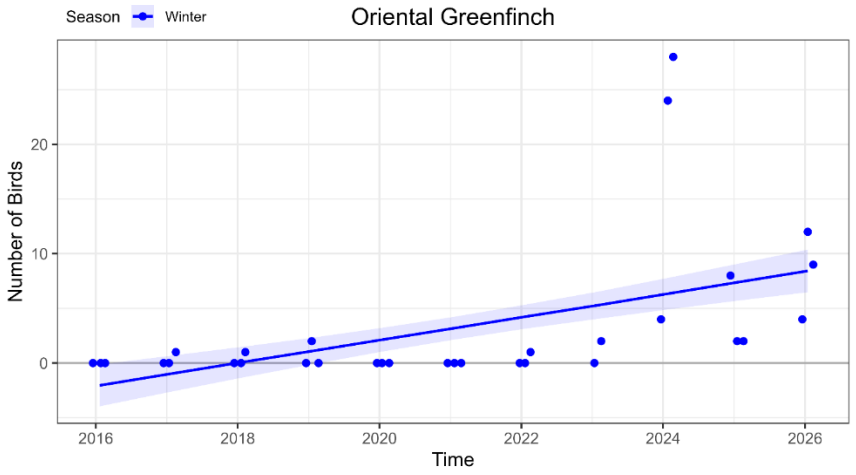

Season
Winter
Falcated Duck
Number of Birds
Time
0
500
1000
2016
2018
2020
2022
2024
2026

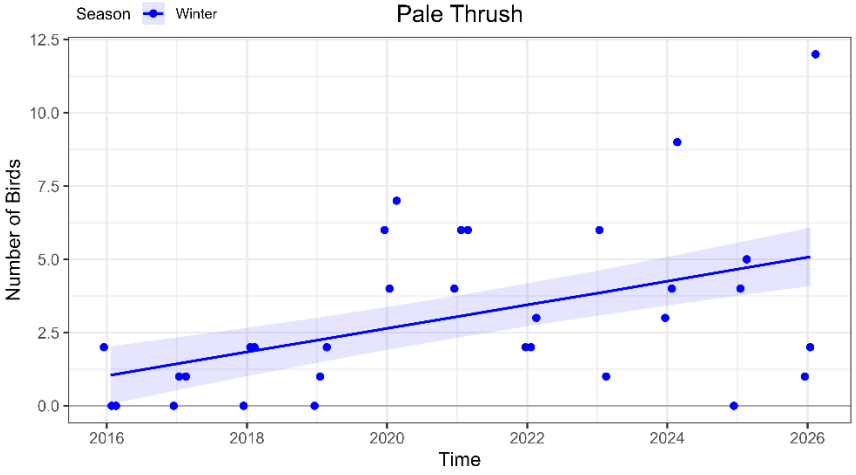

Season
Winter
Gadwall
Number of Birds
Time
0
25
50
75
2016
2018
2020
2022
2024
2026

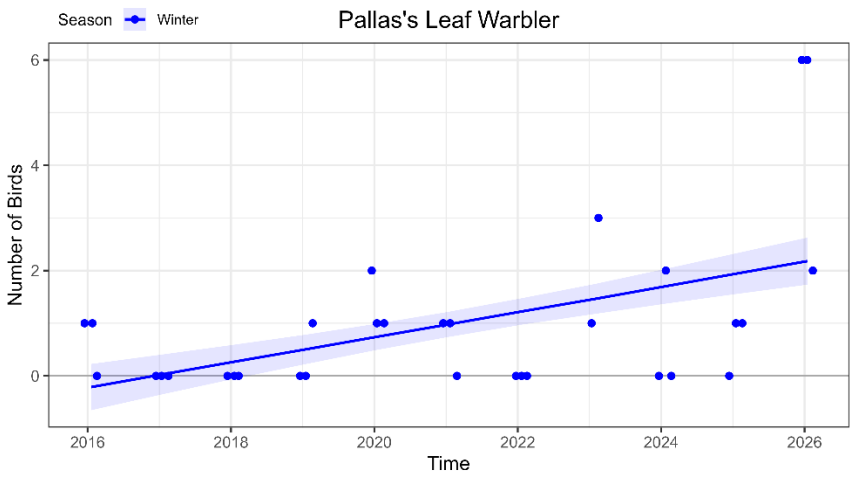

Season
Winter
Gray Heron
Number of Birds
Time
0
20
40
60
2016
2018
2020
2022
2024
2026

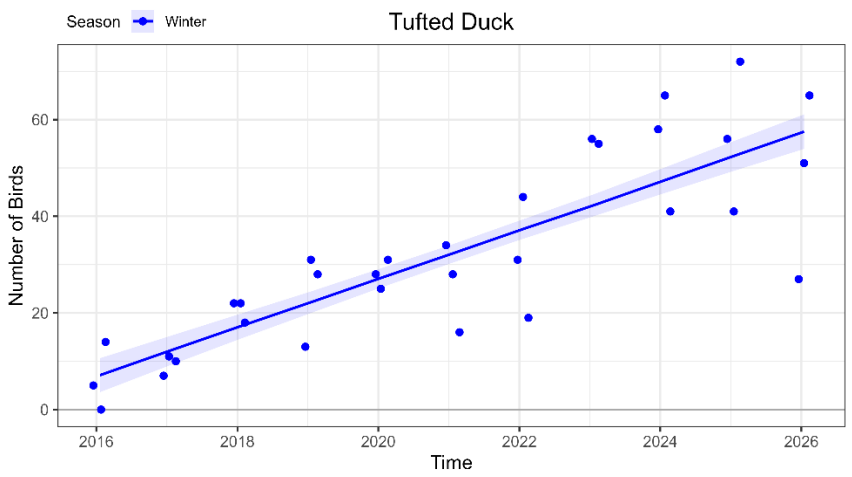

Season
Winter
Mallard
Number of Birds
Time
0
10
20
30
40
50
2016
2018
2020
2022
2024
2026


Season
Winter
Olive-backed Pipit
Number of Birds
Time
0
2
4
6
2016
2018
2020
2022
2024
2026

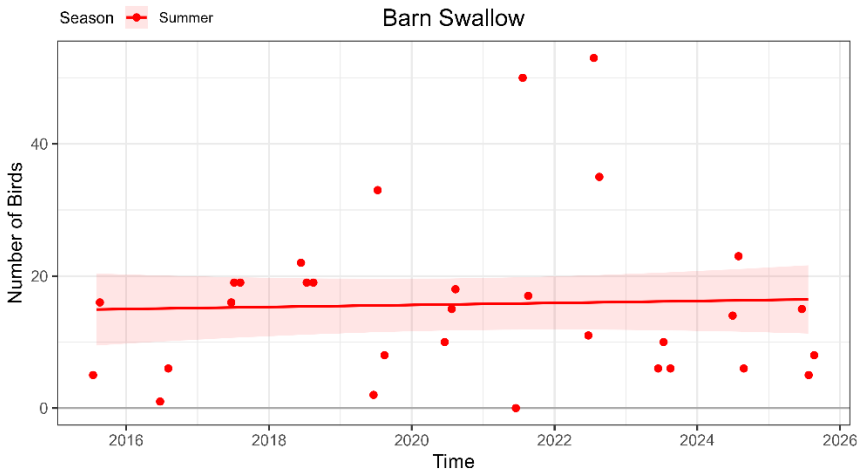

Season
Winter
Oriental Greenfinch
Number of Birds
Time
0
10
20
2016
2018
2020
2022
2024
2026

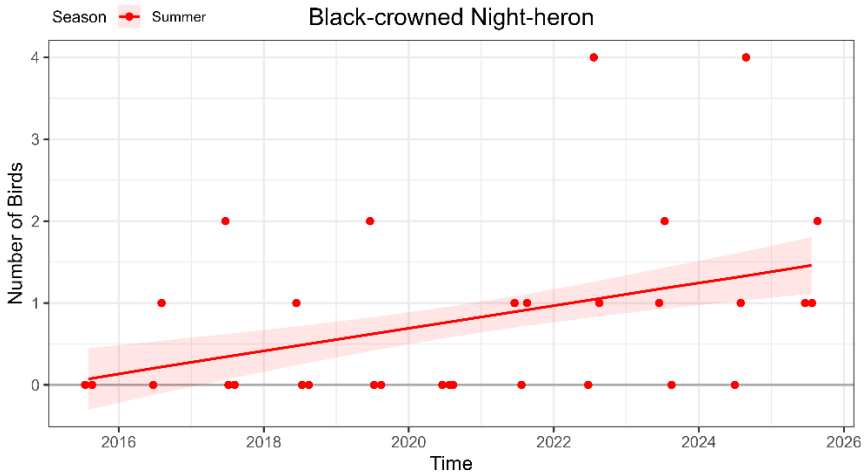

Season
Winter
Pale Thrush
Number of Birds
Time
0.0
2.5
5.0
7.5
10.0
12.5
2016
2018
2020
2022
2024
2026

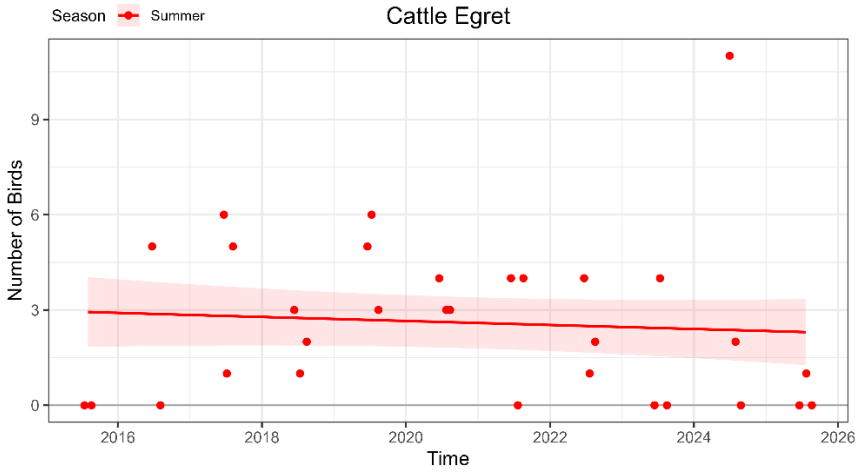

Season
Winter
Pallas's Leaf Warbler
Number of Birds
Time
0
2
4
6
2016
2018
2020
2022
2024
2026

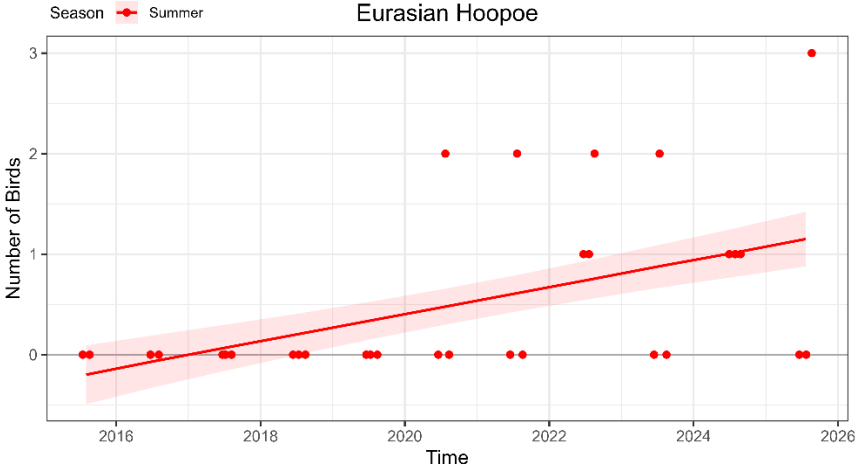

Season
Winter
Tufted Duck
Number of Birds
Time
0
20
40
60
2016
2018
2020
2022
2024
2026

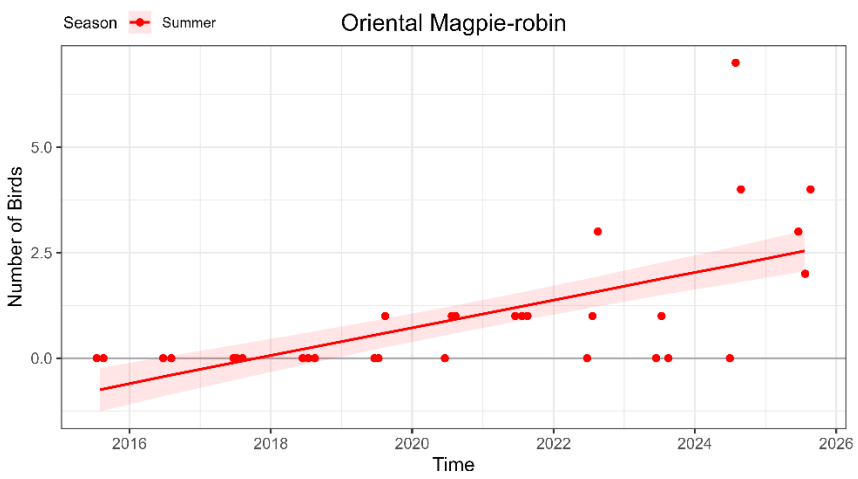
Appendix I. Species-specific Changes in Abundance Through Time for Summer Only Analysis

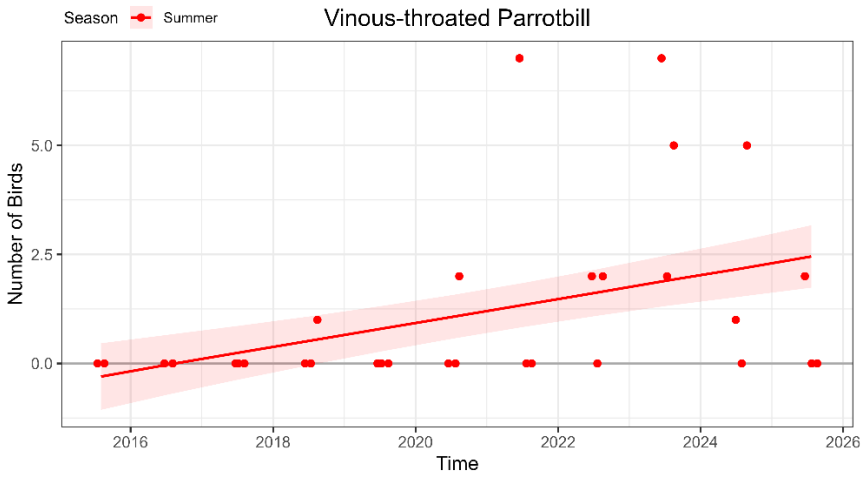


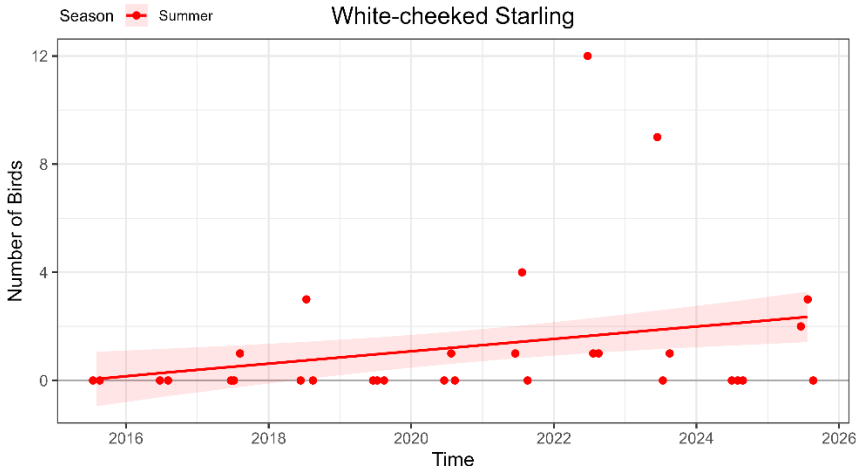


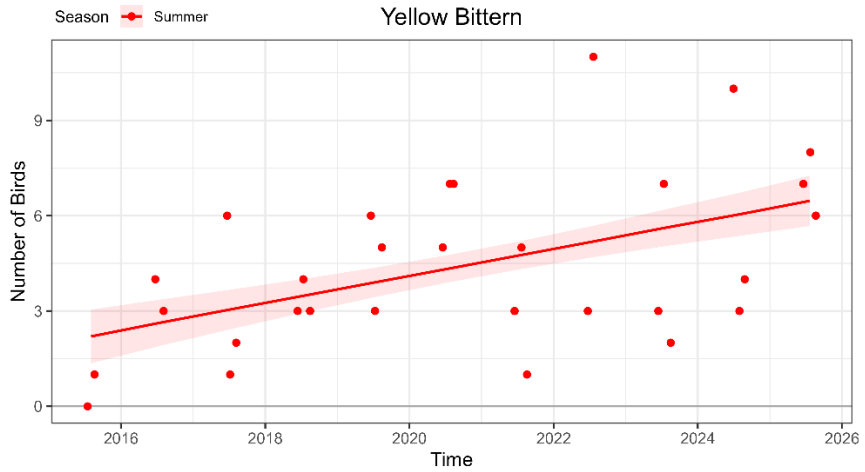





Season
Summer
Oriental Magpie-robin
Number of Birds
5.0
2.5
0.0
2016
2018
2020
2022
2024
2026
Time


Season
Summer
Vinous-throated Parrotbill
Number of Birds
5.0
2.5
0.0
2016
2018
2020
2022
2024
2026
Time


Season
Summer
White-cheeked Starling
Number of Birds
12
8
4
0
2016
2018
2020
2022
2024
2026
Time


Season
Summer
Yellow Bittern
Number of Birds
9
6
3
0
2016
2018
2020
2022
2024
2026
Time