



Disney 迪士尼
自然保护
CONSERVATION
基金 FUND

Creating an Urban Wetland Ecosystem: A Case Study of Shanghai Disney Resort's Wishing Star Park



Shanghai Disney Resort
April 2026

Foreword

Shanghai Disney Resort is designed to be an integrated resort destination, where visitors from near and far can enjoy a wide range of cultural, entertainment and recreational experiences. A key element of the resort concept is Wishing Star Park, comprising an outdoor lake and surrounding park. Wishing Star Park is a showcase example of how nature can thrive in an urban environment in what was once an agro-industrial landscape that provided minimal habitat for wildlife. Today, this 50-hectare urban wetland serves as an outdoor environmental classroom for visitors and a place of quiet respite from the hustle and bustle of city life for guests and wildlife alike.

Development of Wishing Star Park began shortly after the resort's overall start of construction in April 2011, and by 2015, the park's landscaping and lake were in the final stages of development. While Wishing Star Park is manmade, the extensive site formation work, soil remediation and the development of water treatment facilities have, over time, attracted a wide species of birds, mammals, reptiles, fish, amphibians and insects, creating a natural ecosystem for wildlife to thrive.

This report leverages one indicator of ecosystem development, migratory and resident bird populations, to showcase the successful development and biodiversity of Wishing Star Park. In July 2015, Shanghai Disney Resort initiated a monthly bird-monitoring program at Wishing Star Park in partnership with representatives and the Disney Conservation Fund. In the nearly eleven years since the start of the program, the monitoring team has documented 62,659 bird sightings of 133 species as of March 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-hectare 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 means 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. Globally, these species are threatened by illegal hunting and habitat fragmentation. For example, in recent years, the teal is declining in number. Wishing Star Park provides a 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 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 species analyzed 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 was recognized by the Shanghai Forestry Society as a Shanghai Natural Education Destination in 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 and beyond. These learnings include elements of park design and management, their impacts on birdlife, and the benefits of both to visitors and surrounding communities.

Table of Contents

Foreword	i
1. Introduction.....	1
2. Site Overview.....	2
2.1 Shanghai	2
2.2 Shanghai Disney Resort	3
3. Wishing Star Park and Wishing Star Lake	5
3.1 Aquatic and Wetland Habitats.....	5
3.2 Upland Habitats.....	5
4. Bird Monitoring Program.....	6
4.1 Program Design and History	6
4.2 Program Partnerships	7
4.3 Program Findings.....	8
4.3.1. Patterns of Species Discovery	8
4.3.2 Patterns of Changing Abundance	11
4.3.3 Species of Conservation Concern	17
5. Community Outreach, Guest Experiences, and Recognition.....	19
5.1 Community Outreach	19
5.1.1 Bird Map	19
5.1.2 Wishing Star Park Nature Book.....	19
5.1.3 Wishing Star Park Fun Environment Class	19
5.1.4 Young Nature Trainer Program	19
5.2 Guest Experiences	19
5.2.1 Spring Stroll and Botany Class	19
5.2.2 Disney Green Experience – Disneytown Wishing Star Park Adventure	20
5.2.3 Delightful Gardening in Shanghai Disneyland.....	20
5.2.4 Celebrate Earth – Earth Month Fair	20
5.3 Recognition.....	20
6. Learnings and Recommendations	20
7. Acknowledgments	22
Appendices	23
Appendix A. Wildlife-friendly Plants at Wishing Star Park.....	23

Appendix B. Terrestrial Insects Found at Wishing Star Park 26

Appendix C. Wishing Star Park Bird Monitoring Program Datasheet 29

Appendix D. Bird Species Documented at Wishing Star Park 30

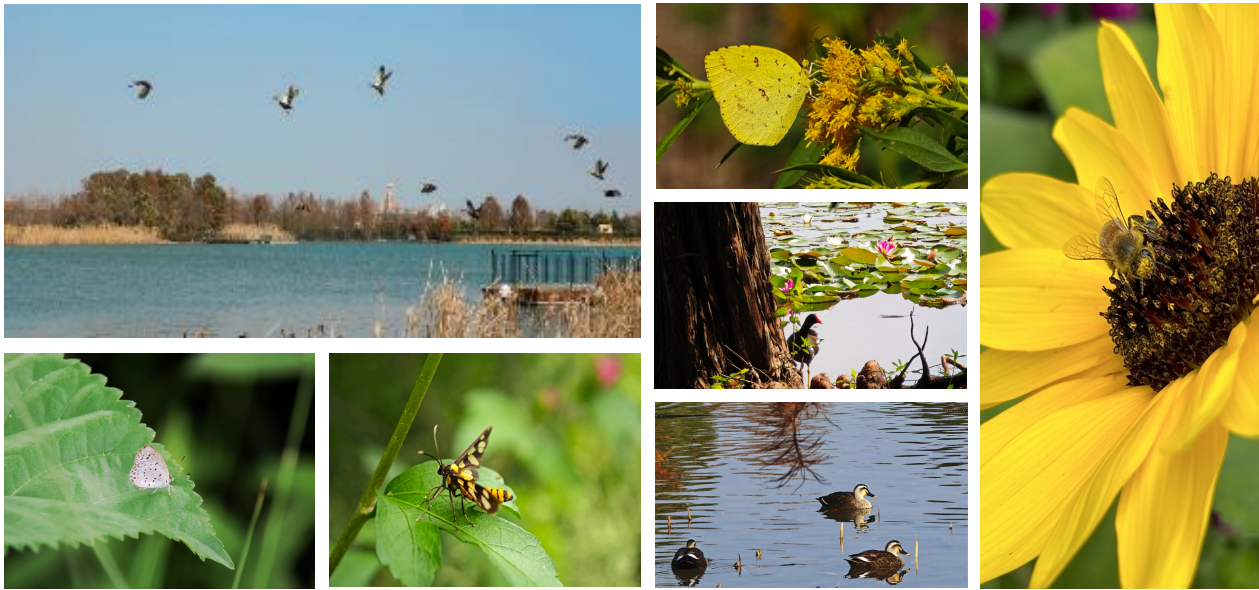
Appendix E. Data Analysis Methods 36

Appendix F. Statistical Model Results for Species-specific Abundance Analyses..... 37

Appendix G. Species-specific Relationships in Abundance Through Time for Winter and Summer Analysis..... 39

Appendix H. Species-specific Changes in Abundance Through Time for Winter Only Analysis..... 44

Appendix I. Species-specific Changes in Abundance Through Time for Summer Only Analysis..... 48



1. Introduction

Urbanization is rapidly changing our planet, and the scale and impact of these changes have been particularly dramatic in recent years. From a biodiversity perspective, urban growth has always exacerbated habitat fragmentation and degradation, which may lead to gradual loss of native biodiversity. From the perspective of human development, rapid urbanization has subtly distanced people from nature and its processes, leading to potentially negative outcomes for sustainable economic development as well as ecosystem diversity and stability. Fortunately, increasing attention across public and private sectors is leading to actions to jointly address the challenges of urbanization.

The People's Republic of China is committed to a path of modernization that pursues harmonious coexistence between humanity and nature through green development. As part of the Beautiful China Initiative, China focuses on coordinated efforts to reduce pollution and carbon emissions, improve environmental quality and ensure ecosystem diversity, steadily shifting towards greener, low-carbon economic and social development.

Despite these promising developments, there are still opportunities for further alignment between how urban green spaces are managed, how they benefit biodiversity, and how people are engaged through them. Addressing these opportunities 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 its location along a key migratory route for birds (the East Asian-Australasian Flyway) and the growing community of people that enjoys birdwatching. According to the data released at the launch ceremony for the 44th Shanghai "Bird Week" in 2025, 534 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 Shanghai Disney Resort.

Wishing Star Park is an urban park located in Shanghai Disney Resort that officially 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 are 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.

People have lived in the Shanghai region for thousands of years, 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 in 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 Ecological Space Plan¹, 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 birds².

¹ Municipal Planning and Natural Resources Bureau. (2021, May 28). *Shanghai Ecological Space Special Plan (2021-2035)*. <https://ghzvj.sh.gov.cn/cmsres/c8/c82f88fe77274b178a9fce499de81a61/2b52dba727cbb95214ee7f384a8eae3.pdf>.

² Shanghai Landscaping and City Appearance Administration Bureau. (2025, April 15). <https://english.shanghai.gov.cn/en-Latest-WhatsNew/20250415/68b2785363714a6da8b93f1382dff5c9.html>.

2.2 Shanghai Disney Resort

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 (Municipal Planning and Natural Resources Bureau, 2021). Consequently, 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 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 1). 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 two new themed hotels currently under development. In addition, the resort is home to a retail, dining and entertainment district 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 Distributed Energy Center, 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 1. *Avian Guests Enjoying Wishing Star Park*



Figure 2. *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 Shanghai Disney Resort and is currently one of the largest lakes within the Main City Area of Shanghai. The water body covers 39 hectares and includes a 0.7-hectare island 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 Wishing Star Park.

3.1 Aquatic and Wetland Habitats

The design and management of the lake support 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).

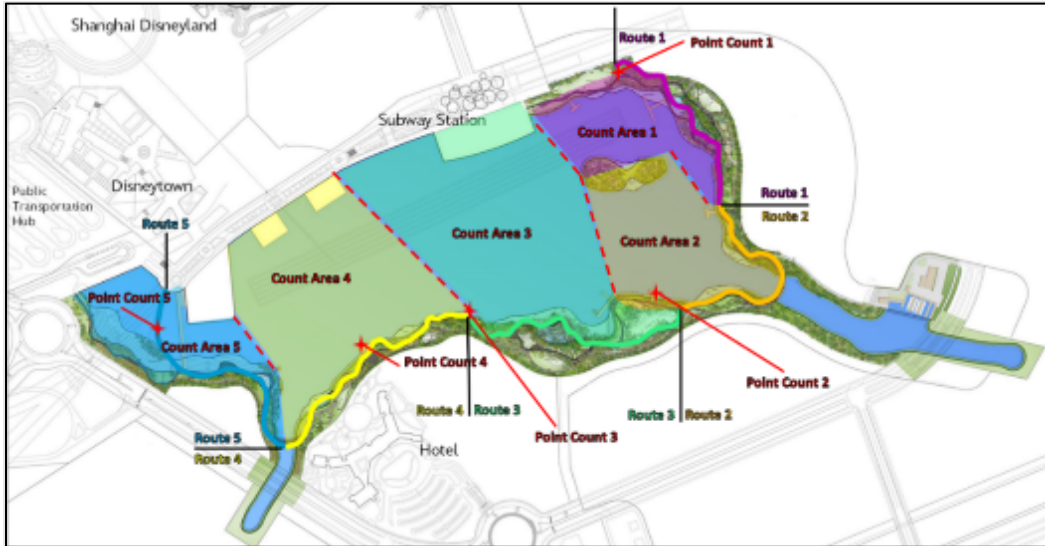
4. Bird Monitoring Program

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 3).

Figure 3. Survey Routes and Point Counts for the Wishing Star Park Bird Monitoring Program



Surveys began between 8:00am and 10:30am 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 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 Disney 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 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 due to special circumstances (July 2016, March to May 2022, and December 2022). As of February 2026, 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 monitoring program has been effective at detecting the diversity of bird species making use of the park.

Of the species spotted, 11 have been found over 1,000 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.

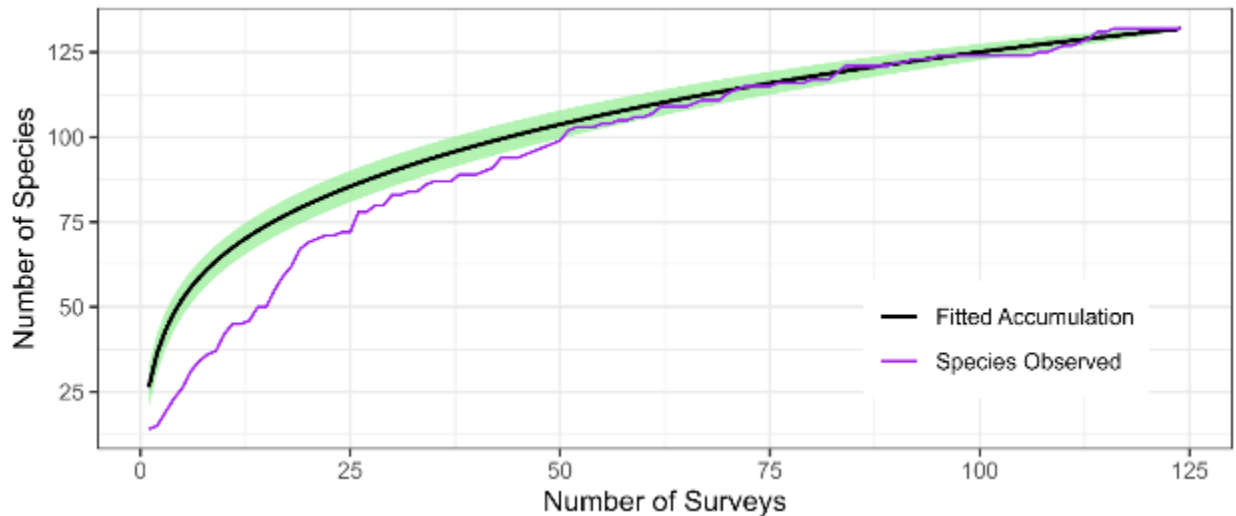
Common upland species (i.e., species with over 500 individuals observed) also varied in where they were most frequently found. Some species like the White Wagtail and Eurasian Tree Sparrow preferred the highly managed vegetation of Route 4 in front of the Shanghai Disneyland Hotel. Other species like 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 always 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 4), 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 4. Species Accumulation Curve for Wishing Star Park

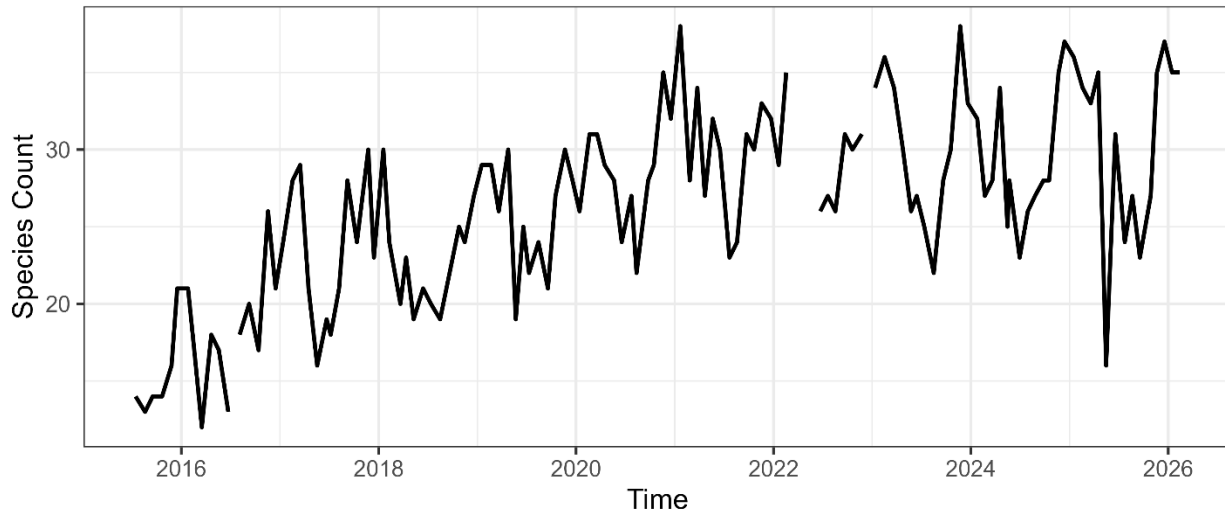


Note. Lines include observed species accumulation (jagged purple) and a fitted accumulation line (smooth black with green error bars shown).

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 5). 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, Wishing Star Park birds 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 5. Number of Species per Survey from July 2015 to February 2026



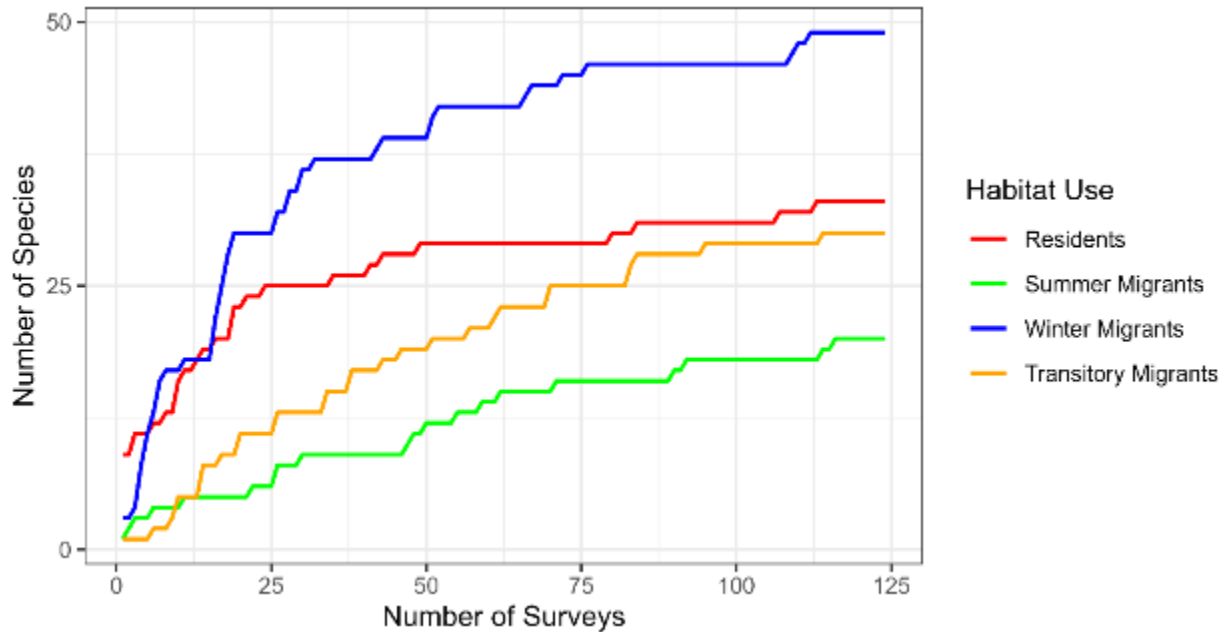
Note. Gaps between lines indicate missed surveys

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 6). 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 6. 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 summer temperatures have been recorded 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 over 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*

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
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

English Name	Overall Trend	Seasonal Differences
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

Note. All trends shown are statistically significant (see Appendices E and F for analytical details).

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 7). 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

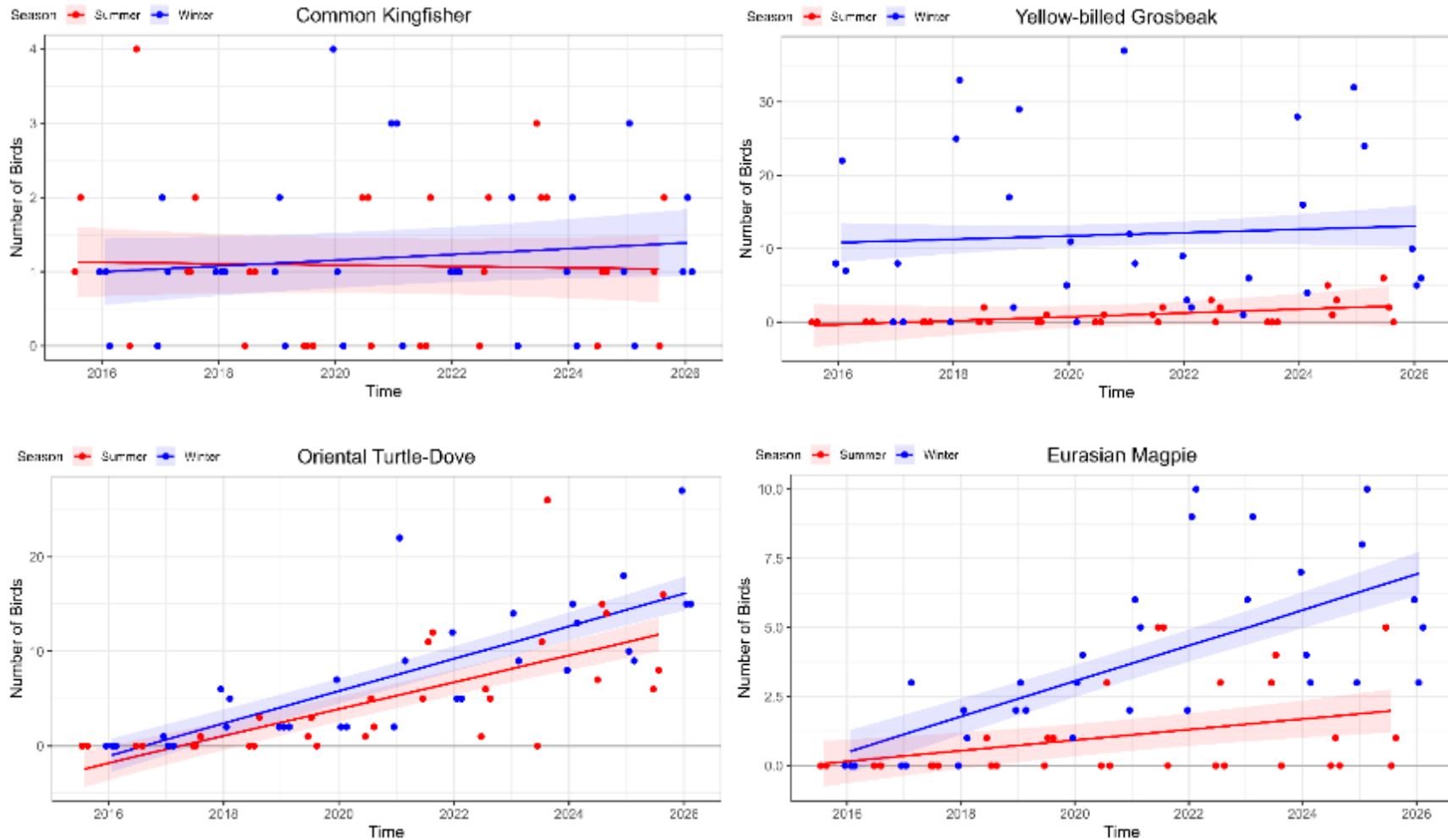
winter when foraging ranges are larger and territoriality is reduced. In some instances, birds from farther north may also be migrating south to Wishing Star Park to join residents for the winter.

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. Five species have decreased in abundance at Wishing Star Park during at least one season (Figure 8). 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.

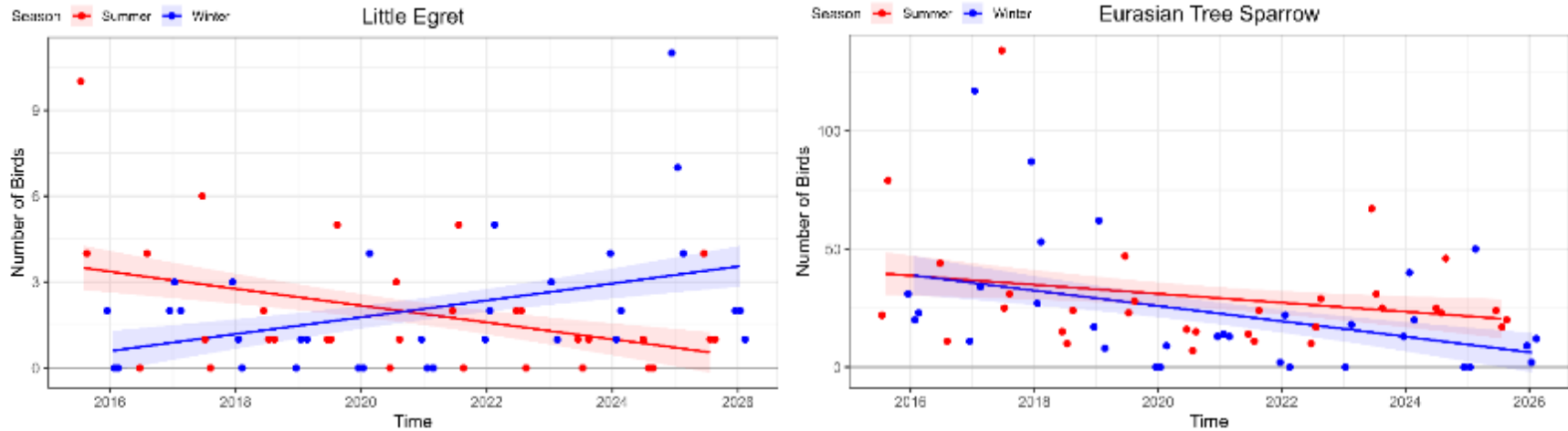
The remaining species were three resident species that declined in both seasons (Eurasian Tree Sparrow, Long-tailed Shrike, and White Wagtail) and a migrant that declined in winter (Olive-backed Pipit). The Eurasian Tree Sparrow, Olive-backed Pipit and Long-tailed Shrike prefer open woodlands or shrublands, 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.

Figure 7. Examples of Different Species-specific Patterns of Stable or Increasing Abundance from 2015-2026



Note. 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 8. Patterns of Abundance Change in Winter and Summer for Species that Declined in at Least One Season.



Note. 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).

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
<i>Mareca falcata</i>	罗纹鸭	Falcated Duck	Near Threatened until 2024	Winter Migrant	11,735
<i>Aythya ferina</i>	红头潜鸭	Common Pochard	Vulnerable	Winter Migrant	55
<i>Emberiza rustica</i>	田鸫	Rustic Bunting	Near Threatened	Winter Migrant	40
<i>Aythya nyroca</i>	白眼潜鸭	Ferruginous Duck	Near Threatened	Transitory Migrant	2
<i>Limosa limosa</i>	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, 14 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
<i>Alauda arvensis</i>	云雀	Eurasian Skylark	2 nd class	Winter Migrant	14
<i>Falco tinnunculus</i>	红隼	Eurasian Kestrel	2 nd class	Winter Migrant	11
<i>Buteo japonicus</i>	普通鵟	Eastern Buzzard	2 nd class	Winter Migrant	10
<i>Podiceps nigricollis</i>	黑颈鸕鹚	Eared Grebe	2 nd class	Winter Migrant	5
<i>Accipiter gentilis</i>	苍鹰	Northern Goshawk	2 nd class	Transitory Migrant	3
<i>Centropus bengalensis</i>	小鸦鹃	Lesser Coucal	2 nd class	Resident	2
<i>Falco peregrinus</i>	游隼	Peregrine Falcon	2 nd class	Resident	2
<i>Sibirionetta formosa</i>	花脸鸭	Baikal Teal	2 nd class	Winter Migrant	1
<i>Aix galericulata</i>	鸳鸯	Mandarin Duck	2 nd class	Winter Migrant	1
<i>Pandion haliaetus</i>	鵟	Osprey	2 nd class	Winter Migrant	1
<i>Pernis ptilorhynchus</i>	凤头蜂鹰	Oriental Honey-buzzard	2 nd class	Transitory Migrant	1
<i>Zosterops erythropleurus</i>	红胁绣眼鸟	Chestnut-flanked White-eye	2 nd class	Winter Migrant	1
<i>Accipiter nisus</i>	雀鹰	Eurasian Sparrowhawk	2 nd class	Winter Migrant	1
<i>Falco amurensis</i>	阿穆尔隼	Amur Falcon	2 nd 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. This gives visitors the chance 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 edu-tainment 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.

5.2.4 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 sustainability and its practices from the fair that showcases the resort’s dedication to promoting environmentally conscious choices.

5.3 Recognition

Because of the breadth and depth of environmental programming offered at 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, 133 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.

7. Acknowledgments

This report was compiled by Disney's Animals, Science and Environment team, in collaboration with Shanghai Disney Resort and Walt Disney Imagineering.

We would like to express our sincere gratitude to Shanghai Wildlife Conservation Association, the Shanghai Wild Bird Society and its team of experts - including Dr. He Xin, Yao Li, Yang Zhidong and Gao Shuhong - for their strong support of the Bird Monitoring Project over the past decade, as well as for the valuable guidance and assistance they provided during the compilation of this report.

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

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

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

Appendix B. Terrestrial Insects Found at Wishing Star Park

Scientific Name	Chinese Name	English Name
<i>Anoplophora chinensis</i>	星天牛	Citrus Long-Horned Beetle
<i>Anoplophora glabripennis</i>	光肩星天牛	Asian Long-Horned Beetle
<i>Batocera horsfieldi</i>	云斑白条天牛	White-Striped Long-Horned Beetle
<i>Apriona germari</i>	桑天牛	Mulberry Longhorn Beetle
<i>Aromia bungii</i>	桃红颈天牛	Red-Necked Longhorn Beetle
<i>Acalolepta sublusca</i>	双斑锦天牛	
<i>Megopis sinica</i>	薄锯齿天牛	Chinese Long-Horned Beetle
<i>Acanthotomicus suncei</i>	枫香刺小蠹	Sweetgum Inscriber
<i>Deporaus bicolor</i>	二色切叶象	Birch Leaf Roller
<i>Plagioder a versicolora</i>	柳蓝叶甲	Imported Willow Leaf Beetle
<i>Chrysochus chinensis</i>	中华萝摩肖叶甲	
<i>Allomyrina dichotoma</i>	双叉犀金龟	Japanese Rhinoceros Beetle
<i>Harpalus sinicus</i>	中华婪步甲	Ground Beetle
<i>Pieris rapae</i>	菜粉蝶	Small Cabbage White
<i>Graphium sarpedon</i>	青凤蝶	Common Bluebottle
<i>Graphium chironides</i>	碎斑青凤蝶	Veined Jay
<i>Papilio polytes</i>	玉带凤蝶	Common Mormon
<i>Papilio xuthus</i>	柑橘凤蝶	Chinese Yellow Swallowtail
<i>Eurema hecabe</i>	宽边黄粉蝶	Common Grass Yellow
<i>Argynnis hyperbius</i>	斐豹蛱蝶	Indian Fritillary
<i>Charaxes bernardus</i>	白带螯蛱蝶	Tawny Rajah
<i>Polygonia c-aureum</i>	黄钩蛱蝶	Asian Comma
<i>Parnara guttata</i>	直纹稻弄蝶	Common Straight Swift
<i>Vanessa indica</i>	大红蛱蝶	Indian Red Admiral

Scientific Name	Chinese Name	English Name
<i>Papilio bianor</i>	碧凤蝶	Chinese Peacock
<i>Apatura ilia</i>	柳紫闪蛱蝶	Lesser Purple Emperor
<i>Holcocerus insularis</i>	小线角木蠹蛾	Carpenterworm Moth
<i>Thosea sinensis</i>	扁刺蛾	Slug Caterpillar Moth
<i>Parasa consocia</i>	褐边绿刺蛾	
<i>Cnidocampa flavescens</i>	黄刺蛾	Oriental Moth
<i>Parasa lepida</i>	丽绿刺蛾	Blue-Striped Nettle Grub
<i>Calliteara pudibunda</i>	丽毒蛾	Pale Tussock Moth
<i>Cephonodes hylas</i>	咖啡透翅天蛾	Coffee Bee Hawkmoth
<i>Orthaga achatina</i>	樟巢螟	
<i>Phyllocnistis citrella</i>	柑橘叶潜蛾	Citrus Leafminer
<i>Cydalima perspectalis</i>	黄杨绢野螟	Box Tree Moth
<i>Algedonia cocclesalis</i>	竹织叶野螟	Bamboo Leaf Roller
<i>Cystidia couaggaria</i>	小蜻蜓尺蛾	Plum Cankerworm Moth
<i>Plutella xylostella</i>	小菜蛾	Diamondback Moth
<i>Prodenia litura</i>	斜纹夜蛾	Cotton Moth
<i>Brithys crini</i>	葱兰夜蛾	Amaryllis Borer
<i>Sidemia depravata</i>	淡剑灰翅夜蛾	Lawn Grass Cutworm
<i>Enmonodia vespertilio</i>	变色夜蛾	
<i>Eumeta minuscula</i>	茶蓑蛾	Tea Bagworm
<i>Erthesina fullo</i>	麻皮蝽	Yellow-Spotted Stink Bug
<i>Corythucha ciliata</i>	悬铃木方翅网蝽	Sycamore Lace Bug
<i>Stephanitis pyrioides</i>	杜鹃冠网蝽	Azalea Lace Bug
<i>Apolygus lucorum</i>	绿盲蝽	Green Plant Bug
<i>Selenothrips rubrocinctus</i>	红带网纹蓟马	Red-banded Thrip
<i>Cinara pinitabulaeformis</i>	松大蚜	Pine Aphid

Scientific Name	Chinese Name	English Name
<i>Periphyllus koelreuteriae</i>	栾多态毛蚜	Golden Rain Tree Aphid
<i>Aleurocanthus spiniferus</i>	黑刺粉虱	Orange Spiny Whitefly
<i>Poratrionia sp.</i>	上海无齿木虱	
<i>Ricania sublimbata</i>	柿广翅蜡蝉	
<i>Clovia punctata</i>	刻点铲头沫蝉	
<i>Ceroplastes rubens</i>	红蜡蚧	Red Wax Scale
<i>Acanthococcus lagerstroemiae</i>	紫薇绒蚧	Crapemyrtle Bark Scale
<i>Ictinogomphus pertinax</i>	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:** _____

观察员 **Observer 2:** _____

技能级别 **Skill level:**

技能级别 **Skill level:**

专业级 (可听/看见所有鸟类) **Professional (all seen/heard)**

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)**

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)**

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: <input type="checkbox"/> 可听到 100% 100% heard <input type="checkbox"/> 可听到 75% 75% heard <input type="checkbox"/> 可听到 50% 50% heard <input type="checkbox"/> 可听到 25% 25% heard <input type="checkbox"/> 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
<i>Anas zonorhyncha</i>	斑嘴鸭	Chinese Spot-billed Duck	Eastern Spot-billed Duck	Winter Migrant	13384
<i>Mareca falcata</i>	罗纹鸭	Falcatad Duck	Falcatad Duck	Winter Migrant	11735
<i>Fulica atra</i>	骨顶鸡	Common Coot	Eurasian Coot	Winter Migrant	8369
<i>Pycnonotus sinensis</i>	白头鹎	Light-vented Bulbul	Light-vented Bulbul	Resident	3537
<i>Passer montanus</i>	树麻雀	Eurasian Tree Sparrow	Eurasian Tree Sparrow	Resident	3229
<i>Tachybaptus ruficollis</i>	小鸕鷀	Little Grebe	Little Grebe	Resident	2433
<i>Gallinula chloropus</i>	黑水鸡	Common Moorhen	Eurasian Moorhen	Resident	1765
<i>Streptopelia chinensis</i>	珠颈斑鸠	Eastern Spotted Dove	Spotted Dove	Resident	1647
<i>Turdus mandarinus</i>	乌鸫	Eurasian Blackbird	Chinese Blackbird	Resident	1599
<i>Aythya fuligula</i>	凤头潜鸭	Tufted Duck	Tufted Duck	Winter Migrant	1475
<i>Acridotheres cristatellus</i>	八哥	Crested Myna	Crested Myna	Resident	1212
<i>Ardea cinerea</i>	苍鹭	Grey Heron	Gray Heron	Resident	901
<i>Eophona migratoria</i>	黑尾蜡嘴雀	Yellow-billed Grosbeak	Yellow-billed Grosbeak	Resident	883
<i>Lanius schach</i>	棕背伯劳	Long-tailed Shrike	Long-tailed Shrike	Resident	785
<i>Motacilla alba</i>	白鹡鸰	White Wagtail	White Wagtail	Winter Migrant	775
<i>Mareca strepera</i>	赤膀鸭	Gadwall	Gadwall	Winter Migrant	758
<i>Streptopelia orientalis</i>	山斑鸠	Oriental Turtle-Dove	Oriental Turtle-Dove	Resident	734
<i>Hirundo rustica</i>	家燕	Barn Swallow	Barn Swallow	Summer Migrant	629
<i>Anas platyrhynchos</i>	绿头鸭	Mallard	Mallard	Winter Migrant	498
<i>Prinia inornata</i>	纯色山鹡鸰	Plain Prinia	Plain Prinia	Resident	413
<i>Emberiza spodocephala</i>	灰头鹀	Black-faced Bunting	Black-faced Bunting	Winter Migrant	333
<i>Pica pica</i>	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
<i>Spinus spinus</i>	黄雀	Eurasian Siskin	Eurasian Siskin	Winter Migrant	287
<i>Egretta garzetta</i>	白鹭	Little Egret	Little Egret	Resident	247
<i>Spodiopsar cineraceus</i>	灰椋鸟	White-cheeked Starling	White-cheeked Starling	Resident	229
<i>Ixobrychus sinensis</i>	黄苇鳉	Yellow Bittern	Yellow Bittern	Summer Migrant	206
<i>Parus cinereous</i>	大山雀	Japanese Tit	Asian Tit	Resident	197
<i>Bubulcus ibis</i>	牛背鹭	Cattle Egret	Cattle Egret	Summer Migrant	196
<i>Alcedo atthis</i>	普通翠鸟	Common Kingfisher	Common Kingfisher	Resident	183
<i>Sinosuthora webbiana</i>	棕头鸦雀	Vinous-throated Parrotbill	Vinous-throated Parrotbill	Resident	176
<i>Fringilla montifringilla</i>	燕雀	Brambling	Brambling	Winter Migrant	174
<i>Chloris sinica</i>	金翅雀	Grey-caped Greenfinch / Oriental Greenfinch	Oriental Greenfinch	Resident	162
<i>Turdus pallidus</i>	白腹鸫	Pale Thrush	Pale Thrush	Winter Migrant	156
<i>Zosterops japonicus</i>	暗绿绣眼鸟	Japanese White-eye	Warbling White-eye	Resident	144
<i>Phoenicurus aureoreus</i>	北红尾鸲	Daurian Redstart	Daurian Redstart	Winter Migrant	143
<i>Nycticorax nycticorax</i>	夜鹭	Black-crowned Night-heron	Black-crowned Night-heron	Resident	114
<i>Gracupica nigricollis</i>	黑领椋鸟	Black-collared Starling	Black-collared Starling	Resident	99
<i>Turdus eunomus</i>	斑鸫	Dusky Thrush	Dusky Thrush	Winter Migrant	90
<i>Anthus hodgsoni</i>	树鹨	Oriental Tree Pipit / Olive-backed Pipit	Olive-backed Pipit	Winter Migrant	78
<i>Phylloscopus proregulus</i>	黄腰柳莺	Pallas's Leaf Warbler	Pallas's Leaf Warbler	Winter Migrant	75
<i>Copsychus saularis</i>	鹊鸲	Oriental Magpie-robin	Oriental Magpie-robin	Resident	70
<i>Lonchura punctulata</i>	斑文鸟	Scaly-breasted Munia	Scaly-breasted Munia	Resident	68
<i>Podiceps cristatus</i>	凤头鸕鹚	Great Crested Grebe	Great Crested Grebe	Winter Migrant	61
<i>Upupa epops</i>	戴胜	Eurasian Hoopoe / Common Hoopoe	Eurasian Hoopoe	Resident	60
<i>Aythya ferina</i>	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
<i>Lonchura striata</i>	白腰文鸟	White-rumped Munia	White-rumped Munia	Resident	50
<i>Mareca penelope</i>	赤颈鸭	Eurasian Wigeon	Eurasian Wigeon	Winter Migrant	48
<i>Remiz consobrinus</i>	中华攀雀	Chinese Penduline Tit	Chinese Penduline Tit	Winter Migrant	47
<i>Emberiza pusilla</i>	小鹀	Little Bunting	Little Bunting	Winter Migrant	47
<i>Acrocephalus orientalis</i>	东方大苇莺	Oriental Reed Warbler	Oriental Reed Warbler	Summer Migrant	47
<i>Motacilla flava</i>	黄鹡鸰	Yellow Wagtail	Western Yellow Wagtail	Transitory Migrant	46
<i>Phylloscopus inornatus</i>	黄眉柳莺	Yellow-browed Warbler	Yellow-browed Warbler	Transitory Migrant	45
<i>Ardeola bacchus</i>	池鹭	Chinese Pond-heron	Chinese Pond-heron	Summer Migrant	44
<i>Anas crecca</i>	绿翅鸭	Common Teal	Green-winged Teal	Winter Migrant	43
<i>Phasianus colchicus</i>	雉鸡	Common Pheasant	Ring-necked Pheasant	Resident	43
<i>Emberiza rustica</i>	田鹀	Rustic Bunting	Rustic Bunting	Winter Migrant	40
<i>Spodiopsar sericeus</i>	丝光椋鸟	Red-billed Starling / Silky Starling	Red-billed Starling	Resident	37
<i>Cisticola juncidis</i>	棕扇尾莺	Zitting Cisticola	Zitting Cisticola	Resident	32
<i>Turdus hortulorum</i>	灰背鸫	Grey-backed Thrush	Gray-backed Thrush	Winter Migrant	30
<i>Amaurornis phoenicurus</i>	白胸苦恶鸟	White-breasted Waterhen	White-breasted Waterhen	Summer Migrant	29
<i>Chroicocephalus ridibundus</i>	红嘴鸥	Common Black-headed Gull	Black-headed Gull	Winter Migrant	28
<i>Ardea alba</i>	大白鹭	Large Egret	Great Egret	Summer Migrant	23
<i>Tarsiger cyanurus</i>	红胁蓝尾鸲	Orange-flanked Bush-robin	Red-flanked Bluetail	Winter Migrant	17
<i>Spatula clypeata</i>	琵嘴鸭	Shoveler	Northern Shoveler	Winter Migrant	15
<i>Alauda arvensis</i>	云雀	Eurasian Skylark	Eurasian Skylark	Winter Migrant	14
<i>Spatula querquedula</i>	白眉鸭	Garganey	Garganey	Transitory Migrant	13
<i>Falco tinnunculus</i>	红隼	Common Kestrel	Eurasian Kestrel	Winter Migrant	11
<i>Regulus regulus</i>	戴菊	Goldcrest	Goldcrest	Winter Migrant	11
<i>Coccothraustes coccothraustes</i>	锡嘴雀	Hawfinch	Hawfinch	Winter Migrant	10

Scientific Name	Chinese Name	English Name (Shanghai Wild Bird Society)	English Name (Birds of the World)	Habitat Use	Total Documented
<i>Buteo japonicus</i>	普通鵟	Common Buzzard / Japanese Buzzard	Eastern Buzzard	Winter Migrant	10
<i>Phylloscopus coronatus</i>	冕柳莺	Eastern Crowned Warbler	Eastern Crowned Warbler	Transitory Migrant	9
<i>Anas acuta</i>	针尾鸭	Northern Pintail	Northern Pintail	Winter Migratory	9
<i>Motacilla cinerea</i>	灰鹊鸂	Grey Wagtail	Gray Wagtail	Winter Migrant	8
<i>Phylloscopus borealis</i>	极北柳莺	Arctic Warbler	Arctic Warbler	Transitory Migrant	8
<i>Apus pacificus</i>	白腰雨燕	Fork-tailed Swift	Pacific Swift	Transitory Migrant	8
<i>Actitis hypoleucos</i>	矶鹬	Common Sandpiper	Common Sandpiper	Transitory Migrant	7
<i>Phalacrocorax carbo</i>	普通鸬鹚	Great Cormorant	Great Cormorant	Winter Migrant	7
<i>Gallinago gallinago</i>	扇尾沙锥	Common Snipe	Common Snipe	Winter Migrant	6
<i>Acrocephalus bistrigiceps</i>	黑眉苇莺	Black-browed Reed Warbler	Black-browed Reed Warbler	Transitory Migrant	6
<i>Aerodramus brevirostris</i>	短嘴金丝燕	Himalayan Swiftlet	Himalayan Swiftlet	Resident	6
<i>Podiceps nigricollis</i>	黑颈鸕鹚	Black-necked Grebe	Eared Grebe	Winter Migrant	5
<i>Lanius cristatus</i>	红尾伯劳	Brown Shrike	Brown Shrike	Transitory Migrant	5
<i>Anthus richardi</i>	理氏鸫	Richard's Pipit	Richard's Pipit	Transitory Migrant	5
<i>Oriolus chinensis</i>	黑枕黄鹂	Black-naped Oriole	Black-naped Oriole	Summer Migrant	5
<i>Cecropis daurica</i>	金腰燕	Red-rumped Swallow	Red-rumped Swallow	Summer Migrant	5
<i>Ardea intermedia</i>	中白鹭	Intermediate Egret	Intermediate Egret	Summer Migrant	5
<i>Aythya marila</i>	斑背潜鸭	Greater Scaup	Greater Scaup	Winter Migrant	4
<i>Turdus naumanni</i>	红尾鸫	Naumann's Thrush	Naumann's Thrush	Winter Migrant	3
<i>Tadorna ferruginea</i>	赤麻鸭	Ruddy Shelduck	Ruddy Shelduck	Winter Migrant	3
<i>Gelochelidon nilotica</i>	鸥嘴噪鸥	Gull-billed Tern	Gull-billed Tern	Transitory Migrant	3
<i>Charadrius dubius</i>	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
<i>Accipiter gentilis</i>	苍鹰	Northern Goshawk	Northern Goshawk	Transitory Migrant	3
<i>Emberiza tristrami</i>	白眉鹀	Tristram's Bunting	Tristram's Bunting	Transitory Migrant	3
<i>Himantopus himantopus</i>	黑翅长脚鹬	Black-winged Stilt	Black-winged Stilt	Summer Migrant	2
<i>Tringa ochropus</i>	白腰草鹬	Green Sandpiper	Green Sandpiper	Winter Migrant	2
<i>Muscicapa dauurica</i>	北灰鹟	Asian Brown Flycatcher	Asian Brown Flycatcher	Transitory Migrant	2
<i>Cyanoptila cyanomelana</i>	白腹蓝鹟	Blue-and-white Flycatcher	Blue-and-white Flycatcher	Transitory Migrant	2
<i>Phylloscopus reguloides</i>	冠纹柳莺	Blyth's Leaf-Warbler	Blyth's Leaf Warbler	Transitory Migrant	2
<i>Sterna hirundo</i>	普通燕鸥	Common Tern	Common Tern	Transitory Migrant	2
<i>Muscicapa griseisticta</i>	灰纹鹟	Grey-streaked Flycatcher	Gray-streaked Flycatcher	Transitory Migrant	2
<i>Horornis fortipes</i>	强脚树莺	Brownish-flanked Bush-Warbler	Brownish-flanked Bush-Warbler	Summer Migrant	2
<i>Cuculus canorus</i>	大杜鹃	Eurasian Cuckoo	Common Cuckoo	Summer Migrant	2
<i>Cuculus micropterus</i>	四声杜鹃	Indian Cuckoo	Indian Cuckoo	Summer Migrant	2
<i>Ardea purpurea</i>	草鹭	Purple Heron	Purple Heron	Summer Migrant	2
<i>Centropus bengalensis</i>	小鸦鹛	Lesser Coucal	Lesser Coucal	Resident	2
<i>Falco peregrinus</i>	游隼	Peregrine Falcon	Peregrine Falcon	Resident	2
<i>Aythya nyroca</i>	白眼潜鸭	Ferruginous Duck	Ferruginous Duck	Transitory Migrant	2
<i>Phylloscopus fuscatus</i>	褐柳莺	Dusky Warbler	Dusky Warbler	Winter Migrant	2
<i>Sibirionetta formosa</i>	花脸鸭	Baikal Teal	Baikal Teal	Winter Migrant	1
<i>Elanus caeruleus</i>	黑翅鸢	Black-winged Kite	Black-winged Kite	Resident	1
<i>Pericrocotus cantonensis</i>	小灰山椒鸟	Swinhoe's Minivet	Brown-rumped minivet	Summer Migrant	1
<i>Saxicola rubicola</i>	黑喉石鹀	Common Stonechat	European Stonechat	Winter Migrant	1
<i>Eophona personata</i>	黑头蜡嘴雀	Japanese Grosbeak	Japanese Grosbeak	Winter Migrant	1
<i>Aix galericulata</i>	鸳鸯	Mandarin Duck	Mandarin Duck	Winter Migrant	1
<i>Pandion haliaetus</i>	鸢	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
<i>Ficedula parva</i>	红胸姬鹇	Red-breasted Flycatcher	Red-breasted Flycatcher	Winter Migrant	1
<i>Emberiza elegans</i>	黄喉鹀	Yellow-throated Bunting	Yellow-throated Bunting	Winter Migrant	1
<i>Falco amurensis</i>	阿穆尔隼	Amur Falcon	Amur Falcon	Transitory Migrant	1
<i>Riparia riparia</i>	崖沙燕	European Sand Martin	Bank Swallow	Transitory Migrant	1
<i>Dicrurus macrocercus</i>	黑卷尾	Black Drongo	Black Drongo	Transitory Migrant	1
<i>Limosa limosa</i>	黑尾膝鹳	Black-tailed Godwit	Black-tailed Godwit	Transitory Migrant	1
<i>Zosterops erythropleurus</i>	红胁绣眼鸟	Chestnut-flanked White-eye	Chestnut-flanked White-eye	Transitory Migrant	1
<i>Eurystomus orientalis</i>	三宝鸟	Dollarbird	Dollarbird	Transitory Migrant	1
<i>Vanellus cinereus</i>	灰头麦鸡	Grey-headed Lapwing	Gray-headed Lapwing	Transitory Migrant	1
<i>Pernis ptilorhynchus</i>	凤头蜂鹰	Oriental Honey-buzzard	Oriental Honey-buzzard	Transitory Migrant	1
<i>Chlidonias leucopterus</i>	白翅浮鸥	White-winged Tern	White-winged Tern	Transitory Migrant	1
<i>Ixobrychus flavicollis</i>	黑鹇	Black Bittern	Black Bittern	Summer Migrant	1
<i>Horornis canturians</i>	远东树莺	Manchurian Bush-warbler / Korean Bush-warbler	Manchurian Bush-warbler	Summer Migrant	1
<i>Streptopelia tranquebarica</i>	火斑鸠	Red Collared Dove	Red Collared Dove	Summer Migrant	1
<i>Butorides atricapilla</i>	绿鹭	Striated Heron	Little Heron	Resident	1
<i>Accipiter nisus</i>	雀鹰	Eurasian Sparrowhawk	Eurasian Sparrowhawk	Winter Migratory	1
<i>Chlidonias hybrida</i>	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.

Literature Cited

Bates D, Maechler M, Bolker B, Walker S. 2015. Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software* 67(1): 1-48.

doi:10.18637/jss.v067.i01.

Oksanen, J., Simpson, G. L., Blanchet, F. G., Kindt, R., Legendre, P., Minchin, P. R., O'Hara, R. B., Solymos, P., Stevens, M. H. H., Szoecs, E., & Wagner, H. (2022). *vegan: Community Ecology Package* (Version 2.6-4) [R package]. <https://cran.r-project.org/package=vegan>.

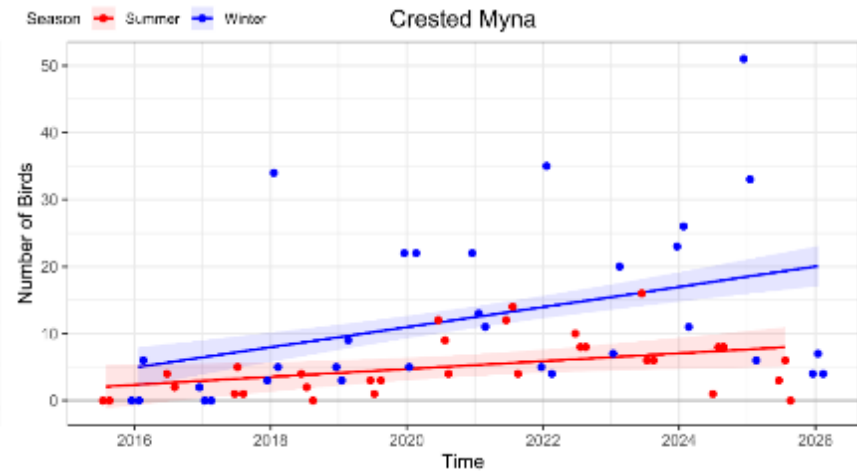
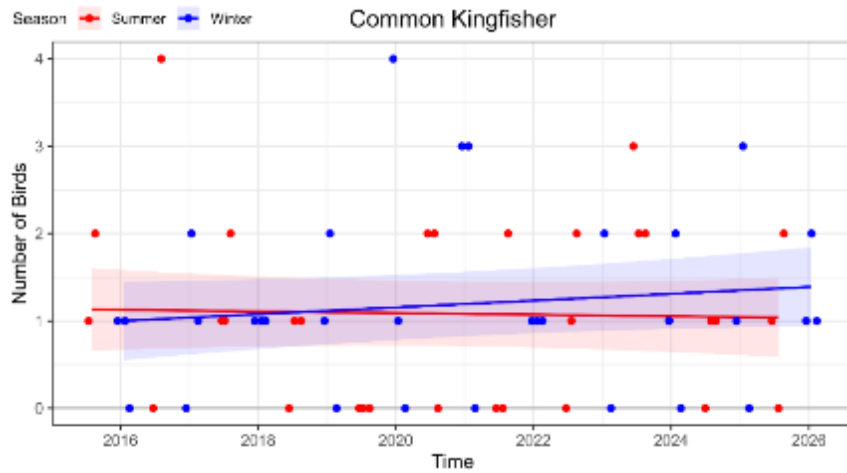
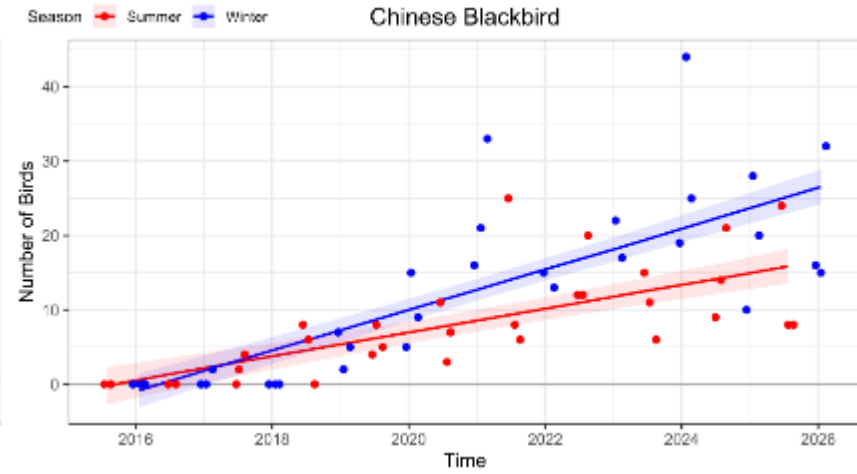
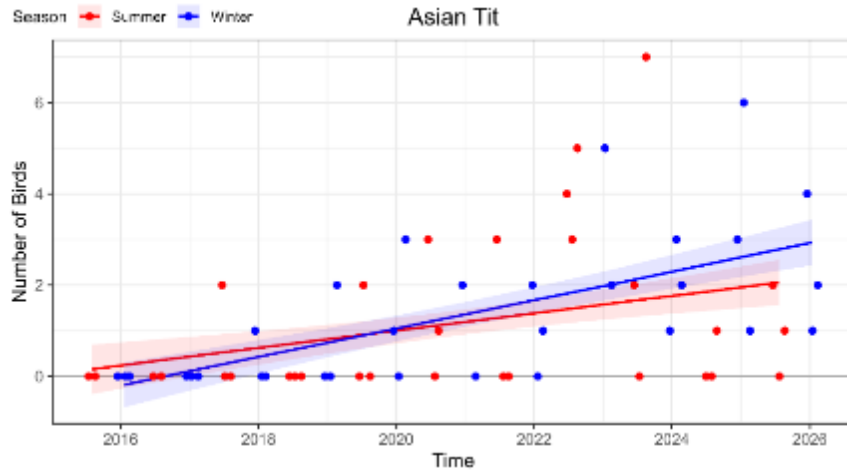
R Core Team. 2023. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.

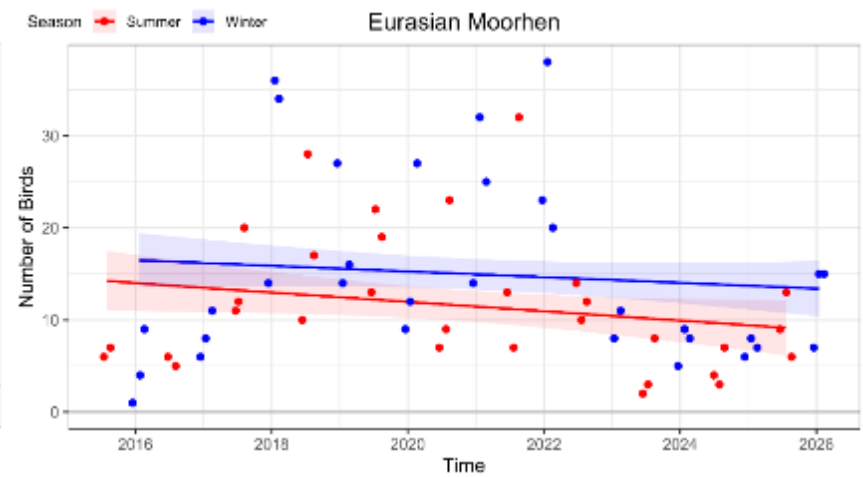
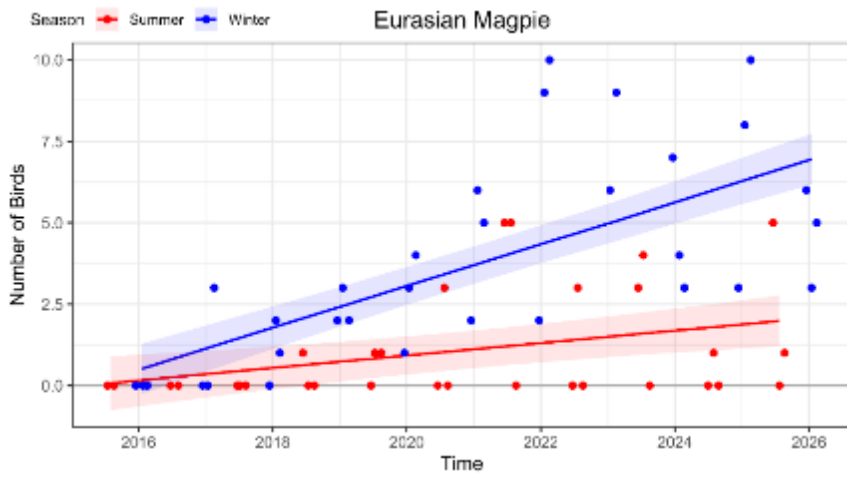
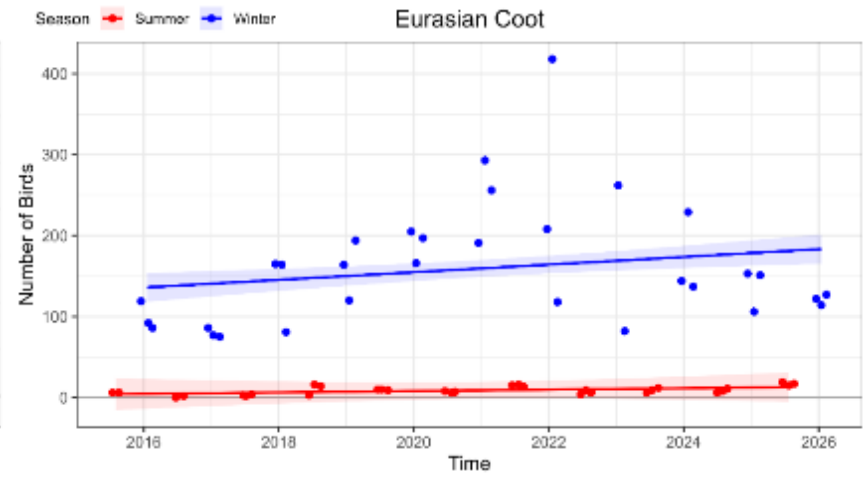
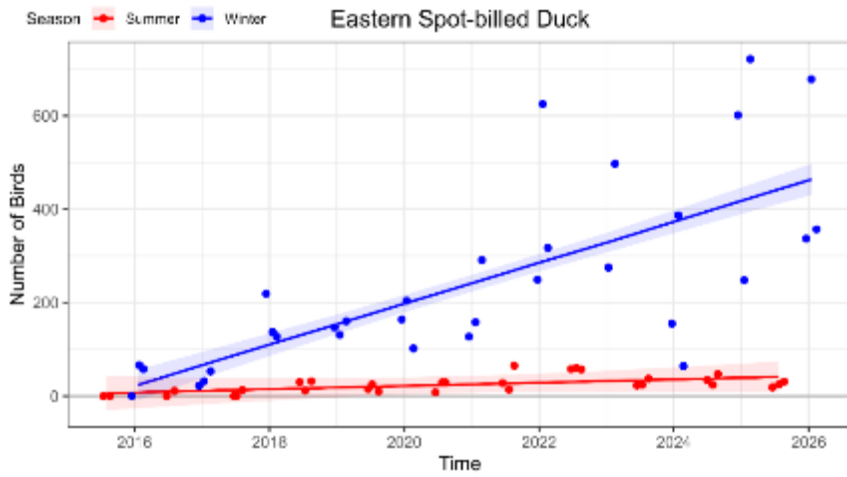
Appendix F. Statistical Model Results for Species-specific Abundance Analyses

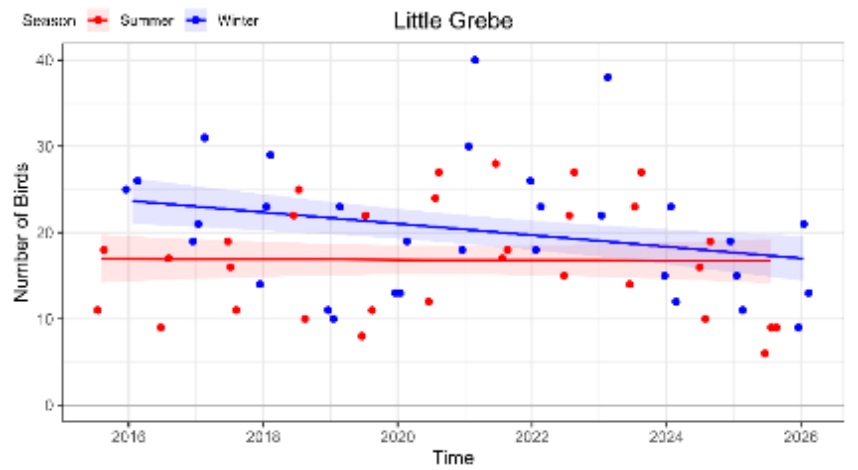
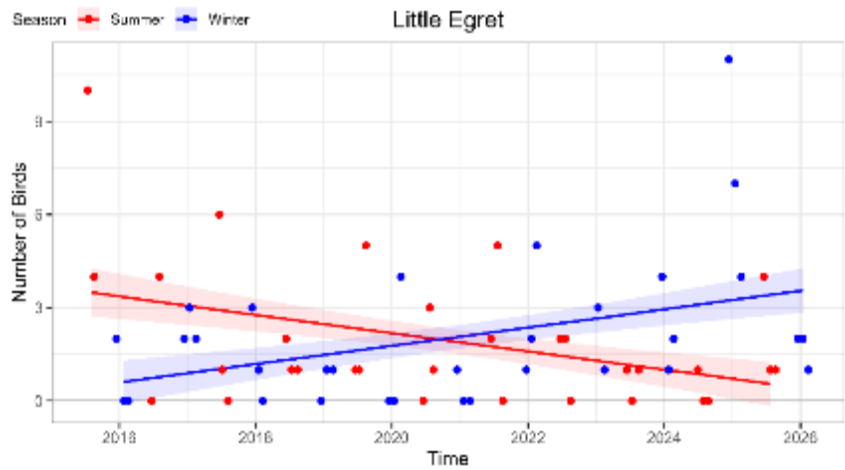
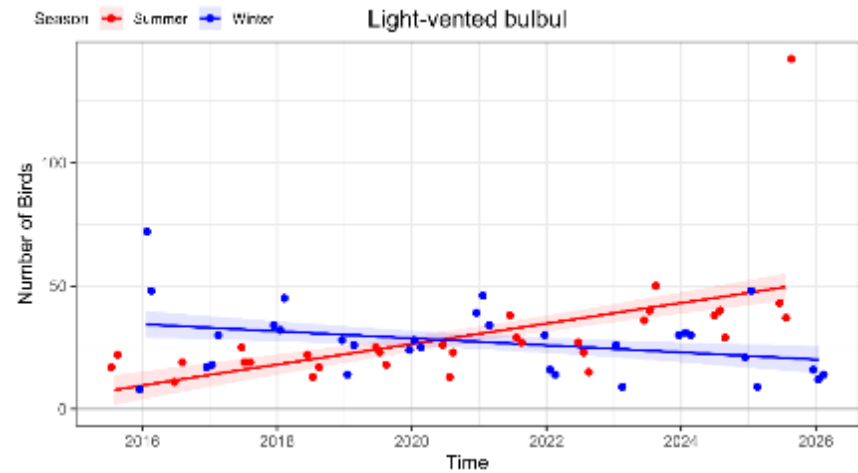
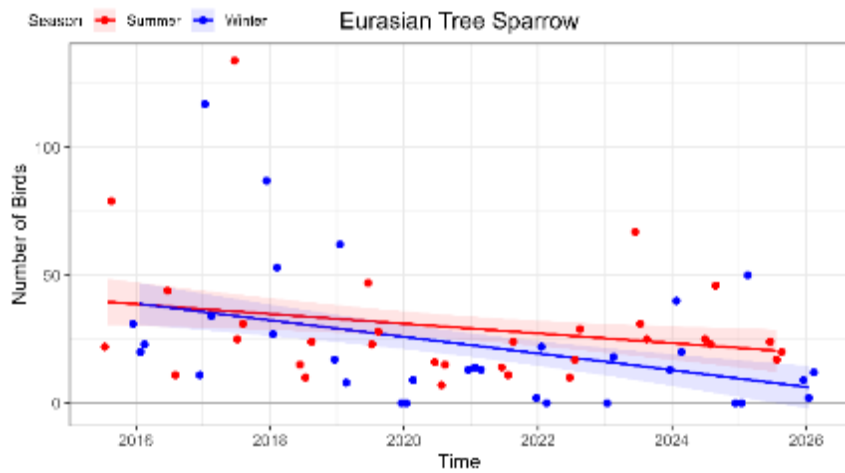
Species	Intercept Estimate (t-value)	P Value	Year Estimate (t-value)	P Value	Season Estimate (t-value)	P Value	Interaction Estimate (t-value)	P Value
Winter & Summer Analyses								
Asian Tit	1.24 (6.508)	<0.001	0.251 (4.158)	<0.001	-0.016 (-0.084)	0.933	-0.061 (-1.006)	0.318
Chinese Blackbird	10.324 (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				

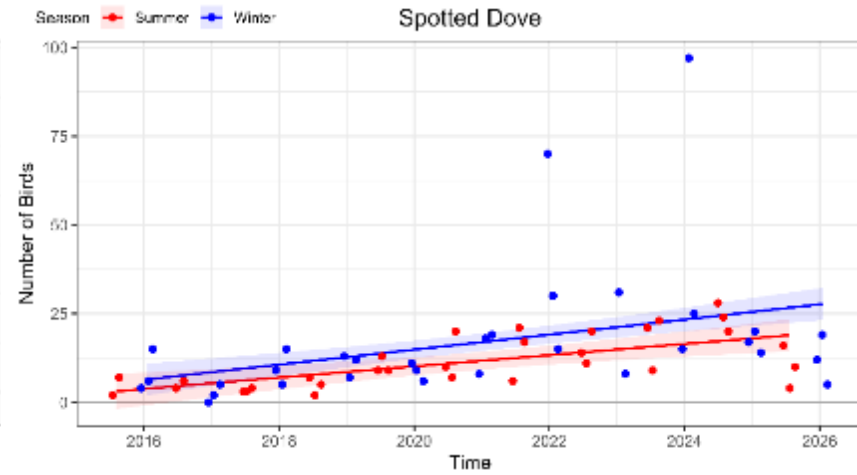
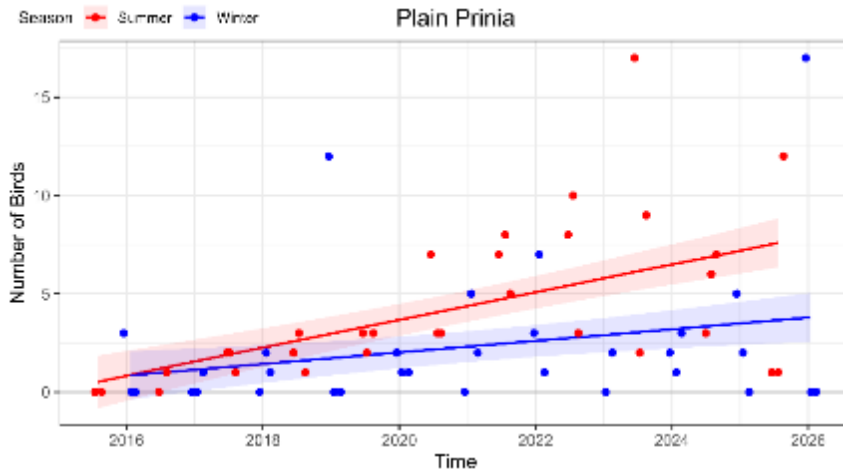
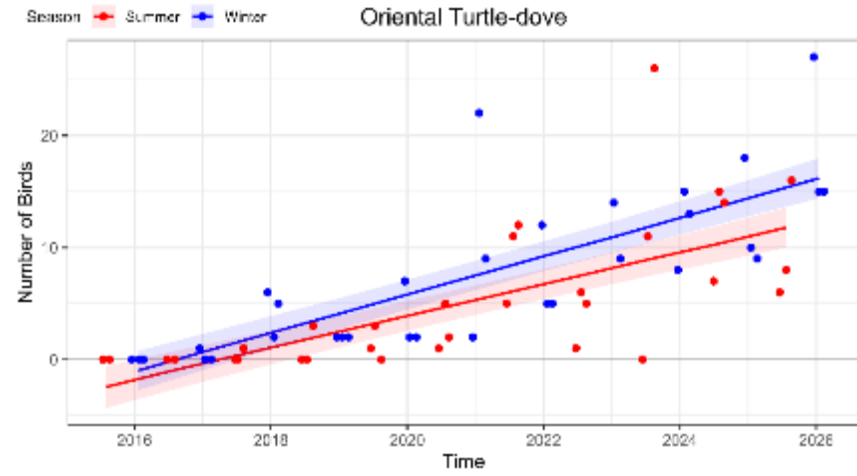
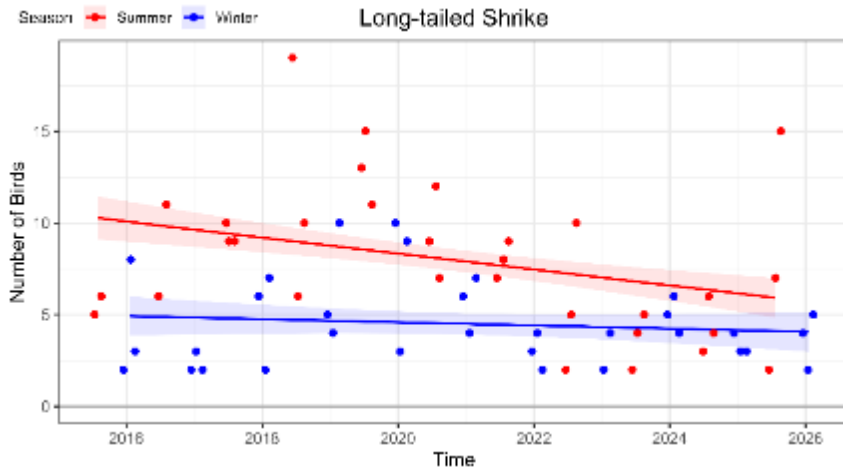
Species	Intercept	P Value	Year	P Value	Season	P Value	Interaction	P Value
	Estimate (t-value)		Estimate (t-value)		Estimate (t-value)			
Daurian Redstart	2.599 (7.475)	0.017	-0.093 (-1.139)	0.264				
Eurasian Siskin	8.153 (2.856)	0.008	1.972 (2.215)	0.034				
Falcated Duck	240.176 (6.78)	<0.001	93.456 (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				

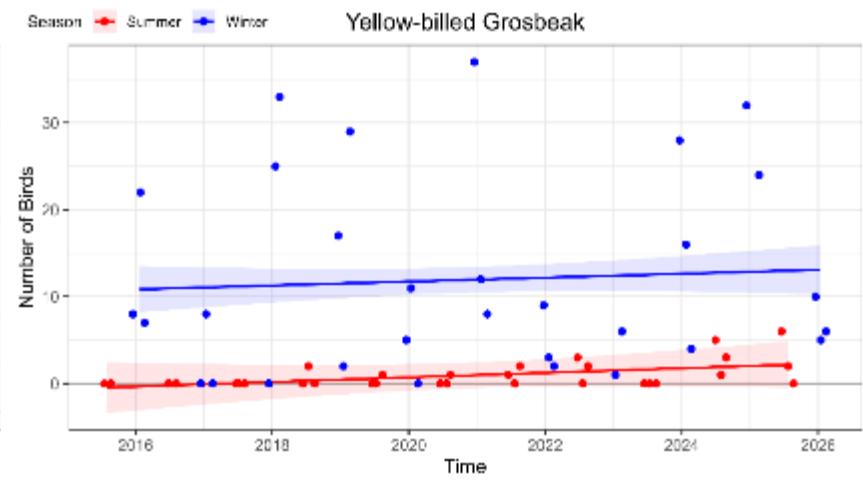
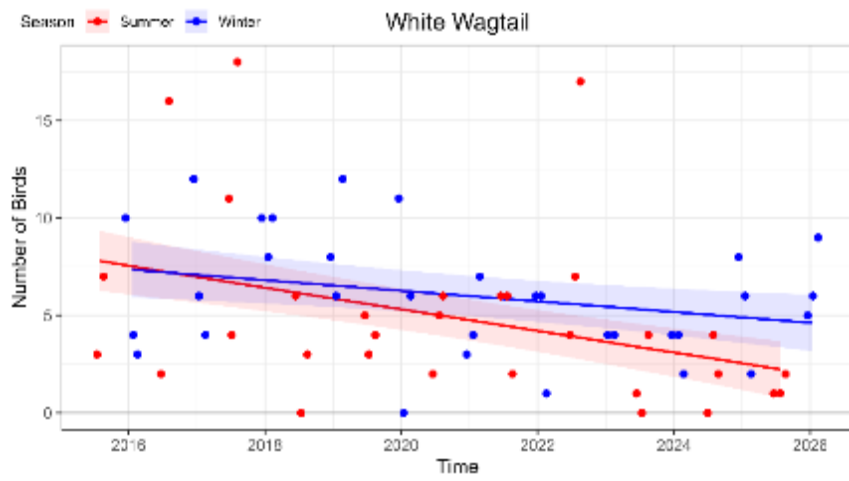
Appendix G. Species-specific Relationships in Abundance Through Time for Winter and Summer Analysis



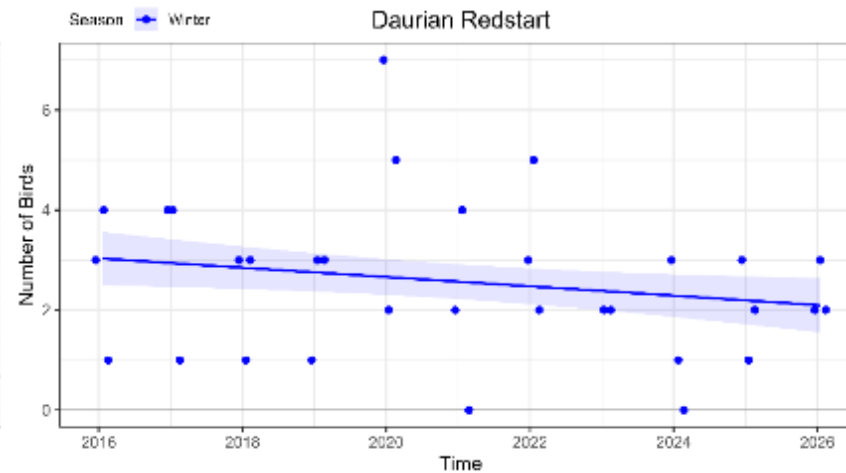
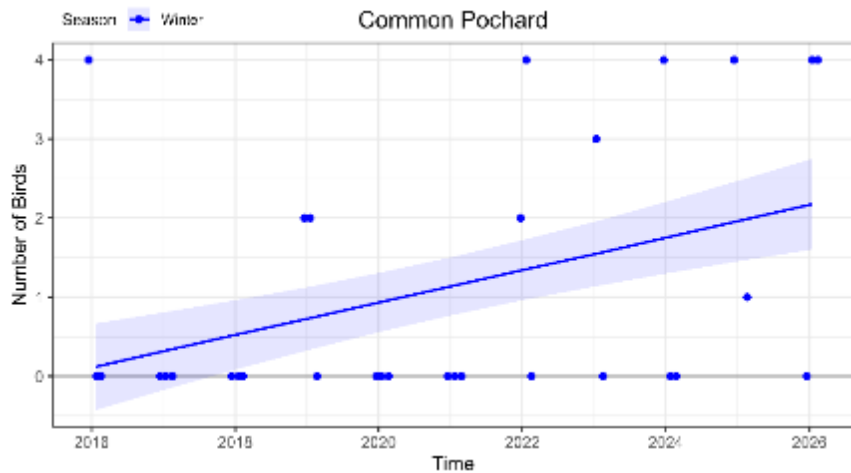
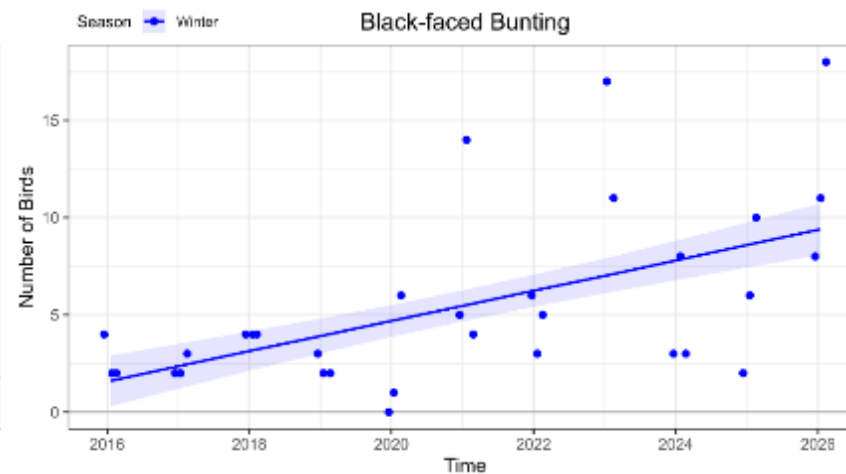
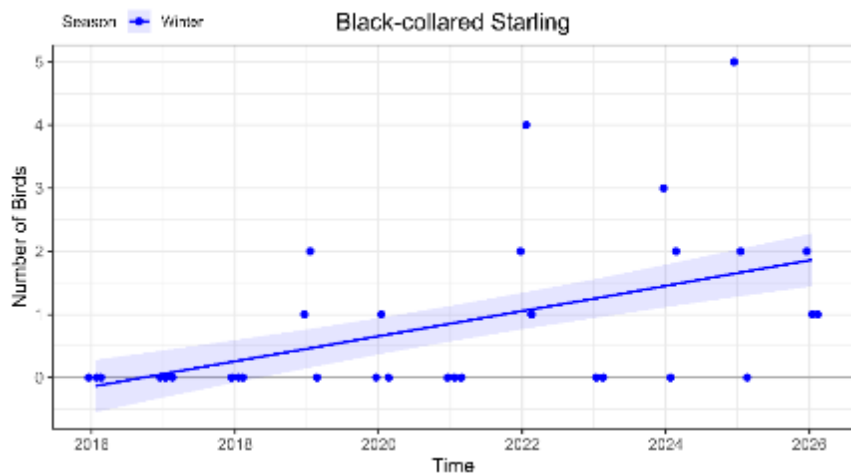


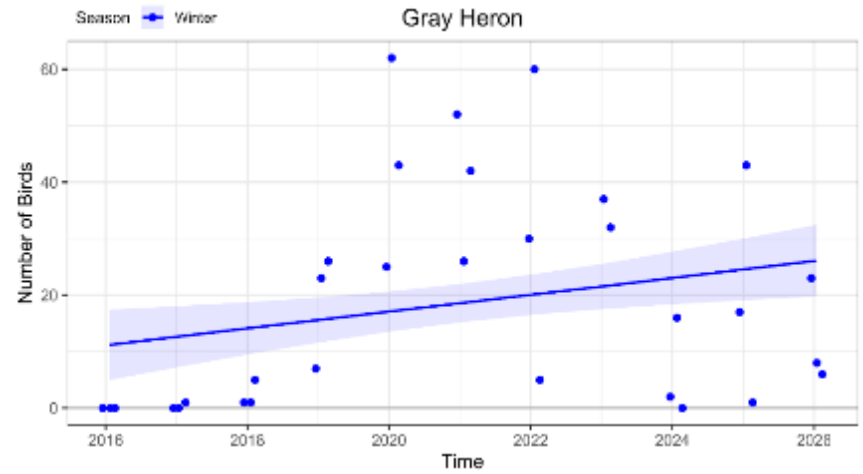
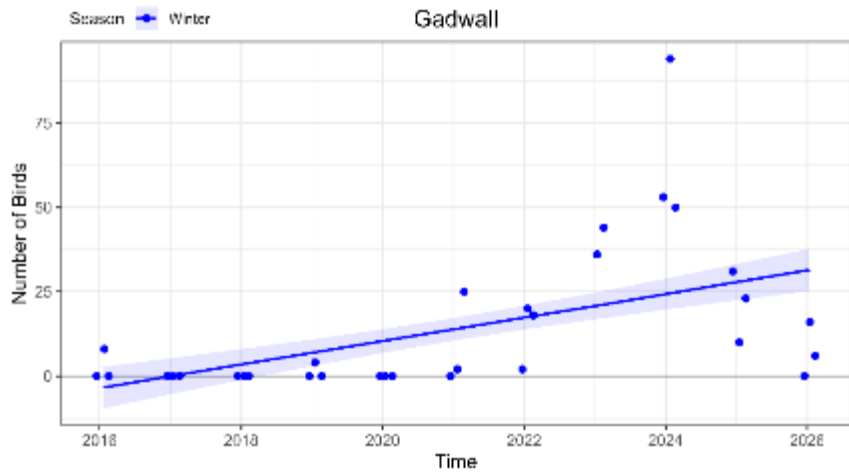
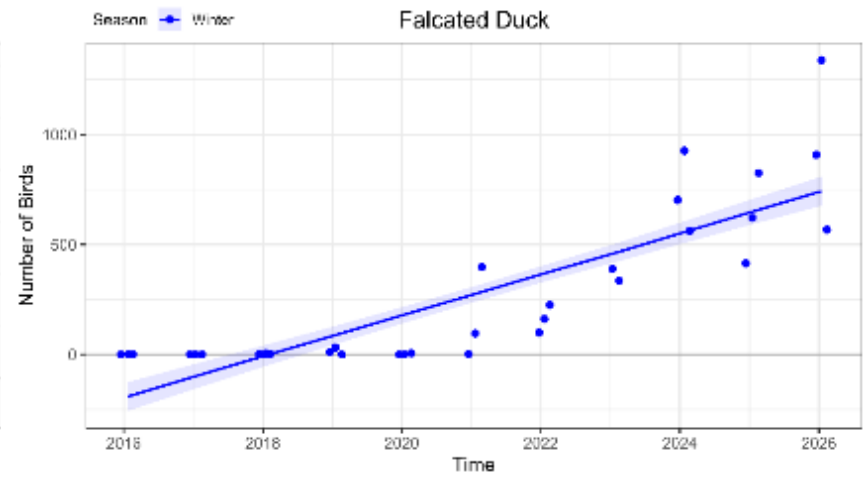
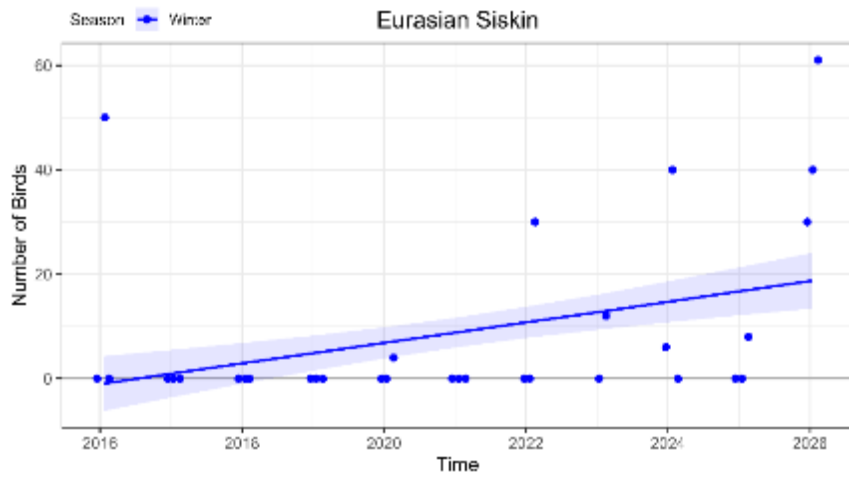


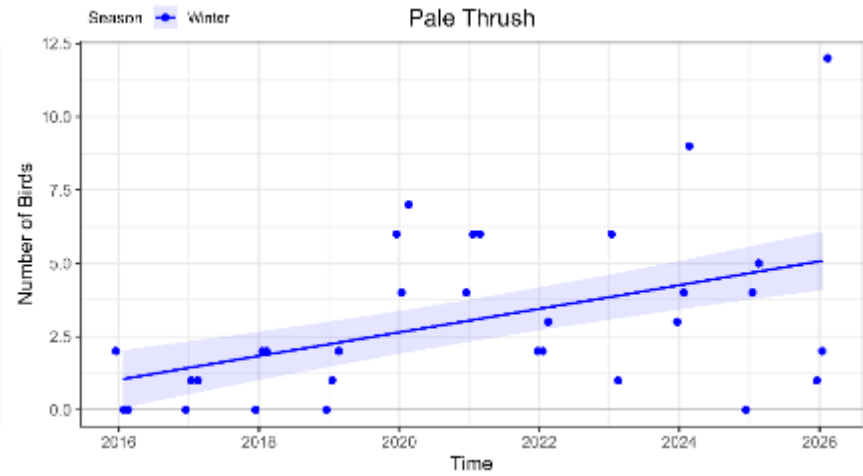
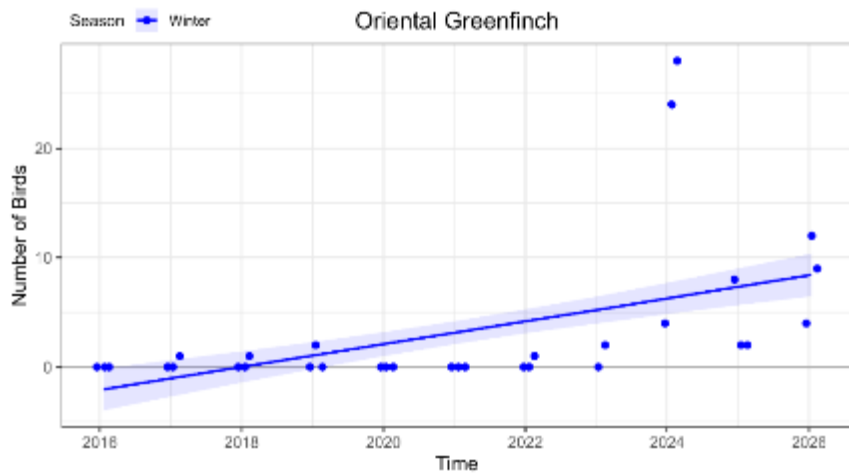
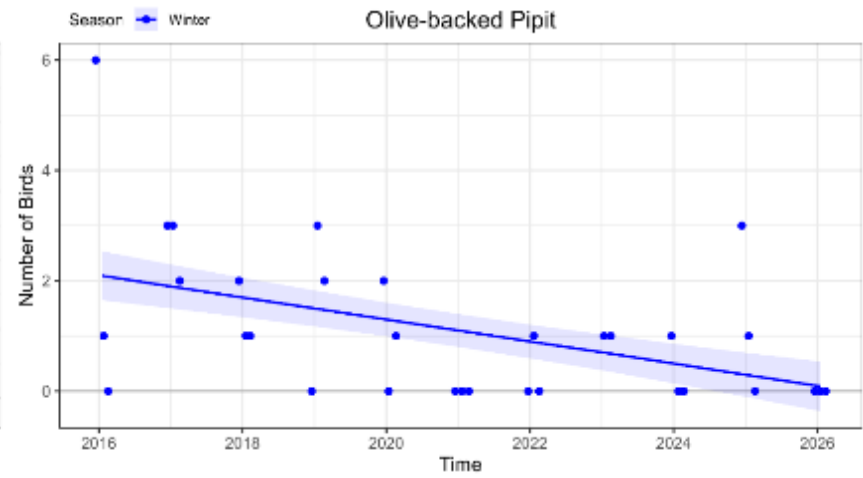
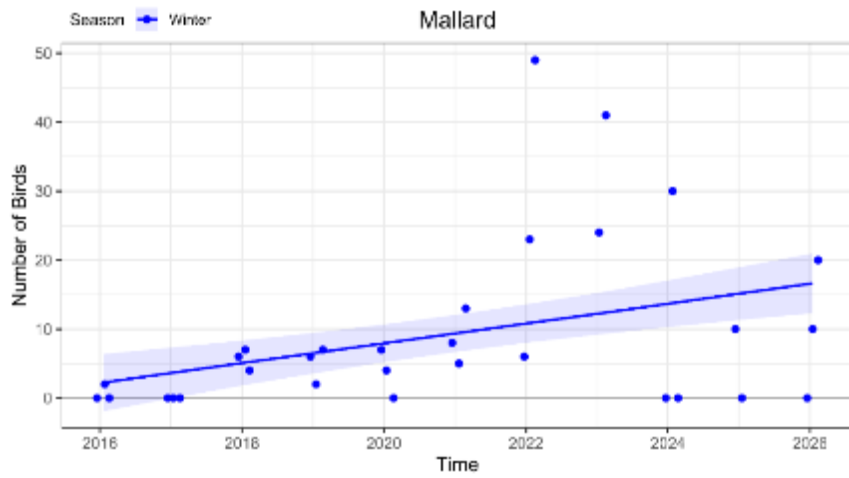


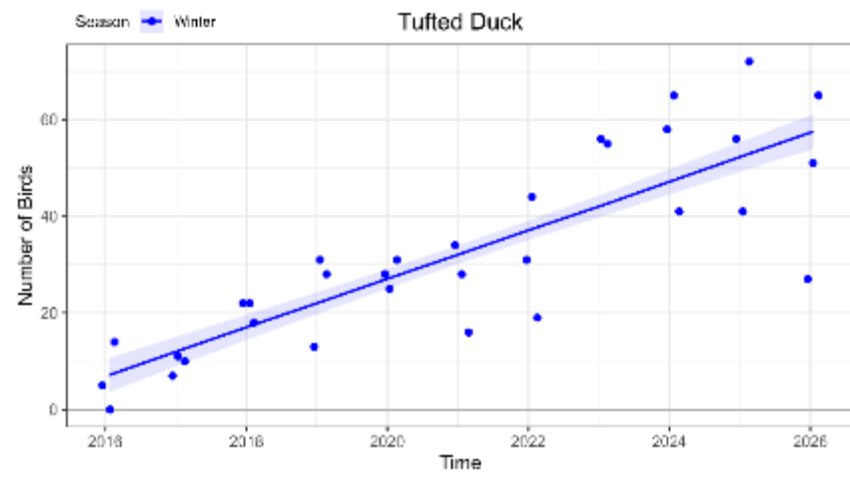
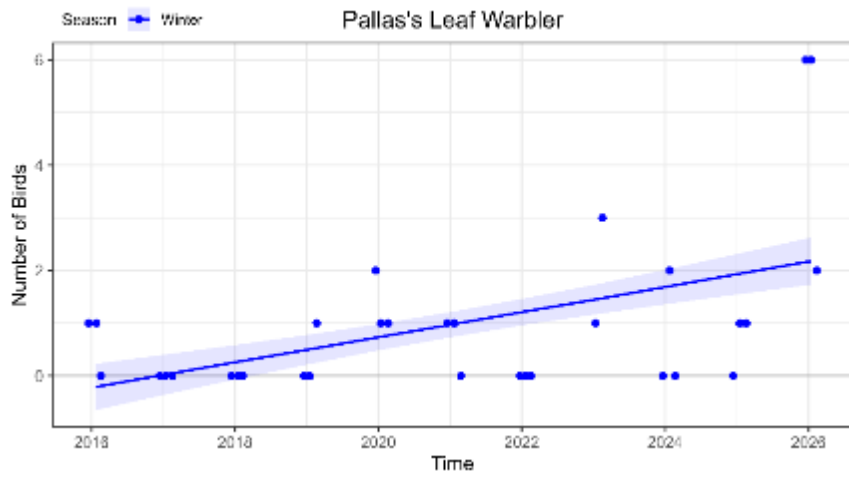


Appendix H. Species-specific Changes in Abundance Through Time for Winter Only Analysis









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

