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Birds Research in the Coastal Area of Dalian

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ABSTRACT. *Dalian coastal wetlands are rich in resources, with various types of coastal wetlands located in the important bird migration routes in the Northeast of Asia. They have abundant biological species diversity and complex species, occupy a very important position in the marine economy development of Bohai region and the economic development in the Northeast of China, and they are important valuable wetlands in the world. Therefore, we can evaluate the comprehensive changes and health status of marine ecological environment through surveys of coastal wetland birds.*

KEY WORD: *Wetland; Bird; Environmental Science*

1. Introduction

Coastal wetlands mainly refer to waters with a water depth of less than 6 meters at low tide and their wetlands along the coast, including permanent waters up to 6 meters deep, intertidal (or floodplains), and low-lying coastal areas. Wetlands have the value of regulating flow, preventing seawater intrusion, replenishing groundwater or from groundwater, sedimentation of nutrients, regulating climate, maintaining biodiversity and ecological functions, protecting the coast, tourism development, education and scientific research. So we should strengthen the protection and management of wetlands. And no enterprises, institutions or individual may use it without the approval of the state. According to the China Ocean News, the area of coastal wetlands in China is about 5.94 million hectares. Coastal wetlands play an important role in the habitat, reproduction and migration of birds. Protecting coastal wetlands is an important means of maintaining birds' diversity and even biodiversity.

Dalian coastal wetlands are rich in resources, with various types of coastal wetlands located in the important bird migration routes in the Northeast of Asia. They have abundant biological species diversity and complex species, occupy a very important position in the marine economy development of Bohai region and the economic development in the Northeast of China, and they are important valuable wetlands in the world. The coastal wetland resources in Dalian mainly include natural wetlands such as estuaries, tidal flats and estuary deltas, as well as semi-artificial wetlands such as salt

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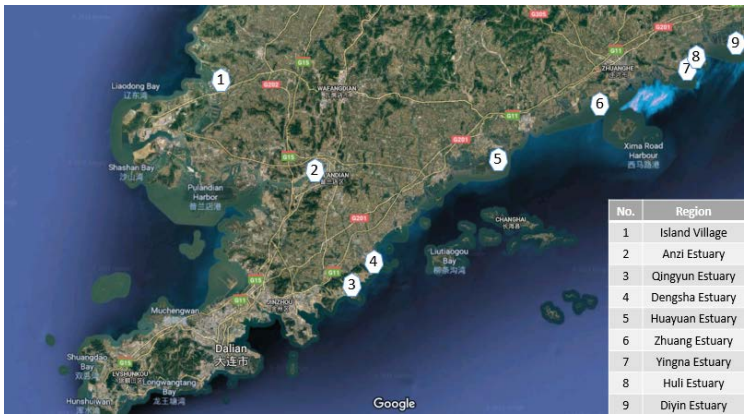
farms and aquaculture farms. They are mainly distributed in the Yellow Sea coast section - north of the Qingyun Estuary, and around the Gimpo Bay and Changxing Island of the Bohai Sea. The area is over 1400 square kilometers [1].

Dalian is also rich in bird resources, with 367 species of birds. It is second only to Qinhuangdao, Chengdu, Inner Mongolia Autonomous Region, and Beijing [2]. It is the main distribution area and habitat of birds in China. It is also the important station of birds' migration routes in Northeast of Asia [3-4]. Coastal wetland birds are at the top of the marine food chain. Environmental pollution, habitat loss, and changes in biological communities will affect them. Therefore, we can evaluate the comprehensive changes and health status of marine ecological environment through surveys of coastal wetland birds.

2. Study area

The areas studied in this article include nine representative coastal wetlands, and they are the island village and Anzi estuary along the coast of the Bohai Sea, the Qingyun Estuary, Dengsha Estuary, Huayuan Estuary, Zhuang Estuary, Yingna Estuary, Huli Estuary, and Diyin Estuary along the Yellow Sea.



Among them, the habitat types of island village are rice fields and breeding ponds; the habitat type of Anzi Estuary and Qingyun Estuary is abandoned breeding ponds; the

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habitat types of Dengsha Estuary are riparian reeds and sandy beaches; the habitat types of Huayuan Estuary, Zhuang Estuary, Yingna Estuary, Huli Estuary, and Diyin Estuary are large-area mudflats and breeding ponds.

3. Species

Within this area, there are 76 species of coastal wetland birds, belonging to 17 families of 10 orders. It includes Podicipediformes (2 species of 1 family), Ciconiiformes (12 species of 3 families), Anseriformes (15 species of 1 family), Falconiformes (3 species of 1 family), Calliformes (1 species of 1 family), Gruiformes (3 species of 2 families), Charadriformes (4 species of 31 families), Lariformes (5 species of 1 family), Coraciformes (2 species of 2 families), Passeriformes (2 species of 1 family).

Among them, the Charadriformes has the largest species, accounting for about 41% of the total species. Ciconiaboyciana, 1 species is classified as first-class state protection birds; Podiceps cristatus, Egretta eulophotes, Platalealeucorodia, Platalea minor, Cygnuscygnus, Anseranser, Falcoamurensis, Falcoperegrinus, Falcocherrug and Grusgrus, 10 species are classified as second-class state protection birds; the rest 65 species are included in the “List of terrestrial wildlife under state protection that are beneficial or have important economic and scientific research value”. In the 76 species, 4 species are classified as E-Endangered, C-Critically endangered, and NT-Close to Endangered by IUCN; 3 species are classified as E-Endangered, V-Vulnerable by “RDB”-the “Red Book of Endangered Animals in China”.

4. Dominant, common and rare species

The dominant species refers to the dominant species in the community, and it includes the species with the largest number, the largest volume, and the largest impact on habitats in each layer of the community. Common species are species that occur more frequently in ecological surveys, but their numbers do not necessarily have advantages. Rare species refer to species with a small number in the community.

According to the conventional classification method of bird abundance, the species that exceed 10% of the total number are classified as dominant species, the species that account for 1% to 10% of the total number are classified as common species, and the species that account for less than 1% of the total number are classified as rare species [5]. The dominant species of birds in the coastal wetland of Dalian include Chroicocephalus ridibundus, Laruscrassirostris, and Calidrisalpina. Common species are 15 species, including Charadriusalexandrinus, Numeniusarquata, and Larusargentatus, etc. Rare species are the rest 58 species.

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The top 10 birds by number are Chroicocephalus ridibundus, Laruscrassirostris, Calidrisalpina, Charadriusalexandrinus, Numeniusarquata, Larusargentatus, Numenius madagascariensis, A.platyrhynchos, T.tadorna, and the Laruscanus; accounting for 82% of the total number.

5. Migratory and Residence Type

Many birds migrate to different places for wintering or breeding, depending on the season. Ornithologists usually divide them into the following types.

1) Resident birds: Birds that live in a certain place all year round and do not migrate with the change of seasons. The most common birds in southern Jiangsu, like sparrows and gray magpies, are typical resident birds.

2) Winter migratory birds: Birds that fly to somewhere in autumn for wintering and fly to the north in the spring of the following year to breed birds. The red-crowned crane is a typical winter migratory bird. In the spring, the adult crane brought the young cranes to the northern area to start nesting, spawning and breeding; after the autumn, the young cranes followed the birds and flew south for wintering. Zhalong of Heilongjiang Province, and Yancheng of Jiangsu Province are breeding and wintering sites for red-crowned cranes, and are also famous red-crowned crane reserves in China.

3) Summer migratory birds: Birds that fly to somewhere in the spring to breed, and fly to the south in autumn for wintering. Swallow is the most familiar example in China.

4) Travelling birds: Birds that make a short stop in a certain place during the migration and then continue to the south or return to the north. Bean goose and Swan goose belong to this category.

Dalian has the large number of travelling birds and summer migratory birds, with 32 and 22 species respectively, accounting for about 42% and 29% of the total number of species; Dalian has less number of resident birds and winter migratory birds, with 1 and 2 species respectively. There are 5 species of a mixed of both summer migratory birds and winter migratory birds, accounting for about 7% of the total number of species; there are 2 species of a mixed of both summer migratory birds and travelling birds, accounting for about 3% of the total number of species; there are 12 species of a mixed of both winter migratory birds and travelling birds, accounting for 16% of the total number of species.

6. Spatial and temporal distribution

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The seasonal changes in the number of birds in Dalian generally show as more number of birds in spring and autumn, and the least number of birds in winter. May is the peak time of species diversity, with 38 species; followed by April and September, with 34 species in both months; December is the low tide of species diversity, with 11 species. Among the 9 regions, Zhuang Estuary has the most species with 44; the Dengsha Estuary as the secondary one with 38 species. In terms of the number of species, Lariformes order accounts for about 48%, Charadriformes order accounts for about 35%, Anseriformes order accounts for about 10%, and Ciconiiformes order accounts for about 5%. Peaks occurred in two periods, from March to May and from August to October. Zhuang Estuary has the largest number, followed by Huli Estuary.

7. Climate impact

There are more species of summer migratory birds than winter migratory birds in Dalian. And the species number in spring and autumn are also significantly higher than in winter. There are more species in low latitudes, which may be related to climate conditions: the average temperature of Dalian in January is -4.8 ℃ [6]. In winter, the wetland waters and coastal waters of Dalian freeze, making it difficult for birds to forage, resulting in reduced species.

There are many types of migratory birds. The main reason is that Dalian is an important channel for bird migration in Northeast Asia. [4] Migratory birds use Dalian as an important transit station during the migration of spring and autumn. So there are many mixed types of birds in Dalian, such as mixed types of summer migratory birds, winter migratory birds, and travelling birds.

Dalian is an important breeding ground for Egretta eulophotes (endangered globally) and Platalea minor (critically endangered globally), which are second-class state protection birds. The Egretta eulophotes breeds on Xingren Island, Shicheng Township, Changhai County, Dalian [7]. It moved in from mid-April, breeding from early May to mid-August, and all moving away from the end of September to early October. It clusters in the early morning every day during breeding, foraging around Qingyun estuary and other surrounding coastal wetlands. Their main food is shrimp and fish. The Zhuang estuary Wetland is an important feeding ground for Platalea minor during breeding. The maximum number of Platalea minor here is more than 1% of the global total number. The Platalea minor moved in from May and moved away in October. Starting from sunrise tide, high tide, low tide, and till before, they mainly feed on the tidal flats in groups or families. They stand, bathe, and plume after taking food. The bank of the Zhuang estuary wetland is artificial dam. After the shoreline is artificially straightened, the tide capacity is reduced. When the tide rises, the seawater directly flows over the tidal flat, and the habitat of the Platalea minor is compressed [8].

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8. Conclusion

Coastal wetlands play an important role in the habitat, reproduction and migration of birds. Protecting coastal wetlands is an important means of maintaining birds' diversity and even biodiversity. Wetland is the "lung" of the city, which has an important impact on the microclimate of the city and is also a paradise for birds. Disturbed by human activities, the coastal wetland function of Dalian has been severely degraded [9]. The living environment of birds has changed significantly, and bird habits have changed accordingly [10]. Taking Zhuang estuary wetland as an example, due to the artificially straightening of the shoreline, the tidal capacity decreases and the habitat space of Platalea minor is compressed. Therefore, it is necessary to protect Zhuang estuary wetland by applying for an internationally important wetland as soon as possible based on the Ramsar Convention. In the future, we should further evaluate the comprehensive changes and health status of the marine ecological environment through the survey results of coastal wetland birds, and promote the marine ecological civilization and the construction of a beautiful China.

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