AVIAN SPECIES COMPOSITION AND ECOLOGICAL DISTRIBUTION IN SOUTH LAKE WETLAND PARK, HOHHOT

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ABSTRACT

Species diversity and composition of bird community at South Lake Wetland Park in Hohhot city were investigated from October 2013 to September 2014. In total，64 bird species belonging to 33 families and 14 orders were recorded. There are 36 summer migrant species, 15 resident species, 11 traveling species and 2 winter migrant species found. The habitats of birds were grouped into four types (wetland, woodland, grassland and residential area) according to topography and vegetation types in the survey area.
Shannon-Weiner Diversity Index (H´) was 2.9450 in wetland area and 1.0768 in grassland area the highest and the lowest values, respectively. The evenness of bird species was 0.4058 lowest in woodland and 0.7581 highest in residential area. The dominance index of bird species was 0.0733 lowest in the wetland and 0.4319 highest in the woodland, respectively. This paper analyzed the relationship between the main dominant bird species and their habitat characteristics，explained the main reasons for the increased bird species number.

KEY WORDS: wetland, habitat, dominance index, migrant.

INTRODUCTION

In the scientific view, wetlands are transitional areas between terrestrial and aquatic systems and play an important role in flood prevention, degradation of pollutants, water supply, erosion control, climate regulation, even more wetlands provide habitat for a wide variety and unique habitats [1], throughout history humans, the term wetlands provide significant economic and social benefits. In the recent years, cross-sectional study on urban wetlands began to increases and such as environmental changes caused by human activity, directly or indirectly affect wetland birds and for their survival [2]. Wetland birds are an important part of the wetland ecosystem, for the maintenance of ecosystem stability plays an important role [3]. Wetland is one of the important ecosystems on the earth, has the rich biodiversity, is a good place for breeding and wintering birds, many birds concentrated around the wetland and wetland birds are an important indicators of wetland changes of environmental quality [4].

Hohhot South Lake Wetland park is a typical artificial wetland, geographic coordinates 111º38' 269"E, 40º44'612"N, 1027 m above sea level, 300 meters south of the Little Black river, west of Zhaojun road, covers an area of 1165 hectares, is one of the city's construction of key projects. On the distribution of climatic zone, Hohhot city in the temperate zone continental monsoon climate, climate change is

obvious, difference is bigger, the four seasons. Long cold winter, a short hot summer, spring and autumn climate variability, often accompanied by windy weather, sand is large. The annual average temperature is about 8℃.The lowest average temperature -12.7℃, the hottest month average temperature up to 22.9℃. Annual sunshine time is 2800-3100h, annual rainfall of 300-350 mm.

MATERIALS AND METHODS

We classified habitats according to vegetation type, landscape future, and environmental conditions (surface water, temperature, settled area etc.) Within all four habitat types, we were setting 10 transect lines and installed 12 observation points, respectively.

Survey was made once a month, each time for a period of 2-3 days. Transect method is to determine the direction along the center line of the transect to 2 km/h speed travel, observe and record on both sides of the center line transect within each 50 m range and number of species of birds, each transect length 1000 m and wide 100 m. Fixed radius point count method within a radius of 200 m of the area, with a telescope to observe and record the species and number of birds of each observation 15 min. 45 mm objective lens diameter of 12 Bosma binoculars and objective lens diameter 77 mm Leica Monocular 20-60 zoom binoculars to observe birds, combined with comprehensive features flight and song birds such as state funding to determine the birds specific types and quantities, uncertainty birds photographed with a digital camera.

Referring to identify birds «*A Field Guide to the Birds of China*» [5] and «*A Handbook of the Birds of China*» [6]，the birds fauna and geographic areas based on «*Animal Geography of China*» [7] division. Species classification system based on «*A Checklist on the Classification and Distribution of the Birds of China*» [8].

Statistical Methods

(1) The bird diversity index calculated using *Shannon- Index* (H ');

$$H' = -\sum_{i=1}^{s} Pi \ln Pi$$

S-the number of bird species，ln is the natural logarithm of Pi, Pi is the i-the species of birds in the number of individuals of the total number of individual bird species ratio [9].

(2) Is calculated using Simpson index (C) dominance index $C = \sum_{i=1}^{s} (Pi)^2$,

S and Pi significance within the meaning of the same species with bird diversity [10].

(3) The evenness index using Pielou index (J) is calculated，$J = H'|H_{max}$, H_{max} as the largest diversity index theoretically，which is H_{max}=LnS, S-the number of bird species [11].

(4) Encounter rates using the formula R = m / M × 100%, m for that meet the total number of birds, M is the total number of all birds found in the survey.

According to the habitat of the observed number of birds, birds in a number of statistical accounting for all the statistics the total individual number of the birds calculating the relative abundance (D). Based on relative abundance divided level of bird populations: D ≧ divided into dominant species, 5% and 0.5% ≦ D < 5% for common types of ≦ 0.05% D < 0.5% for rare species, D < 0.05% for occasional species or a release.

RESULTS

During the investigation, a total of 64 species were recorded, belonging to 14 orders and 33 families (table 1). Where breeding birds of 40 species (including summer resident birds and migratory birds), accounts for 62.5 percent of the total number of species: 39 species of non-passerine and 25 species of passerine.

The summer migratory 36 species of birds, accounting for 56.25% of the total; 15 species of resident birds, accounts for 23.44% of the total number of species; 11 species of traveling birds, accounts for 17.19% of the total number of species; 2 species of winter migratory birds, accounts for 3.12% of the total number of species.

Table 1

Avian community composition and number in South Lake Wetland Park

Species	Quantity				Residence type
	Wetland	Woodland	Grassland	Residential area	
PODICIPEDIFORMES					
Podicipedidae					
1. *Podiceps cristatus*	285	0	0	0	S
2. *Tachybaptus ruficollis*	151	0	0	0	S
3. *Podiceps nigricollis*	8	0	0	0	S
PELECANIFORMES					
Phalacrocoracidae					
4. *Phalacrocorax carbo*	1	0	0	0	S
CICONIIFORMES					
Ardeidae					
5. *Ardea cinerea*	64	0	0	0	S
6. *Ixobrychus sinensis*	1	0	0	0	S
7. *Nycticorax nycticorax*	1	0	0	0	S
Ciconiidae					
8. *Ciconia nigra*	10	0	0	0	S
ANSERIFORMES					
Anatidae					
9. *Cygnus Cygnus*	53	0	0	0	P
10. *Aythya nyroca*	8	0	0	0	S
11. *Tadorna ferruginea*	6	0	0	0	S
12. *Anas clypeata*	9	0	0	0	P
13. *Anas crecca*	10	0	0	0	P
14. *Anas penelope*	6	0	0	0	P
15. *Anas platyrhynchos*	36	0	0	0	S
16. *Anas poecilorhyncha*	75	0	0	0	S
17. *Anas strepera*	34	0	0	0	S
18. *Netta rufina*	26	0	0	0	S
FALCONIFORMES					
Falconidae					
19. *Falco amurensis*	0	0	1	0	S
20. *Falco tinnunculus*	1	0	3	0	R
21. *Falco subbuteo*	0	0	2	0	S
Accipitridae					
22. *Circus aeruginosus*	2	0	0	0	P
GALLIFORMES					
Phasianidae					
23. *Phasianus colchicus*	0	0	23	0	R
GRUIFORMES					
Rallidae					
24. *Gallinula chloropus*	7	0	0	0	S
25. *Fulica atra*	196	0	0	0	S
CHARADRIIFORMES					
Charadriidae					
26. *Vanellus cinereus*	47	0	0	0	S
Recurvirostridae					
27. *Himantopus himantopus*	23	0	0	0	S

Scolopacidae

28. *Actitis hypoleucos*	7	0	0	0	S
29. *Gallinago gallinago*	2	0	0	0	P
30. *Tringa stagnatilis*	2	0	0	0	P
31. *Tringa tetanus*	6	0	0	0	S

Laridae

32. *Larus ridibundus*	222	0	0	0	S

Sternidae

33. *Sterna hirundo*	102	0	0	0	S

COLUMBIFORMES

Columbidae

34. *Streptopelia decaocto*	15	97	0	175	R

CUCULIFORMES

Cuculidae

35. *Cuculus canorus*	23	65	0	0	S

APODIFORMES

Apodidae

36. *Apus apus*	89	0	0	0	S

Alcedinidae

37. *Alcedo atthis*	1	0	0	0	S

UPOPIFORMES

Upupidae

38. *Upupa epops*	1	3	0	0	S

PICIFORMES

Picidae

39. *Dendrocopos major*	0	8	0	0	R

PASSERIFORMES

Hirundinidae

40. *Hirundo rustica*	0	0	0	21	S

Motacillidae

41. *Motacilla alba*	1	7	0	0	S
42. *Motacilla cinerea*	0	2	0	0	S
43. *Motacilla citreola*	0	2	0	0	S
44. *Motacilla flava*	0	1	0	0	S

Laniidae

45. *Lanius cristatus*	0	1	0	0	S
46. *Lanius sphenocercus*	0	0	1	1	R

Sturnidae

47. *Sturnus cineraceus*	0	93	0	0	S

Corvidae

48. *Corvus corone*	4	0	0	2	R
49. *Corvus dauuricus*	22	0	513	871	R
50. *Corvus frugilegus*	0	0	23	0	R
51. *Pica pica*	120	483	131	109	R
52. *Pyrrhocorax pyrrhocorax*	4	0	0	0	R

Sylviidae

53. *Acrocephalus orientalis*	124	0	0	0	R
54. *Phylloscopus inornatus*	0	4	0	0	P

Muscicapidae

55. *Ficedula albicilla*	0	9	0	0	P

Turdidae

56. *Turdus ruficollis*	18	20	0	0	W
57. *Phoenicurus auroreus*	2	4	0	0	S
58. *Phoenicurus erythrogaster*	1	1	0	0	W

Paradoxornithidae

59. *Panurus biamicus*	15	0	0	0	R
Fringillidae					
60. *Carduelis sinica*	3	6	0	0	R
Paridae					
61. *Parus major*	0	4	0	0	R
Passeridae					
62. *Passer montanus*	245	1279	792	1037	R
Emberizidae					
63. *Emberiza chrysophrys*	1	1	0	0	P
64. *Emberiza pussila*	2	3	0	0	P

Residence type: R. resident， S. summer migrant， P. traveling, W. winter migrant.

South Lake Wetland Park has 64 species of birds, 44 species of ancient north, accounts for 68.75 percent of the bird species; 14 species widely distributed species, accounts for 21.88 percent of the bird species; Oriental 6 species, accounts for 9.37 percent of the number of bird species. Therefore South Lake Wetland Park avifauna species composition dominated medieval north.

Ecological Distribution of Birds

Wetland, grassland, woodland and residential areas consisting of bird relationships between the parameters has the following characteristics (table 2): the diversity index H' wetlands > H' woodland > H' residential area > H' grassland, dominant index D' woodland > D' grassland > D' residential area > D' wetlands, evenness index J' residential area > J' wetlands > J' grassland > J' woodland.

Table 2

Avian community structure indices at different habitats in South Lake Wetland Park

Parameter	Wetland	Woodland	Grassland	Residential area
Species	49	21	9	7
Number	2092	2093	1489	2216
Diversity index	2.9450	1.2354	1.0768	1.1250
Dominance index	0.0733	0.4319	0.4098	0.3822
Evenness index	0.7567	0.4058	0.4901	0.7581

DISCUSSION

Wetland environment to attract many bird feeding has an important relationships, particularly in the spring and autumn bird migration season, the water and the surrounding lush reed wetlands for birds feeding, drinking, hidden provide the protection provided for a number of waterfowl breeding environment, which is also available from woodland habitats dominance index was the highest (0.4319), wetlands dominance index was the lowest (0.0733) reflected, explained diversity index and this has to a certain extent, dominance index was negatively correlated. From

each habitat evenness index, residential than other habitats, residential evenness index was the highest (0.7581), woodland lowest (0.4058).

In a variety of habitats, birds always choose for their survival and reproduction of the most favorable environment, therefore, Environment habitat structure determines the community of birds. By similarity analysis to compare bird communities in different habitats, which birds can learn what the environment for a particular appeal [12].

CONCLUSION

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From South Lake Wetland Park bird diversity in different habitats index, in descending order Wetlands > woodland > residential > grassland, wetlands highest (2.9450) and the lowest in grassland (1.0768).

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