Journal of Global Change Data & Discovery. 2025, 9(3): 299-307
www.geodoi.ac.cn

Monitoring Dataset Development of Waterbirds in the Late Breeding Season in the Qinghai Section of the Yellow River Basin (2024)

Dong, Y. G.[1,2] Cui, Q. C.[1,2] Ji, H. C.[3] Zhang, G. M.[4] Tang, X. Y.[5] Zhong, Y. T.[1] Tang, B. Y.[1] Yang, F.[6] Zhao, H.[7] Duo, W. K.[6] LI, G. G.[8] Sun, N.[8] Shen, M. H.[1] Wang, X. L.[9] Wang, A. Z.[1] Wang, W.[1*]

1. State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, Xining 810016, China;
2. College of Eco-Environmental Engineering, Qinghai University, Xining 810016, China;
3. Qinghai Wetland Protection Center, Xining 810008, China;
4. Qinghai Clover Ecological Technology Service Co., Ltd., Xining 810007, China;
5. College of Agriculture and Animal Husbandry, Qinghai University, Xining 810016, China;
6. Qinghai Duomei Ecological Environmental Protection Technology Co., Ltd., Xining 810003, China;
7. Qinghai Yilin Forestry Planning and Design Co., Ltd., Xining 810007, China;
8. College of Life Sciences, Qinghai Normal University, Xining 810016, China;
9. Qinghai Forestry Engineering Consulting Co., Ltd., Xining 810003, China

Abstract: The Yellow River Basin in Qinghai covers area of northeastern edge of the Qinghai-Xizang Plateau, its wetland ecosystem is vital for waterbirds during breeding, stopover, and wintering. In August 2024, 335 sites across 21 units in the basin were monitored using the plot method to obtain the monitoring dataset of waterbirds in the late breeding season in the Qinghai Section of the Yellow River Basin (2024). The dataset includes: (1) locations of sample sites and general information of 21 monitoring units; (2) species composition and numbers in each unit; (3) species composition and dominant species across the basin; (4) location, elevation, and habitat type of 335 sites; (5) waterbird species list for the basin; (6) diversity indices of waterbird communities in each unit and basin section, etc. The dataset is archived in .xlsx, .shp, .jpg and .doc formats, and consists of 19 data files with data size of 36.2 MB (compressed into one file with 35.0 MB).

Keywords: **Yellow River Basin; Qinghai Province; late breeding season; waterbird; 2024**

DOI: https://doi.org/10.3974/geodp.2025.03.05

Dataset Availability Statement:

The dataset supporting this paper was published and is accessible through the *Digital Journal of Global Change Data Repository* at: https://doi.org/10.3974/geodb.2025.03.08.V1.

Received: 13-05-2025; **Accepted:** 25-08-2025; **Published:** 25-09-2025

Foundation: Qinghai Province (QHJY-2024-07-001)

***Corresponding Author:** Wang, W., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, 007cell @126.com

Data Citation: [1] Dong, Y. G., Cui, Q. C., Ji, H. C., *et al*. Monitoring dataset development of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024) [J]. *Journal of Global Change Data & Discovery*, 2025, 9(3): 299–307. https://doi.org/10.3974/geodp.2025.03.05.

[2] Dong, Y. G., Cui, Q. C., Ji, H. C., *et al*. Monitoring dataset of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024) [J/DB/OL]. *Digital Journal of Global Change Data Repository*, 2025. https://doi.org/10.3974/geodb.2025.03.08.V1.

1 Introduction

The Yellow River Basin in Qinghai Province, which is located within the northeastern margin of the Qinghai-Xizang Plateau, constitutes a critical node in the East Asia–Australasia and Central Asia flyways for migratory birds. Its unique wetland ecosystem provides essential habitats for waterbirds to breed, rest, and overwinter[1,2]. As a global biodiversity hotspot, this basin not only exhibits distinctive ecological functions but also serves as an important indicator system for evaluating regional environmental health. Waterbirds, as indicator species of wetland ecosystems, demonstrate population dynamics that directly reflect the health status of the regional ecological environment and the effects of climate change. These dynamics correlate positively with the quality of the habitat quality and the integrity of the food chain, thereby possessing significant ecological monitoring value[3,4].

The breeding period, a core phase in the annual life cycle of birds, occurs during the most favorable season for chick growth due to abundant food availability. It encompasses behaviors such as courtship, nest-site selection, egg-laying and hatching, and chick rearing[5,6]. The post-breeding period is crucial for juveniles to complete feathering and achieve independent survival, with its population dynamics directly reflecting the relationship between breeding success and habitat carrying capacity. Previous research has indicated that the population size during the post-breeding period and the survival rate of juveniles represent a key window for evaluating breeding outcomes[7]. Despite research being conducted on the ecological requirements of waterbirds during migration and overwintering periods, there are insufficient systematic studies on the post-breeding period, particularly the juvenile dispersal stage in August. Investigations during this period can not only reveal the mechanisms of population replenishment among waterbirds but also hold significant implications for improving the conservation of breeding bird communities. In this regard, the dataset described in this study, which was developed based on the monitoring data of post-breeding waterbirds in the Yellow River Basin of Qinghai Province in August 2024, aims to clarify the population structure, distribution characteristics, and their association with environmental factors during this phase. It also aims to provide a scientific basis for improving the wetland protection network within the Yellow River Basin and formulating adaptive management strategies.

2 Metadata of the Dataset

The metadata of the Monitoring dataset of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024)[8] is summarized in Table 1. It includes the dataset full name, short name, authors, year of the dataset, data format, data size, data files, etc.

3 Methods

(1) Division of survey units: Due to the large area and numerous watersheds involved in the Yellow River Basin within Qinghai Province, this study delineated 21 survey units for monitoring post-breeding waterbirds based on wetland types, distribution characteristics, and behavioral traits of waterbirds, as well as practical considerations regarding human resources, material capacity, and financial conditions (Figure 1). These units are located across 12 counties (cities) in 6 prefectures (municipalities). The selected survey units encompass a wide variety of wetland habitat types, including rivers, lakes, and marshes, and represent multiple conservation management categories, viz., 2 internationally important wetlands, 10 national wetland parks, 1 small wetland, 2 reservoir areas, 2 reservoirs, 2 protected

Table 1 Metadata summary of the Monitoring dataset of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024)

Items	Description
Dataset full name	Monitoring dataset of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024)
Dataset short name	WaterbirdsQinghaiYellowRiverBasin2024
Authors	Dong, Y. G., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, dyg0516@126.com Cui, Q. C., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, cqc5614@163.com Ji, H. C., Qinghai Wetland Protection Center, 1522730373@qq.com Zhang, G. M., Qinghai Clover Ecological Technology Service Co., Ltd., 1259706000@qq.com Tang, X. Y., College of Agriculture and Animal Husbandry, Qinghai University, maybefogot@163.com Zhong, Y. T., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, 384043309@qq.com Tang, B. Y., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, 3028746390@qq.com Yang, F., Qinghai Duomei Ecological Environmental Protection Technology Co., Ltd., 13119768655@163.com Zhao, H., Qinghai Yilin Forestry Planning and Design Co., Ltd., 1559068384@qq.com Duo, W. K., Qinghai Duomei Ecological Environmental Protection Technology Co., Ltd., 1738197848@qq.com Li, G. G., College of Life Sciences, Qinghai Normal University, qhnulgg@126.com Sun, N., College of Life Sciences, Qinghai Normal University, applewolf@126.com Shen, M. H., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University., 709652141@qq.com Wang, X. L., Qinghai Forestry Engineering Consulting Co., Ltd., 15597006137@163.com Wang, A. Z., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, 154633018@qq.com Wang, W., State Key Laboratory of Plateau Ecology and Agriculture, Qinghai University, 007cell @126.com
Geographical region	Yellow River Basin in Qinghai Province
Year	2024
Data format	.xlsx, .shp, .jpg, .doc
Data size	36.2 MB
Data files	Geographical locations of survey sites and basic information of 21 monitoring units; species composition and numbers of waterbirds in each unit; species composition and dominant species of waterbirds across the entire basin; basic information of 335 monitoring sites; waterbird checklist during the post-breeding period in the Qinghai section of the Yellow River Basin; and biodiversity indices of waterbird communities in each unit and across different river segments
Foundation	Qinghai Province (QHJY-2024-07-001)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	(1) *Data* are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use *Data* subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute *Data* subject to written permission from the GCdataPR Editorial Office and the issuance of a *Data* redistribution license; and (4) If *Data* are used to compile new datasets, the "ten percent principal" should be followed such that *Data* records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[9]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS, GEOSS, PubScholar, CKRSC

areas, and 2 additional waterbird aggregation sites.

To facilitate spatial analysis and comparison, the 21 survey units were divided into upper, middle, and lower reaches of the Yellow River in Qinghai Province, based on the flow

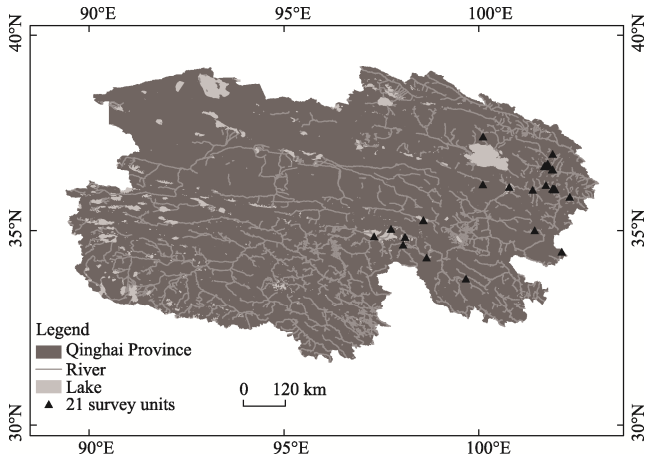

Figure 1 Distribution map of waterbird survey units in the Yellow River Basin within Qinghai Province

direction and elevation gradients of the river across the units. The upper reach comprises 10 monitoring units at elevations between 3,000 and 4,000 m, including Gyaring Lake, Eling Lake, Xingxinghai, Lake Jiangmeng, Lake Gangnagema, Maduo Dongge Cuona Lake National Wetland Park, Dari Yellow River National Wetland Park, Zeku Zequ National Wetland Park, Taoheyuan National Wetland Park, and Gangcha Shaliu River National Wetland Park. The middle reach includes 4 units at elevations between 2,000 and 3,000 m, viz., Lake Gengga, Longyangxia Reservoir, Huzhu Nanmenxia National Wetland Park, and Gui De Huangheqing National Wetland Park. The lower reach encompasses 7 units at elevations approximately between 1,800 and 2,000 m, including Xining Huangshui National Wetland Park (Ninghu), Xining Huangshui National Wetland Park (Huangshui), Xining Huangshui National Wetland Park (Beichuan River), Hualong Yashiga Town Micro Wetland, Suzhi Reservoir Area, Kangyang Reservoir Area, and Lijiaxia Reservoir.

(2) Survey species definition, survey methods, and selection of observation plots: According to the definition of waterbirds provided by the Ramsar Convention on Wetlands—i.e., birds that are ecologically dependent on wetlands and exhibit morphological and behavioral adaptations to such habitats—the waterbirds in this study were restricted to aquatic birds (divers and swimming feeders) and waders (shorebirds) based on ecological classification. Different survey methods (including direct counting and plot-based counting) were applied according to the flocking behavior of waterbirds and differences in their habitats. Observation plots within each survey unit were determined based on topographic features, habitat type, and spatial distribution of waterbirds.

(3) Classification and evaluation system of disturbance types: Disturbance types were categorized into the following 6 types: grazing, fishing, river regulation, tourism development, road construction, and water pollution. Disturbance intensity was classified into 3 levels—moderate, weak, and none—according to the degree of influence on habitat structure, wetland status, and waterbird survival and reproduction. Moderate disturbance refers to situations where habitat is affected, a portion of the wetland has disappeared, but vegetation can recover after the disturbance ceases, and despite slight impact on bird breeding, reproduction can occur. Weak disturbance indicates that the habitat is slightly disturbed, wetland vegetation remains largely intact, and the impact on waterbird survival and reproduction is minimal. No disturbance implies that the habitat remains undisturbed, wetland vegetation maintains its original state, and waterbird breeding and survival are unaffected. Figure 2 shows the technical roadmap of the data development methodology.

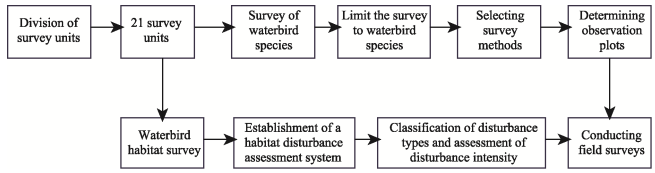

Figure 2 Flowchart of the dataset development

4 Data Results

4.1 Dataset Composition

This dataset monitors postbreeding waterbirds across 21 units in the Yellow River Basin within Qinghai Province. It includes: (1) geographic locations of survey sites and basic information on the 21 monitoring units, (2) species composition and numbers of waterbirds in each unit, (3) species composition and dominant species of waterbirds throughout the entire Yellow River Basin in Qinghai, (4) basic information, including latitude, longitude, altitude, and habitat types, for 335 monitoring sites, (5) checklist of postbreeding waterbirds in the Yellow River Basin in Qinghai, (6) diversity indices of waterbird communities across different units and river segments, and (7) photographs of some waterbird species. The dataset is archived in .xlsx, .shp, .jpg, and .doc formats.

4.2 Data Results

4.2.1 Species Composition

Monitoring records from August 2024 documented 65 species of waterbirds belonging to 7 orders and 14 families, with a total count of 24,250 individuals. In terms of species diversity, Anatidae of Anseriformes accounted for 19 species, Podicipedidae of Podicipediformes accounted for 4 species, Rallidae of Gruiformes accounted for 2 species, Gruidae of Gruiformes accounted for 1 species, Ciconiidae of Ciconiiformes accounted for 1 species, Threskiornithidae of Pelecaniformes accounted for 1 species, Ardeidae of Pelecaniformes accounted for 4 species, Phalacrocoracidae of Suliformes accounted for 1 species, Ibidorhynchidae of Charadriiformes accounted for 1 species, Recurvirostridae of Charadriiformes accounted for 2 species, Charadriidae of Charadriiformes accounted for 7 species, Scolopacidae of Charadriiformes accounted for 16 species, Glareolidae of Charadriiformes accounted for 1 species, and Laridae of Charadriiformes accounted for 5 species. Among these, Charadriiformes had the highest proportion at 49.2% (32 species), followed by Anseriformes at 29.2% (19 species). In terms of numbers, the top 10 most abundant waterbird species were the Bar-headed Goose (*Anser indicus*) (6,681 individuals), Ruddy Shelduck (*Tadorna ferruginea*) (6,031 individuals), Great Crested Grebe (*Podiceps cristatus*) (2,442 individuals), Brown-headed Gull (*Chroicocephalus brunnicephalus*) (1,581 individuals), Great Cormorant (*Phalacrocorax carbo*) (1,435 individuals), Eurasian Coot (*Fulica atra*) (833 individuals), Common Redshank (*Tringa totanus*) (527 individuals), Common Tern (*Sterna hirundo*) (476 individuals), Eastern Spot-billed Duck (*Anas zonorhyncha*) (421 individuals), and Pallas's Gull (*Ichthyaetus ichthyaetus*) (410 individuals). 5 species, viz., the Bar-headed Goose, Ruddy Shelduck, Great Crested Grebe, Brown-headed Gull, and Great Cormorant, exceeded 1,000 individuals.

The species composition and numbers of waterbirds recorded in each of the 21 survey units are presented in Table 2. Among the 21 survey units, 3 units, viz., Eling Lake (3,898), Lake Gengga (3,870), and Lake Gangnagema (2,699), had the highest number of waterbirds, and another 3 units, viz., Lake Gengga (55 species), Longyangxia Reservoir (23 species),

and Gangcha Shaliu River National Wetland Park (23 species), showed the highest species diversity. Regarding conservation status, there were 2 nationally protected species under Class I, viz., the Black-necked Crane (*Grus nigricollis*) and Black Stork (*Ciconia nigra*), and 7 nationally protected species under Class II, including the Mute Swan (*Cygnus olor*), Whooper Swan (*Cygnus cygnus*), and Horned Grebe (*Podiceps auritus*). According to the International Union for Conservation of Nature Red List, 56 species were classified as Least Concern (LC); 2 species were classified as Vulnerable (VU), viz., the Common Pochard (*Aythya ferina*) and Horned Grebe; and 7 species were classified as Near Threatened, including the Ferruginous duck (*Aythya nyroca*), Black-necked Crane, and Northern Lapwing (*Vanellus vanellus*), etc.

Table 2 Species composition in 21 survey units

Survey unit	Order	Family	Species	Total number of birds
Gyaring Lake	5	7	12	2,183
Eling Lake	5	7	13	3,898
Xingxinghai	5	6	15	1,735
Lake Jiangmeng	3	4	6	273
Lake Gangnagema	5	6	14	2,699
Maduo Dongge Cuona Lake National Wetland Park	5	8	14	3,173
Dari Yellow River National Wetland Park	3	6	9	85
Lake Gengga	4	12	55	3,870
Longyangxia Reservoir	5	8	23	1,720
Gui De Huangheqing National Wetland Park	6	6	14	193
Gangcha Shaliu River National Wetland Park	5	10	23	1,909
Xining Huangshui National Wetland Park (Ninghu)	5	5	10	187
Xining Huangshui National Wetland Park (Huangshui)	3	3	5	356
Xining Huangshui National Wetland Park (Beichuan River)	4	4	5	581
Huzhu Nanmenxia National Wetland Park	4	7	11	103
Hualong Yashiga Town Micro Wetland	3	3	5	36
Suzhi Reservoir Area	4	5	12	206
Kangyang Reservoir Area	4	7	16	240
Lijiaxia Reservoir	4	6	14	207
Zeku Zequ National Wetland Park	4	5	13	320
Taoheyuan National Wetland Park	5	8	15	276
Total	7	14	65	24,250

4.2.2 Analysis of Waterbird Ecological Indices in Different Units

Table 3 shows the waterbird community diversity, analyzed using diversity indices (Shannon, Pielou, and Simpson)[10–12], across the 21 survey units in the Yellow River Basin within Qinghai Province. The structure of waterbird communities exhibited certain spatial heterogeneity among different units. The highest Shannon diversity indices were observed in Lake Gengga (2.55) and Gui De Huangheqing National Wetland Park (2.20), indicating that these two survey units have relatively high species diversity. However, some regions, such as Gui De Huangheqing National Wetland Park and Huzhu Nanmenxia National Wetland Park, exhibited relatively high Shannon diversity indices and Pielou evenness indices but lower Simpson indices, which suggest a degree of dominance by certain species in these areas.

Table 3 Waterbird community diversity indices in 21 survey units

Survey unit	Shannon	Pielou	Simpson
Gyaring Lake	1.48	0.59	0.37
Eling Lake	1.52	0.57	0.28
Xingxinghai	2.15	0.79	0.14
Lake Jiangmeng	1.02	0.57	0.47
Lake Gangnagema	1.59	0.60	0.30
Maduo Dongge Cuona Lake National Wetland Park	1.45	0.55	0.29
Dari Yellow River National Wetland Park	1.79	0.81	0.21
Lake Gengga	2.55	0.64	0.15
Longyangxia Reservoir	1.51	0.48	0.35
Gui De Huangheqing National Wetland Park	2.20	0.83	0.13
Gangcha Shaliu River National Wetland Park	1.68	0.54	0.32
Xining Huangshui National Wetland Park (Ninghu)	1.47	0.67	0.28
Xining Huangshui National Wetland Park (Huangshui)	0.76	0.47	0.58
Xining Huangshui National Wetland Park (Beichuan River)	1.08	0.67	0.40
Huzhu Nanmenxia National Wetland Park	2.00	0.84	0.16
Hualong Yashiga Town Micro Wetland	1.13	0.70	0.36
Suzhi Reservoir Area	1.78	0.74	0.25
Kangyang Reservoir Area	2.17	0.78	0.17
Lijiaxia Reservoir	2.08	0.79	0.16
Zeku Zequ National Wetland Park	1.53	0.60	0.36
Taoheyuan National Wetland Park	1.23	0.45	0.52

4.2.3 Analysis of Waterbird Ecological Indices Across River Segments

Based on the flow direction and elevation gradients of the 21 survey units, the Yellow River Basin in Qinghai Province was divided into 3 river segments—upper, middle, and lower reaches—for the analysis of waterbird ecological indices. As shown in Table 4, the Shannon diversity index for the middle reach was 2.71, which was significantly higher than those of the upper reach (1.91) and lower reach (1.90), indicating that the middle reach has a higher species richness and overall diversity. Similarly, the Pielou evenness index was also higher in the middle reach than in the upper and lower reaches, suggesting a more balanced relative abundance among species in this segment.

Table 4 Waterbird community diversity indices in different river segments

Watershed	Shannon	Pielou	Simpson
Upper segment of the Qinghai Watershed in the Yellow River	1.91	0.55	0.22
Middle segment of the Qinghai Watershed in the Yellow River	2.71	0.65	0.13
Lower segment of the Qinghai Watershed in the Yellow River	1.90	0.62	0.22

4.2.4 Evaluation of Dominant Species

The Berger-Parker dominance index (I)[13] was used to determine dominant bird species, where $I \geq 0.05$ indicates dominant species, $0.005 \leq I < 0.05$ indicates common species, and $I < 0.005$ indicates rare or occasional species. There were 5 dominant waterbird species across the entire Yellow River Basin in Qinghai Province, as detailed in Table 5. Among the remaining 60 species, 17 were classified as common species, and 43 were classified as rare or occasional species.

Table 5 Evaluation of dominant species in the Yellow River Basin within Qinghai Province

Species	Number	Berger-Parker	Dominant species	Species	Number	Berger-Parker	Dominant species
Bar-headed Goose	6,681	0.275,5	√	Brown-headed Gull	1,581	0.065,2	√
Ruddy Shelduck	6,031	0.248,7	√	Great Cormorant	1,435	0.059,2	√
Great Crested Grebe	2,442	0.100,7	√				

4.2.5 Habitat Types and Disturbance Analysis

The recorded waterbirds were found primarily in 3 types of wetland habitats, viz., lake wetlands, river wetlands, and marsh wetlands. The following 6 categories of human disturbance were identified: grazing, fishing, river regulation, tourism development, road construction, and water pollution. Analysis of disturbed monitoring sites revealed that of the 335 monitoring sites, 62 were affected by grazing, 56 were affected by fishing, and 40 were affected by tourism development (Figure 3). Grazing was the most prevalent disturbance type that affected 18.51% of the sites, followed by fishing (16.72%) and tourism development (11.94%). Regarding disturbance intensity, 190 monitoring sites experienced weak disturbance, 130 experienced no disturbance, and 15 were subject to moderate disturbance.

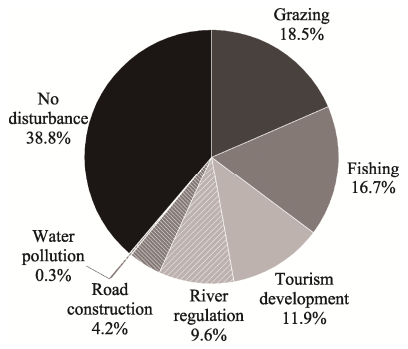

Figure 3 Percentage of disturbance types at 335 monitoring sites

5 Discussion and Conclusion

Waterbirds inhabiting the vast wetlands of the Qinghai section of the Yellow River Basin are an essential component of biodiversity in Qinghai Province and play a vital role in biodiversity research and conservation. Systematic surveys and long-term monitoring of waterbird species composition, population size, spatial distribution, and habitat conditions not only help track population trends but also reflect the current status and evolution of wetland ecosystems. These efforts provide important scientific guidance for the effective protection and management of waterbirds and their habitats.

This study presents a basic analysis of waterbird data collected during the post-breeding period in the Yellow River Basin in Qinghai Province. A total of 65 species across 14 families and 7 orders were recorded, with an overall count of 24,250 individuals. Diversity index analyses were conducted for different river segments and survey units, which showed that the middle section of the Yellow River Basin in Qinghai has relatively higher species richness and diversity. Remarkably, the Lake Gengga sample area within the 21 surveyed units recorded as many as 55 species totaling 3,870 individuals—representing one of the most significant contributions to the dataset in terms of both species diversity and population abundance. This area might provide diverse microhabitats and abundant food resources, making it an attractive habitat and stopover site for numerous waterbirds. Nevertheless, compared with other survey units, this area currently lacks specific protective measures. T. W. Connell's Intermediate Disturbance Hypothesis suggests that moderate levels of disturbance can promote species diversity[14]. However, this hypothesis is not universally applicable to all ecosystem types, and its applicability often depends on specific environmental conditions. Furthermore, defining what constitutes "moderate" disturbance requires a case-by-case analysis due to large differences in how various ecosystems respond to disturbances[15,16]. Therefore, grazing—the

most common type of disturbance throughout the basin—may either increase or reduce waterbird species diversity, which warrants further investigation in future studies. In addition, the methodology used in developing this dataset has several limitations. The division of survey units may lack comprehensive coverage and sufficient spatial resolution. In terms of bird classification and survey methods, reliance on classifications such as diving birds (waterfowl) and wading birds (shorebirds) might overlook other wetland-associated avian species. Moreover, direct counting and partitioned counting methods encounter challenges and potential observational errors in complex habitats. Regarding the evaluation of disturbance, the categorization of disturbance types remains relatively coarse. Overall, there exists considerable room for improvement in the systematic, scientific, and operational aspects of the research methodology. Nonetheless, the data collected during this monitoring effort on post-breeding waterbirds in the Qinghai section of the Yellow River Basin provide foundational support for subsequent ecological analyses and population dynamics prediction.

Author Contributions

Wang, W., Ji, H. C., Wang, A. Z. designed the algorithms of dataset. Dong, Y. G., Cui, Q. C., Ji, H. C., Zhang, G. M., Tang, X. Y., Zhong, Y. T., Tang, B. Y., Yang, F., Zhao, H., Duo, W. K., Li, G. G., Sun, N., Shen, M. H., Wang, X. L., Wang, A. Z., Wang, W. contributed to the data processing and analysis. Dong, Y. G. wrote the data paper.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Cui, Q. C., Ji, H. C., Zhang, G. M., *et al*. County analysis of wetland waterbird diversity in Qinghai Province [J]. *Journal of Green Science and Technology,* 2025, 27(8): 37–42.

[2] Wang, C. X., Zhang, Z. W., Xia, S. X., *et al.* Seasonal and regional patterns and conservation strategies of waterbird diversity in the Yellow River Basin [J]. *Biodiversity Science,* 2024, 32(11): 215–223.

[3] Wang, Q., Lv, X. G. Application of waterbird to monitor and evaluate wetland ecosystem [J]. *Wetland Science,* 2007(3): 274–281.

[4] Zhang, S. X., Dong, Y. X., Xia, F. Significance of waterbird monitoring in lake ecosystems [J]. *Journal of Lake Sciences,* 2011, 23(2): 155–162.

[5] Liu, W. X. The influence of breeding and wintering ground conditions on the annual life cycle and behavior of two large waterbird species [D]. Hefei: University of Science and Technology of China, 2024.

[6] Martin, T. E. Avian life history evolution in relation to nest sites, nest predation, and food [J]. *Ecological Monographs*, 1995, 65(1): 101–127.

[7] Wang, Q. X., Yang, C., Hu, D. F., *et al*. Breeding population dynamics of Relict Gull (*Larus relictus*) in Hongjian Nur, Shaanxi, China [J]. Anim*als* (*Basel*), 2022, 12(8): 1035. DOI: 10.3390/ani12081035.

[8] Dong, Y. G., Cui, Q. C., Ji, H. C., *et al*. Monitoring dataset of waterbirds in the late breeding season in the Qinghai section of the Yellow River Basin (2024) [J/DB/OL]. *Digital Journal of Global Change Data Repository*, 2025. https://doi.org/10.3974/geodb.2025.03.08.V1.

[9] GCdataPR Editorial Office. GCdataPR data sharing policy [OL]. DOI: 10.3974/dp.policy.2014.05 (Updated 2017).

[10] Shannon, C. E. A mathematical theory of communication [J]. *The Bell System Technical Journal*, 1948, 27(3): 379–423.

[11] Simpson, E. H. Measurement of diversity [J]. *Nature*, 1949, 163(4148): 688.

[12] Pielou, E. C. The measurement of diversity in different types of biological collections [J]. *Journal of Theoretical Biology*, 1966, 13: 131–144.

[13] Berger, W. H., Parker, F. L. Diversity of planktonic foraminifera in deep-sea sediments [J]. *Science*, 1970, 168(3937): 1345–1347.

[14] Connell, J. H. Diversity in tropical rain forests and coral reefs [J]. *Science*, 1978, 199(4335): 1302–1310. DOI: 10.1126/science.199.4335.1302.

[15] Bao, J., Lin, B. Q., Li, L. S., *et al*. Effect of grazing on bird diversity in natural communities of Ulmus macrocarpa var. mongolica in spring [J]. *Journal of Jilin Forestry Science and Technology,* 2009, 38(5): 39–41+51.

[16] Luo, T. X., Liu, S. Influence of the intermediate grazing disturbance on the biodiversity of grassland ecosystem [J]. *Journal of Anhui Agricultural Sciences,* 2007, 35(21): 6567–6568+6612.