

# Waterfowl Habitat Dataset of 30 Monitoring Sites in the Qinghai Lake Basin (2018)

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**Abstract:** The Qinghai Lake basin (97°50'E–101°20'E, 36°15'N–38°20'N) is an important natural and geographical region in the northeastern Qinghai-Tibet Plateau, and an important part of the ecological security pattern in Qinghai province. The basin is rich in biodiversity and is the species gene pool of the Qinghai-Tibet Plateau and a typical area of the plateau's ecosystem. Through the determination of the habitat type of waterbird monitoring sites in 2018 and the collection record of interference type and interference intensity information, a monitoring dataset of 30 sample birds in the Qinghai Lake basin (2018) was obtained. The dataset includes: (1) the monitoring time and frequency of waterbirds; (2) geographic information system data for monitoring the sample site overview and sample site location; (3) the composition of water-borne bird species; (4) new waterbird observation records added in 2018; (5) waterbird distributions in different periods and the year; (6) the percentage of waterbird population in 1% of the world population; (7) dynamic changes in waterfowl populations from 2014 to 2018; (8) the number of waterbirds from 2014 to 2018; (9) the distribution of waterbirds during the spring, summer, autumn, and winter migration periods in 2018; (10) the number of individuals reached 1,000 magnitude birds during spring migration, summer breeding, autumn migration, and winter in 2018; and (11) the numbers of breeding waterbirds in four major clusters from 2014 to 2018. The dataset is archived in .shp and .xls format, and consists of two data files, totaling 71 KB (compressed to two files, 55.7 KB).

**Keywords:** Qinghai Lake basin; Qinghai-Tibet Plateau; waterbird monitoring; 2018

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## 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.2021.10.01.V1> or <https://cstr.science.org.cn/CSTR:20146.11.2021.10.01.V1>.

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## 1 Introduction

Biodiversity monitoring provides information on the spatial and temporal changes in biodiversity. Biodiversity has become one of the most important indicators when evaluating the effectiveness of ecological protection<sup>[1]</sup>. Birds are one of the most important top consumers in wetland ecosystems, and are unlikely to be completely isolated from other low-nutrition organisms and inorganic environments<sup>[2]</sup>. Waterbirds are a higher biota endemic to wetlands, and form an important component in wetland ecosystems; waterbirds are also an indicator species used to characterize changes in wetland quality<sup>[3,4]</sup>. Waterbird monitoring involves monitoring their numbers, behavior, habitat, and other information, according to the previously arranged space and time plan<sup>[5,6]</sup>.

A relatively independent closed basin, the Qinghai Lake basin is located on the eastern edge of the Qinghai-Tibet Plateau, and is a hub connecting the eastern and western Qinghai province and southern Qinghai region. The Qinghai Lake basin forms a very important part of the ecological security barrier of the Qinghai-Tibet Plateau and plays an important role in blocking the spread of western desert to the east<sup>[7,8]</sup>. The Qinghai Lake National Nature Reserve is located at the intersection of two migratory paths in Central Asia and East Asia, and its wetland area ranks first in China<sup>[9]</sup>. This dataset constitutes a waterbird monitoring sample point of the Qinghai Lake National Nature Reserve Administration over the years<sup>[10]</sup>. The monitoring period was from March 2018 to February 2019, and waterfowl monitoring was carried out nine times throughout the year. Through waterbird monitoring, the waterbird population, population dynamics, population distribution, and population structure were obtained. The waterbird monitoring data were sorted out and to construct the 2018 waterbird monitoring dataset of the Qinghai Lake basin.

## 2 Metadata of the Dataset

The metadata of the Waterfowl habitat and migration dataset collecting from 30 sample sites in Qinghai Lake basin (2018)<sup>[11]</sup> is summarized in Table 1. It includes the dataset full name, short name, authors, year of the dataset, data format, data size, data files, data publisher, and data sharing policy, etc.

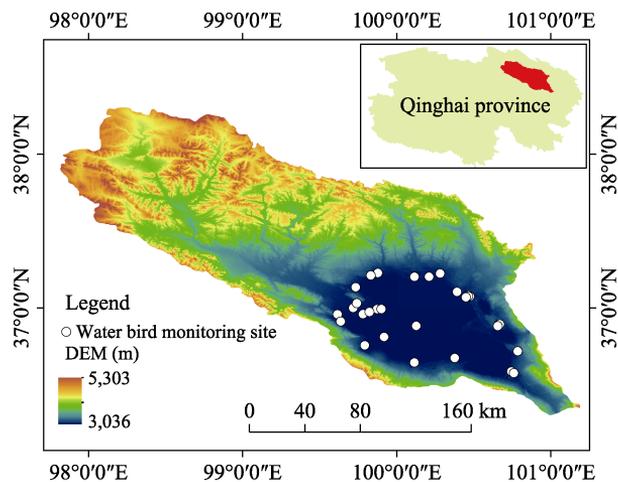
## 3. Data Development Methods

Waterbird monitoring involves numbering the original monitoring sites and points, and standardizing named plots and place names according to the associated administrative division. It also involves determining 10 habitat types, and unifying the collection record of interference type and interference intensity information. According to the characteristics of waterfowl distribution in Qinghai Lake, 24 waterbird monitoring samples were set up in the area around Qinghai Lake. These 24 monitoring samples were composed of 30 monitoring sample points (Figure 1).

In 2018, the place names of the waterbird monitoring sample sites and sample sites were sorted out and standardized according to the administrative areas, and all the monitoring sample sites were uniformly numbered. Among them, there are three sample sites: Reed Lake, Sun Lake, Yuya Lake, Ganzi River Wetland, grass bag, Ganzi Estuary, Orchid Lake, Buha River samples, Buha River Bay, and Buha River Estuary. According to the spatial and temporal distribution characteristics of Qinghai Lake, the habitat types of the monitoring samples (the habitats of waterbirds), the waterbird migratory residence places, the non-cluster breeding grounds, the wintering grounds, the foraging grounds, the cluster breeding camp nest ground five categories. The habitat types are divided into 10 different types: estuarine wetland, marsh meadow, farmland, sub-lake, freshwater lake, river wetland,

**Table 1** Metadata summary of the Waterfowl habitat and migration dataset collecting from 30 sample sites in Qinghai Lake basin (2018)

Items	Description
Dataset full name	Waterfowl habitat and migration dataset collecting from 30 sample sites in Qinghai Lake basin (2018)
Dataset short name	Waterbirds_QinghaiLakeBasin2018
Authors	Chen, Z. R., Qinghai Normal University, 424142312@qq.com Sun, J. Q., Qinghai Lake National Nature Reserve Administration, sunjq@163.com Hou, Y. S., Qinghai Lake National Nature Reserve Administration, 823996451@qq.com Chen, K. L., Qinghai Normal University, ckl7813@163.com Ma, Y. X., Qinghai Normal University, 346404980@qq.com Wang, X. Y., Qinghai Normal University, 245003744@qq.com
Geographical region	Qinghai Lake basin
Year	2018
Data format	.shp, .xlsx
Data size	71 KB (55.7 KB after compression)
Data files	Population number, population dynamics, population distribution, and population structure of waterfowl from 31 sample sites
Foundations	Ministry of Science and Technology of P. R. China (2019QZKK0405); National Natural Science Foundation of China (41661023); Qinghai Province (2020-ZJ-Y06)
Data publisher	Global Change Research Data Publishing & Repository, <a href="http://www.geodoi.ac.cn">http://www.geodoi.ac.cn</a>
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	<b>Data</b> from the Global Change Research Data Publishing & Repository includes metadata, datasets (in the <i>Digital Journal of Global Change Data Repository</i> ), and publications (in the <i>Journal of Global Change Data &amp; Discovery</i> ). <b>Data</b> sharing policy includes: (1) <b>Data</b> are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use <b>Data</b> subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute <b>Data</b> subject to written permission from the GCdataPR Editorial Office and the issuance of a <b>Data</b> redistribution license; and (4) If <b>Data</b> are used to compile new datasets, the ‘ten per cent principal’ should be followed such that <b>Data</b> records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset <sup>[7]</sup>
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

**Figure 1** Distribution of sample sites in the Qinghai Lake basin

lakeside salt marsh, river floodplain, peninsula, and islands. The functional division of the reserve area is divided into five types: the core area, buffer area, experimental area, outside the protection area, and the protection zone boundary. According to the type and intensity of interference, grazing, tourism, bird watching photography, no interference and weak, medium and strong three intensity levels. The administrative division of the waterbird

monitoring sample point is clearly assigned to the township and town level.

## 4 Data Results and Validation

### 4.1 Dataset Composition

This dataset includes the population number, population dynamics, population distribution, and the population structure, and the dataset is archived in .shp and .xls format, consists of two data files, with a total size of 71 KB (compressed to 2 files, at 55.7 KB).

### 4.2 Data Results

In 2018, 57 bird species, six orders, and 12 families (Table 2), including one kind of national key protection class I and three kinds of national key protection class II, two new waterbirds monitoring records (*Ardea purpurea* and *Calidris minuta*, Table 3), 32 waterfowl accounted for 56%; 25 wading birds accounted for 44%. A total of 72 waterfowl species were recorded between 2013 and 2018, including 36 common species, 23 rare species, and three new species. In 2018, “Whether to reach or exceed 1% of the world population distribution is an internationally important wetland”, there were 11 waterbirds that reached this index, including one national-level protected bird. According to the data from 2014 to 2018, 10 species of waterfowl constituted the dominant species in Qinghai Lake. There were three kinds of great black-headed gull, *Larus ichthyaetus*, (including the brown-headed gull, *Larus brunnicephalus*), Bar-headed Goose *Anser indicus* and Great Cormorant *Phalacrocorax carbo*, and non-cluster summer migratory birds have six species of ruddy shelduck *tadorna ferruginea*, black-necked crane *grus nigricollis*, tufted duck *aythya fuligula*, common pochard *aythya ferina*, tufted duck *aythya fuligula*, red-crested pochard *netta rufina* and one species of whooper swan *cygnus cygnus* in the wintering period.

**Table 2** Species composition of waterfowl in 2018

Order	Family	Species	Order	Family	Species
Ciconiiformes	Department of Pediatrics	4		Charadriidae	5
Pelecaniformes	Phalacrocoracidae	1	Plovers	Recurvirostridae	2
Storks	Ciconiidae	1		Scolopacidae	8
	Ardeidae	5		Laridae	3
Ornithales	Gruidae	2	6 Orders	Sternidae	3
	Ralline	2		12 Families	57 Species
Anserinales	Anatidae	21			

**Table 3** Added waterfowl observations in 2018

Latin name	Observation time	Observational sample point number	Quantity (pcs)
<i>Ardea purpurea</i>	May 22 <sup>nd</sup>	6301011001	1
	May 23 <sup>rd</sup>	6301011202	1
<i>Calidris minuta</i>	August 12 <sup>th</sup>	6301012201	21

In 2018, the habitat interference degree of waterbirds was the Heimahe river wetland, Daotanghe wetland, Erhai, Quanwan wetland and Jiangxigou. The main interference types were tourism, bird watching, and road traffic. Field surveillance was shown in Figure 2. Important waterbird habitats not included in the protection area are Daotanghe wetland, Hadatan, and Jiangxigou. In 2018, the annual cumulative number of waterbirds in Qinghai Lake was 251,000, nearly 20,000 fewer compared with 2017. The total population of waterbirds in Qinghai Lake between 250,000 was between 250,000 and 360,000 and 2018 (Table 4).

The 57,000 waterbirds recorded in late October 2018 was the highest peak of the year. During spring migration, waterbirds have 10 key habitats (Figure 3), namely Ganzi river

wetland, Hadatan, Naren wetland, Cormorant island, Egg island, Erhai, the Shaliuhe river estuaries, Paerqiong wetland, Quanwan wetland, and Jiangxigou. The dominant species are the great cormorant, *Phalacrocorax carbo*; the coot, *Fulica atra*; the bar-headed goose, *Anser indicus*; the ruddy shelduck, *Tadorna ferruginea*; the tufted duck, *Aythya fuligula*; the common pochard, *Aythya ferina*; and the brown-headed gull, *Larus brunnicephalus*.

**Table 4** Population dynamics of waterfowl from 2014 to 2018

Year	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Dec.	The next February
	Spring migration period			Summer breeding period		Autumn migration period		Overwintering period	
2018	16,695	20,203	46,332	45,001	23,961	31,514	57,792	8,582	1,178
2017	38,157	24,289	26,731	51,781	38,638	42,931	100,969	6,232	6,731
2016	25,350	41,673	27,107	35,751	18,196	55,176	43,832	3,245	21,177
2015	23,666	65,375	48,859	50,019	35,413	26,383	110,496	2,945	1,438
2014	21,540	53,268	32,016	43,010	32,482	55,333	114,342	3,434	1,434

The 10 key habitats are situated in freshwater lakes, river floodplains, peninsulas, estuarine wetlands, marsh meadows, and farmlands (Table 5).

**Table 5** Spring migration period in 2018

Order number	Location	Individual number	Number of species	Habitat type
1	Ganzi river wetland	1,148	26	Fresh water lake
2	Hadatan	3,626	21	Flood plain
3	Naren wetland	1,031	21	Marsh
4	Cormorant island	3,158	20	Lake shore peninsula
5	Egg island	1,381	19	Lake shore peninsula
6	Erhai	4,773	17	Fresh water lake
7	Shaliuhe river estuaries	510	16	Estuarine wetland
8	Paerqiong wetland	411	15	Estuarine wetland
9	Quanwan wetland	4,153	13	Marsh
10	Jiangxigou	2,894	6	Farmland

During the summer breeding period, waterbirds inhabit 12 key habitats (Figure 3): Cormorant island, Egg island, the Buhuhe river estuaries, Hadatan, Quanwan wetland, Heimahe river wetland, Erhai, the Shaliuhe river estuaries, Naren wetland, the Haergai river estuaries, Sankuaishi, and Haixinshan mountain. There are nine dominant species, namely the great black-headed gull, *Larus ichthyaetus*; the great cormorant, *Phalacrocorax carbo*; the bar-headed goose, *Anser indicus*; the common pochard, *Aythya ferina*; the tufted duck, *Aythya fuligula*; the red-crested pochard, *Netta rufina*; the brown-headed gull, *Larus brunnicephalus*; the ruddy shelduck, *Tadorna ferruginea*; and the coot, *Fulica atra*. The five habitats are peninsulas, estuarine wetlands, freshwater lakes, marsh meadows, and islands (Table 6).

During autumn migration, waterbirds inhabit 13 key habitats (Figure 3), namely Egg island, Cormorant island, the Buhuhe river estuaries, Paerqiong wetland, the Qiejihe river estuaries, Hadatan, Quanwan wetland, Heimahe river wetland, Daotanghe wetland, Erhai, Jiangxigou, Xiaobohu, and Shadao. There are 11 dominant species: the red-crested pochard, *Netta rufina*; the common pochard, *Aythya ferina*; the tufted duck, *Aythya fuligula*; the ruddy shelduck, *Tadorna ferruginea*; the coot, *Fulica atra*; the mallard, *Anas platyrhynchos*; the gadwall, *Anas strepera*; the great cormorant, *Phalacrocorax carbo*; the common teal, *Anas crecca*; the pintail, *Anas acuta*; and the whooper swan, *Cygnus cygnus*. The seven habitat types are peninsula, estuarine wetland, river floodplain, swamp meadow, river wetland, freshwater lake, and farmland (Table 7).

During the overwintering period, there are three Jiangxigou, Egg island, and Quanwan wetland (Figure 3). The dominant species are the ruddy shelduck, *Tadorna ferruginea*; the chicken-head diving duck; the red-necked duck, and the magpie duck. During the winter,

the three key waterbirds inhabit farmland, peninsulas, and swamp meadows (Table 8).

**Table 6** Summer breeding period in 2018

Order number	Location	Individual number	Number of species	Habitat type
1	Cormorant island	2,291	9	Lake shore peninsula
2	Egg island	1,172	11	Lake shore peninsula
3	Buhahe river estuaries	17,988	7	Estuarine wetland
4	Hadatan	2,546	15	Flood plain
5	Quanwan wetland	7,625	16	Marsh
6	Heimahe river wetland	1,411	9	Marsh
7	Erhai	1,036	11	Fresh water lake
8	Shaliuhe river estuaries	2,304	16	Estuarine wetland
9	Naren wetland	10,115	22	Marsh
10	Haergai river estuaries	1,316	9	Estuarine wetland
11	Sankuaishi	23,317	5	Island in the lake
12	Haixinshan mountain	3,790	5	Island in the lake

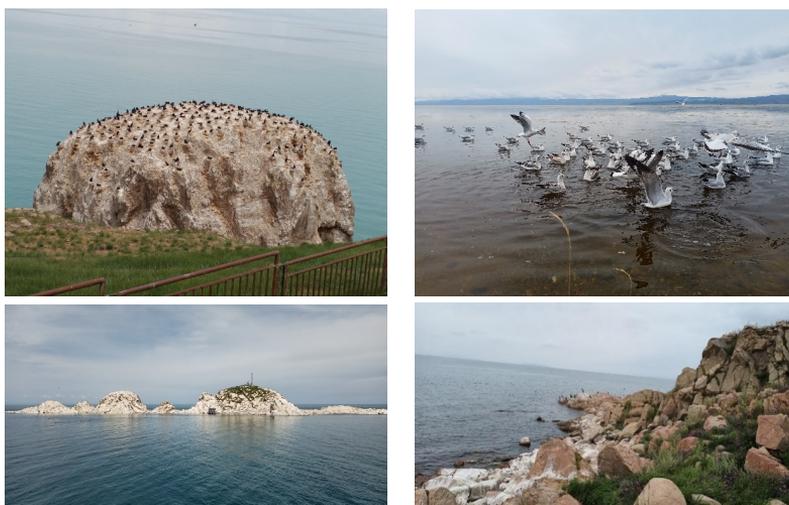
**Table 7** Autumn migration period in 2018

Order number	Location	Individual number	Number of species	Habitat type
1	Egg island	17,850	14	Lake shore peninsula
2	Cormorant Island	9,444	4	Lake shore peninsula
3	Buhahe river estuaries	8,723	6	Estuarine wetland
4	Paerqiong wetland	8,013	2	Estuarine wetland
5	Chee estuary	6,487	11	Estuarine wetland
6	Hadatan	5,023	14	Flood plain
7	Quanwan wetland	3,768	10	Marsh
8	Heimahe river wetland	2,513	15	Marsh
9	Pour river wetland	2,154	10	Freshet
10	Erhai	1,644	17	Fresh water lake
11	Jiangxigou	1,619	4	Farmland
12	Xiao Bo lake	1,547	3	Marsh
13	Shadao	1,337	8	Fresh water lake

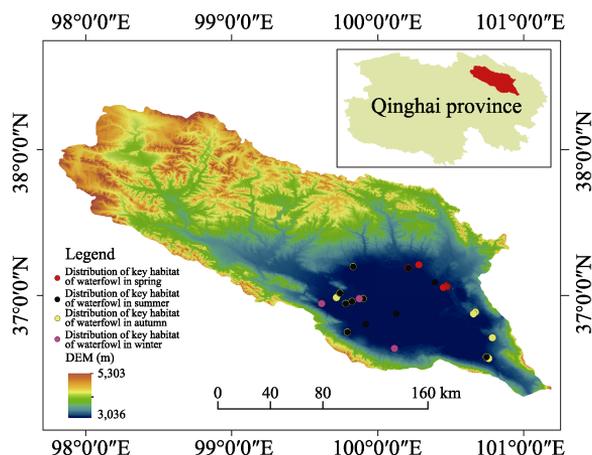
**Table 8** Overwintering period in 2018

Order number	Location	Quantity	Number of species	Habitat type
1	Jiangxigou	4,957	2	Farmland
2	Egg island	2,752	6	Lake shore peninsula
3	Chee estuary	412	3	Estuarine wetland
4	Ganzi river wetland	233	3	Estuarine wetland
5	Quanwan wetland	208	3	Swamp meadow
6	Naren wetland	6	1	Swamp meadow
7	Gazhila wetland	4	1	Swamp meadow
8	Xiao Bo lake	10	1	Swamp meadow

In 2018, Qinghai Lake produced 44,000 summer migratory birds (comprising the species of the great black-headed gull, *Larus ichthyaetus*; the great cormorant, *Phalacrocorax carbos*; the bar-headed goose, *Anser indicus*; and the brown-headed gull, *Larus brunnicephalus*). In the peninsula habitat, the dominant species are the great cormorant, *Phalacrocorax carbos*; the tufted duck, *Aythya fuligula*; and the bar-headed goose, *Anser indicus*, etc. In the estuary wetland habitat, the dominant species are the brown-headed gull, *Larus brunnicephalus*; the red-crested pochard, *Netta rufina*; the common pochard, *Aythya ferina*; *Podiceps cristatus*; the ruddy shelduck, *Tadorna ferruginea*; the mallard, *Anas platyrhynchos*; the gadwall, *Anas strepera*; and the common teal, *Anas crecca*, etc. In island habitats, the dominant species are the ruddy shelduck, *Tadorna ferruginea* and the brown-headed gull, *Larus brunnicephalus*; the dominant species of other habitats are not certain, so analysis was not done.



**Figure 2** Field surveillance shooting plots



**Figure 3** Major habitats distribution for seasons

## 5 Discussion and Summary

During the 2018 summer breeding and autumn migration periods, due to the inaccessibility to people and vehicles, the Buha river estuary, Wuhaalanqu estuaries, Paerqiong wetland, and the Qiejihe river estuaries led to incomplete monitoring sample site records. Due to the 2017 brown-headed gull, *Larus brunnicephalus*, camp site (Cormorant island), the camp nest conditions were lost. No new brown-headed gull, *Larus brunnicephalus*, camp site was found during monitoring, and only a few nest areas were found in the bird island area. The brown-headed gull, *Larus brunnicephalus*, breeding status was not recorded. As Qinghai Lake waters rising wetland environment change, since 2016 appeared several new waterbird habitat and waterbirds distribution is more concentrated location, Naishiji Wetland (the old Hong Lake), Haergai river estuaries, Ganzi river wetland, Erlangjian, Zhegeli Wetland, Nuraogeta Estuary, the above sites in 2018 but was not formally included in the sample point monitoring, so waterbird habitat monitoring is not comprehensive. Monitoring equipment and means is not adapted to the current needs of waterbird monitoring, such as some personnel and vehicles in an inaccessible habitat without effective means to conduct monitoring work. Although efforts have been made to standardize the monitoring of

waterbirds, due to human factors, there is no unified and efficient field patrol system.

In view of the drastic decline in waterbird populations, further strengthen the patrol monitoring work real-time grasp of waterbird dynamic changes and distribution, actively implement the wetland protection and restoration project and reserve overall planning of ecological restoration and ecological restoration project, make the overall population of Qinghai Lake waterbirds stable. It is necessary to actively respond to the adverse effects of waterbird nesting habitats due to changing ecological environments, and to restore waterbird nesting habitats for cluster breeding waterbirds. Qinghai Lake wintering waterbirds has formed from the original swan as the main advantage species to latent duck and Ruddy Shelduck *Tadorna ferruginea* as the advantage of the original wintering ground (Quanwan wetland, Qiejihe river estuaries, Niaodao) to strengthen patrol monitoring, the new wintering ground (Jiangxigou) wintering birds foraging land award measures, retain the wintering and migratory waterbirds guarantee the population of Qinghai Lake wintering birds. Law enforcement should be strengthened to reduce the interference of no activities within a specific period of time, to create a safe and quiet habitat for waterbirds. For waterbird habitats not situated in protected areas, negotiations with local government should be conducted to establish a “community watch” or jointly carry out joint prevention and management with the community.

#### **Author Contributions**

Ma, Y. X. and Chen, K. L. made a general design for the development of the dataset. Hou, Y. S., Chen, Z. R., and Wang, X. Y. collected and processed all the data. Ma, Y. X. wrote the data papers.

#### **Conflicts of Interest**

The authors declare no conflicts of interest.

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