water MDPI

Supplementary Materials

Increased Water Abstraction and Climate Change Have Substantial Effect on Morphometry, Salinity, and Biotic Communities in Lakes: Examples from the Semi-Arid Burdur Basin (Turkey)

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BIRDS SUPPLEMENTARY MATERIAL

Section S1. Breeding Bird Atlas Methodology

Turkish Breeding Bird atlas was conducted between 2014–2018 at the national scale [40]. The breeding season the Burdur Basin was defined as the period between the last week of March and mid-June, and it was divided into two periods: early breeding season and late breeding season. The main spatial unit used in the atlas was 50 × 50 km UTM grid squares. In each of these 50 × 50 km squares, two 10 × 10 km squares were surveyed by teams made up of a mixture of experts and volunteers. These 10 × 10 km squares were chosen to be different in terms of the habitat types they contain and to represent the habitat types present in the 50 × 50 km square. The teams walked two to four 1km-long line transects [104] in an hour in each 10 ×10 km square and recorded every species they saw or heard. The same breeding codes in [105] were used. In addition to the line transects, the teams also gathered data while moving between line transects. The teams conducted supplementary surveys in each 50 × 50 km if they believed they were missing some different habitats. We used the 50 × 50 km grid square data for our study because the atlas data was made available only at scale. To filter the records from the 50 × 50 km squares that fall within the basin boundaries, we visualized eBird data in ArcGIS Pro 2.3 [106] and retained only observations falling within the boundaries. We used all types of breeding records possible and confirmed-coded records [105] to be more inclusive because we realized that for some of the species, such as reed-nesting passerines (Passeriformes), the confirmed-coded records were lacking, resulting in a bias in the dataset. To tackle this problem, we present two numbers for the total number of breeding birds of the basin: one having species with all types of breeding records (i.e., including the possible-coded species) and another having only probable and confirmed-coded species.

Section S2. Additional Sources Used for the White-headed Duck Case Study

The additional sources used to obtain all winter records of the species in the basin were [41,67,81,83,85,89,107–112].

Section S3. Mid-winter Waterbird Survey Methodology

We used mid-winter waterbird census results for the years between 1967 and 2020 [43]. The censuses used point counts [104] from a fixed set of points, and the teams covered the whole surfaces of the wetlands in a single day. The censuses were conducted by experts. There were multiple gaps of no-count periods for most of the wetlands in the basin. We retained only the years for which we had survey data for all of the major wetlands in the region: Lake Burdur, Lake Acıgöl, Lake Salda, Lake Karataş, Lake Yarışlı, and Lake Ak.

Section S4. Functional Diversity & Statistical Analyses

We used body mass (from [113]), foraging stratum (from [114]), foraging behaviour (from [115], and diet (from [114]) to quantify the functional diversity of the wintering waterbird communities. We have followed Violle et al. [116] and Luck et al. [117] while we were choosing these functional traits. We calculated function diversity indices in R [118] by using *dbFD* function from *FD* package [119]. We calculated Functional Evenness (FEve; [44]). Non-binary numeric traits, which had different ranges and units, were standardized before functional diversity metrics were calculated [120]. Before the calculation of the FEve, we calculated the distances between the species by using new the “gawdis” method presented in [121], which can avoid the problem of disproportional contribution of some traits that happens when Gower distances are used. Before the calculation of the FEve with the dbFD function, we applied a dimensionality reduction (required for min.species richness > number of dimensions [120], which resulted in a 52.8% representation of the total variance. We used *glmmTMB* function from *glmmTMB* package [122] to model the effect of time (i.e., year) on FEve metrics. We used generalized linear models [45] with Gamma distributed errors. We used *testResiduals* function from *DHARMa* package [123] to check the model validity and its residuals. We also checked for autocorrelation in the residuals [124]. The model had no problems in its residuals and was a valid one.