*JGR Biogeosciences*

Supporting Information for

**Reservoir drawdown highlights the emergent effects of water level change on reservoir physics, chemistry, and biology**

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**Additional Supporting Information (Files uploaded separately)**

Caption for Table S1

**Introduction**

This supplementary information file includes text describing our literature scoping review (Text S1) and five supporting figures (Figures S1–S5), referenced in the main manuscript text. The scoping review results in a separate data table, with the caption for the table included here (Table S1).

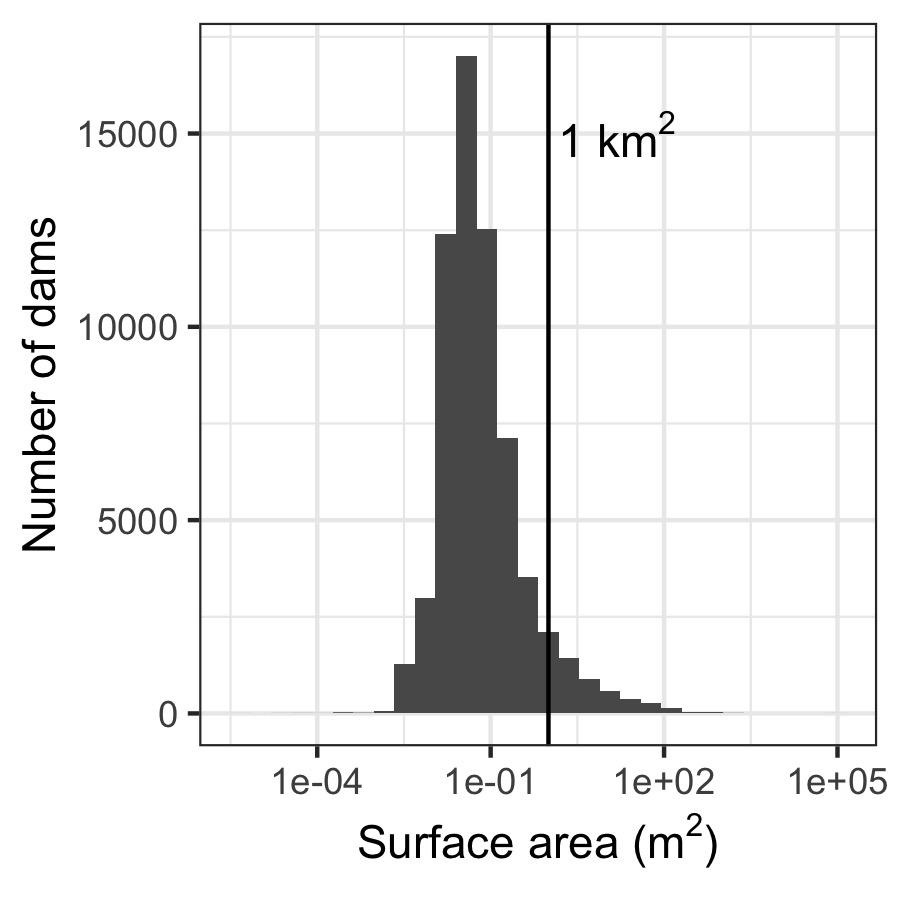
**Text S1.**

To assess the effects of drawdown on our three focal variables across published literature, we conducted a preliminary scoping review (following Grant & Booth, 2009). We queried the Web of Science Core Collection for “(lake OR reservoir) AND drawdown AND (oxygen OR phytoplankton OR chlorophyll OR stratification OR thermocline)” on 28 April 2023. The search yielded 159 results. We then screened the full text of these 159 papers and selected those that met both of the following criteria:

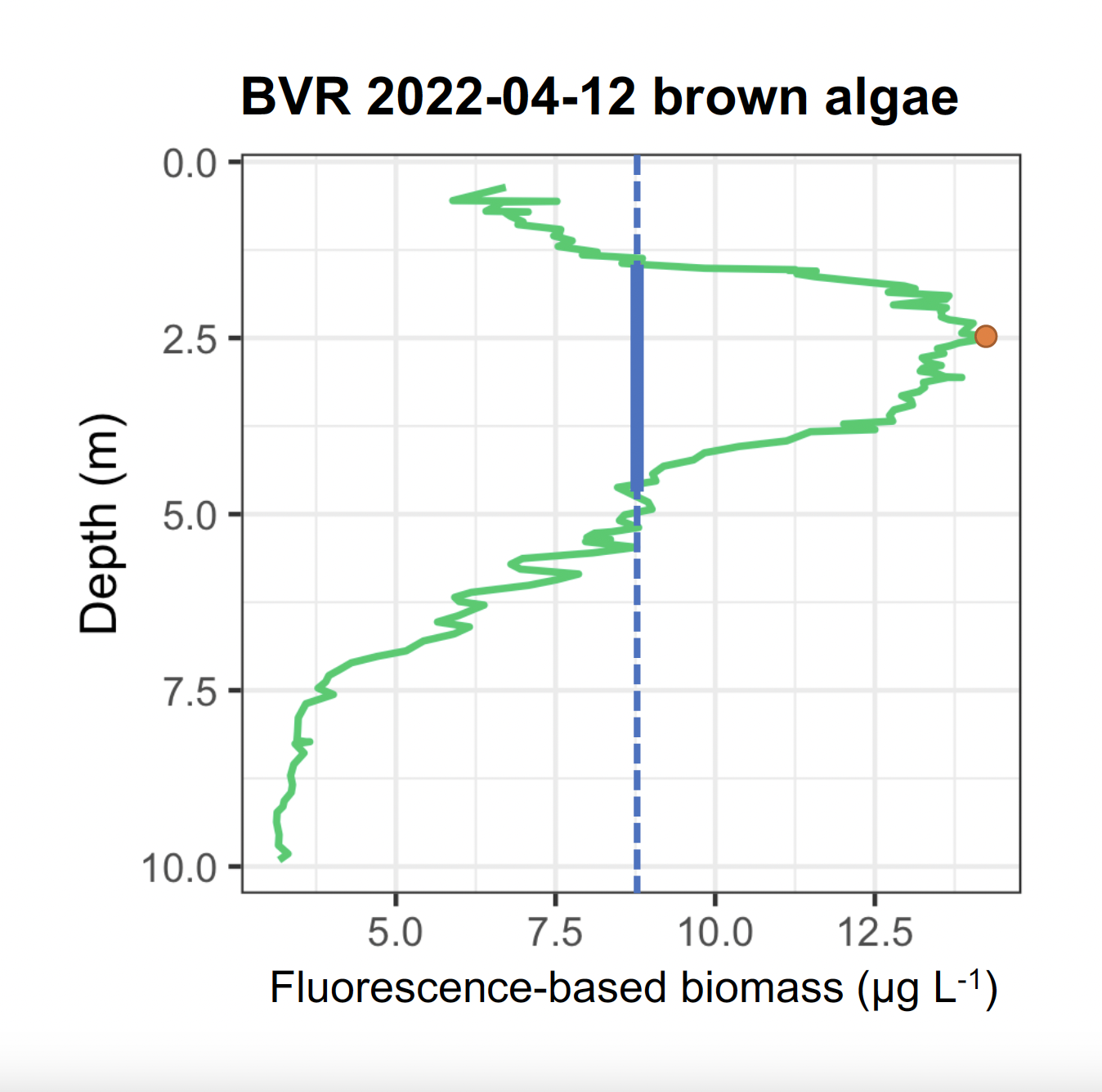
* The paper had to include measurements of at least one of our three focal variables (thermal stratification strength, surface oxygen, surface phytoplankton) during a drawdown event that lasted for a season or less (i.e., not multiannual trends)
* The drawdown needed to have occurred in a freshwater lake or reservoir

We supplemented this systematic search with *n* = 6 additional publications that were not flagged in the initial search that we knew reported relevant information. While our search was not comprehensive, this scoping review provided an overview of drawdown literature.

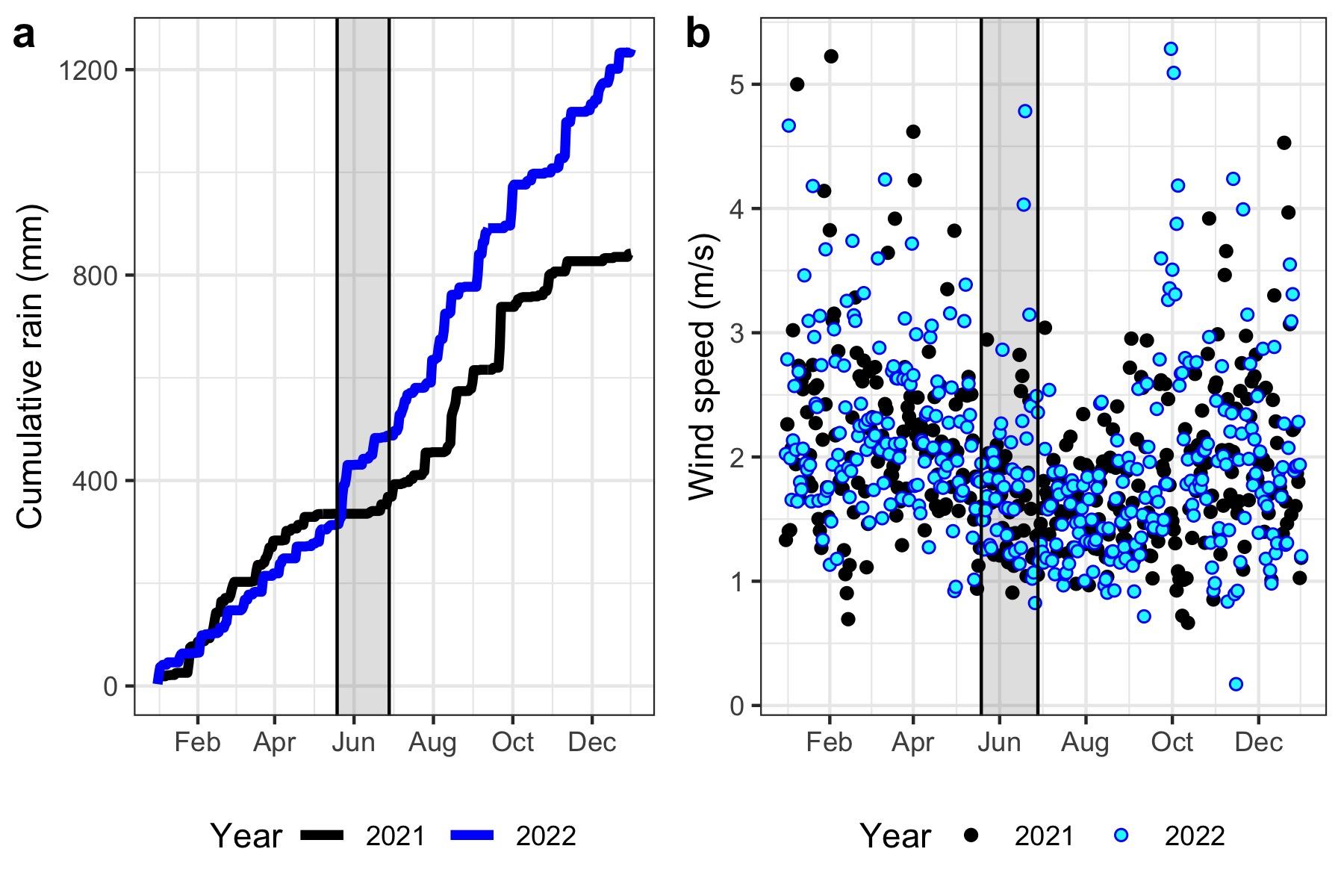
For papers that met our two criteria, we compiled metadata about the drawdown event (e.g., drawdown extent, naturally-occurring vs. management-induced), and noted whether the drawdown resulted in an increase, decrease, or no change for each of our three focal variables (Table S1). In total, our search yielded *n* = 24 relevant publications describing drawdown events across six continents.



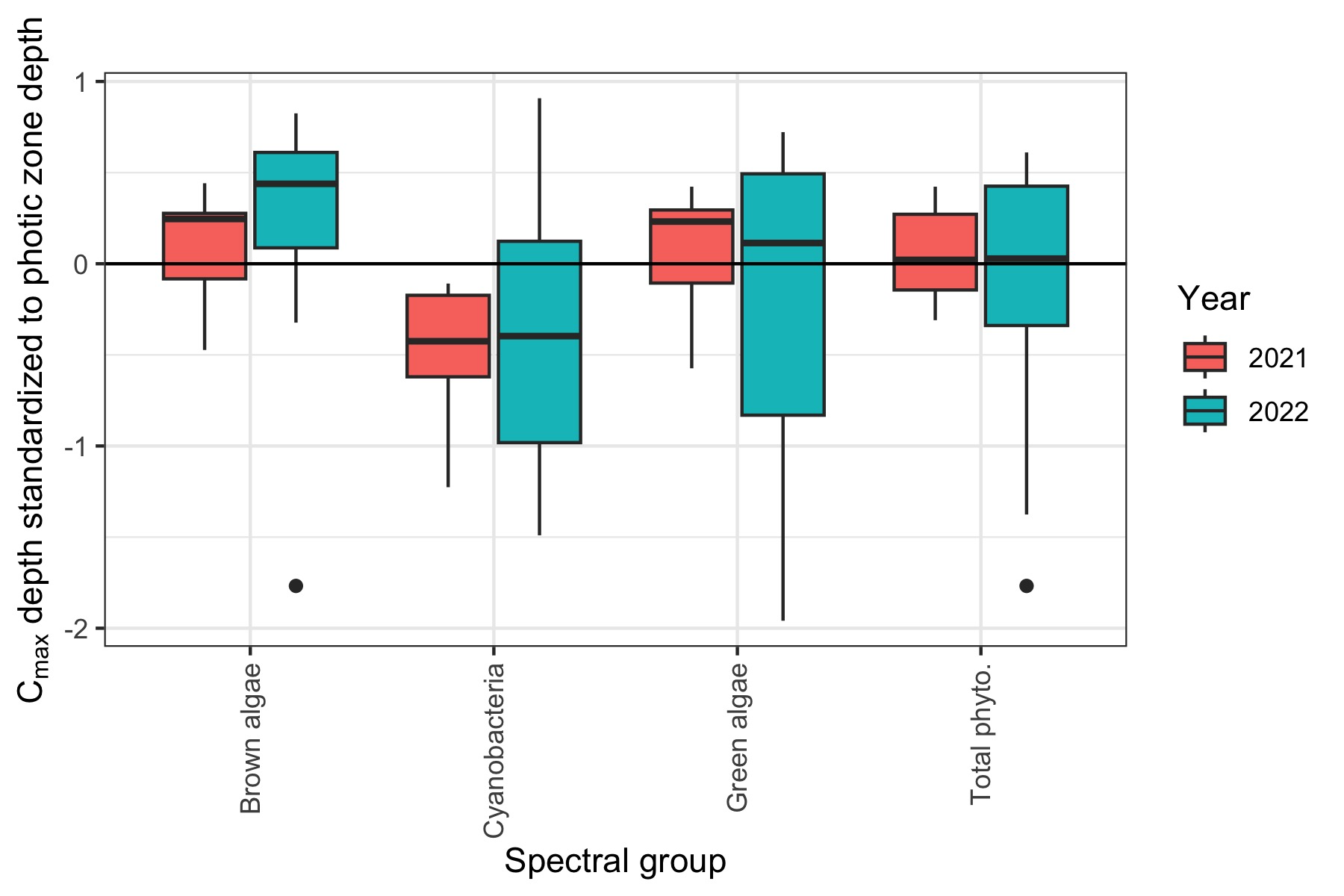
**Figure S1.** Most dams in the United States have surface area <1 km2. Data from the National Inventory of Dams (NID; U.S. Army Corps of Engineers, 2021).



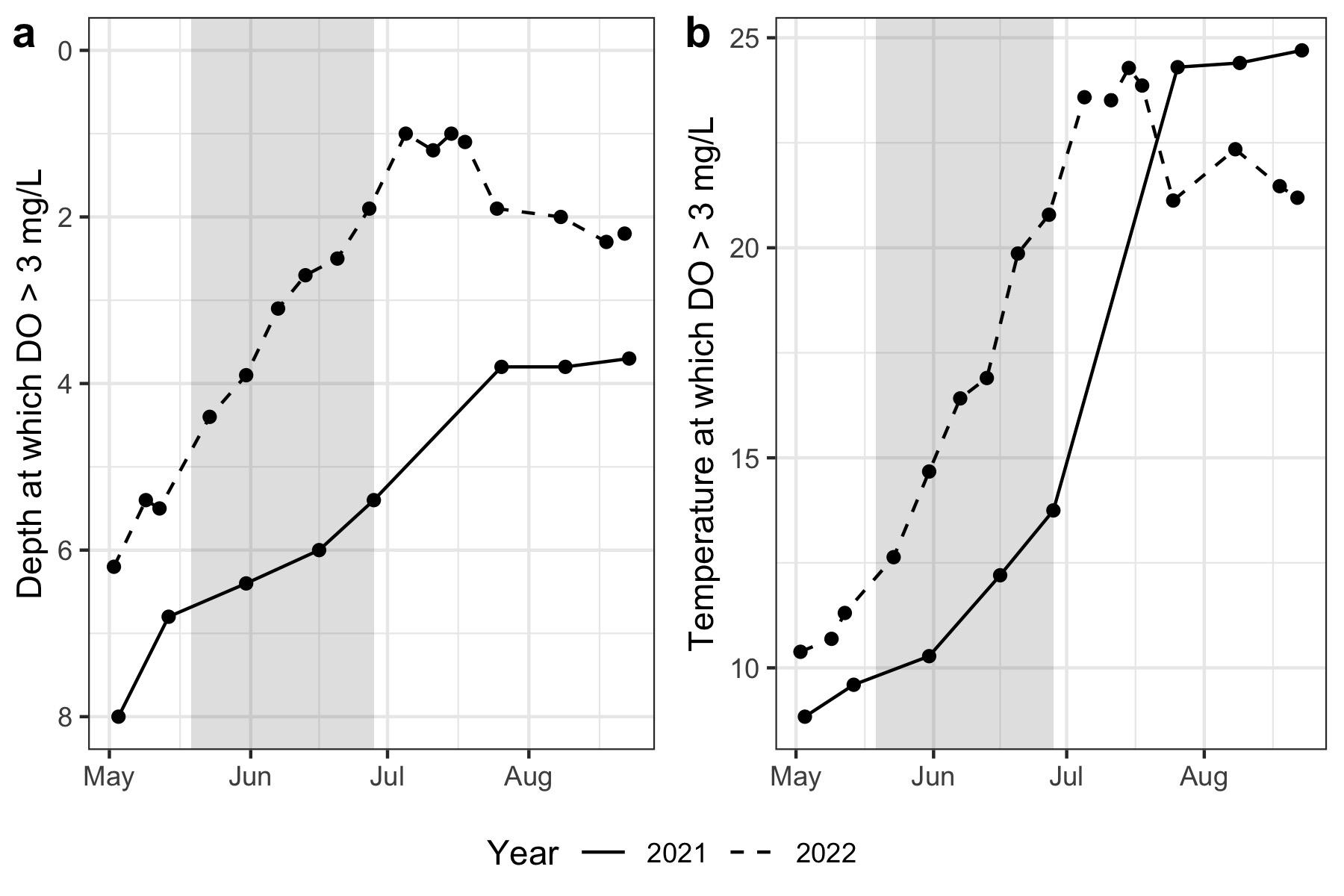
**Figure S2.** Example fluorescence-based biomass depth profile describing the calculation of phytoplankton biomass peak width in Beaverdam Reservoir (BVR). We determined the closest depth above and below the depth of maximum biomass (Cmax depth; orange point) where measured phytoplankton biomass concentration was less than or equal to the mean concentration (blue dashed line) across the water column. The difference between these two depths was assigned as the peak width (blue solid line). Biomass depth profiles had approximately a 0.1 m resolution.



**Figure S3.** Cumulative rain was greater in 2022 compared to 2021 (a), while wind speeds were comparable between the two years (b). Shaded interval indicates the 2022 drawdown period.



**Figure S4.** Boxplot of the depth of maximum observed fluorescence-based biomass (Cmax depth) standardized to photic zone depth from weekly depth profiles in Beaverdam Reservoir from May–July in 2021 and 2022 for three fluorescence-based spectral groups and their summed total. Photic zone depth was calculated as the depth at which only 1% of surface irradiance was detected. Positive values indicate that the Cmax depth fell above the photic zone depth, whereas negative values indicate that Cmax depth fell below the photic zone depth.



**Figure S5.** The depth at which dissolved oxygen (DO) crossed 3 mg/L (a common threshold below which many fish and zooplankton taxa cannot survive; e.g., Missaghi et al., 2017; Stefan et al., 2001) tended to be shallower (panel a) and warmer (panel b) in 2022 compared to 2021. Here, the drawdown interval is marked with a gray shaded rectangle.

**Table S1.** Papers identified by our scoping review process (Text S1). NR = not reported. +/- indicates increases or decreases in our three focal variables (thermal stratification strength, surface oxygen, surface phytoplankton) during drawdown.

**References**

Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Missaghi, S., Hondzo, M., & Herb, W. (2017). Prediction of lake water temperature, dissolved oxygen, and fish habitat under changing climate. *Climatic Change*, *141*. https://doi.org/10.1007/s10584-017-1916-1

Stefan, H., Fang, X., & Eaton, J. (2001). Simulated Fish Habitat Changes in North American Lakes in Response to Projected Climate Warming. *Transactions of the American Fisheries Society*, *130*, 459–477. https://doi.org/10.1577/1548-8659(2001)130<0459:SFHCIN>2.0.CO;2