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Appendix S3. Calculating indices of biomass density for different size classes of fish

Given that lakes were sampled using a depth-stratified design, we used stratified means to calculate whole lake indices of abundance density (expressed as catch of fish per unit effort, CPUE) and biomass density (expressed as biomass of fish per unit effort, BPUE). These indices were calculated for different size ranges of fish and then corrected for size selectivity of the sampling method.

Hypsographic curves were used to calculate the proportion of lake area in each depth stratum (0–3, 3–6, 6–12, 12–20, 20–35, 35–50, 50–75 and >75 m) and strata were sampled using overnight sets of large mesh and small mesh gillnets. All sampling was done using benthic nets (i.e., set on the lake bottom). The CPUE was first calculated within each depth stratum (for each gear) as the catch divided by netting effort, measured in units of 100 m-nights. The CPUE from each gear was then summed within depth stratum before calculating a whole lake index of abundance as the area-weighted mean of CPUE. This CPUE score represents the expected catch (number of fish) from setting 100 m of each gear for one night (i.e., 200 m; or 200 m x 1.8 = 360 m2 given that the net height was always 1.8 m for both gears). These calculations were done for each species divided into 10 mm length classes. A weight-based index of abundance (BPUE) was then calculated from CPUE using weight-length relationships estimated for each species: BPUE was calculated for each length class by multiplying CPUE by predicted weight. The corrected BPUE was calculated for each gear in each depth zone and then summed. A whole lake index of BPUE was calculated as the weighted mean of BPUE in each depth, where weighting was based on the benthic area in each depth zone. These measures of catch rate are biased indices of fish density because gillnet sampling is size-selective. Although the wide range in mesh size (13 to 127 mm stretch mesh) tends to equalize size-retention properties of the gear, larger fish were more likely to encounter the gear given they swim faster and have a larger home range (Rudstam et al. 1995). We used the indirect method (e.g., Millar and Fryer 1999; Walker et al. 2013) to assess the retention selectivity of the gillnets. Comparison of the fish sizes caught in each mesh implied that the selectivity of the combined gear was relatively flat across a fish fork length range of 150 to 600 mm (approx. 50 to 3,000 grams); fish outside this range were less catchable (Fig. S1). Optimal foraging theory predicts that the daily search volume of a fish scales with body length to the power of 2.4 (Andersen and Beyer 2006). This result assumes 3-dimensional foraging. If foraging is 2-dimensional (e.g., benthic foraging), the exponent reduces to 1.41 because the appropriate search space is an area, not a volume. Because our gillnets are benthic (i.e., not suspended), the latter exponent (1.41) seems more appropriate for modeling the effect of body size on gillnet encounter rate. Given that fish weight is a cubic function of length, encounter rate therefore scales approximately with weight to the power of 0.5.

The overall selectivity of the sampling method was calculated as the product of gillnet retention times the encounter rate (Fig. S1). As illustrated, the catch rate underestimates the abundance of fish smaller than 2,000 grams (approx. 500 mm). To correct for this bias, we divided BPUE by selectivity of the size class. This selectivity-corrected index of biomass density was used when describing the size composition of fish in each lake.

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**Figure S1**. Estimated selectivity of the sampling method. Gillnet retention (dashed line) measures properties of the gear to retain fish of different sizes. Overall selectivity (solid line, the product of gillnet retention times the encounter rate) assumes encounter rate scales with body weight to the power of 0.5.