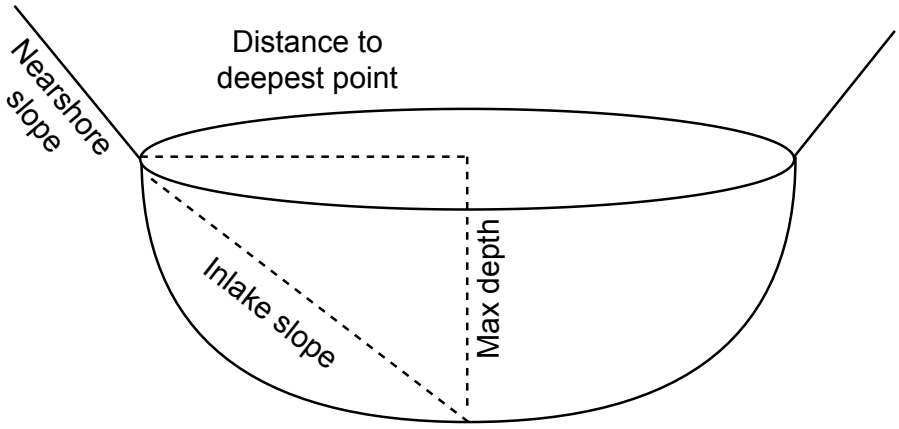

Figure 1: Diagram showing the assumption of most lake depth models that the nearshore slope extends into the lake and that all lakes have a common relationship between nearshore and inlake slope.

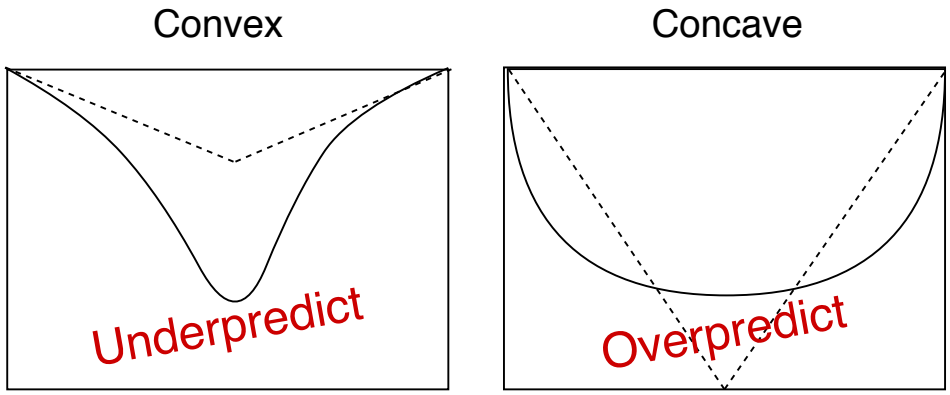

Figure 2: Diagram showing our expectation that slope-based models of lake depth will under predict true depth in convex lakes (left) and over predict true depth in concave lakes (right). Dashed lines represent extrapolated nearshore slope while solid lines represent the lake bottom.

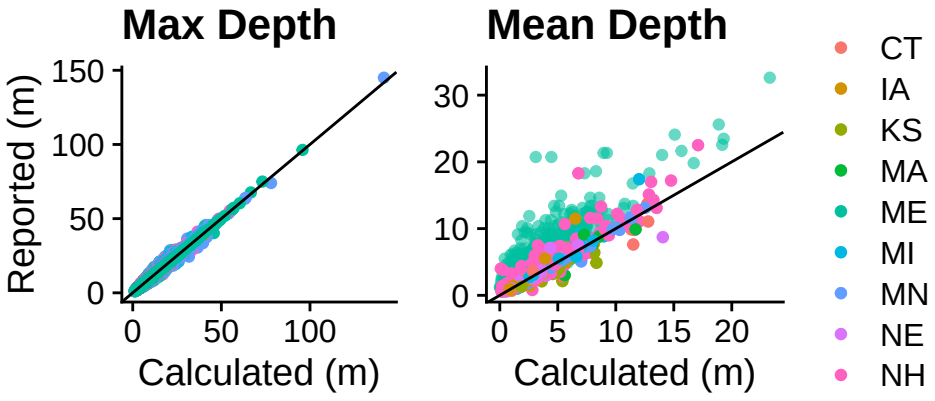

Figure 3: Comparison between reported depth and depth calculated from bathymetry surfaces by US State.

variable	Median	Q25	Q75	n
Max depth (m)	8.2 (7)	4.6 (3.7)	14 (12)	4850 (17700)
Mean depth (m)	2.7 (3)	1.5 (1.7)	4.6 (4.8)	3430 (8020)
Elevation (m)	300 (340)	180 (210)	400 (460)	4850 (17700)
Area (ha)	55 (33)	21 (11)	140 (100)	4850 (17700)
Island area (ha)	0 (0)	0 (0)	0.18 (0.076)	4850 (17700)
Perimeter (m)	4400 (3500)	2500 (1800)	8100 (7300)	4850 (17700)
Shoreline development	1.7 (1.7)	1.4 (1.4)	2.1 (2.2)	4850 (17700)
Watershed-lake ratio	7.8 (10)	3.9 (4.4)	17 (28)	4850 (17700)
Deepest point distance (m)	180 (-)	110 (-)	290 (-)	4850 (-)
Visual center distance (m)	240 (-)	160 (-)	380 (-)	4850 (-)
Inlake slope (m/m)	0.046 (-)	0.024 (-)	0.079 (-)	4850 (-)
Nearshore slope (m/m)	0.077 (7)	0.051 (3.7)	0.11 (12)	4850 (17700)

Table 1: Summary of lake depth predictor variables for modelling efforts (and for lakes continent-wide).

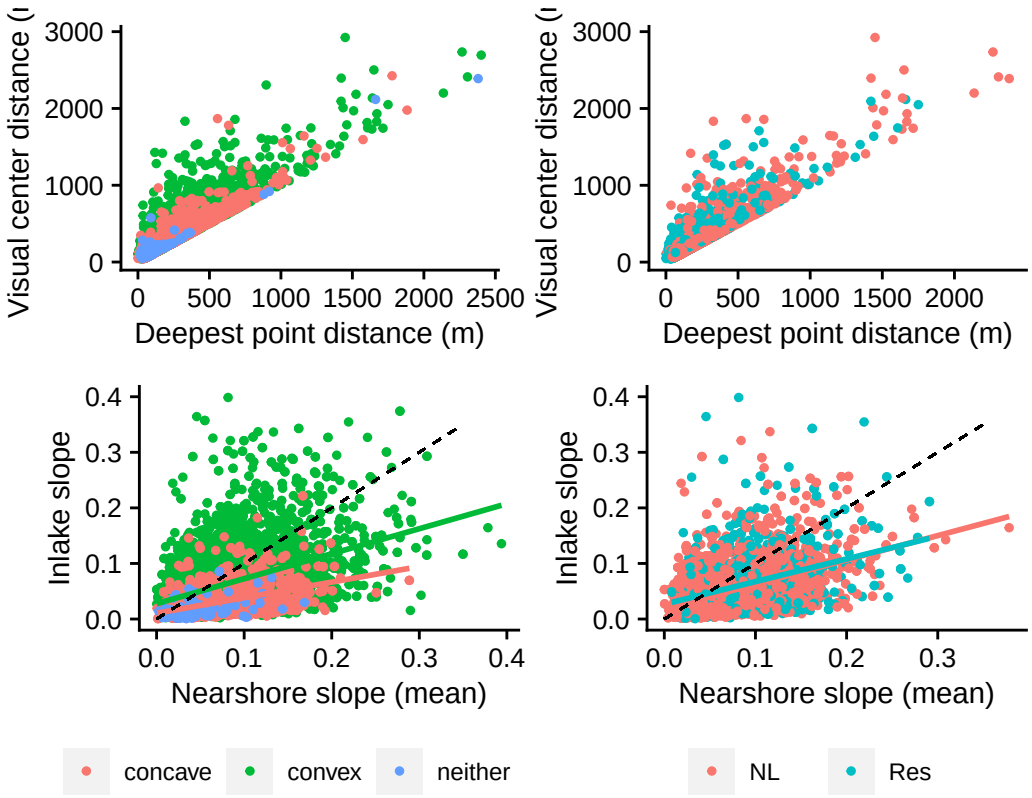

Figure 4: Comparison among lake shape and reservoir classes for A-B) distance to deepest point versus distance to lake visual center and C-D) nearshore slope versus inlake slope. Also shown is a 1:1 line for comparison.

Figure 5: Model fit and predictive accuracy metrics for all combinations of true (inlake slope, deepest point distance) and proxy (nearshore slope, visual center distance) metrics. Tiles are colored by their R^2 values and labeled with their RMSE values.

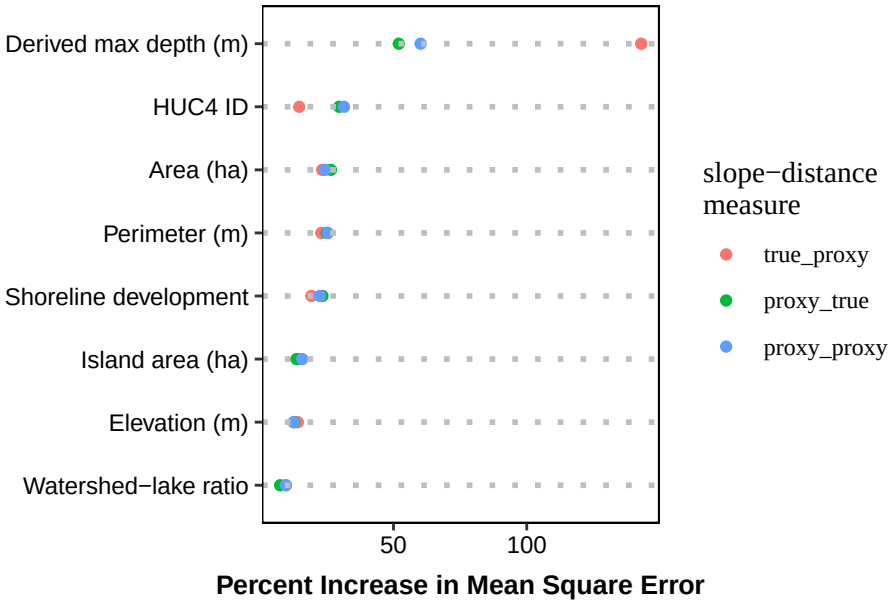

Figure 6: Importance plot for random forest variables showing increase in mean square error. Higher values indicate greater importance to model predictions.

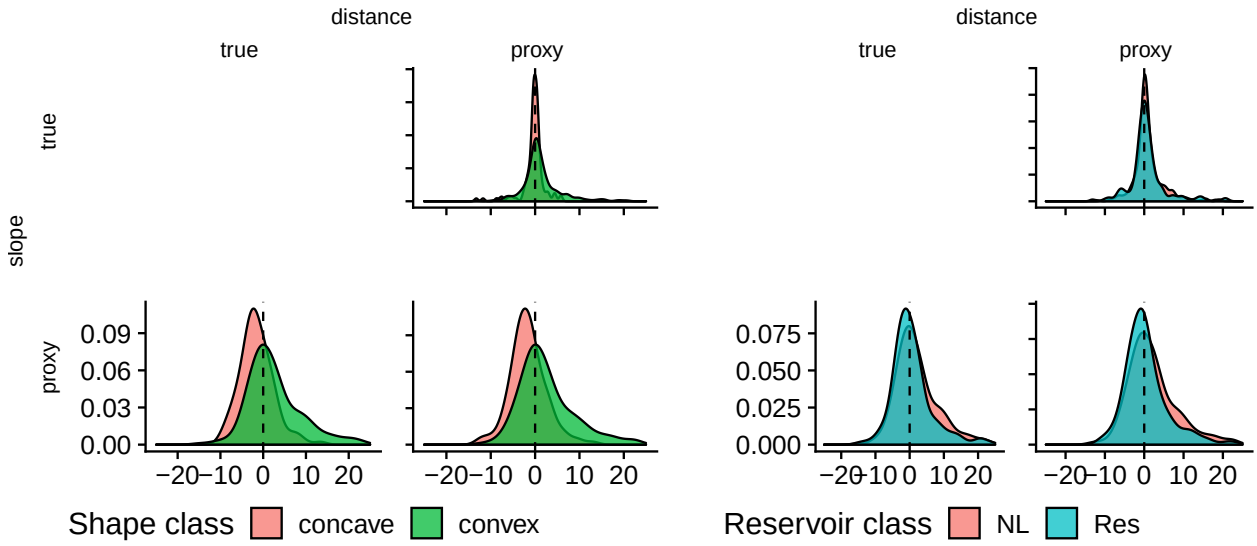

Figure 7: Depth model residuals by shape and reservoir class.

Appendix

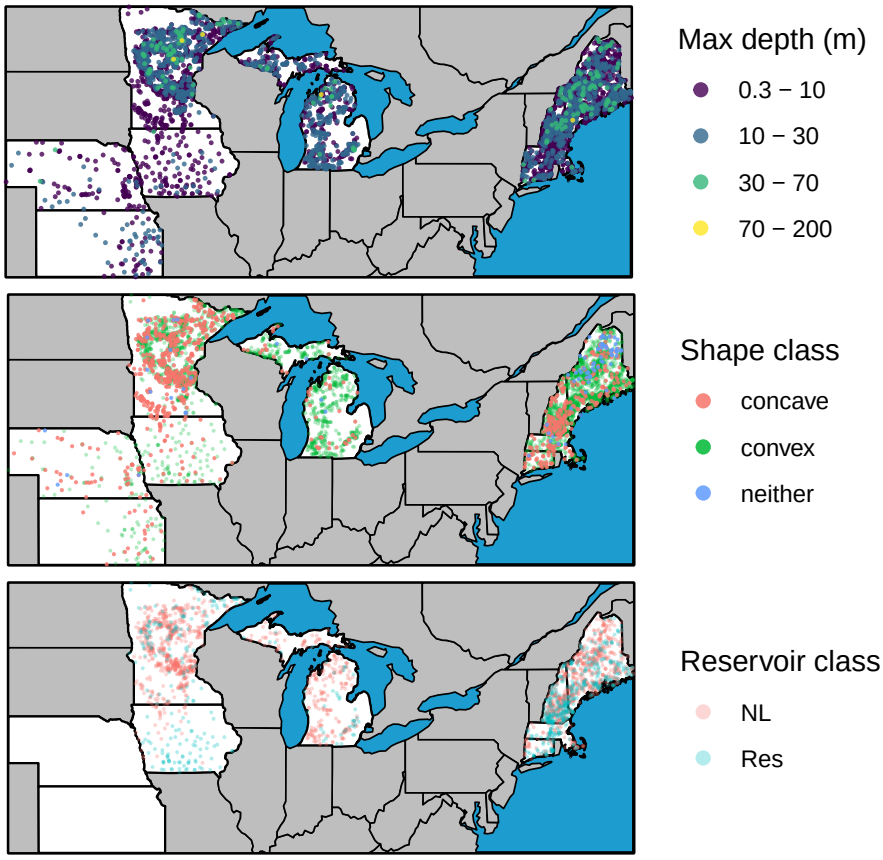

Figure 1: Map of study lakes showing A) lake maximum depth measurements, B) cross-section shape class, and C) reservoir classification.

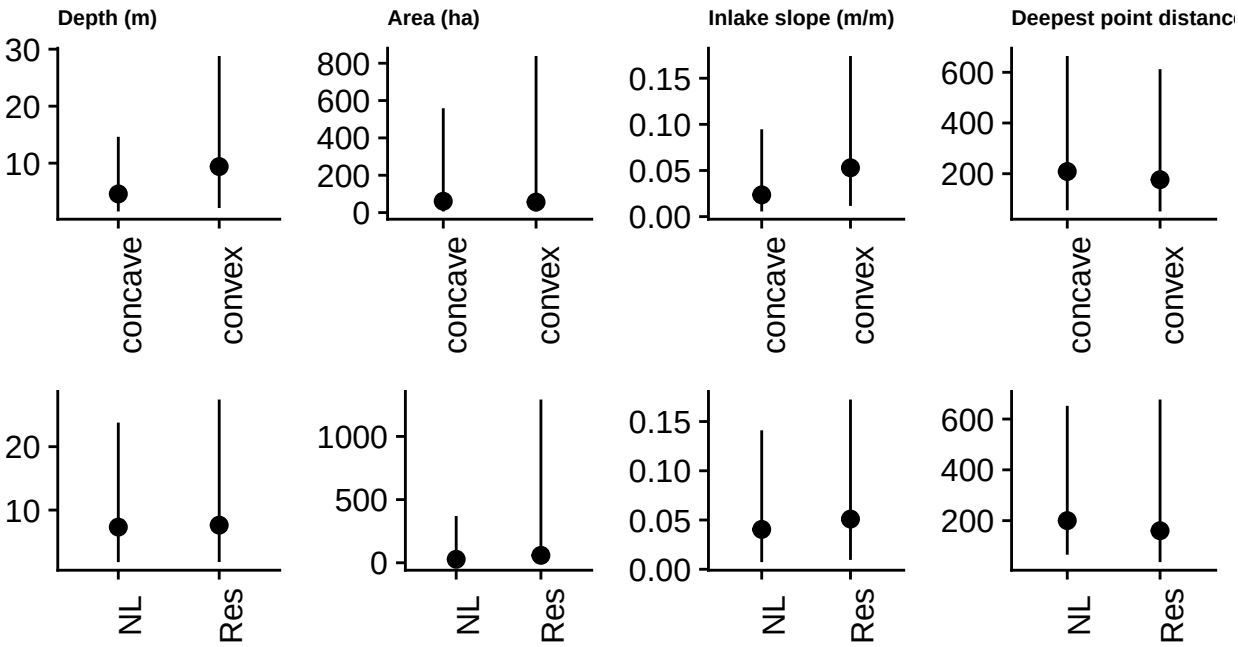

Figure 2: Lake characteristics by categorical variables.

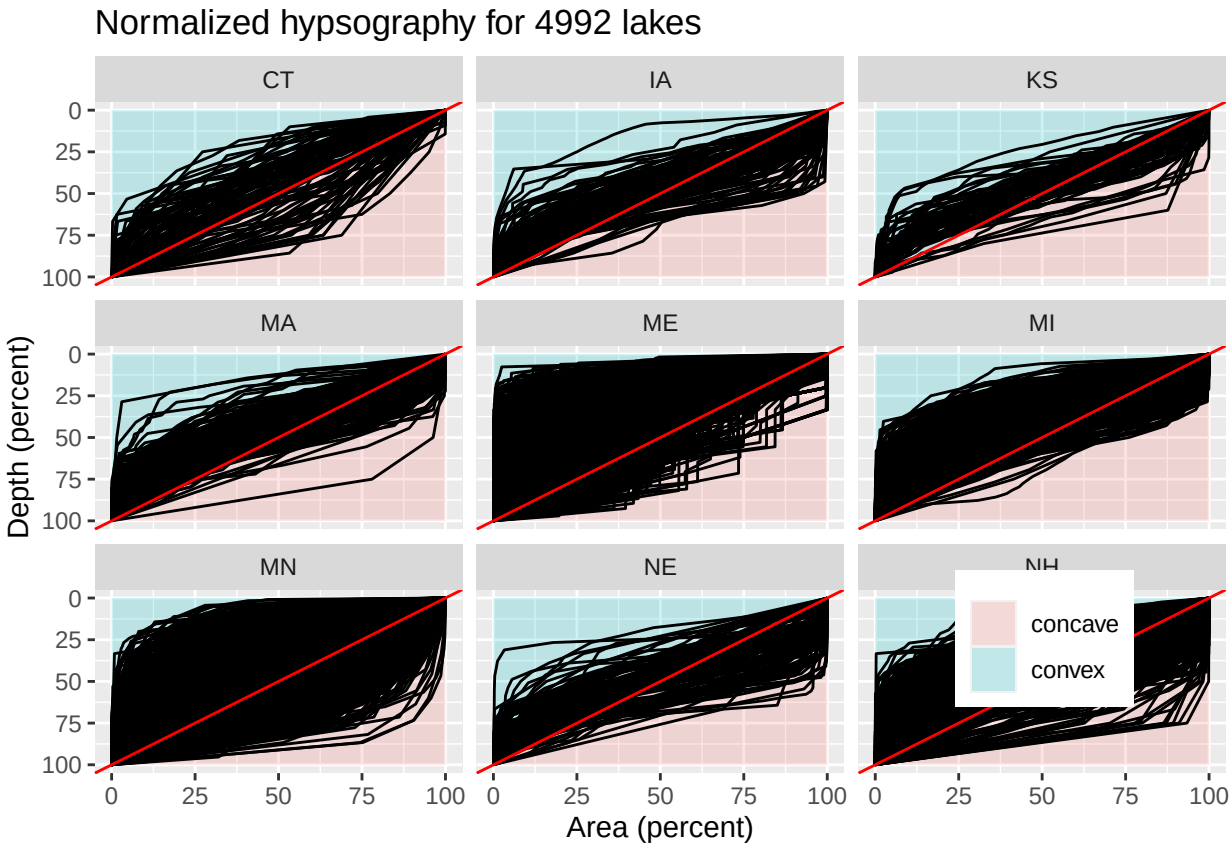

Figure 3: Hypsography classification by state.