

Figure 1: Map of lake maximum depth in the continental United States.

Table 1: Summary of lake depth predictor variables.

variable	Median	Q25	Q75	n
lake_maxdepth_m	7.3	4	13	17400
lake_meandepth_m	3	2	5	6430
lake_elevation_m	340	210	460	17400
lake_waterarea_ha	34	11	100	17400
lake_totalarea_ha	34	11	100	17400
lake_islandarea_ha	0	0	0.087	17400
lake_perimeter_m	3500	1800	7500	17400
lake_islandperimeter_m	0	0	130	17400
lake_shorelinedevfactor_nounits	1.7	1.4	2.3	17400
nws_focallakewaterarea_ha	110	37	410	5200
nws_area_ha	5300	1600	30000	5200
nws_lake_arearatio	49	17	190	5200
nws_perimeter_m	77000	39000	2e+05	5200
nws_mbgonhull_width_m	7700	4200	18000	5200
nws_meanwidth_m	4000	2100	9200	5200
nws_mbgonhull_length_m	13000	7300	33000	5200
nws_mbgonhull_orientation_deg	94	46	140	5200
ws_focallakewaterarea_ha	34	11	100	17400
ws_area_ha	370	120	1500	17400
ws_lake_arearatio	10	4.4	29	17400
ws_perimeter_m	19000	10000	40000	17400
ws_mbgonhull_width_m	2100	1200	4100	17400
ws_meanwidth_m	1000	570	2100	17400
ws_mbgonhull_length_m	3600	2000	7200	17400
ws_mbgonhull_orientation_deg	90	42	140	17400
buffer100m_slope_max	21	16	27	12400

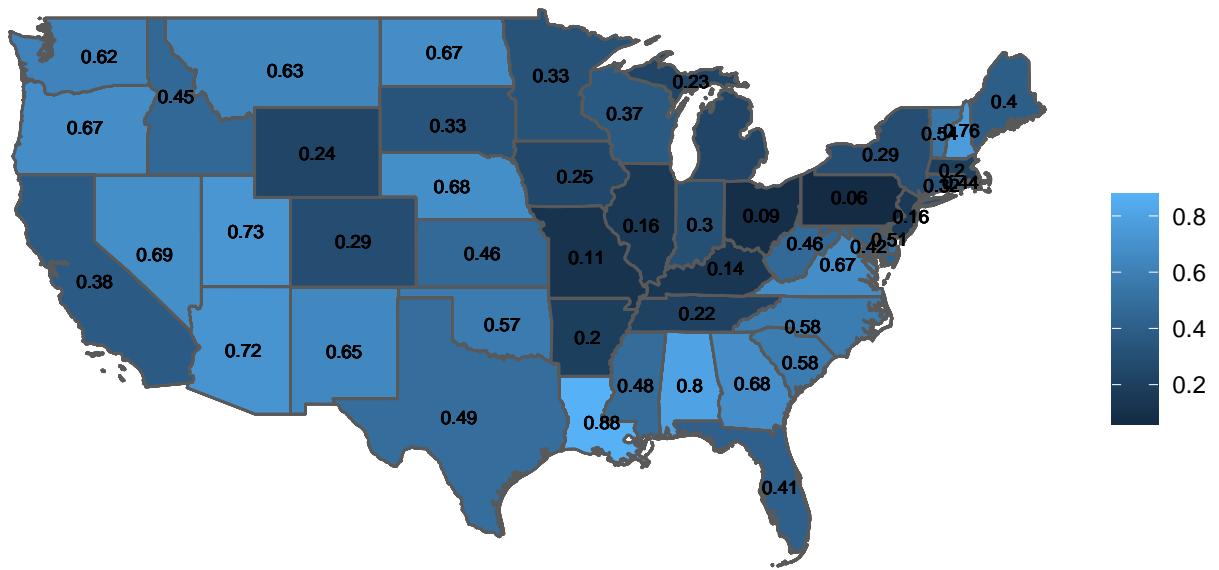


Figure 2: Proportion of lakes greater than 4ha with maximum depth availability by state.

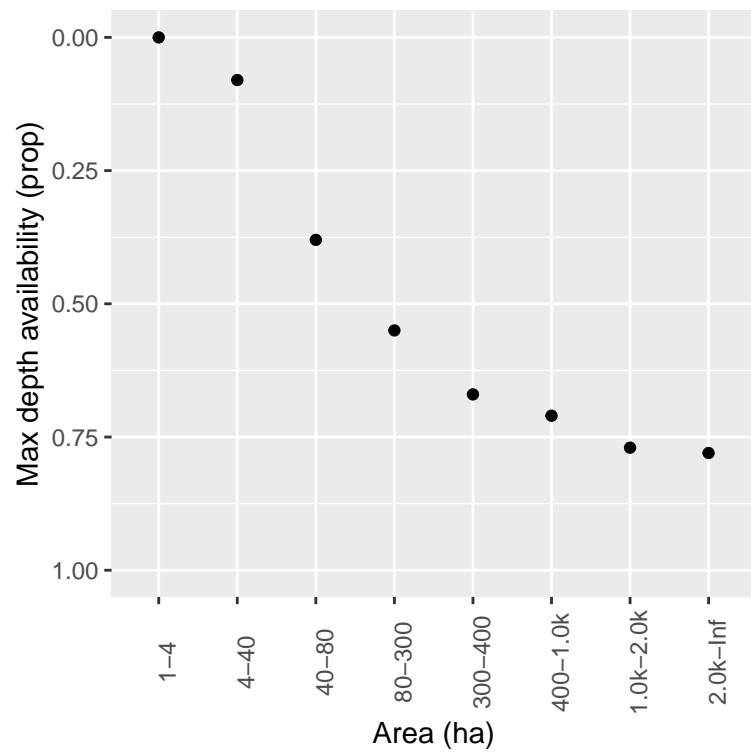


Figure 3: Proportion max depth availability by lake area class.

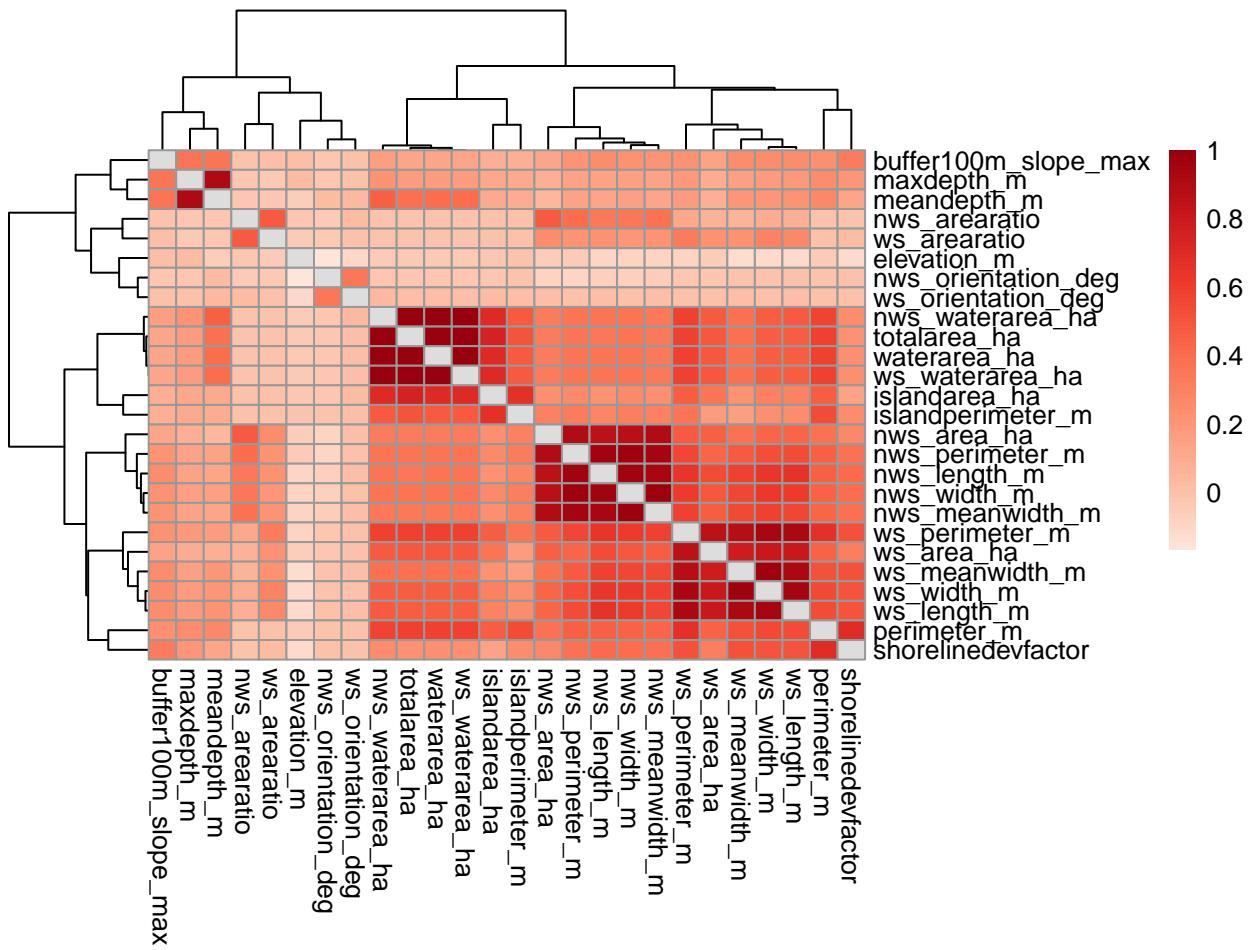


Figure 4: Correlation matrix heatmap.

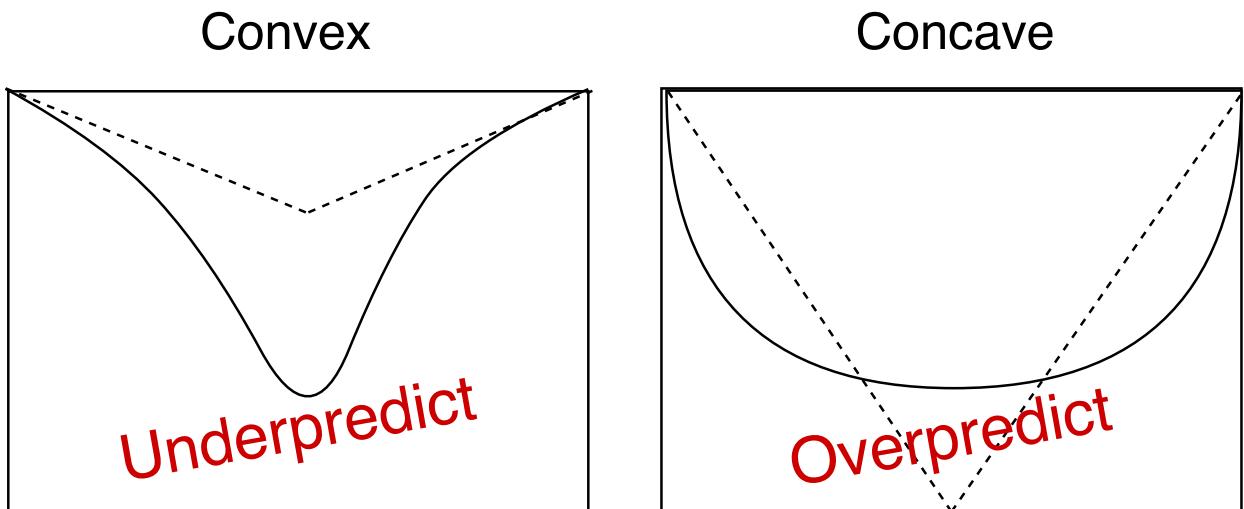


Figure 5: Lake shape caption

Normalized hypsography for 3513 lakes

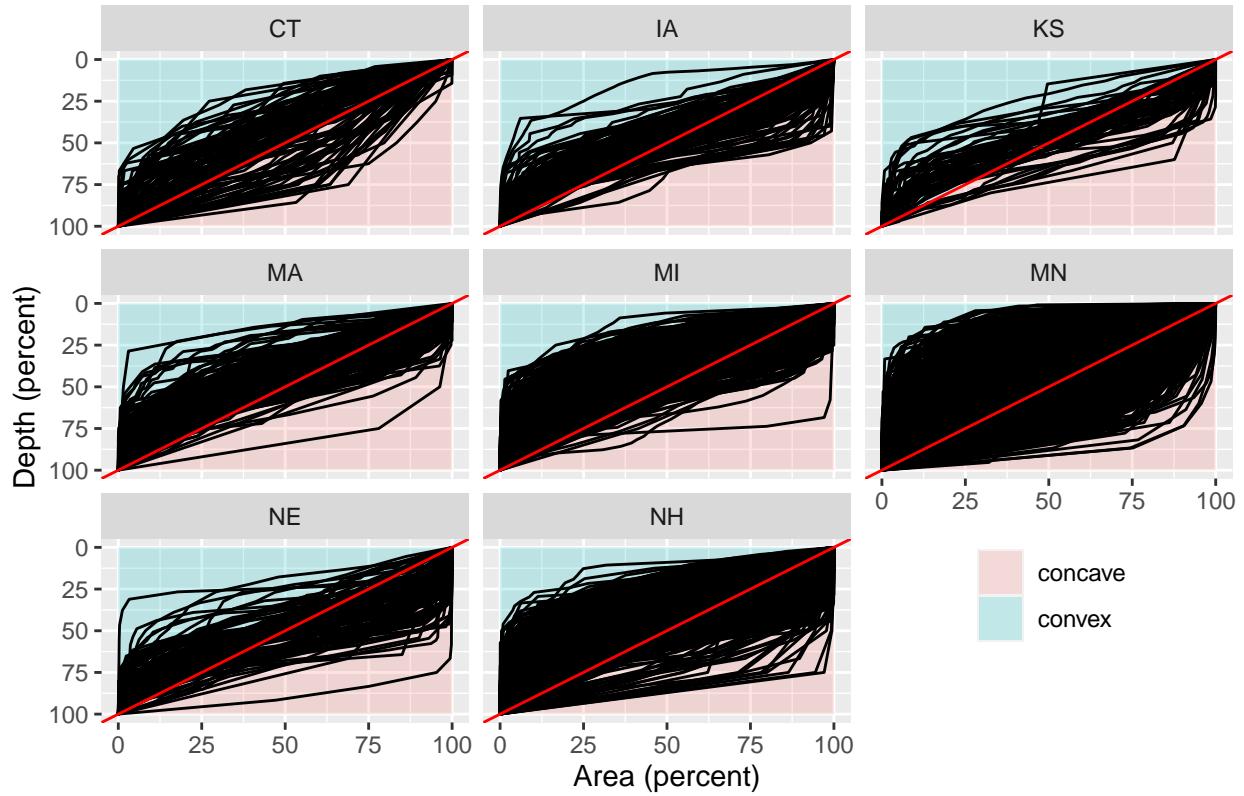


Figure 6: Hypsography classification by state.

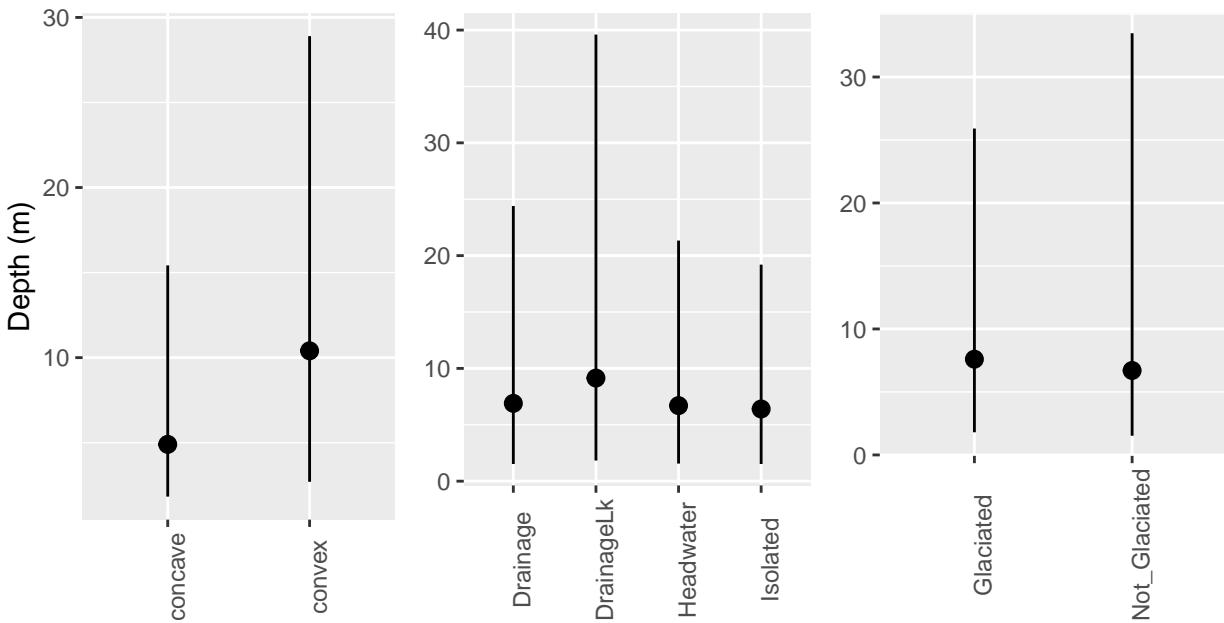


Figure 7: Lake maximum depth by categorical variables.

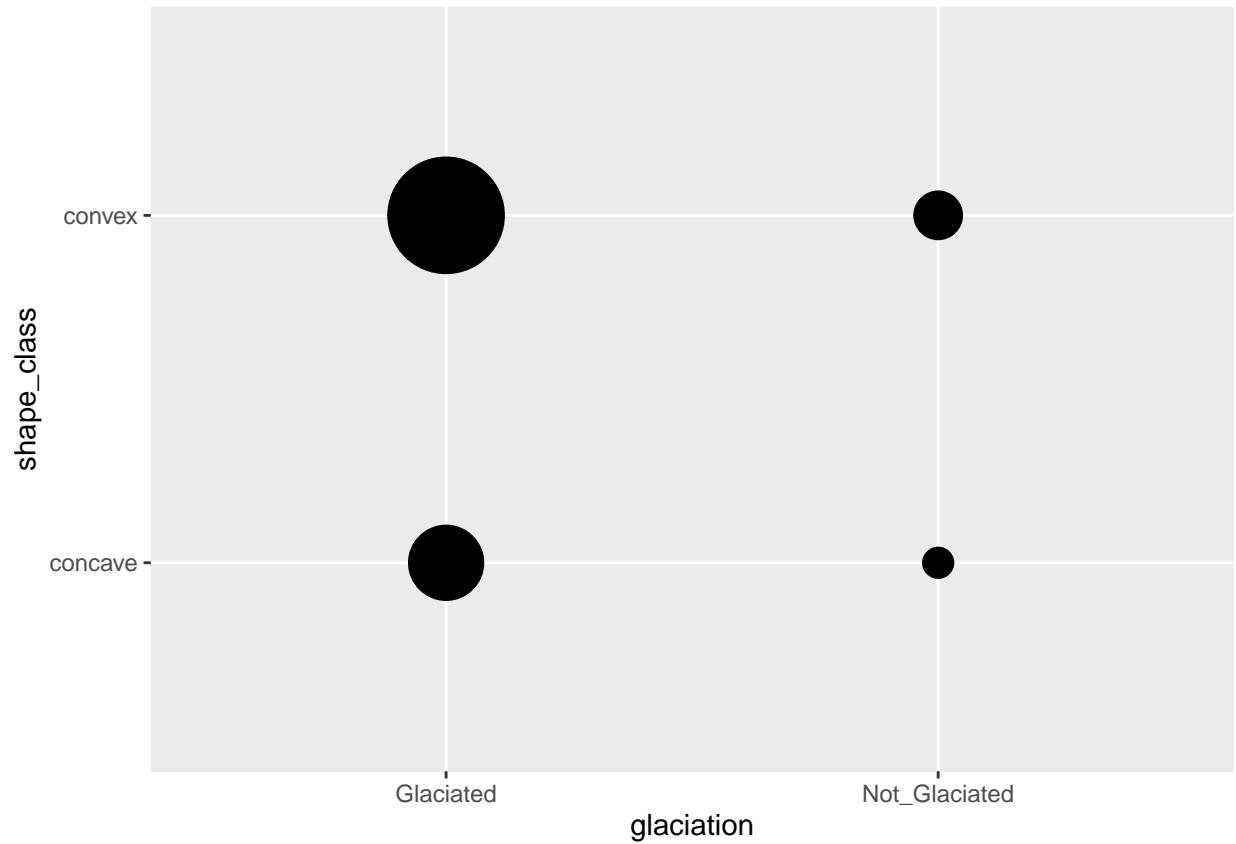


Figure 8: Cross tabulation between lake glaciation and shape class. Circles are proportional to the number of lakes in each category. If a lake has been glaciated it is more likely to be convex. However, if a lake has not been glaciated there is no tendency towards a particular shape class.

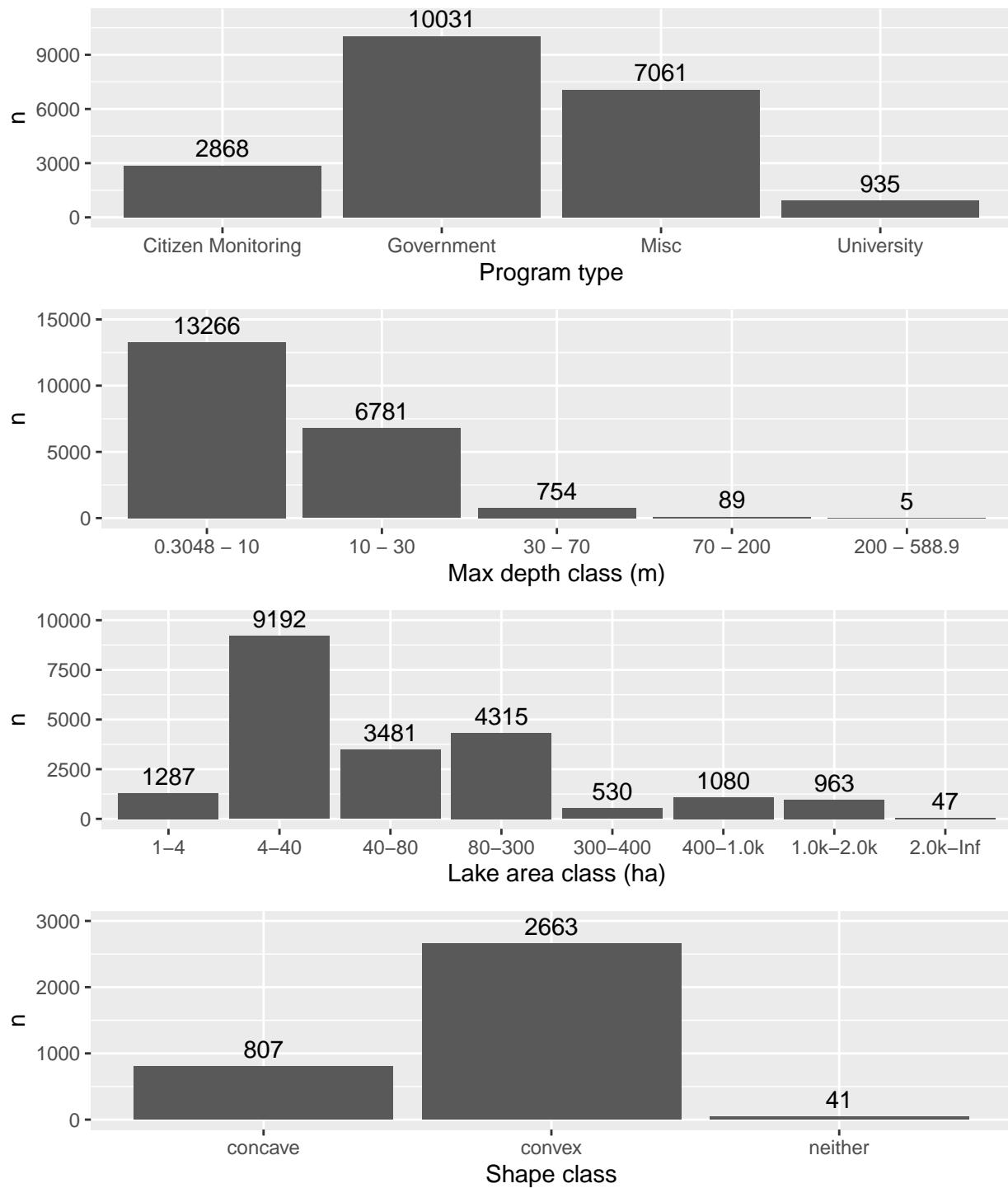


Figure 9: Number of lake depth measurements by categories.

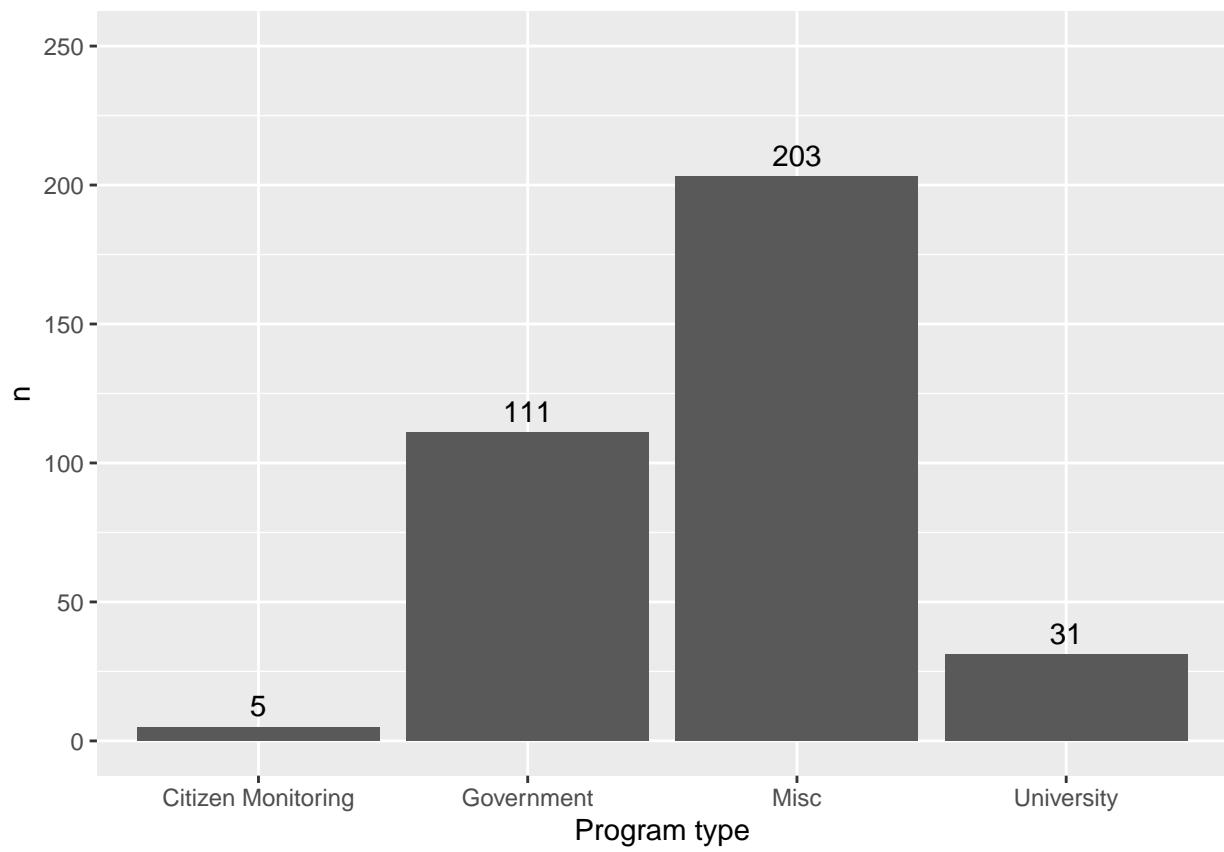


Figure 10: Number of programs by categories.

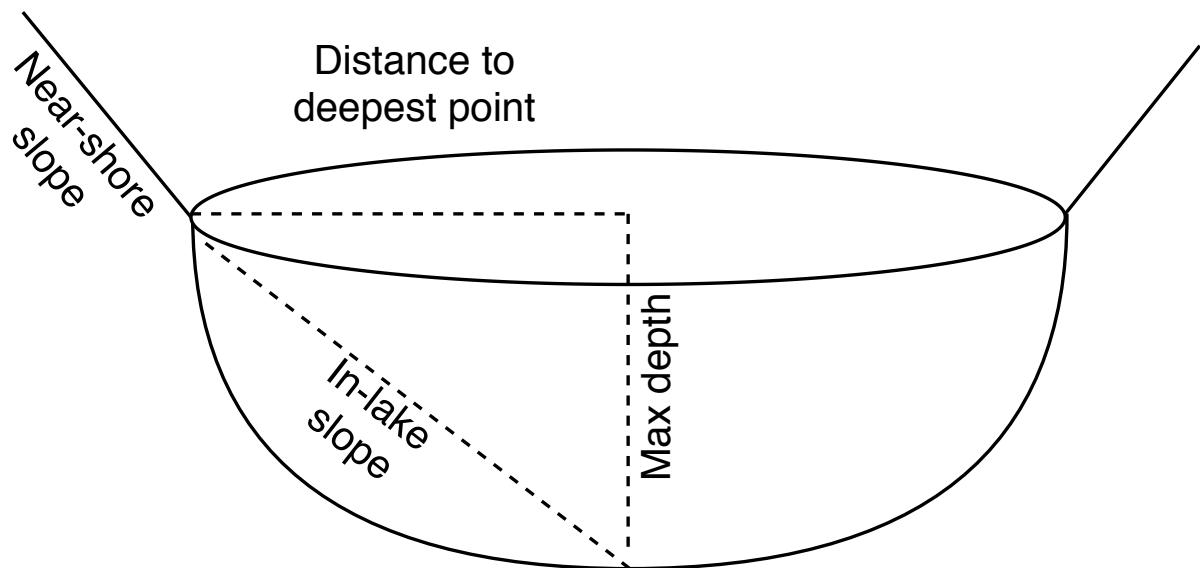


Figure 11: Slope diagram caption

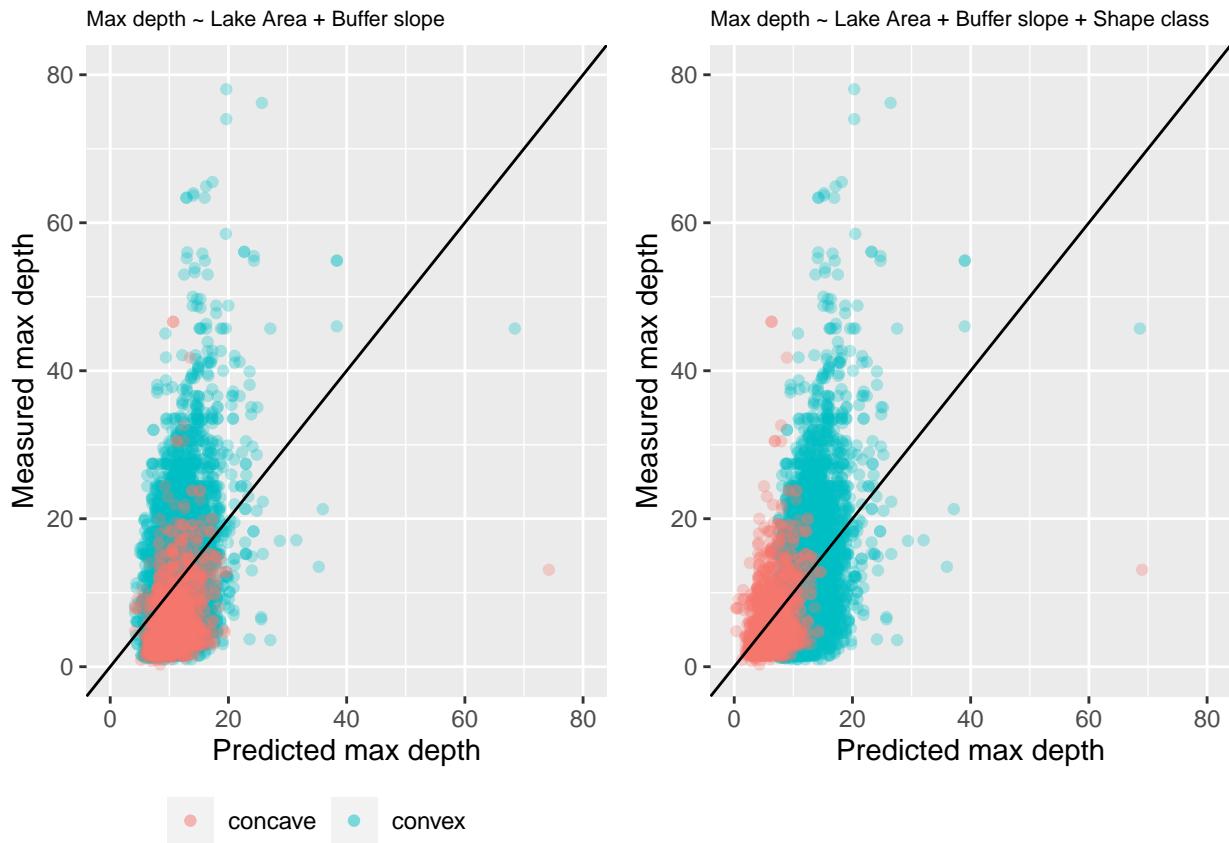


Figure 12: A model that does not include shape class over predicts depth in concave lakes but does not systematically under predict depth in convex lakes.

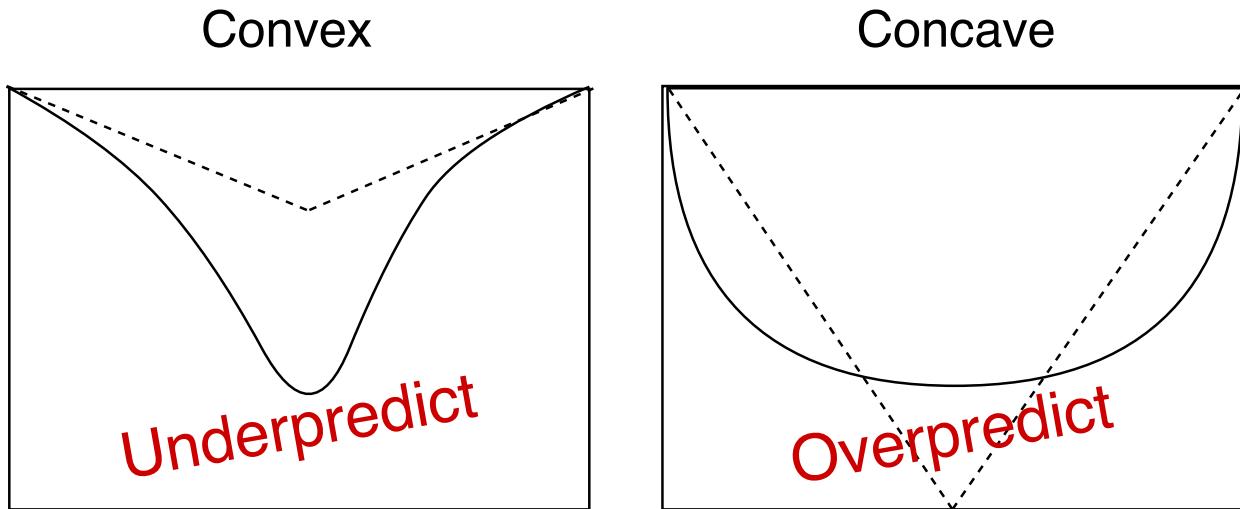


Figure 13: Lake shape caption

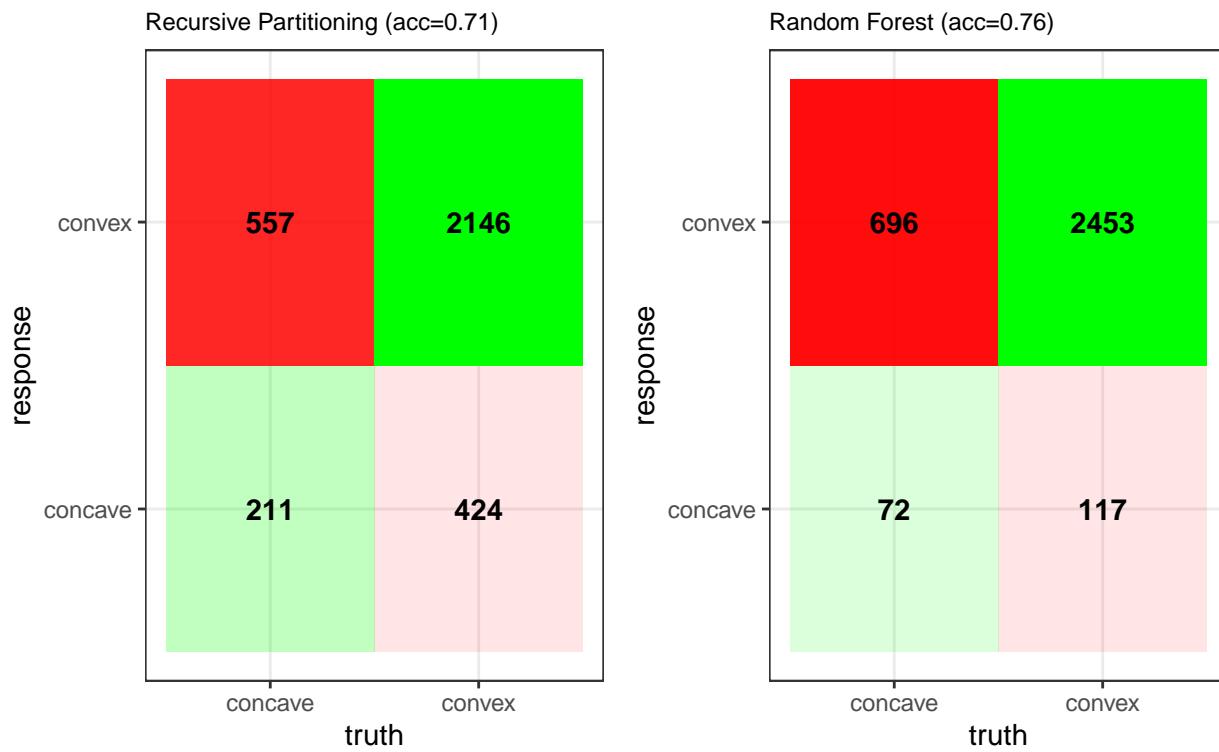


Figure 14: Confusion matrix comparing two classification methods

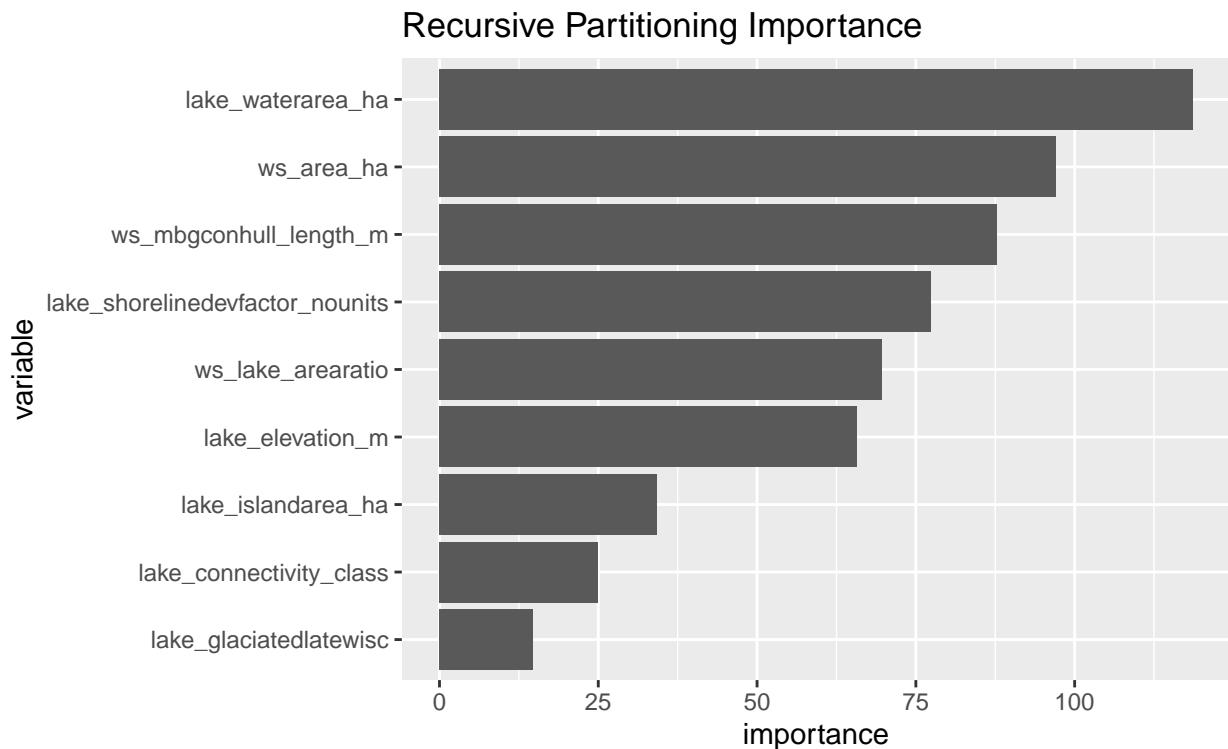


Figure 15: Recusive Partitioning variable importance.

Supplementary Table 4. Equations of the six best-fit statistical models of increasing complexity tested in this study.

Model	Size class by area [km ²]	Best-fit equation	Residual variance s ²
1	All	$\log_{10}(D) = 0.6625 + 0.2289 \times \log_{10}(A)$	0.1150
2	All	$\log_{10}(D) = -0.0144 + 0.6887 \times \log_{10}(D_t)$	0.0765
3	All	$\log_{10}(D) = 0.0549 + 0.0774 \times \log_{10}(A) + 0.5893 \times \log_{10}(elv_{25\%})$	0.0790
4	All	n/a	n/a
	0.1-1	$\log_{10}(D) = 0.2045 + 0.0687 \times \log_{10}(A) + 0.4226 \times \log_{10}(elv_{25\%})$	0.0719
	1-10	$\log_{10}(D) = -0.0381 + 0.1315 \times \log_{10}(A) + 0.6488 \times \log_{10}(elv_{25\%})$	0.0814
	10-100	$\log_{10}(D) = -0.1535 - 0.0208 \times \log_{10}(A) + 0.8432 \times \log_{10}(elv_{25\%})$	0.0853
	100-500	$\log_{10}(D) = -0.3501 - 0.0024 \times \log_{10}(A) + 0.9216 \times \log_{10}(elv_{25\%})$	0.1044
5	All	n/a	n/a
	0.1-1	$\log_{10}(D) = 0.3826 + 0.1512 \times \log_{10}(A) + 0.4820 \times \log_{10}(S_{100})$	0.0678
	1-10	$\log_{10}(D) = 0.1801 + 0.2985 \times \log_{10}(A) + 0.8473 \times \log_{10}(S_{100})$	0.0689
	10-100	$\log_{10}(D) = 0.0379 + 0.2445 \times \log_{10}(A) + 1.1517 \times \log_{10}(S_{100})$	0.0692
	100-500	$\log_{10}(D) = 0.0123 + 0.2664 \times \log_{10}(A) + 1.1474 \times \log_{10}(S_{100})$	0.1094
6	All	n/a	n/a
	0.1-1	$\log_{10}(D) = 0.3346 + 0.1221 \times \log_{10}(A) + 0.3673 \times \log_{10}(S_{100}) + 0.1150 \times \log_{10}(D_t)$	0.0677
	1-10	$\log_{10}(D) = 0.0606 + 0.2158 \times \log_{10}(A) + 0.2808 \times \log_{10}(S_{100}) + 0.5771 \times \log_{10}(D_t)$	0.0678
	10-100	$\log_{10}(D) = -0.0692 + 0.0823 \times \log_{10}(A) + 0.7609 \times \log_{10}(S_{100}) + 0.4080 \times \log_{10}(D_t)$	0.0636
	100-500	$\log_{10}(D) = 0.0479 + 0.1260 \times \log_{10}(A) + 0.9462 \times \log_{10}(S_{100}) + 0.2350 \times \log_{10}(D_t)$	0.1071

D is the predicted mean depth in meters; A is the surface area of the lake in km²; D_t is the topographic mean depth in meters; elv_{25%} is the difference in meters between lake surface and mean landscape elevation within a buffer width equal to 25% of the diameter of a circle that represents the lake area; and S₁₀₀ is the average slope within a 100 m buffer around the lake in

Figure 16: Messager et al. 2016 equation table