variable	Median	Q25	Q75	n
lake_maxdepth_m	7	3.7	12	17600
lake_meandepth_m	3	1.7	4.8	7680
has_limno	1	1	1	17600
shape_offset	-17	-30	-4.2	4950
lake_elevation_m	340	210	460	17600
lake_waterarea_ha	33	11	100	17600
lake_totalarea_ha	33	11	100	17600
lake_islandarea_ha	0	0	0.076	17600
lake_perimeter_m	3500	1800	7300	17600
lake_islandperimeter_m	0	0	120	17600
lake_shorelinedevfactor_nounits	1.7	1.4	2.2	17600
nws_focallakewaterarea_ha	100	36	390	5190
nws_area_ha	5100	1500	29000	5190
nws_lake_arearatio	48	17	190	5190
nws_perimeter_m	75000	38000	2e+05	5190
nws_mbgconhull_width_m	7600	4100	18000	5190
nws_meanwidth_m	3900	2100	9000	5190
nws_mbgconhull_length_m	13000	7100	32000	5190
nws_mbgconhull_orientation_deg	95	46	140	5190
ws_focallakewaterarea_ha	33	11	100	17600
ws_area_ha	360	120	1400	17600
ws_lake_arearatio	10	4.4	28	17600
ws_perimeter_m	19000	9900	39000	17600
ws_mbgconhull_width_m	2100	1200	4100	17600
ws_meanwidth_m	1000	570	2100	17600
ws_mbgconhull_length_m	3600	2000	7000	17600
ws_mbgconhull_orientation_deg	90	42	140	17600
buffer100m_slope_max	20	15	27	12800
buffer100m_slope_mean	4.2	2.7	6.1	12800
dist_deepest	180	110	290	4970
dist_viscenter	240	160	390	4970
dist_between	140	44	390	4970
inlake_slope	0.046	0.024	0.079	4970

Figure 1: Summary of lake depth predictor variables.

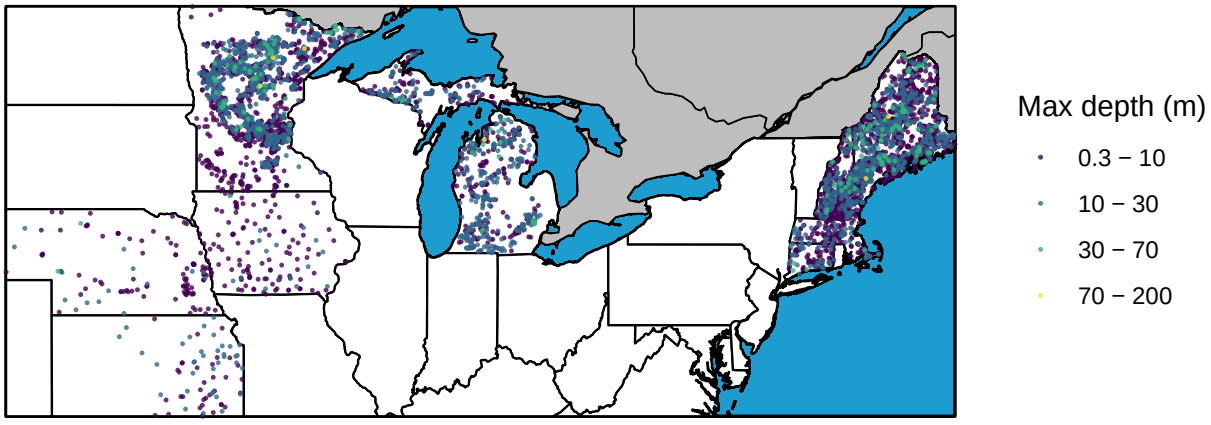

Figure 2: Map of lake maximum depth measurements derived from lake bathymetry surfaces.

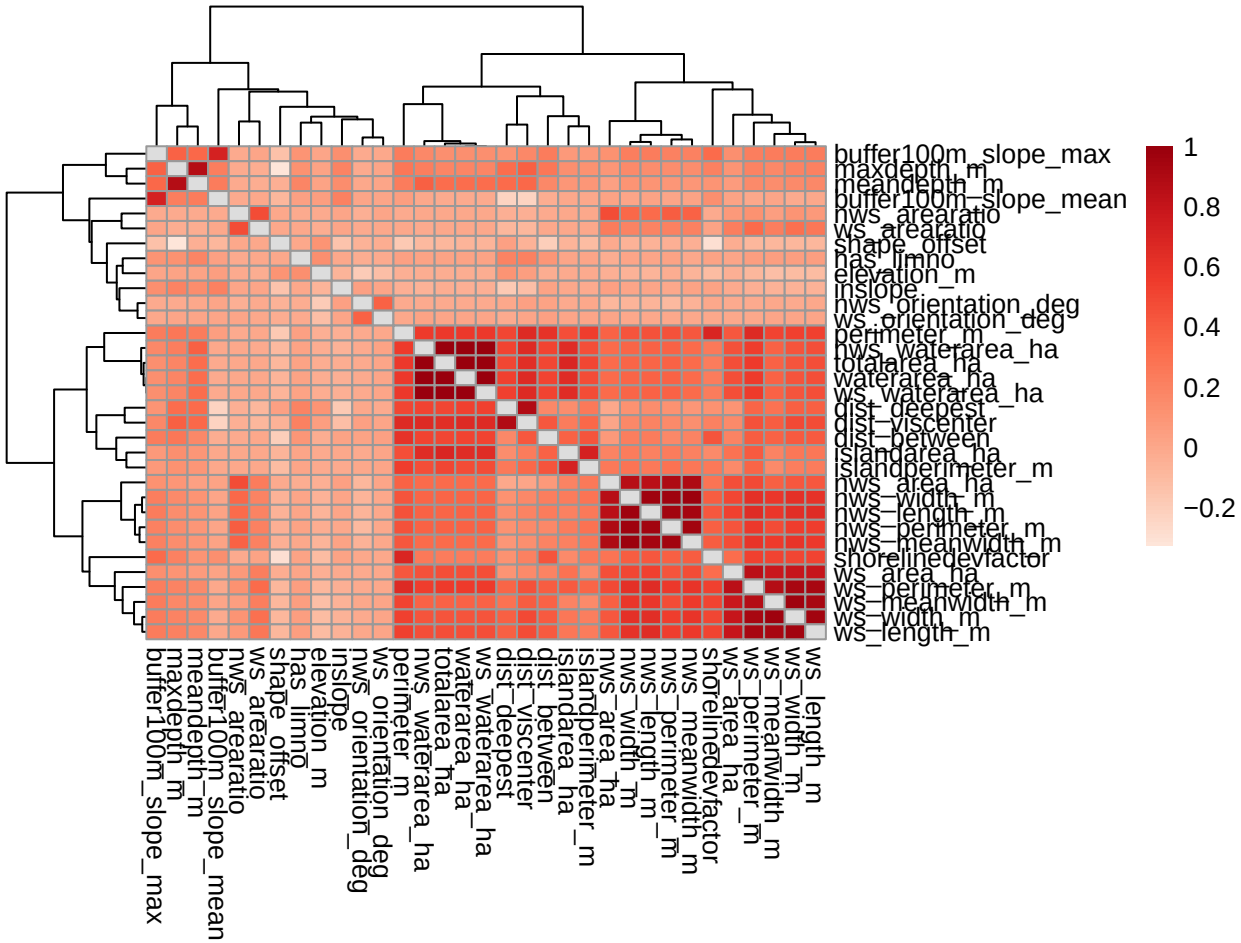

Figure 3: Correlation matrix heatmap.

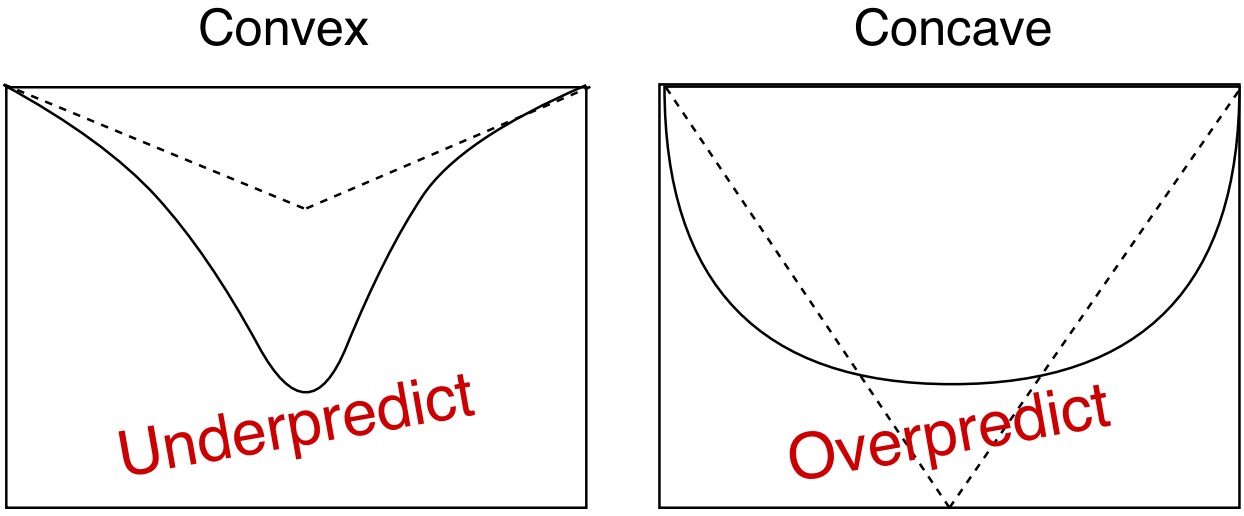

Figure 4: Lake shape caption

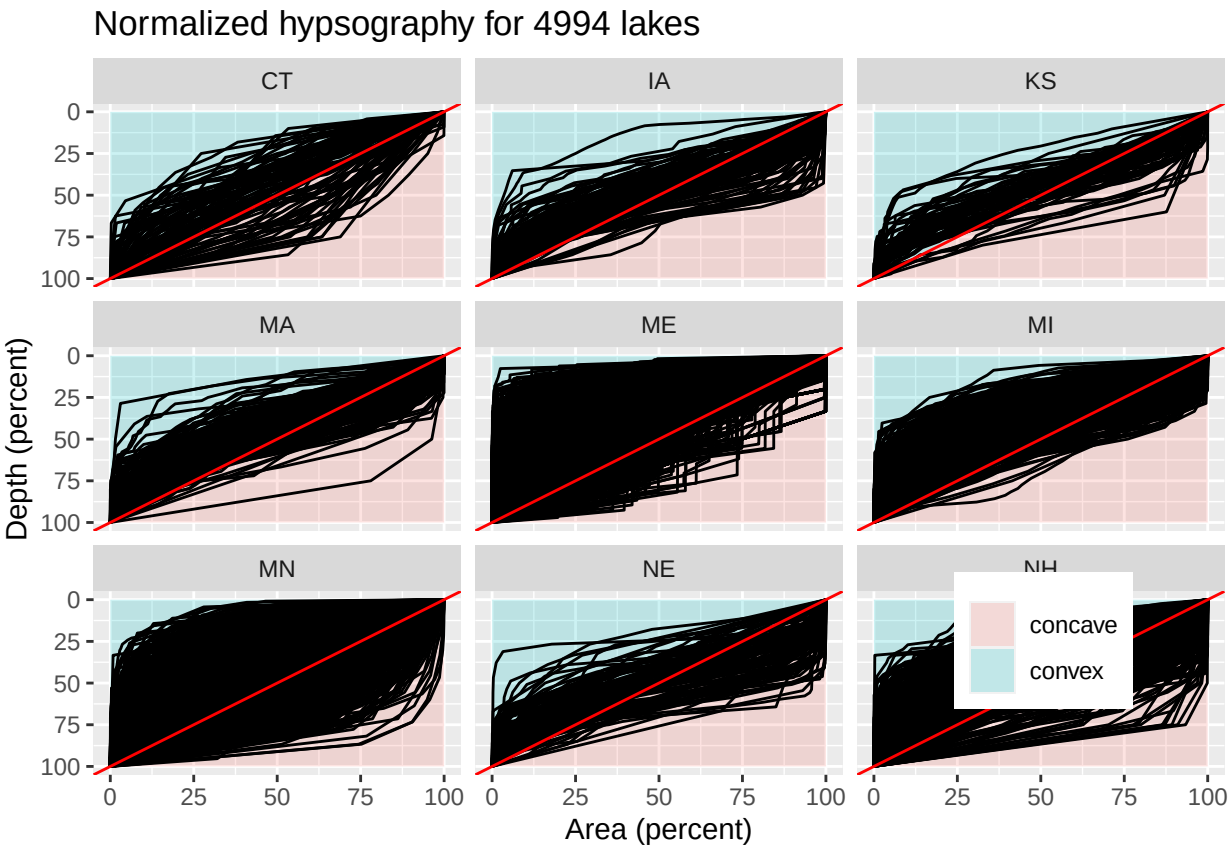

Figure 5: Hypsography classification by state.

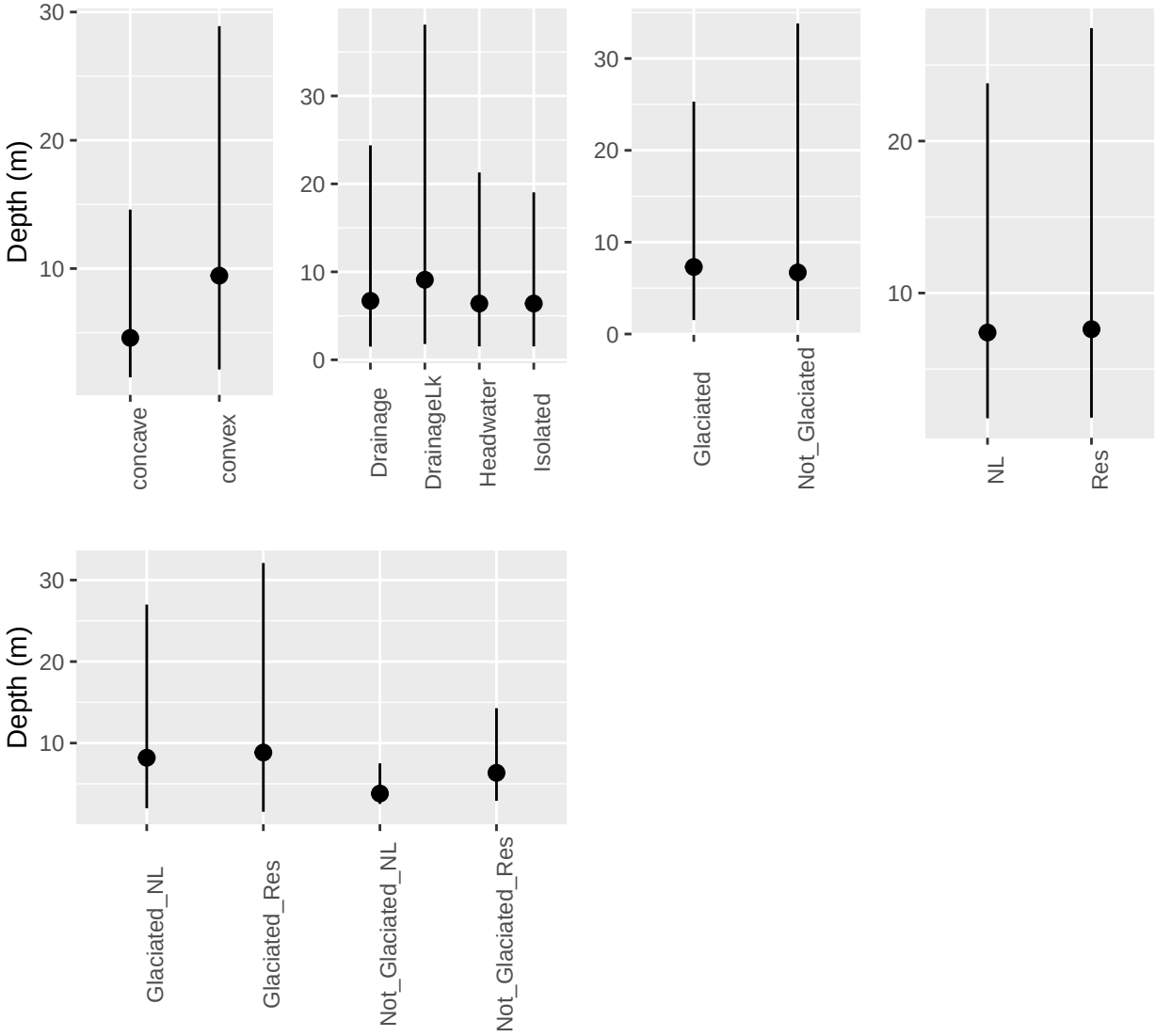

Figure 6: Lake maximum depth by categorical variables.

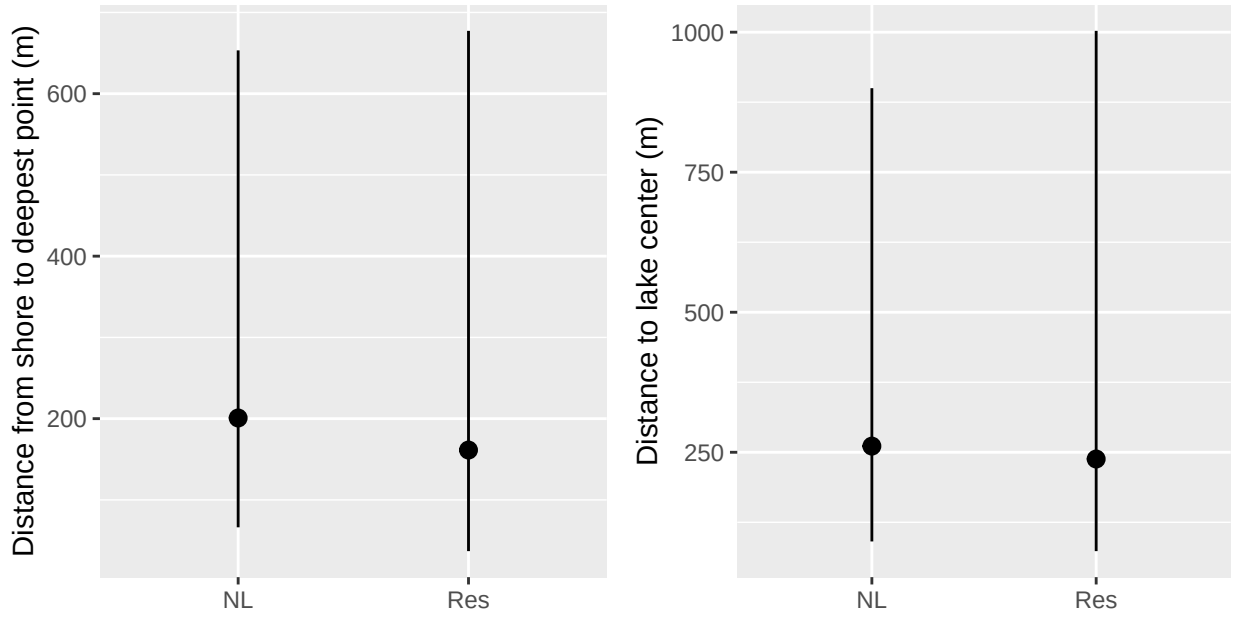

Figure 7: Contrasting distance from shore to the deepest point in the lake and distance to the lake visual center for natural lakes and reservoirs.

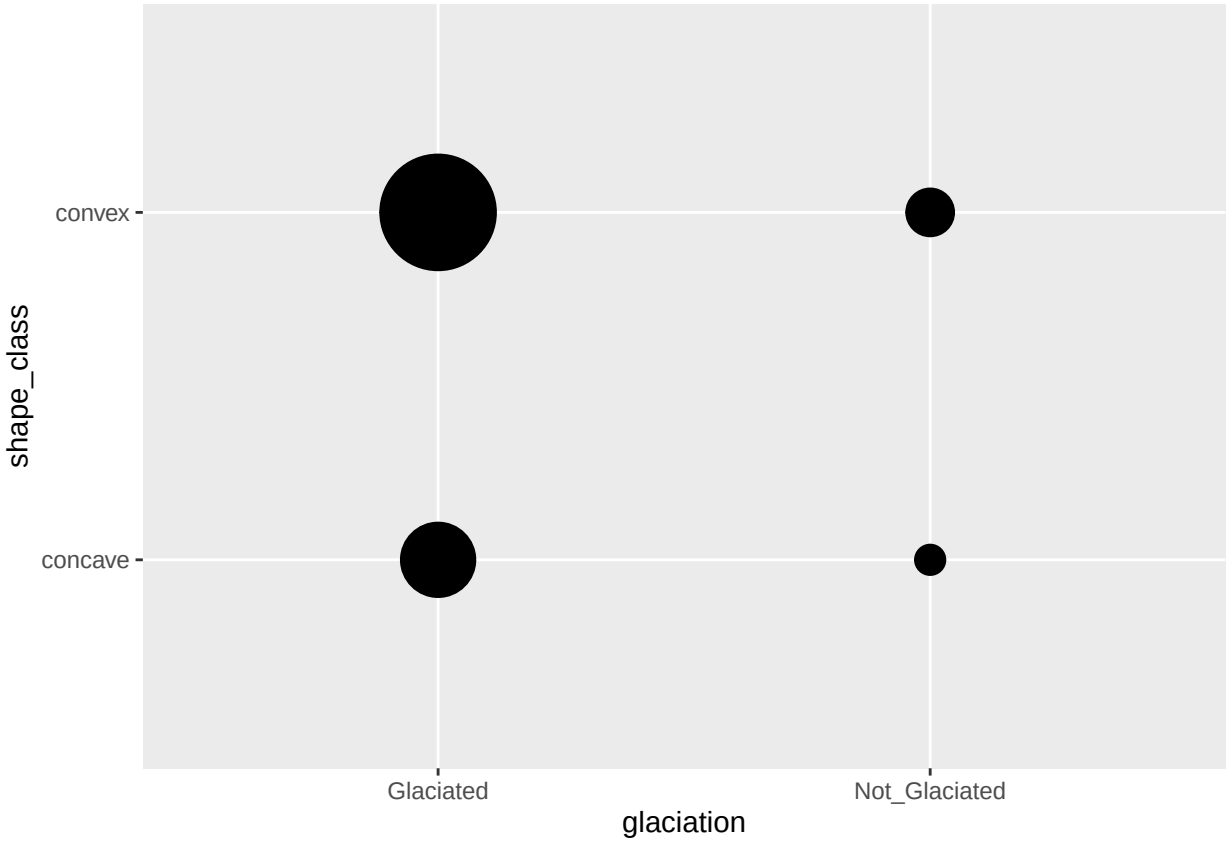

Figure 8: Cross tabulation between lake glaciation and shape class. Circles are proportional to the number of lakes in each category. If a lake has been glaciated it is more likely to be convex. However, if a lake has not been glaciated there is no tendencey towards a particular shape class.

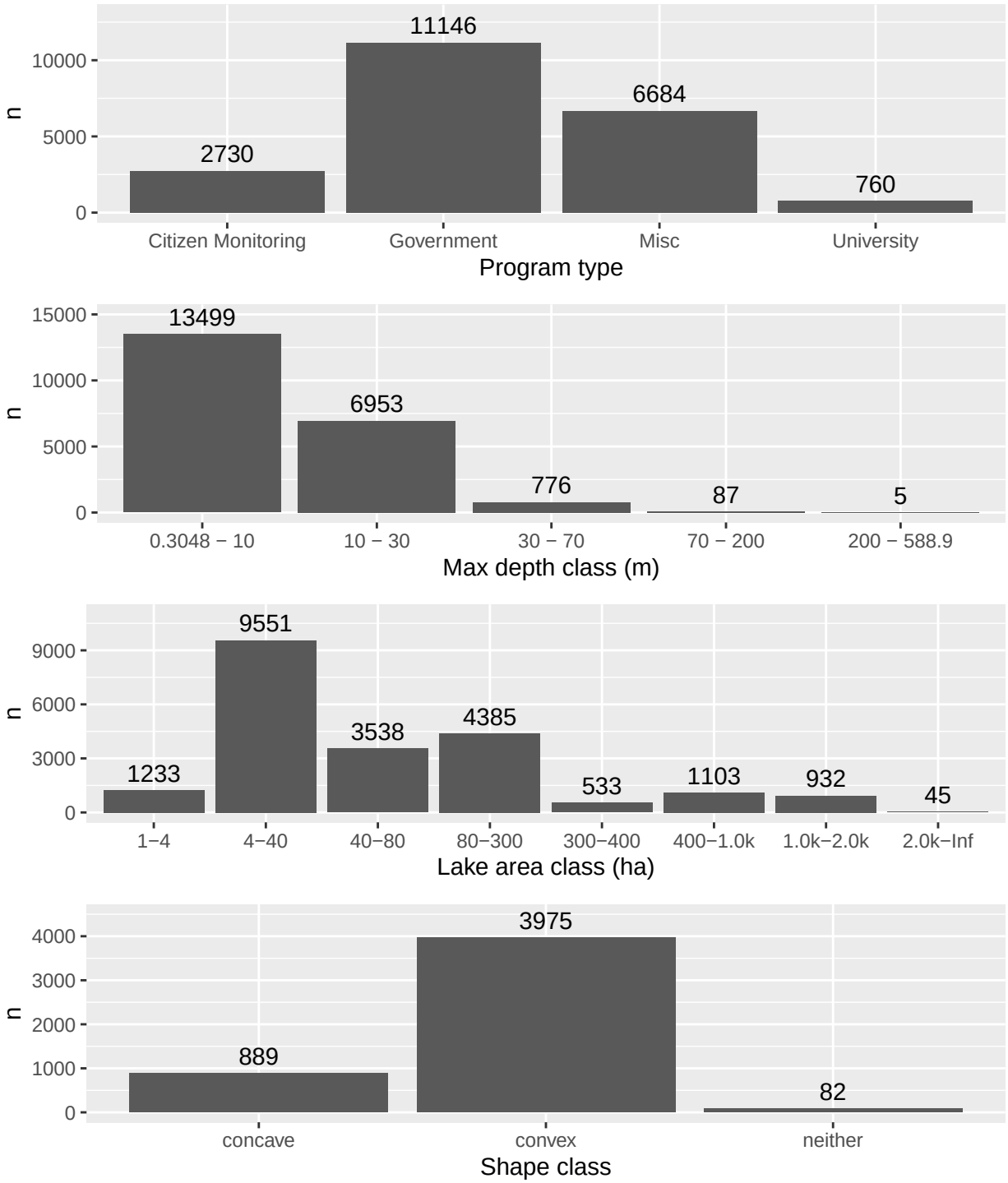

Figure 9: Number of lake depth measurements by categories.

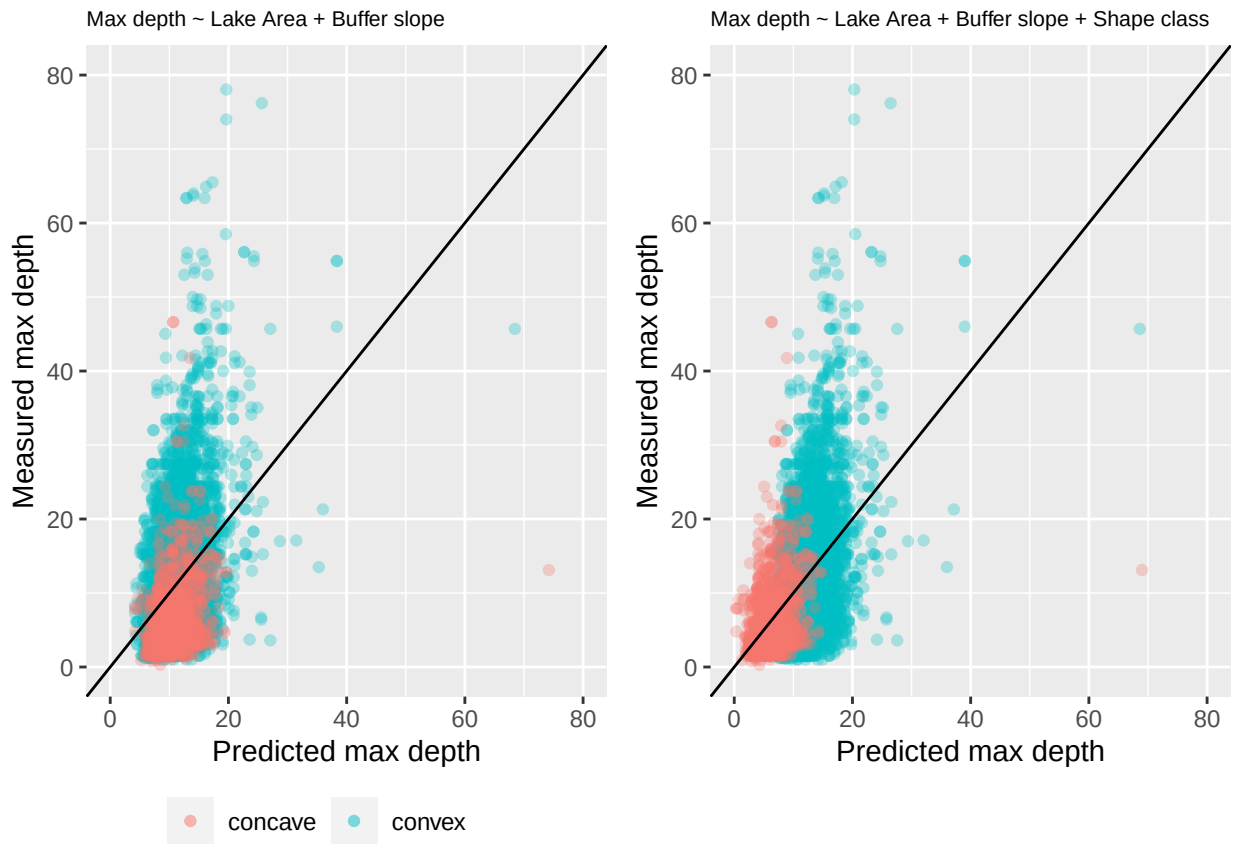

Figure 10: A model that does not include shape class over predicts depth in concave lakes but does not systematically under predict depth in convex lakes.

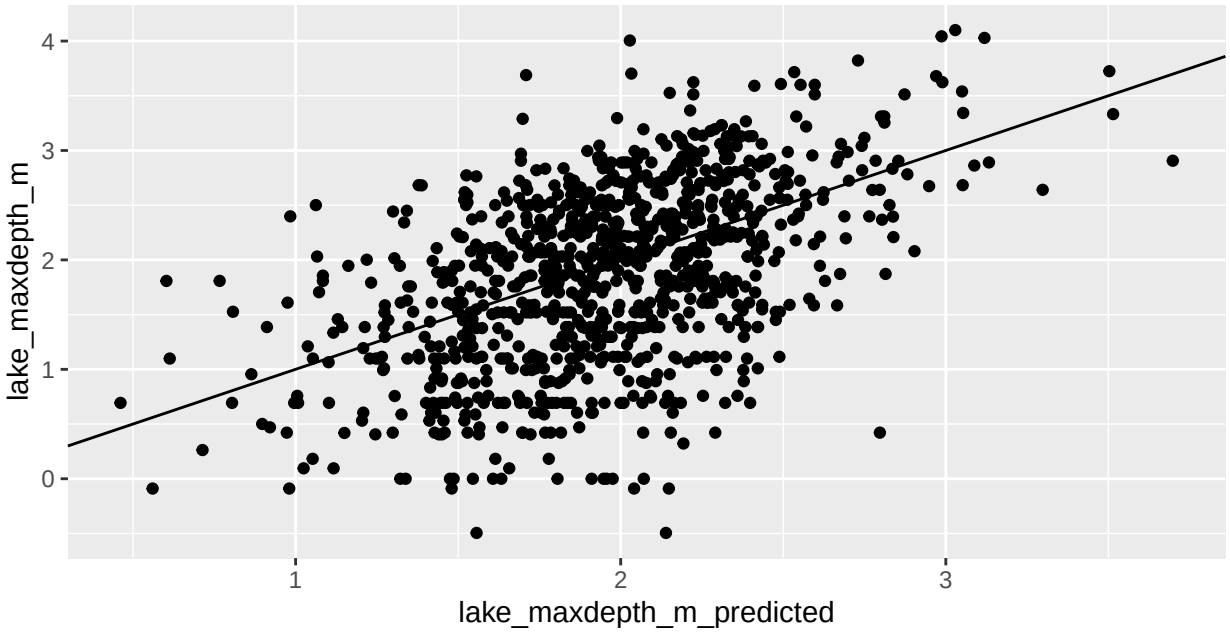

Figure 11: Reproduction of Oliver 2016 using LAGOSUS data in LAGOSNE footprint.

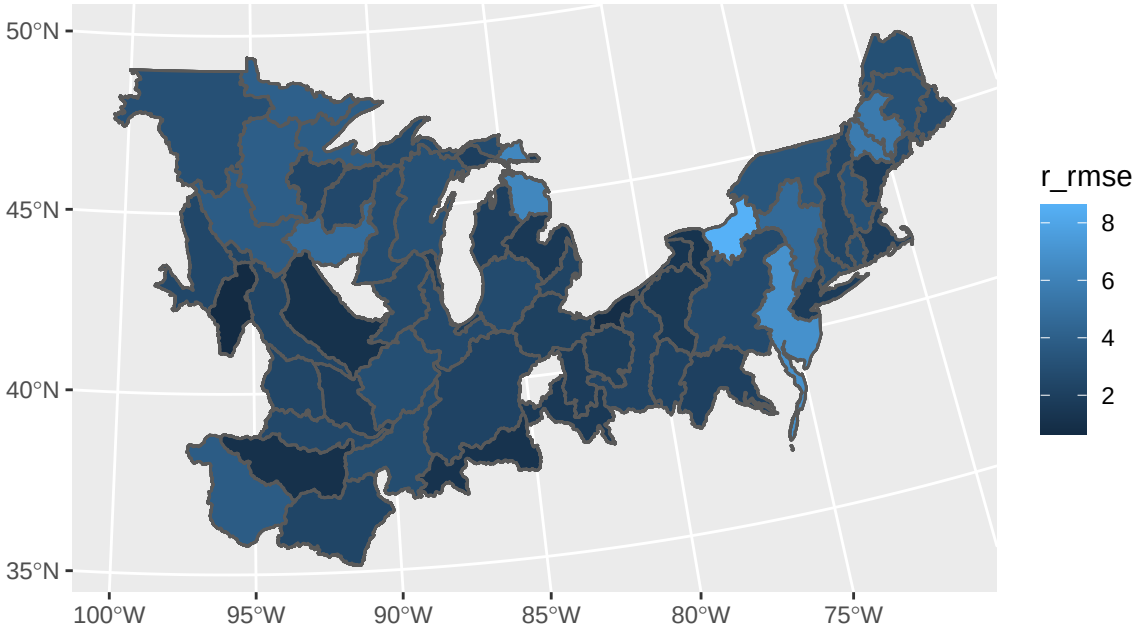

Figure 12: Reproduction of Oliver 2016 using LAGOSUS data in LAGOSNE footprint.

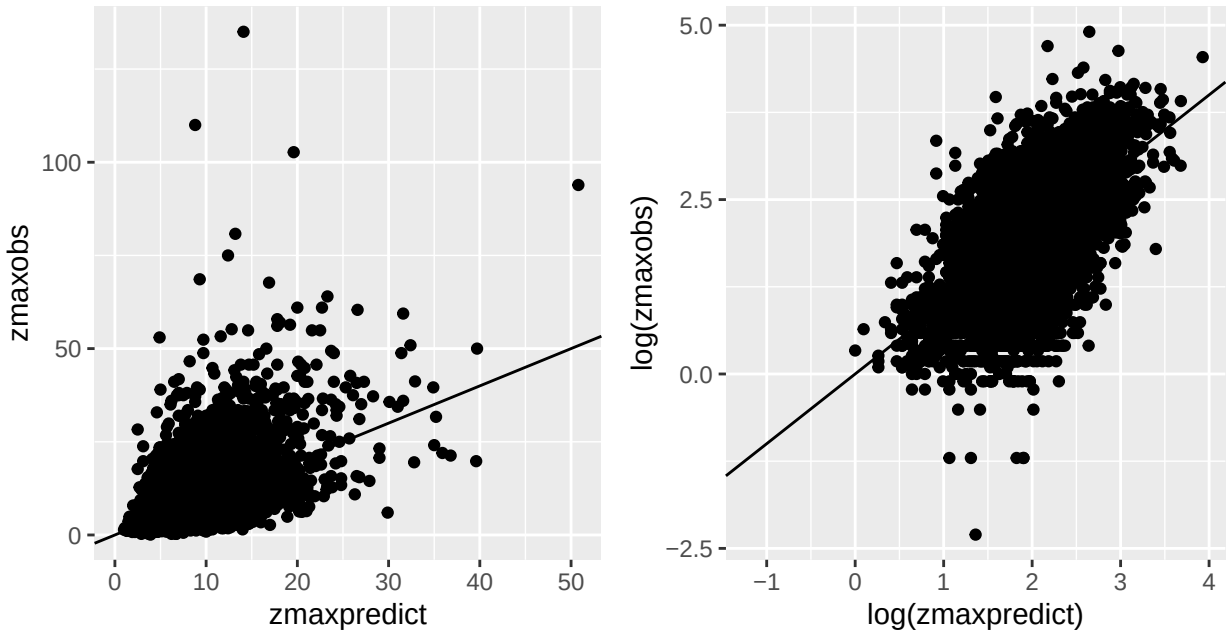

Figure 13: Oliver 2016 observed versus predicted.

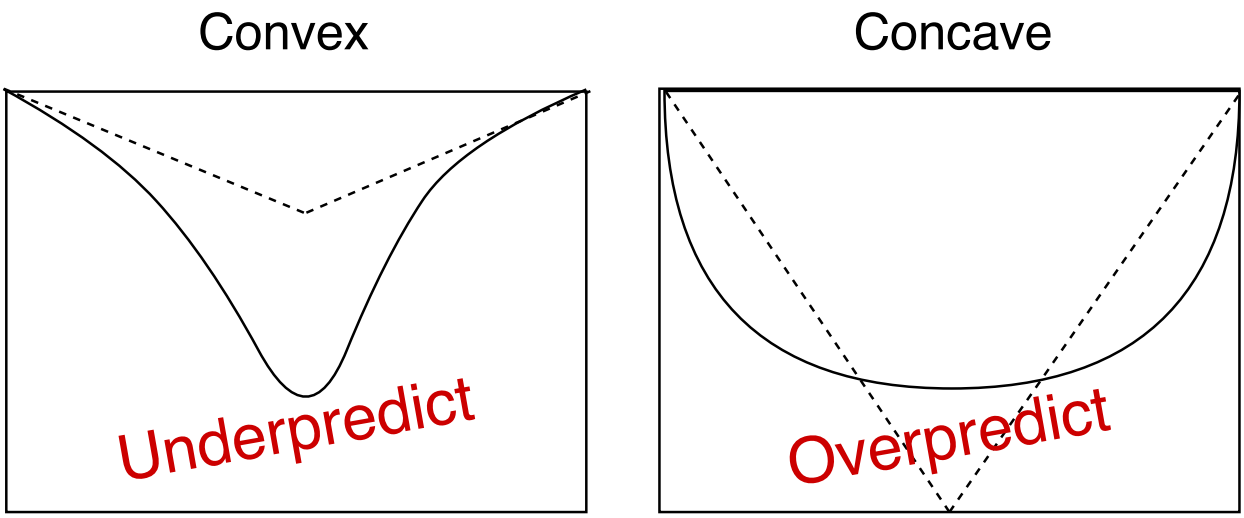

Figure 14: Lake shape caption

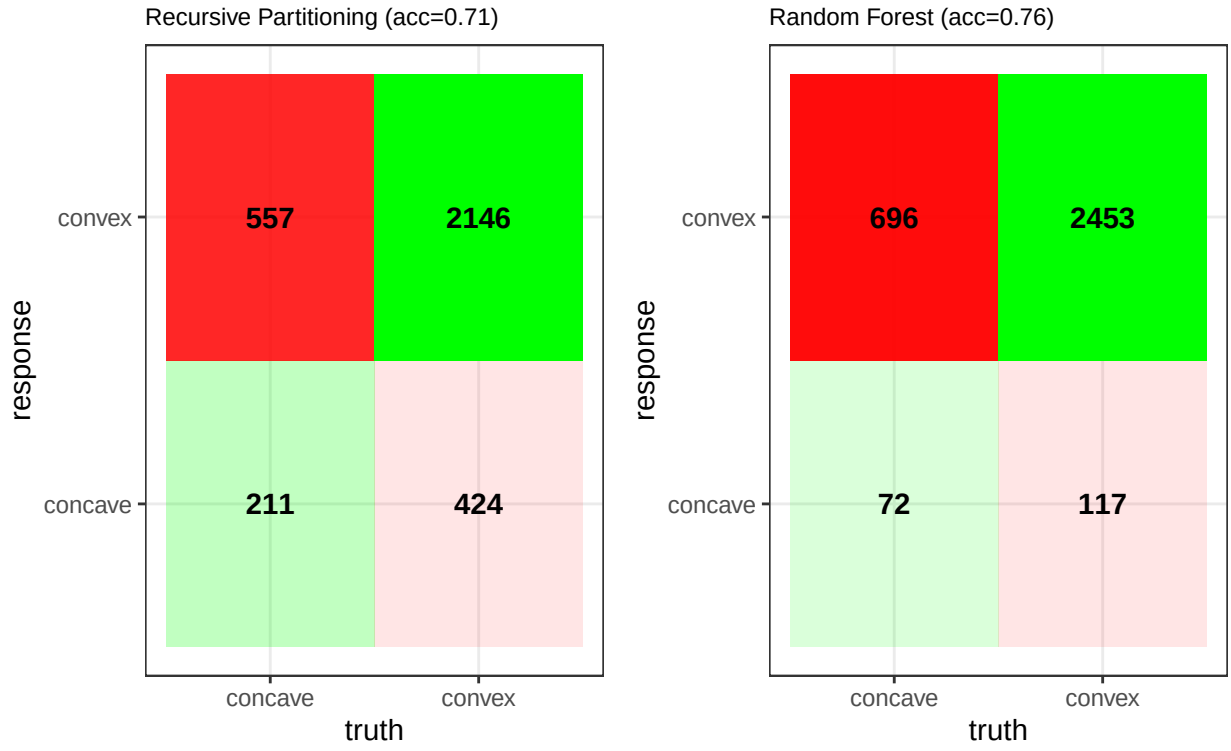

Figure 15: Confusion matrix comparing two classification methods

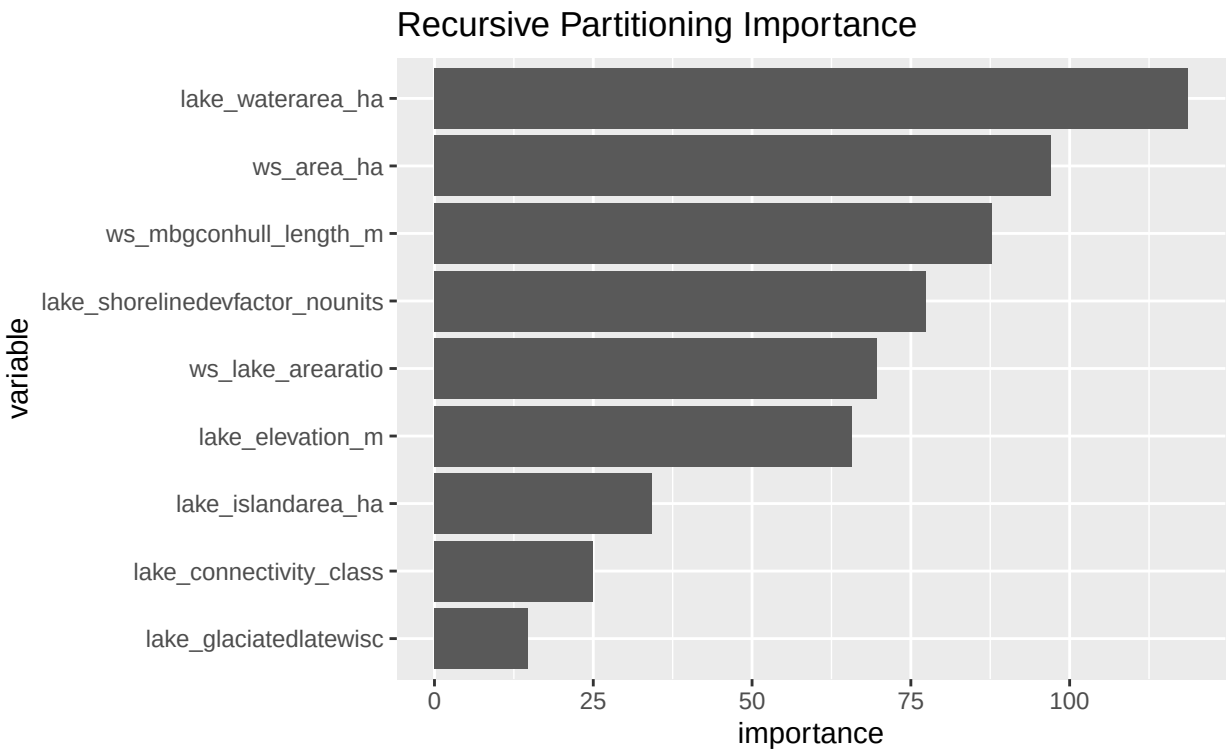

Figure 16: Recusive Partitioning variable importance.

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 km^2; 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 S_{100} is the average slope within a 100 m buffer around the lake in

Figure 17: Messager et al. 2016 equation table

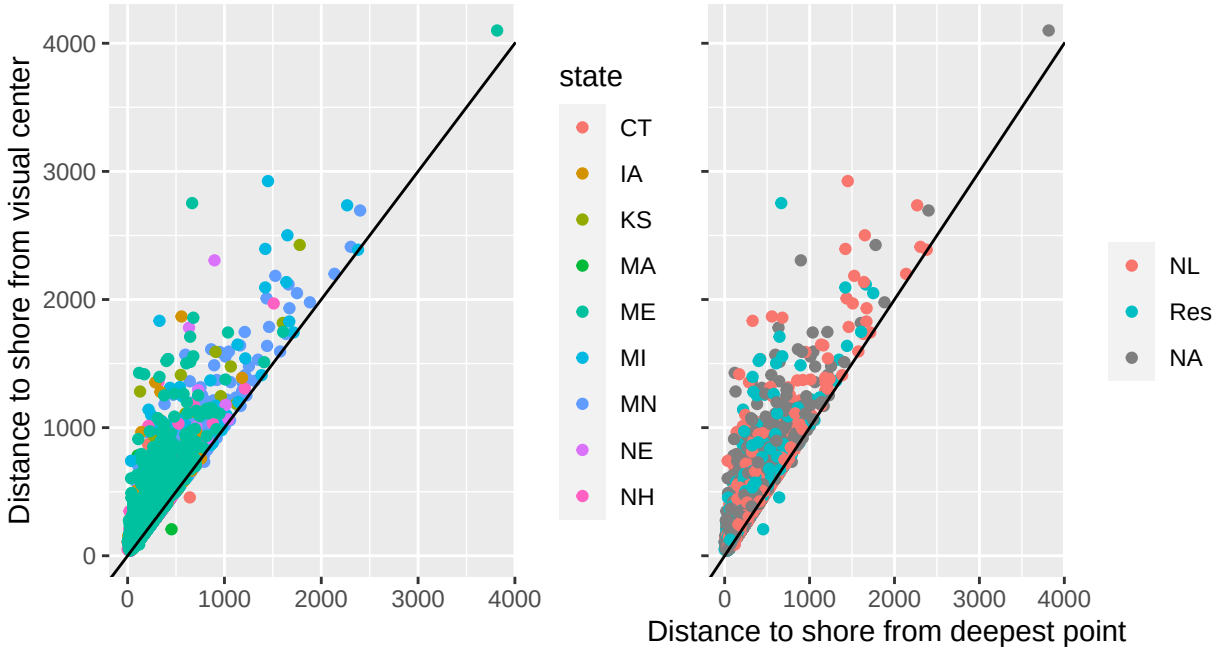

Figure 18: Distance to deepest point versus distance to lake visual center.

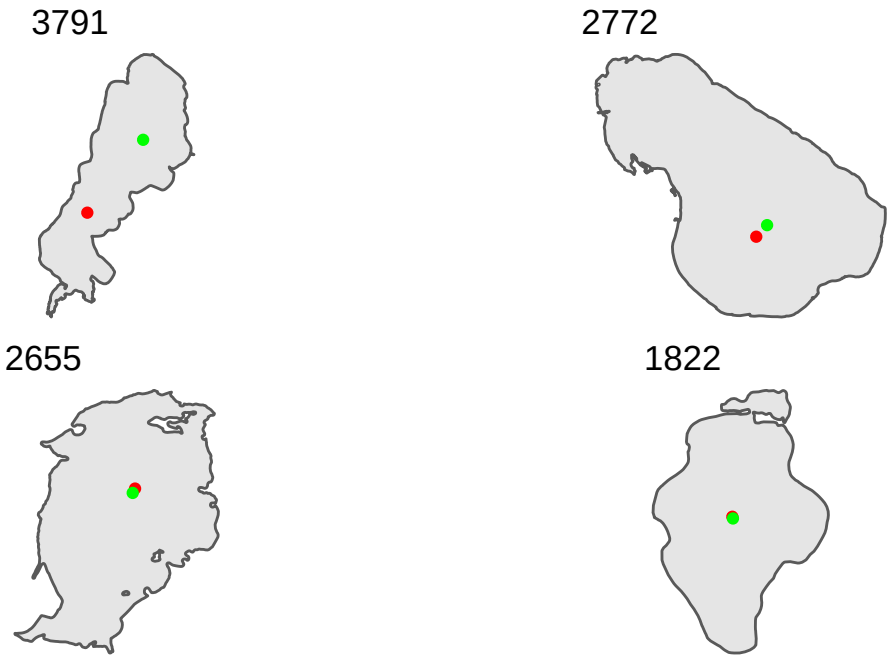

Figure 19: Green points show the 'visual center' of the lake. Red points show the true deepest point of a lake.

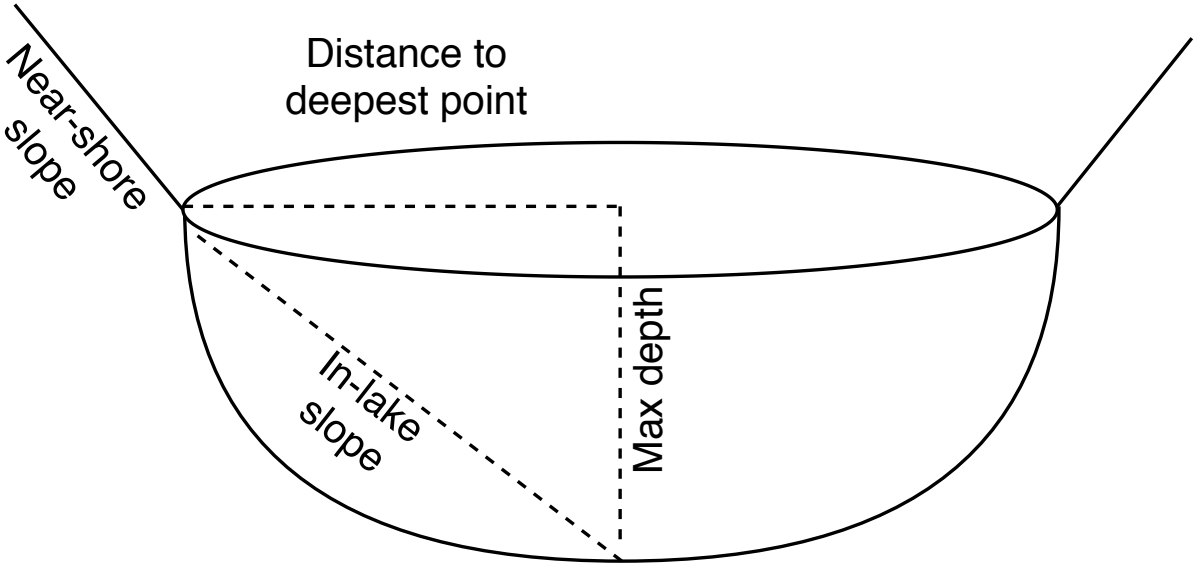

Figure 20: Slope diagram caption