Supporting Information for *Fur roughness, density, and length reduce raindrop penetration of mammalian pelts*

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Supplemental Tables

Table S1: Measured guard hair length (L_g), underfur hair length (L_u), guard hair density (δ_g), underfur density (δ_u), guard hair distal diameter (d_3), and hair roughness ($\tilde{r}_g$) of our mammalian fur samples and typical values reported for our mammals of interest.

mammal	L_g [mm] (N=3)	L_u [mm] (N=3)	δ_g [mm^{-2}] (N=3)	δ_u [mm^{-2}] (N=3)	d_3 [nm] (N=3)	$\tilde{r}_g$ [μm] (N=3)
zebra *Equus quagga*	12.58 ± 0.45	8.31 ± 0.51	4.58 ± 0.48	1.39 ± 0.16	92.51 ± 5.31	1.75 ± 0.43
grey wolf *Canis lupus*	71.67 ± 5.57	34.03 ± 0.87	3.98 ± 0.60	37.76 ± 4.97	65.25 ± 1.27	2.66 ± 0.87
moose *Alces alces*	108.70 ± 5.21	18.45 ± 0.71	1.84 ± 0.13	112.5 ± 5.10	41.88 ± 1.18	3.23 ± 0.44
beaver *Castor canadenis*	54.86 ± 3.07	24.30 ± 1.19	2.49 ± 0.33	300.00 ± 13.61	77.09 ± 0.61	2.22 ± 0.68
mink *Neovison vison*	27.26 ± 0.39	13.48 ± 0.48	0.70 ± 0.11	222.22 ± 9.07	53.57 ± 0.74	2.48 ± 0.60
sea otter *Enhydra lutris*	28.57 ± 1.67	18.50 ± 0.36	0.70 ± 0.04	1216.67 ± 40.83	58.99 ± 1.64	1.59 ± 0.36
typical range	7-290 [1,2]	0-80 [3,4]	0.5-10 [5,6]	0-900 [4,6]	14-260 [2,7]	0.25-6.6 [8,9]

Table S2: Measured receding (θ_r), equilibrium (θ_e), and advancing (θ_a) contact angles of our mammalian fur samples.

mammal	hair section	θ_r [°] (N=3)	θ_e [°] (N=3)	θ_a [°] (N=3)
domestic cat	guard fur	78.31 ± 6.77	83.71 ± 3.91	107.40 ± 3.84
domestic cat	underfur	83.88 ± 2.07	92.83 ± 0.21	95.55 ± 1.06
zebra	guard fur	74.61 ± 7.96	87.48 ± 1.84	106.69 ± 2.17
grey wolf	guard fur	70.35 ± 4.68	76.85 ± 8.45	98.48 ± 12.44
moose	guard fur	77.95 ± 3.04	85.85 ± 8.25	106.58 ± 2.16
beaver	guard fur	69.70 ± 4.15	86.54 ± 5.57	103.00 ± 2.15
mink	guard fur	69.76 ± 1.27	78.92 ± 1.85	85.82 ± 4.11
sea otter	guard fur	84.75 ± 6.43	99.85 ± 5.62	103.92 ± 6.06

Supplemental Figures

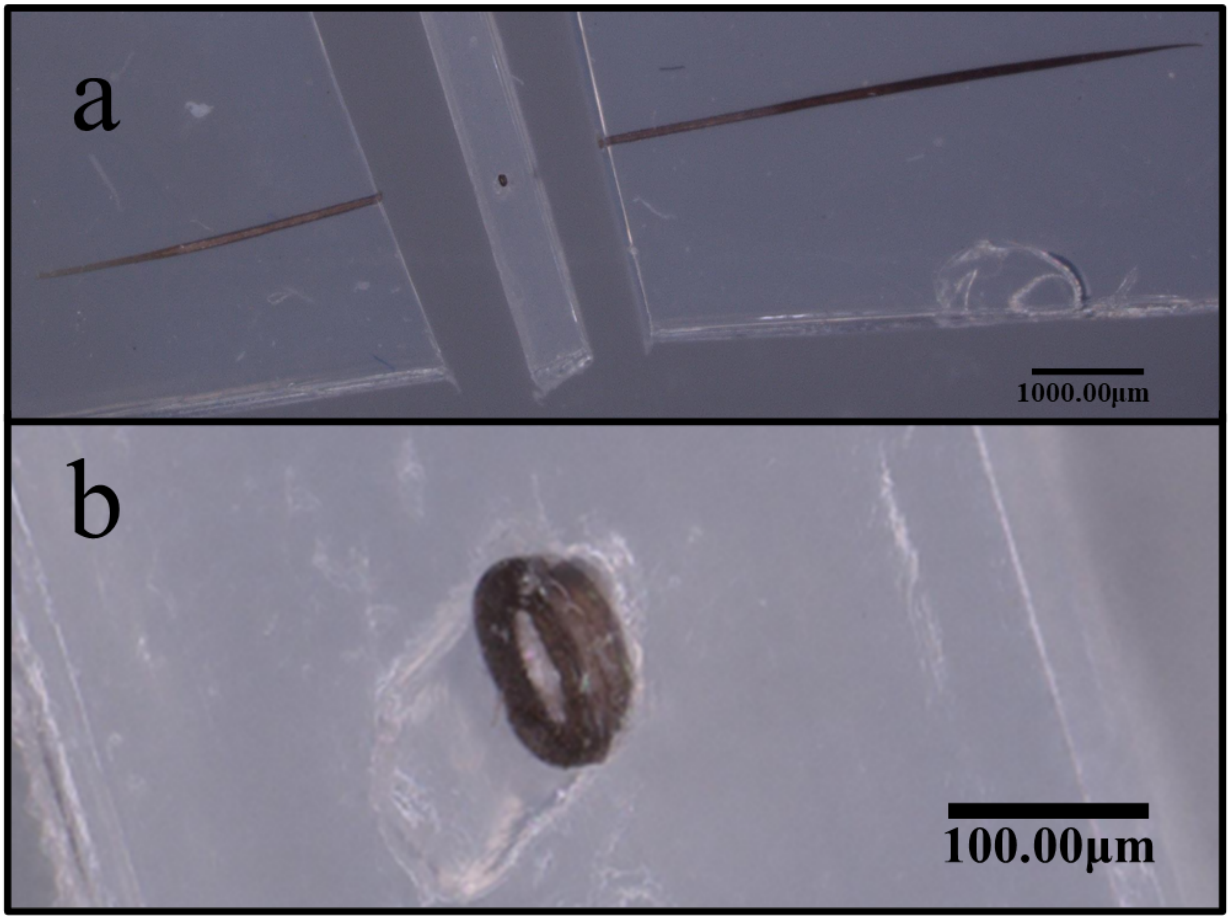

Figure S1: Close-up view of cross-section using the method published by Koch[10]. **(a)** The slices are oriented to view the hair cross-section. **(b)** Zoomed in view of the hair cross-section.

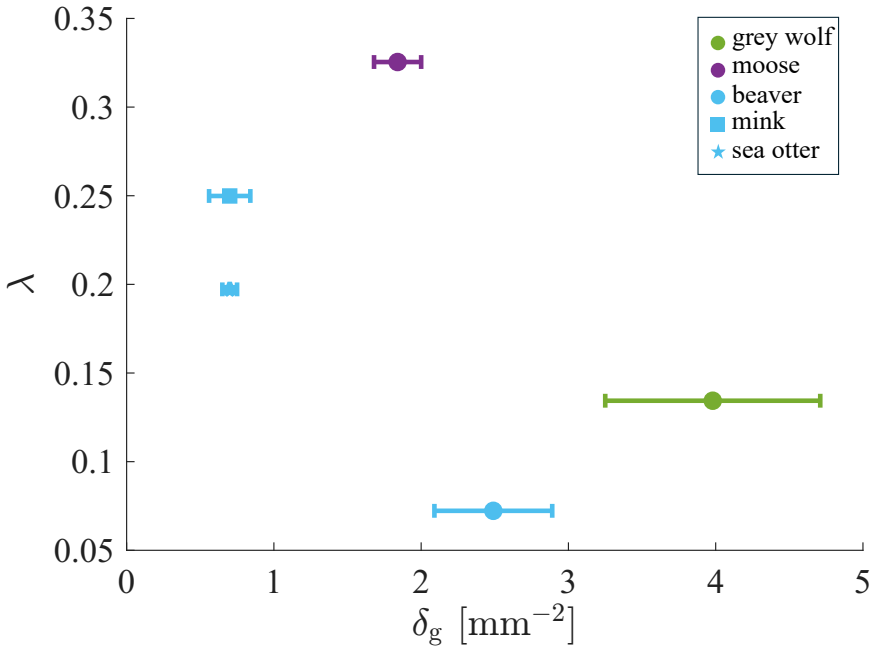

Figure S2: Plot of dry zone decay rate λ versus the guard hair density δ_g

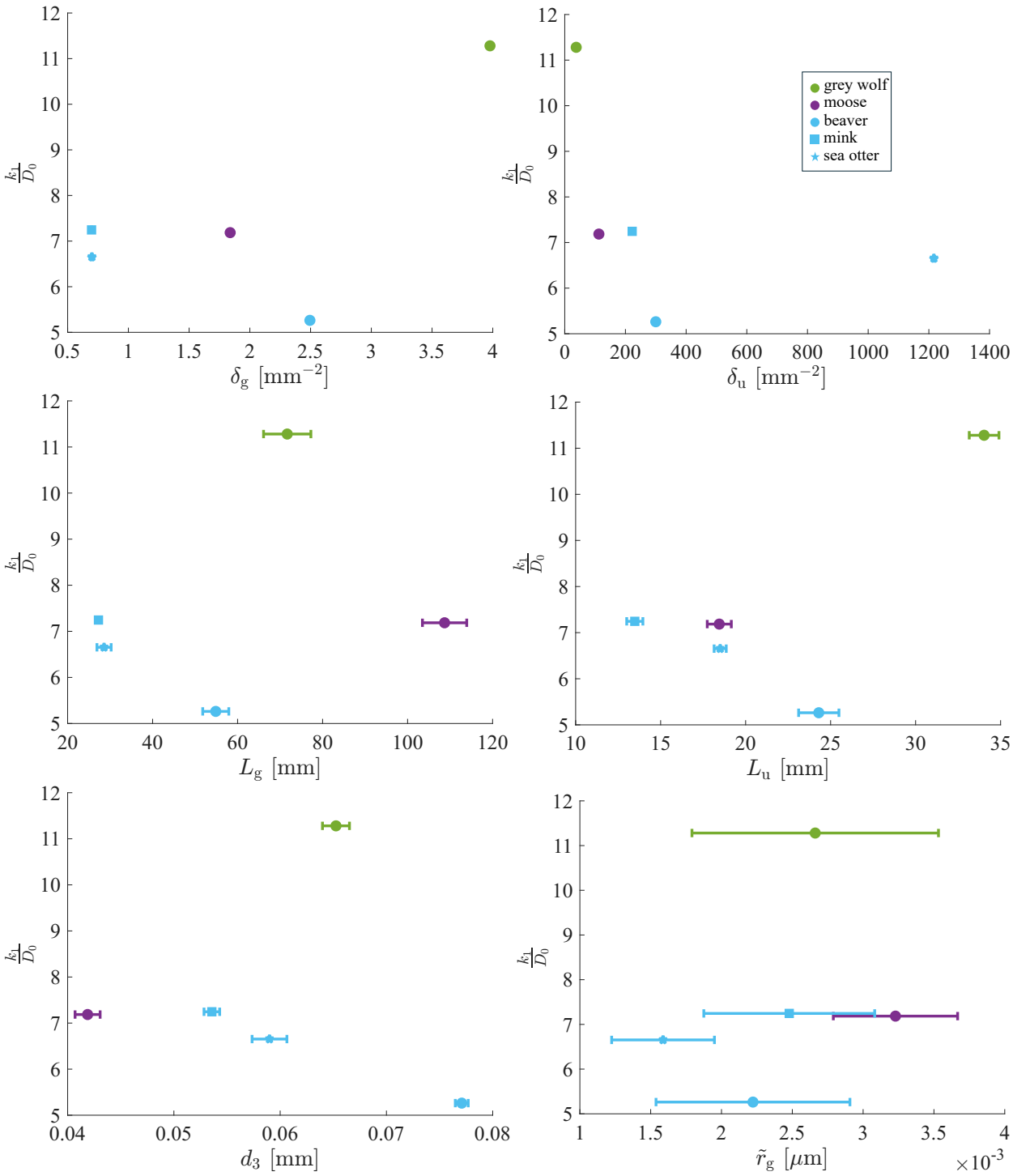

Figure S3: Plot of dimensionless steady-state penetration depth k_1/D_0 versus the variables in Eq. 4 of the manuscript.

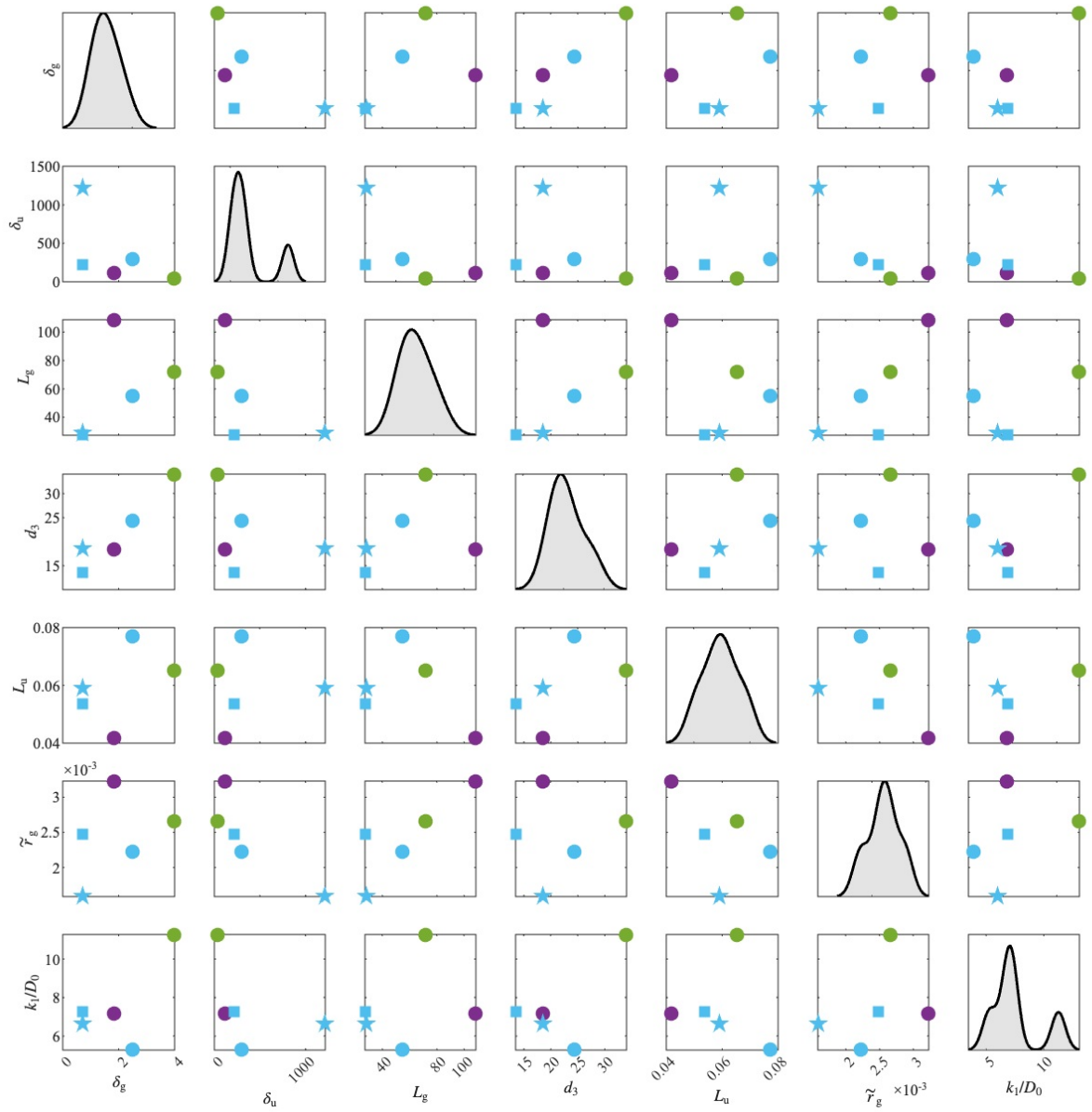

Figure S4: Pairplot of the variables affecting the dimensionless steady-state penetration depth k_1/D_0. Variable units are consistent with Fig. S3.

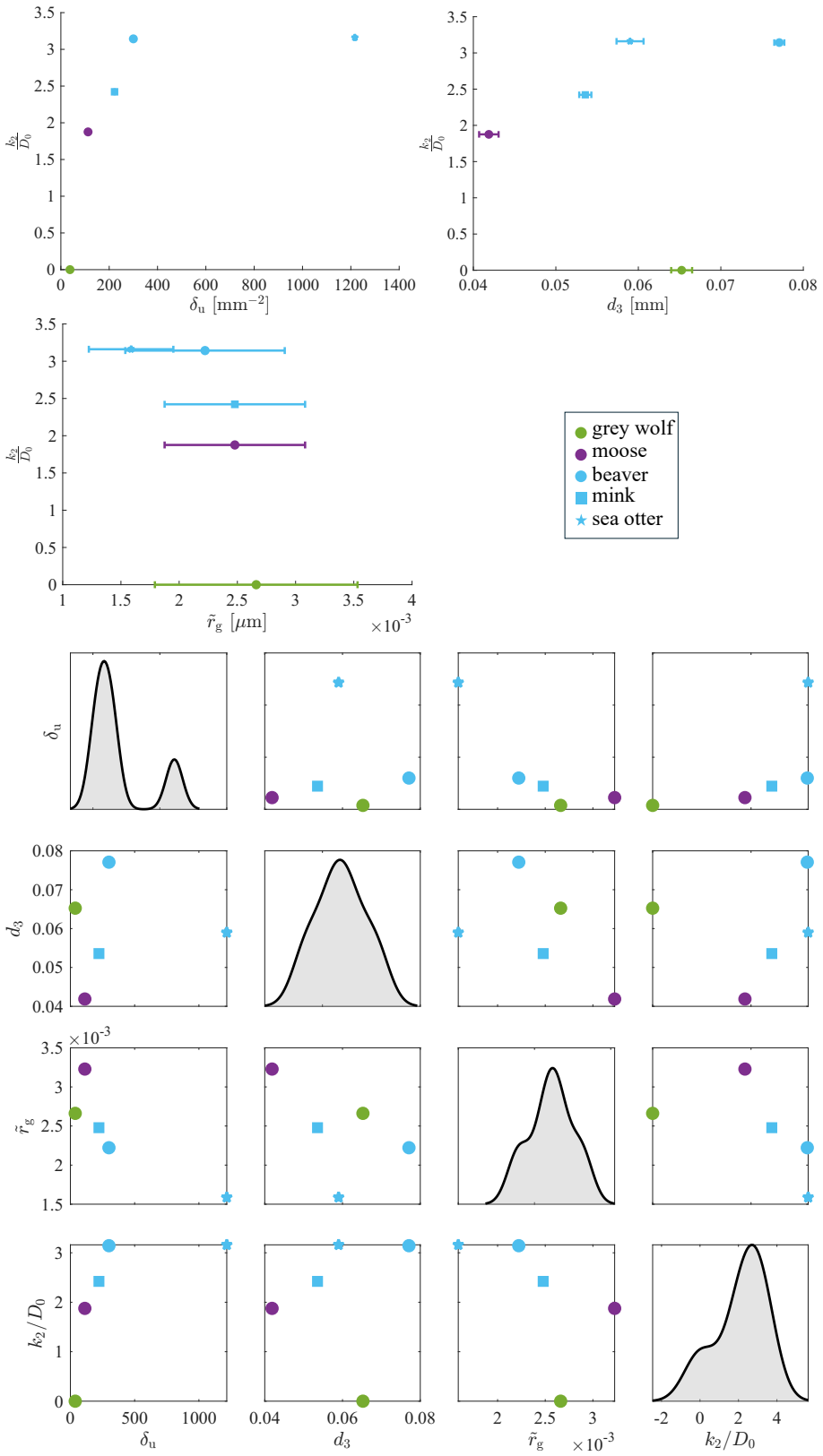

Figure S5: *Top*: Plot of dimensionless steady-state dry zone thickness k_2/D_0 versus the variables in Eq. 7 of the manuscript. *Bottom*: Pairplot of the variables affecting the dimensionless steady-state dry zone thickness k_2/D_0. Variable units are consistent with top plots.

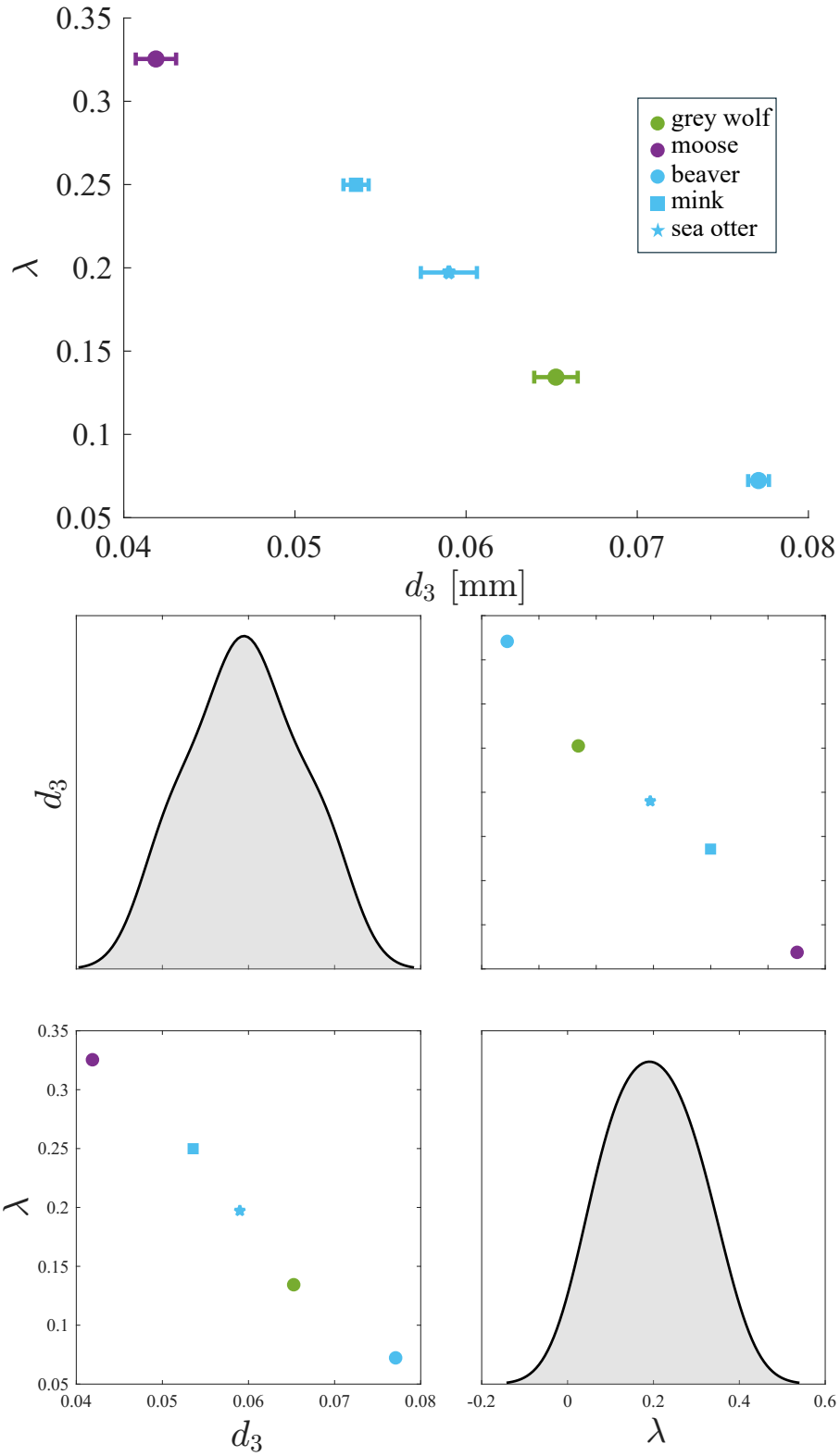

Figure S6: *Top*: Plot of dry zone decay rate λ versus the variables in Eq. 10 of the manuscript. *Bottom*: Pairplot of the variables affecting the dry zone decay rate λ. Variable units are consistent with top plots.

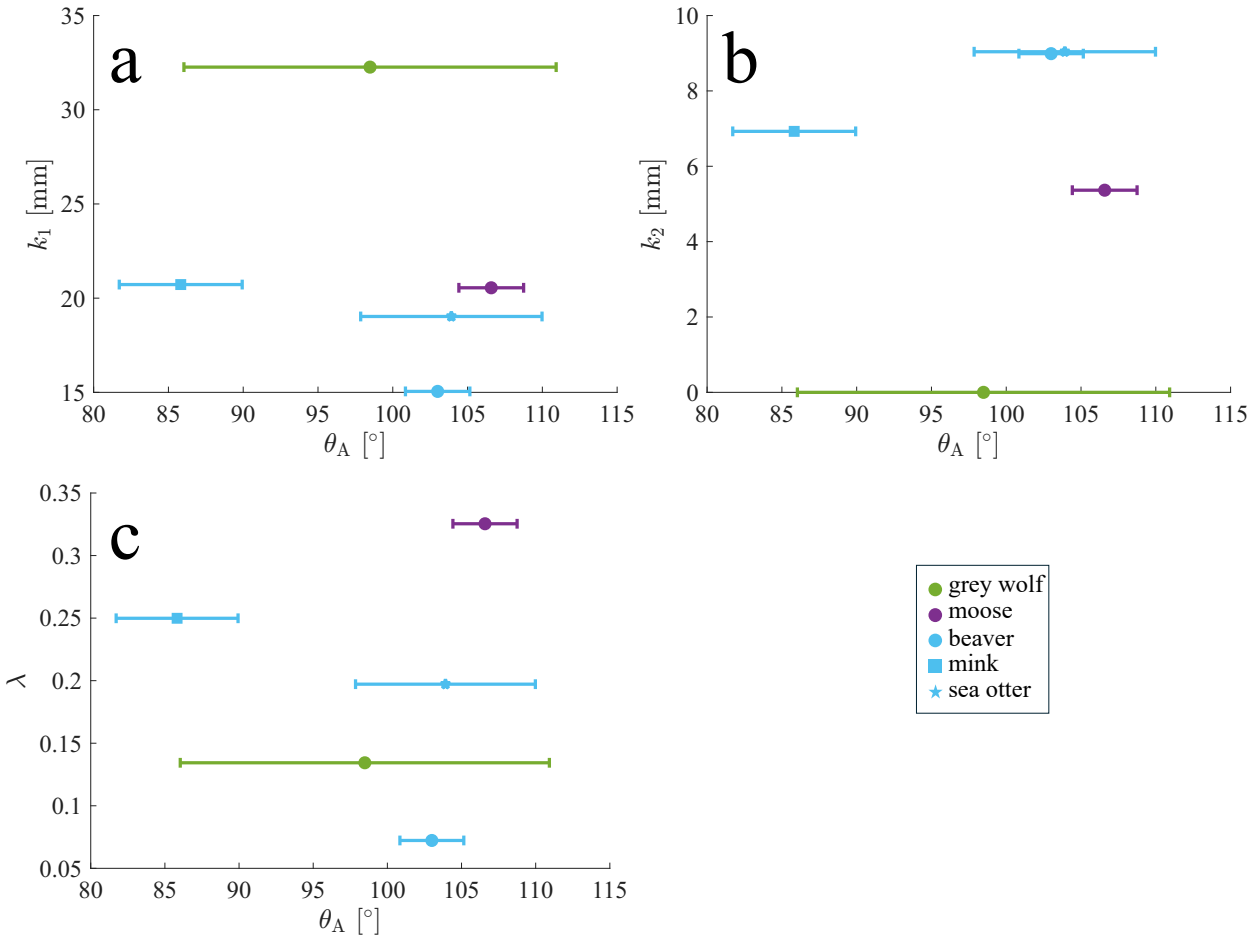

Figure S7: Plot of **(a)** steady-state penetration depth k_1, **(b)** steady-state dry zone thickness k_2, and **(c)** dry zone decay rate λ versus the advancing contact angle θ_a.

References

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