

Supplementary information 3 (SI3): Candidate breeding and whole life cycle habitat suitability models

Table SI3a: Average ($\bar{\phi}$) and variance (var) of test data AUC (AUC_{test}), difference from training AUC (Δ AUC), minimum training presence omission rate (orMTP), 10% training omission rate (or10%) as well as AUC, AICc and number of parameters of the top ranked (lowest AIC) of all breeding habitat suitability models. MaxEnt settings refer to feature types (L = linear, Q = quadratic, H = hinge, P = product) and regulation multipliers (0.5-4 in steps of 0.5) used. The selected breeding model (**L_0.5**) is written in bold.

Settings	AUC	$\bar{\phi}$ AUC _{test}	$\bar{\phi}$ Δ AUC	$\bar{\phi}$ orMTP	$\bar{\phi}$ or10%	AICc	Δ AICc	Parameters
P_0.5	0.799	0.796 (0.021)	0.024 (0.011)	0.007 (<0.001)	0.116 (0.016)	4323.6	0.0	4
L_0.5	0.794	0.79 (0.018)	0.021 (0.01)	0.007 (<0.001)	0.11 (0.013)	4324.1	0.4	4
P_1	0.793	0.79 (0.021)	0.023 (0.01)	0.007 (<0.001)	0.11 (0.012)	4329.4	5.7	4
P_1.5	0.789	0.787 (0.018)	0.023 (0.007)	0.006 (<0.001)	0.103 (0.006)	4332.7	9.0	3
L_1	0.786	0.782 (0.018)	0.02 (0.01)	0.007 (<0.001)	0.117 (0.013)	4335.4	11.8	4
P_2	0.786	0.785 (0.019)	0.024 (0.008)	0.013 (0.001)	0.103 (0.006)	4337.4	13.8	3
H_4	0.826	0.816 (0.015)	0.025 (0.007)	0.013 (0.001)	0.122 (0.005)	4341.4	17.8	27
P_2.5	0.783	0.782 (0.02)	0.024 (0.009)	0.007 (<0.001)	0.103 (0.006)	4341.6	18.0	3
L_1.5	0.781	0.779 (0.018)	0.021 (0.011)	0.006 (<0.001)	0.103 (0.005)	4342.2	18.6	4
P_3	0.781	0.78 (0.02)	0.024 (0.009)	0.007 (<0.001)	0.116 (0.004)	4345.5	21.8	3
L_2	0.778	0.775 (0.018)	0.021 (0.011)	0.006 (<0.001)	0.103 (0.006)	4346.8	23.2	4
LQH_4	0.829	0.819 (0.015)	0.025 (0.008)	0.006 (<0.001)	0.102 (0.006)	4349.6	26.0	31
L_2.5	0.775	0.773 (0.019)	0.022 (0.012)	0.006 (<0.001)	0.103 (0.007)	4350.4	26.8	4
P_3.5	0.780	0.777 (0.021)	0.025 (0.01)	0.007 (<0.001)	0.11 (0.005)	4351.0	27.3	4
LQH_3	0.834	0.824 (0.015)	0.025 (0.008)	0.006 (<0.001)	0.122 (0.006)	4351.2	27.6	35
L_3	0.772	0.77 (0.019)	0.022 (0.012)	0.006 (<0.001)	0.11 (0.007)	4353.4	29.8	4
P_4	0.779	0.776 (0.022)	0.026 (0.011)	0.007 (<0.001)	0.103 (0.004)	4354.0	30.4	4
L_3.5	0.770	0.768 (0.019)	0.022 (0.012)	0.006 (<0.001)	0.104 (0.007)	4356.1	32.4	4
L_4	0.768	0.766 (0.019)	0.022 (0.012)	0.006 (<0.001)	0.104 (0.007)	4358.5	34.9	4
LQH_2.5	0.837	0.826 (0.016)	0.025 (0.009)	0.006 (<0.001)	0.128 (0.005)	4359.5	35.9	39
LQH_3.5	0.832	0.822 (0.015)	0.025 (0.008)	0.006 (<0.001)	0.109 (0.006)	4359.9	36.3	36
LQH_1.5	0.840	0.826 (0.016)	0.025 (0.009)	0.013 (0.001)	0.115 (0.005)	4373.7	50.1	45
LQH_1	0.841	0.826 (0.013)	0.028 (0.007)	0.019 (0.001)	0.123 (0.006)	4385.0	61.3	49
LQH_2	0.839	0.827 (0.016)	0.025 (0.009)	0.019 (0.001)	0.122 (0.005)	4386.1	62.5	47
Q_0.5	0.745	0.741 (0.024)	0.023 (0.011)	0.007 (<0.001)	0.105 (0.007)	4387.1	63.4	4
Q_2	0.740	0.738 (0.014)	0.018 (0.009)	0.006 (<0.001)	0.097 (0.003)	4391.5	67.8	3
Q_2.5	0.740	0.738 (0.014)	0.018 (0.009)	0.006 (<0.001)	0.097 (0.003)	4391.5	67.9	3
Q_3	0.740	0.738 (0.014)	0.019 (0.009)	0.006 (<0.001)	0.097 (0.003)	4391.6	68.0	3
Q_3.5	0.740	0.738 (0.014)	0.019 (0.009)	0.006 (<0.001)	0.097 (0.003)	4391.7	68.1	3
Q_4	0.740	0.738 (0.014)	0.019 (0.009)	0.006 (<0.001)	0.097 (0.003)	4391.8	68.2	3
Q_1	0.741	0.736 (0.025)	0.023 (0.012)	0.007 (<0.001)	0.111 (0.007)	4392.4	68.8	4
Q_1.5	0.740	0.738 (0.014)	0.018 (0.009)	0.006 (<0.001)	0.097 (0.003)	4393.3	69.7	4
H_3.5	0.828	0.816 (0.015)	0.025 (0.007)	0.013 (0.001)	0.122 (0.005)	4415.5	91.8	49
H_3	0.831	0.817 (0.015)	0.026 (0.008)	0.013 (0.001)	0.128 (0.005)	4418.3	94.7	51
H_2.5	0.833	0.819 (0.015)	0.026 (0.008)	0.013 (0.001)	0.128 (0.005)	4441.5	117.9	57
H_1.5	0.839	0.823 (0.016)	0.027 (0.009)	0.013 (0.001)	0.128 (0.007)	4478.7	155.0	66
H_2	0.836	0.821 (0.015)	0.026 (0.008)	0.013 (0.001)	0.128 (0.005)	4499.4	175.8	68
H_1	0.841	0.825 (0.013)	0.028 (0.007)	0.019 (0.001)	0.116 (0.007)	4512.5	188.9	72
LQH_0.5	0.846	0.825 (0.013)	0.03 (0.009)	0.019 (0.001)	0.116 (0.005)	4556.2	232.6	79
H_0.5	0.847	0.825 (0.013)	0.031 (0.009)	0.019 (0.001)	0.123 (0.006)	4642.6	319.0	88

Table S13b: Average ($\bar{\phi}$) and variance (var) of test data AUC (AUC_{test}), difference from training AUC (Δ AUC), minimum training presence omission rate (orMTP), 10% training omission rate (or10%) as well as AUC, AICc, difference of AIC from the top ranked model (Δ AICc), number of parameters and niche overlap in geographic space (Δ Schoeners D) of the **two selected whole life cycle models**. MaxEnt settings refer to feature types (L = linear, Q = quadratic, H = hinge, P = product) and regulation multipliers (1-4 in steps of 1) used.

Settings	AUC	$\bar{\phi}$ AUC _{test}	$\bar{\phi}$ Δ AUC	$\bar{\phi}$ orMTP	$\bar{\phi}$ or10%	AICc	Δ AICc	Parameters	Δ Schoeners D
LQH_3	0.846	0.835 (0.01)	0.021 (0.007)	0.013 (0.001)	0.11 (0.013)	4706.4	0.0	17	0.000
LQH_4	0.842	0.834 (0.011)	0.02 (0.007)	0.013 (0.001)	0.116 (0.016)	4711.0	4.6	16	0.972
LQH_2	0.852	0.84 (0.01)	0.021 (0.007)	0.013 (0.001)	0.097 (0.009)	4718.3	11.9	25	0.958
LQH_1	0.860	0.842 (0.009)	0.023 (0.008)	0.013 (0.001)	0.11 (0.007)	4754.5	48.2	40	0.904
H_4	0.842	0.824 (0.012)	0.025 (0.009)	0.006 (0)	0.11 (0.013)	4758.7	52.3	31	0.922
L_1	0.805	0.803 (0.014)	0.017 (0.007)	0.006 (0)	0.103 (0.009)	4763.1	56.7	5	0.735
L_2	0.805	0.803 (0.015)	0.018 (0.007)	0.006 (0)	0.103 (0.009)	4764.3	57.9	5	0.735
L_3	0.804	0.803 (0.015)	0.018 (0.008)	0.006 (0)	0.103 (0.009)	4765.4	59.0	5	0.735
L_4	0.804	0.802 (0.015)	0.018 (0.008)	0.006 (0)	0.103 (0.009)	4766.5	60.1	5	0.734
H_3	0.849	0.831 (0.011)	0.025 (0.009)	0.013 (0.001)	0.11 (0.013)	4770.3	63.9	38	0.942
H_2	0.854	0.836 (0.01)	0.024 (0.009)	0.013 (0.001)	0.11 (0.009)	4778.9	72.5	43	0.929
Q_1	0.772	0.772 (0.014)	0.015 (0.006)	0.006 (0)	0.11 (0.008)	4801.4	95.0	5	0.675
Q_2	0.771	0.771 (0.014)	0.016 (0.006)	0.006 (0)	0.103 (0.008)	4804.0	97.6	5	0.674
Q_3	0.770	0.77 (0.014)	0.016 (0.007)	0.006 (0)	0.096 (0.008)	4805.8	99.4	5	0.673
Q_4	0.769	0.77 (0.014)	0.016 (0.007)	0.006 (0)	0.096 (0.008)	4807.3	100.9	5	0.671
H_1	0.861	0.84 (0.009)	0.024 (0.009)	0.019 (0.001)	0.117 (0.008)	4809.5	103.2	53	0.897
P_1	0.820	0.809 (0.016)	0.023 (0.009)	0.007 (0)	0.11 (0.007)	4842.3	135.9	5	0.608
P_2	0.822	0.811 (0.016)	0.022 (0.009)	0.006 (0)	0.104 (0.006)	4845.5	139.1	5	0.607
P_3	0.824	0.813 (0.016)	0.022 (0.009)	0.006 (0)	0.097 (0.006)	4846.4	140.0	4	0.605
P_4	0.827	0.816 (0.016)	0.021 (0.01)	0.006 (0)	0.097 (0.007)	4849.1	142.7	4	0.603