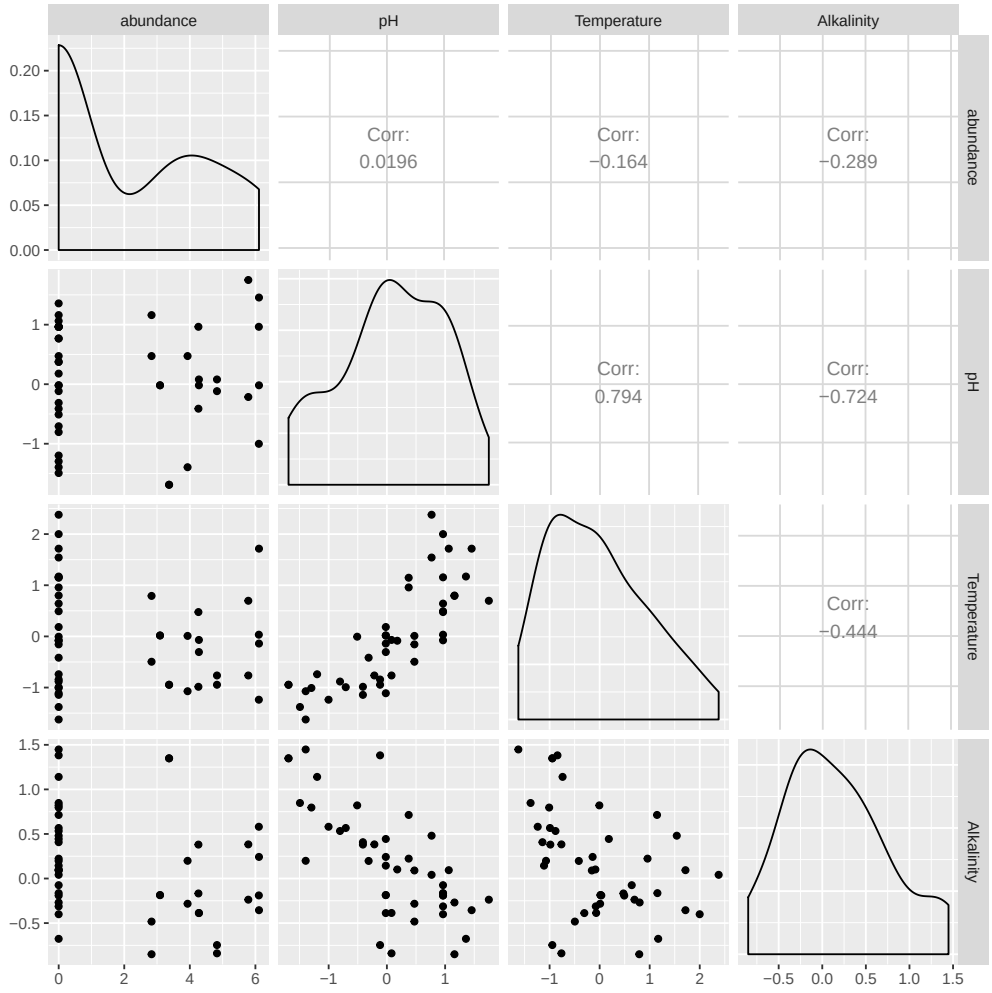
Analysis of crab abundance, presence/absence, and carapace length

January 5, 2018

1 Regression



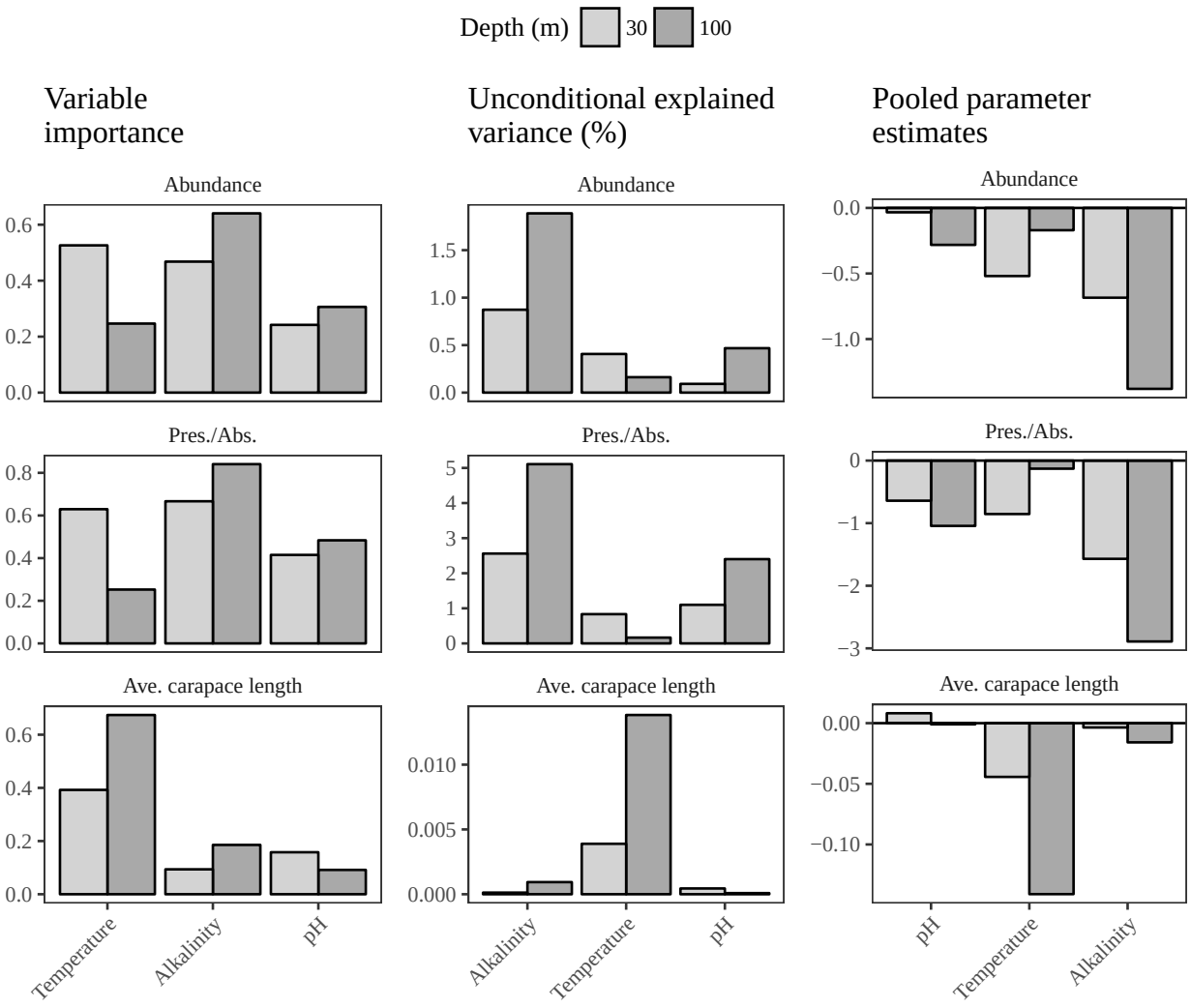


Figure 1: Results of model selection analysis with three crab population variables (abundance, presence/absence, carapace length) by shallow and deep water. Variable importances and pooled estimates show summarized results from multiple models that evaluated all parameter combinations. The unconditional explained variance (%) is the effect of each variable independent of all other variables.

Table 1: Top five selected models for crab abundance at shallow and deep water. Input variables were alkalinity, ph, and temperature. All explanatory variables were scaled and centered.

Models	Int.	Alkalinity	pH	Temperature	df	logLik	AICc	delta
30 m								
1	2.48	-1.5	-	-1.05	4	-49.32	108.86	0
2	1.94	-	-	-	2	-52.17	108.94	0.08
3	2.44	-	-	-0.82	3	-50.98	109.22	0.36
4	1.87	-1.1	-	-	3	-51.35	109.96	1.1
5	2.59	-1.94	-1.11	-	4	-50.48	111.18	2.32
100 m								
1	2.57	-1.61	-	-	3	-50.52	108.3	0
2	1.94	-	-	-	2	-52.17	108.94	0.64
3	2.31	-3.01	-1.55	-	4	-49.51	109.24	0.94
4	2.1	-1.97	-	-0.92	4	-49.87	109.97	1.67
5	2.14	-	0.39	-	3	-52.04	111.35	3.05

Table 2: Top five selected models for crab presence/absence at shallow and deep water. Input variables were alkalinity, ph, and temperature. All explanatory variables were scaled and centered.

Models	Int.	Alkalinity	pH	Temperature	df	logLik	AICc	delta
30								
1	0.46	-1.86	-	-1.65	3	-11.88	31.02	0
2	1.08	-3.07	-2.26	-	3	-12.22	31.71	0.69
3	0.32	-	-	-1.05	2	-13.76	32.11	1.09
4	1.09	-2.86	-1.33	-1.13	4	-11.28	32.78	1.76
5	-0.26	-	-	-	1	-15.75	33.68	2.66
100								
1	0.3	-4.58	-2.39	-	3	-11.82	30.9	0
2	0.46	-1.99	-	-	2	-13.44	31.49	0.58
3	0.02	-2.51	-	-0.98	3	-12.82	32.91	2.01
4	-0.26	-	-	-	1	-15.75	33.68	2.78
5	0.37	-4.66	-2.54	0.16	4	-11.81	33.85	2.94

Table 3: Top five selected models for crab carapace length at shallow and deep water. Input variables were alkalinity, ph, and temperature. All explanatory variables were scaled and centered.

Models	Int.	Alkalinity	pH	Temperature	df	logLik	AICc	delta
30								
1	6.59	-	-	-	2	6.99	-8.28	0
2	6.6	-	-	-0.09	3	8.57	-7.14	1.13
3	6.57	-	0.11	-0.2	4	10.45	-4.9	3.38
4	6.6	-	-0.02	-	3	7.12	-4.23	4.04
5	6.58	-0.02	-	-	3	7.03	-4.06	4.22
100								
1	6.45	-	-	-0.19	3	9.82	-9.64	0
2	6.59	-	-	-	2	6.99	-8.28	1.37
3	6.43	-0.09	-	-0.25	4	11.6	-7.2	2.44
4	6.44	-	0.06	-0.25	4	10.34	-4.68	4.97
5	6.56	-	-0.05	-	3	7.33	-4.65	4.99

2 PCA regression

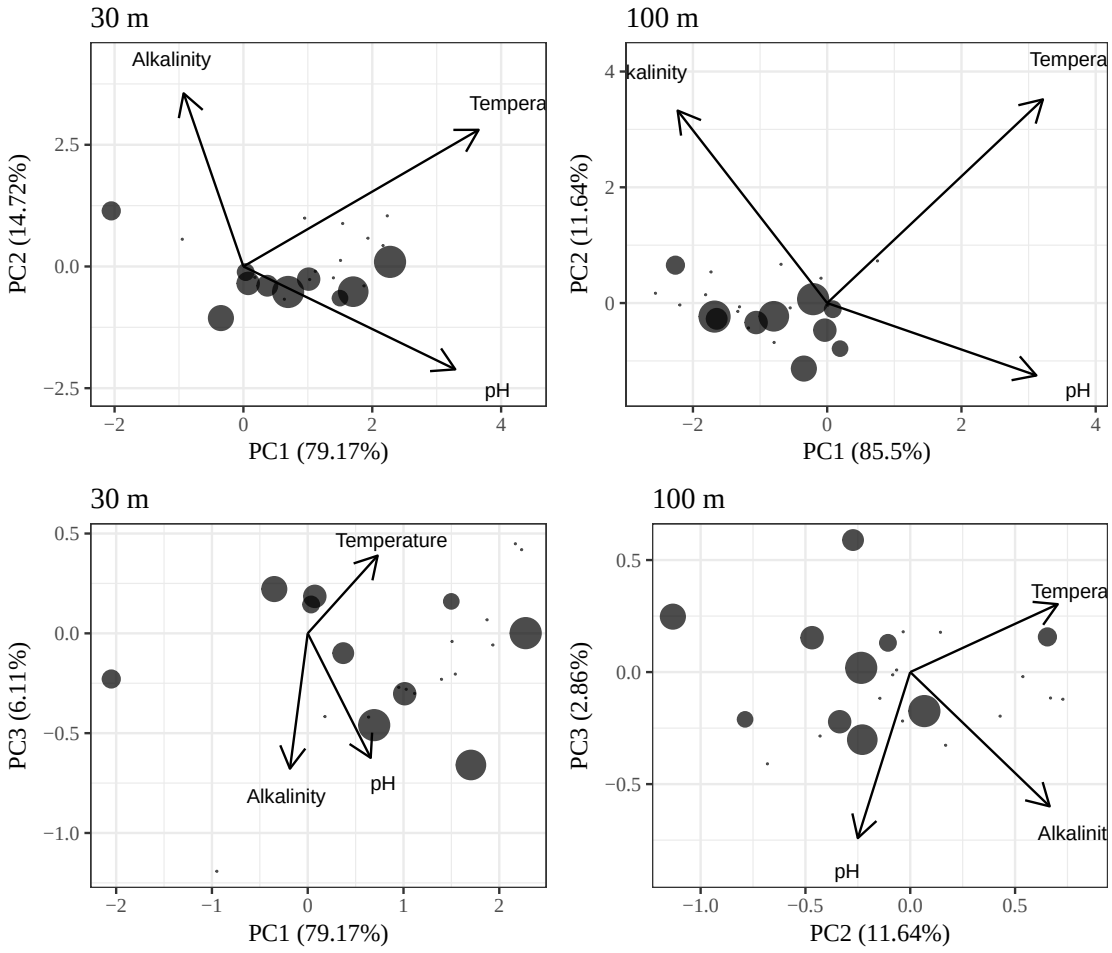


Figure 2: PCA results, points sized by abundance

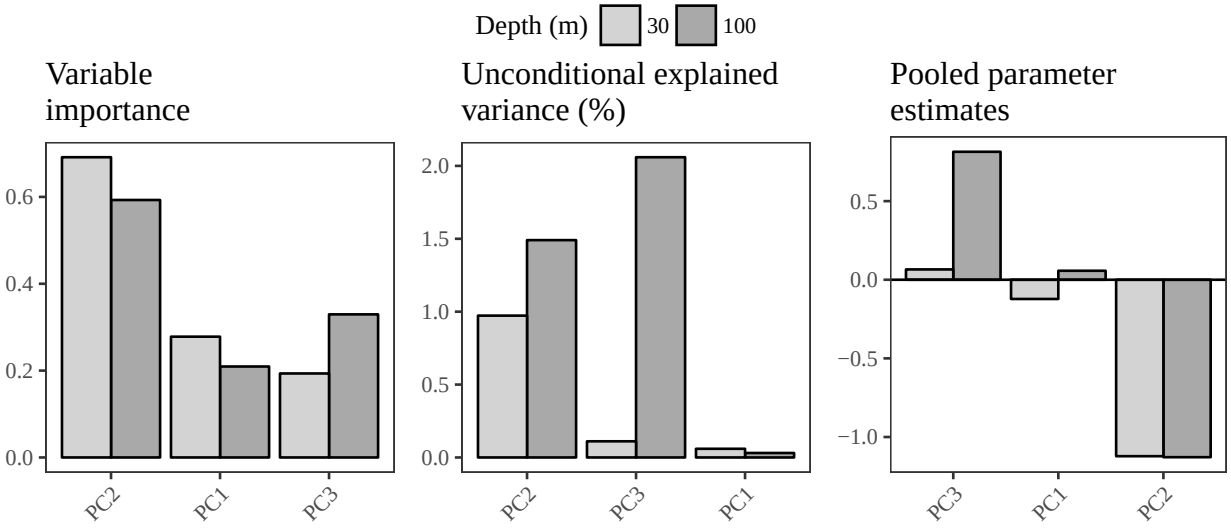


Figure 3: Results of model selection analysis with crab abundance, by shallow and deep water. Models were created using three principal components of input variables. Importances and pooled estimates show summarized results from multiple models that evaluated all parameter combinations. The unconditional explained variance (%) is the effect of each axis independent of all other variables.

Table 4: Top five selected models for crab abundance at shallow and deep water using principal component axes. Input variables for PCA were alkalinity, ph, and temperature. All explanatory variables were scaled and centered.

Models	Int.	PC1	PC2	PC3	df	logLik	AICc	delta
30 m								
1	1.94	-	-1.62	-	3	-49.99	107.25	0
2	1.94	-	-	-	2	-52.17	108.94	1.7
3	2.33	-0.42	-1.63	-	4	-49.48	109.18	1.93
4	1.97	-	-1.62	0.19	4	-49.98	110.19	2.94
5	2.32	-0.42	-	-	3	-51.76	110.78	3.53
100 m								
1	1.8	-	-1.93	-	3	-50.37	107.99	0
2	1.94	-	-	-	2	-52.17	108.94	0.95
3	1.91	-	-1.89	2.35	4	-49.64	109.51	1.51
4	2.05	-	-	2.47	3	-51.49	110.24	2.25
5	1.94	0.14	-1.88	-	4	-50.33	110.88	2.88

Table 5: Correlations of crab abundance and input variables with principal component (PC) axes. Abundance was modelled with PC axes created using the input variables.

Models	PC1	PC2	PC3
30 m			
Abundance	-0.19	-0.42*	0.03
Alkalinity	-0.51*	0.76*	-0.56*
pH	0.88*	-0.37	0.05
Temperature	0.91*	0.37	0.48*
100 m			
Abundance	0.11	-0.38	0.24
Alkalinity	-0.77*	0.71*	-0.12
pH	0.95*	-0.32	-0.45*
Temperature	0.84*	0.39	-0.11