

1 **Distribution and life history trait models indicate vulnerability of skates**

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3 Supplementary information

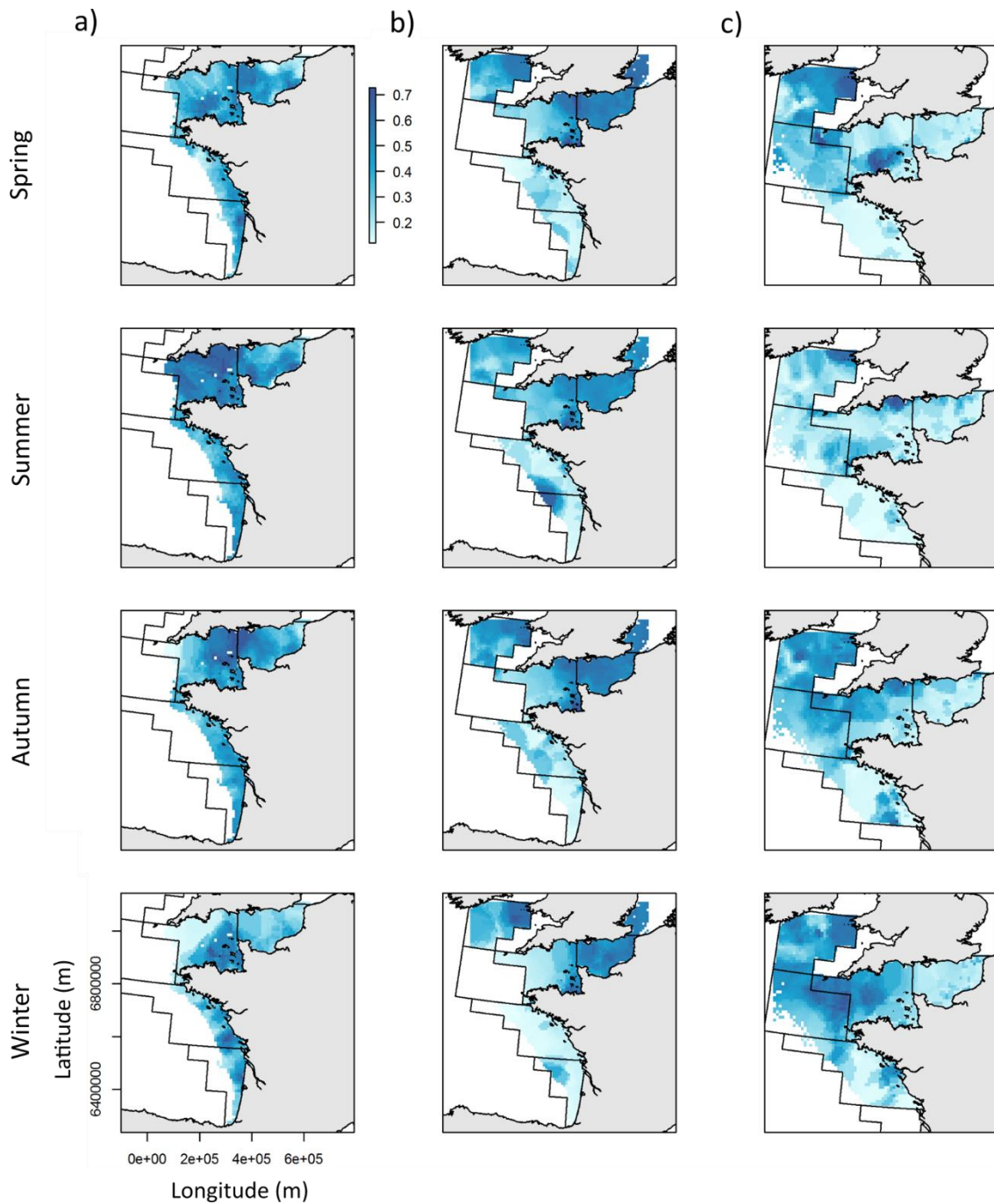
4 Table S1: Summary table of the total number of hauls for each species per gear and

5 season. GNS = Set gillnets, GTR = Trammel nets, OTB = Otter beam trawls, OTT =

6 Otter twin trawls, SDN = Danish seine nets.

Species	Gear	Autumn	Spring	Summer	Winter
<i>Raja undulata</i>	GNS	134	216	166	152
	GTR	1051	1562	1178	816
	OTB	688	512	831	329
	OTT	28	121	59	27
<i>Raja clavata</i>	GNS	380	221	275	316
	GTR	1272	1760	1225	921
	OTB	2293	1829	2895	1332
	OTT	260	172	215	131
	SDN	454	287	272	148
<i>Raja montagui</i>	GTR	708	996	776	481
	OTB	1179	888	898	722
	OTT	446	484	578	359
	SDN	113	152	217	103

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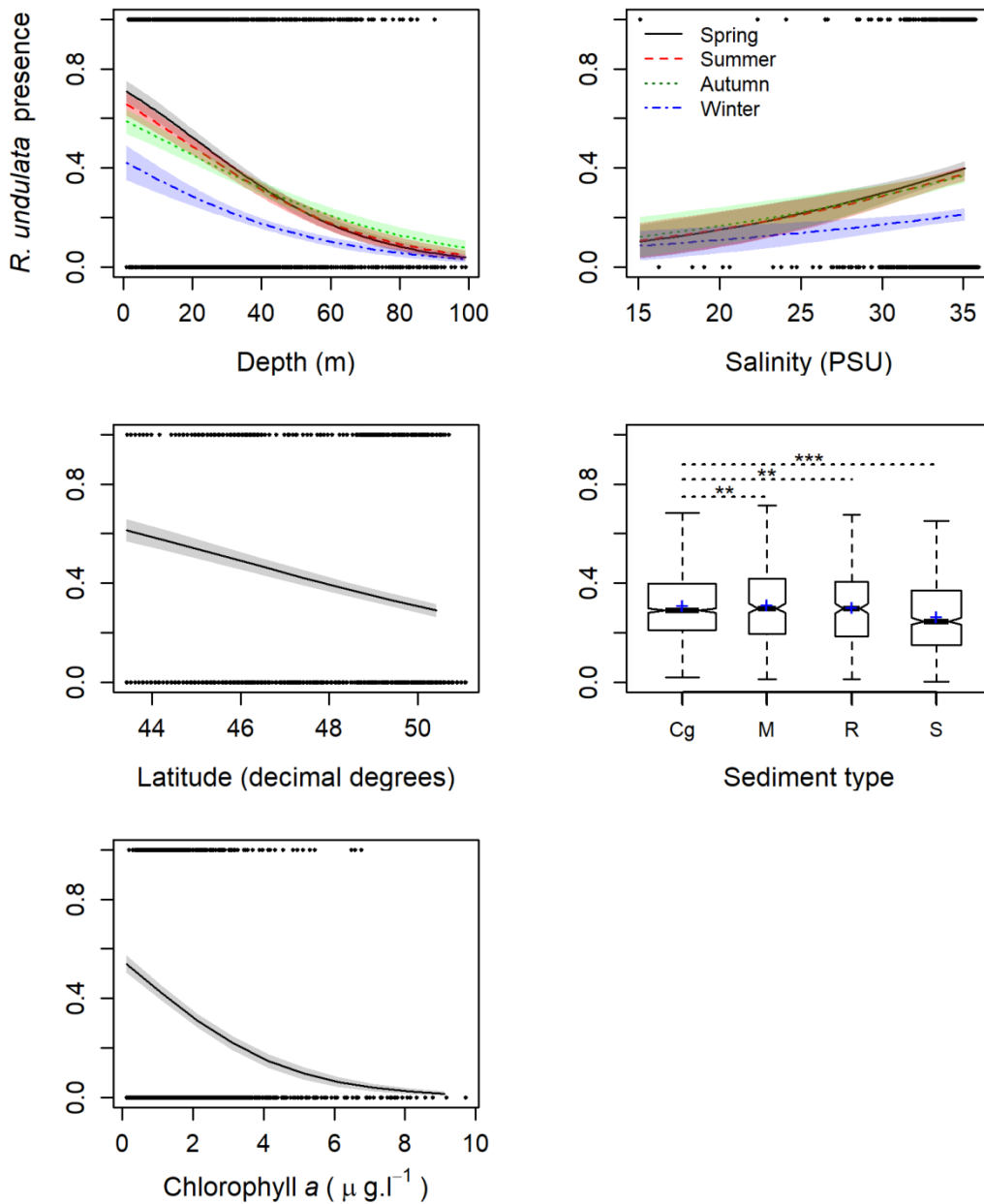
9 Fig. S1. Prediction error maps (10 km²) per season (three-month period) for a) *Raja*

10 *undulata* b) *Raja clavata* and c) *Raja montagui* Lighter shades of blue indicate

11 lower prediction error, darker blue shades represent higher modelled prediction

12 error. Black solid lines delineate ICES statistical divisions.

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15 Fig. S2. The effects of the model of best fits behaviour on *Raja undulata*

16 occurrence with the model fitted lines and the shaded area indicating $\pm 95\%$

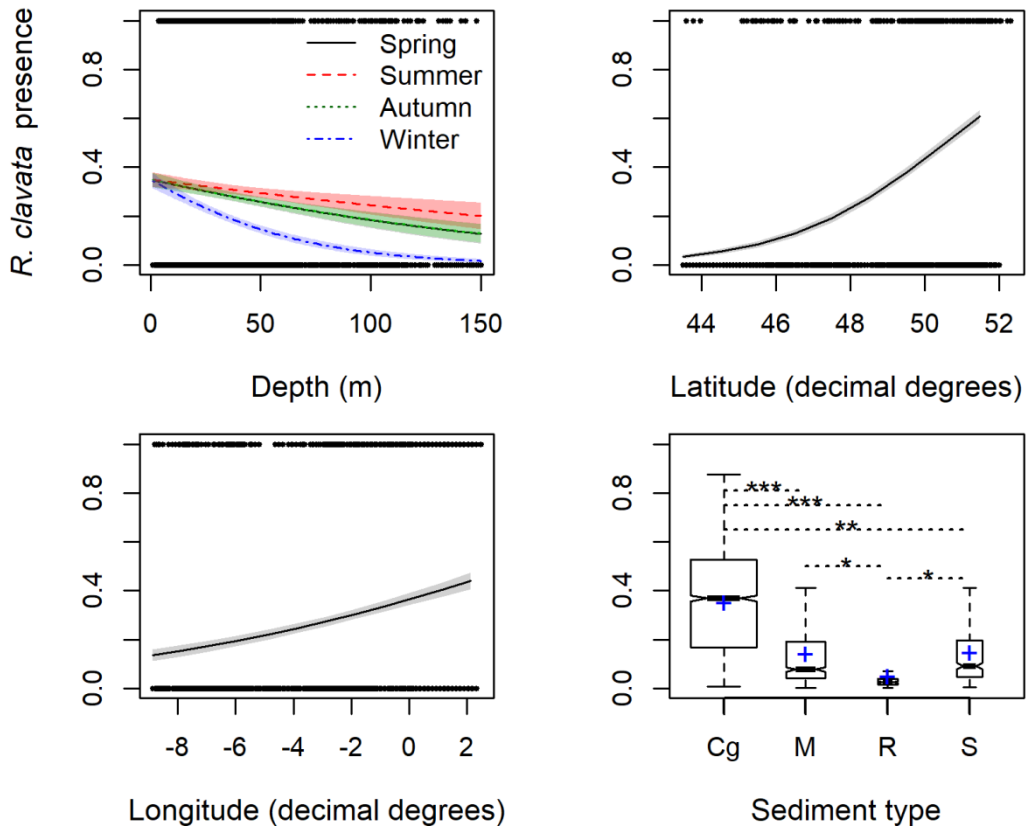
17 confidence intervals. Boxplots notch displays the confidence interval around the

18 median, blue crosses represent the mean for each sediment type. Dotted

19 horizontal lines with * refer to Tukey test P-value significance between sediment

20 types. Cg = coarse grain; M = mud; R = rock; S = sand.

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22 Longitude (decimal degrees)

23 Fig. S3. The effects of the model of best fits behaviour on *Raja clavata* occurrence,

24 with the model fitted lines and the shaded area indicating $\pm 95\%$ confidence

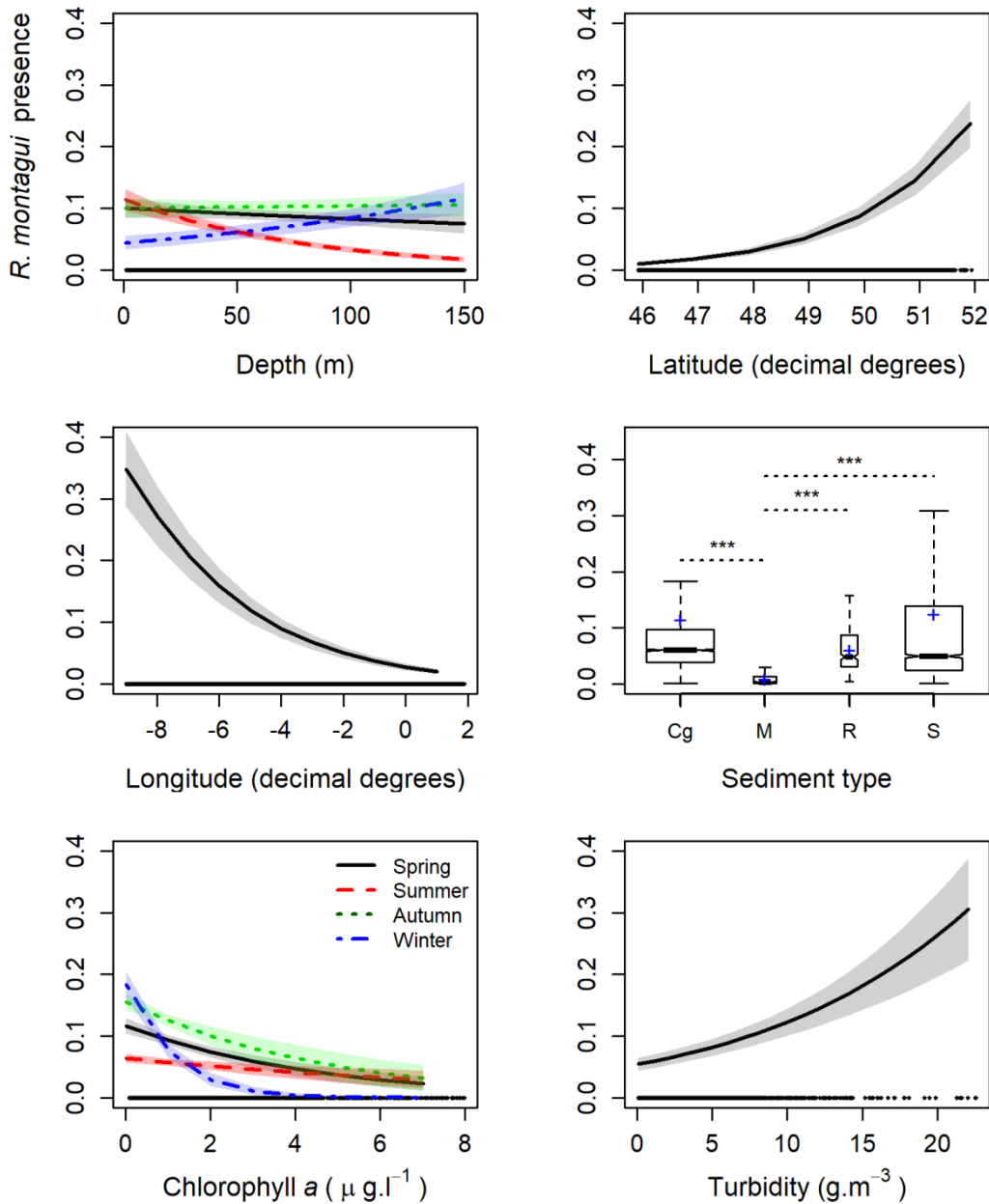
25 intervals. Boxplots notch displays the confidence interval around the median, blue

26 crosses represent the mean for each sediment type. Dotted horizontal lines with *

27 refer to Tukey test P-value significance between sediment types.

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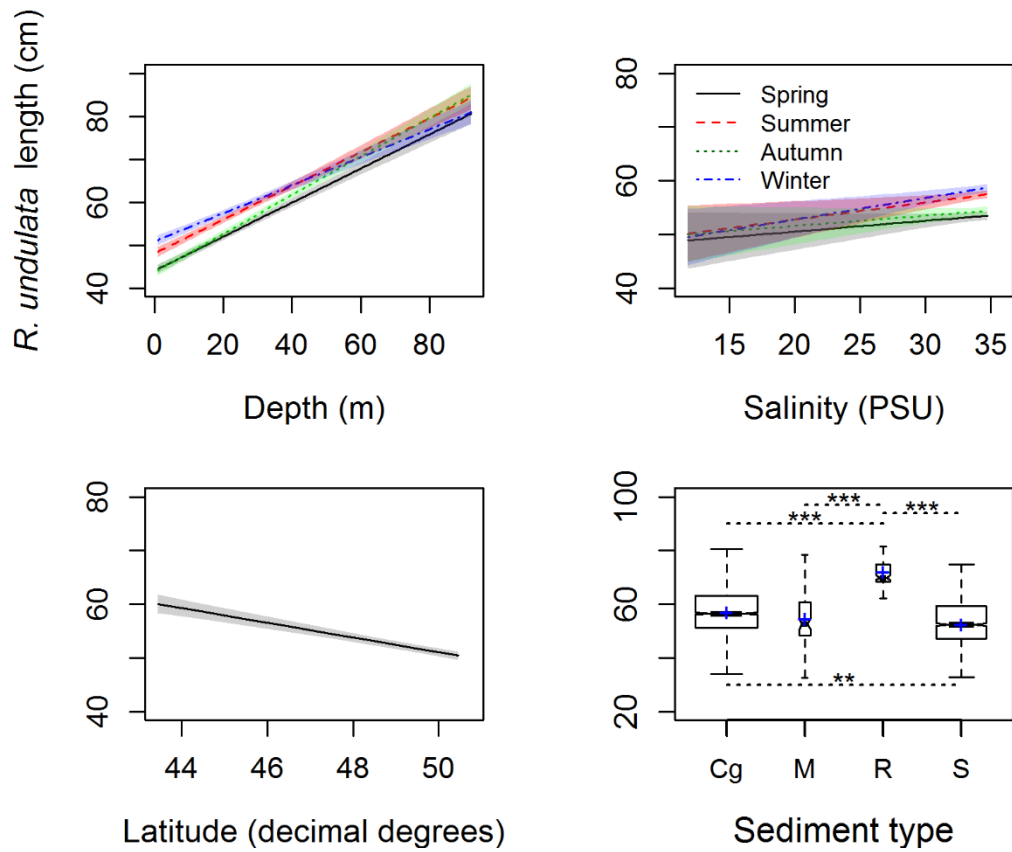
31 Fig. S4. The effects of the model of best fit behaviour for *Raja montagui*, with the
 32 model fitted lines and the shaded area indicating $\pm 95\%$ confidence intervals.

33 Boxplots notch displays the confidence interval around the median, blue crosses

34 represent the mean for each sediment type. Dotted horizontal lines with * refer to

35 Tukey test P-value significance between sediment types.

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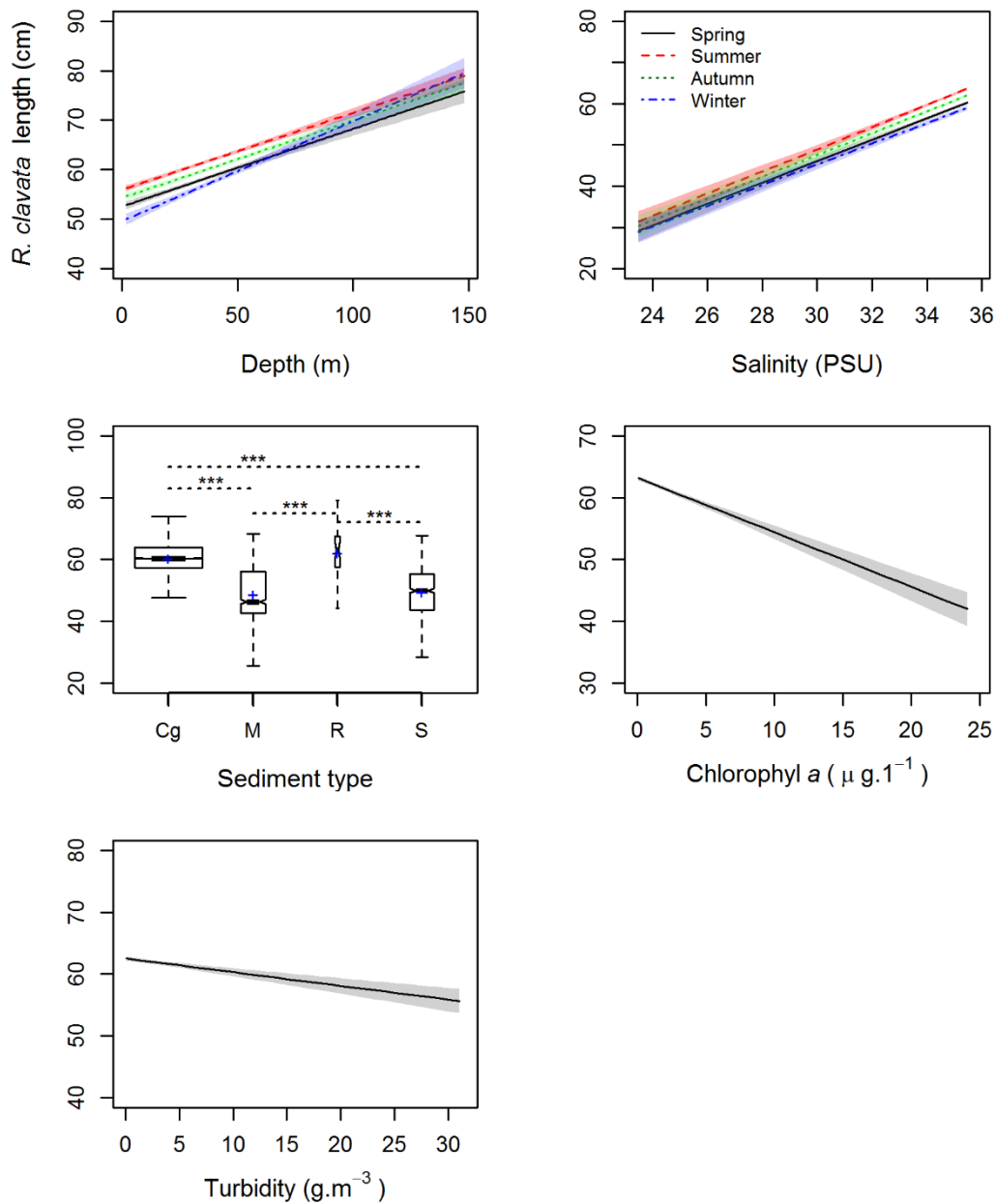
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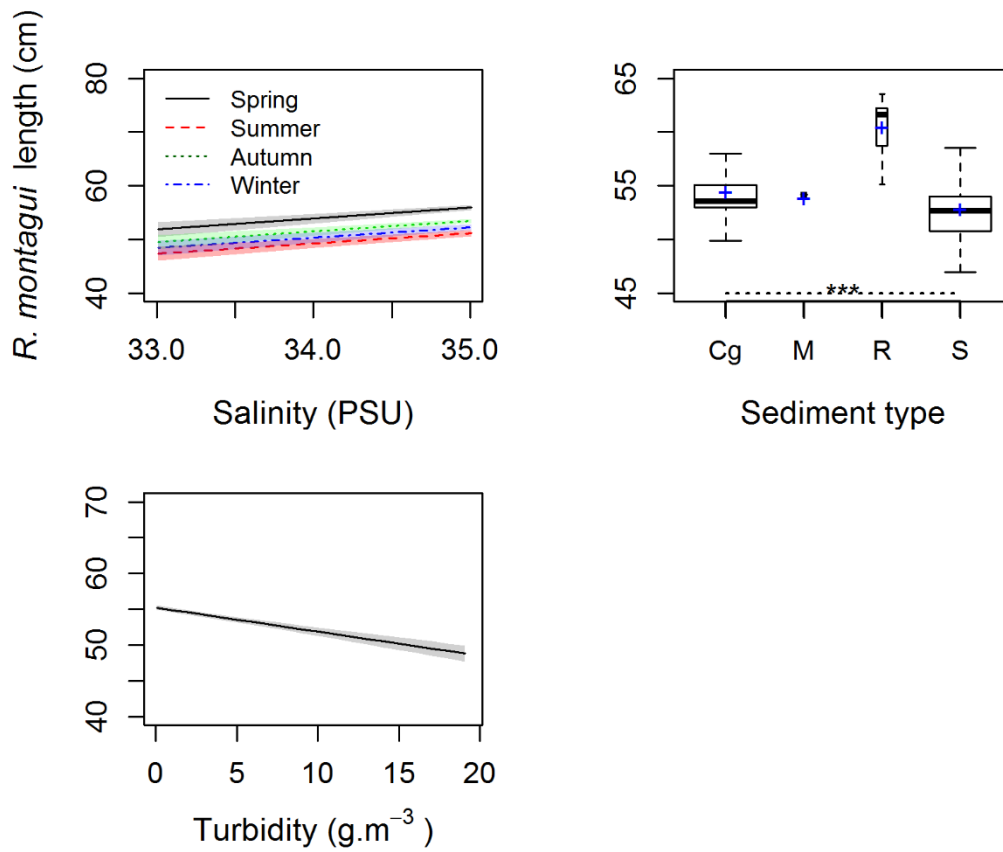
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Fig. S5. The effects of the model of best fit behaviour for *Raja undulata* length, with the model fitted lines and the shaded area indicating $\pm 95\%$ confidence intervals. Boxplots notch displays the confidence interval around the median, blue crosses represent the mean for each sediment type. Dotted horizontal lines with * refer to Tukey test P-value significance between sediment types.



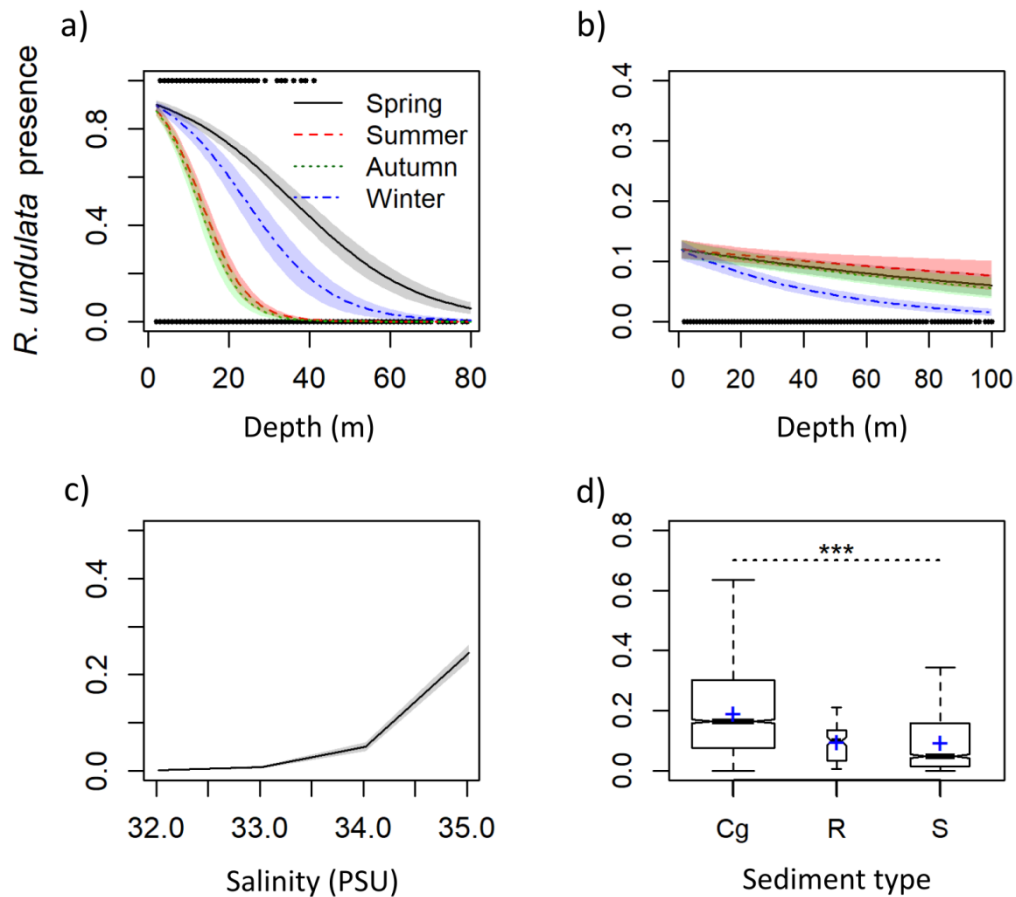
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 45 Fig. S6. The effects of the model of best fit behaviour for *Raja clavata* length, with
 46 the model fitted lines and the shaded area indicating $\pm 95\%$ confidence intervals.
 47 Boxplots notch displays the confidence interval around the median, blue crosses
 48 represent the mean for each sediment type. Dotted horizontal lines with * refer to
 49 Tukey test P-value significance between sediment types.

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 52 Fig. S7. The effects of the model of best fit behaviour for *Raja montagui* length,
 53 with the model fitted lines and the shaded area indicating $\pm 95\%$ confidence
 54 intervals. Boxplots notch displays the confidence interval around the median, blue
 55 crosses represent the mean for each sediment type. Dotted horizontal lines with *
 56 refer to Tukey test P-value significance between sediment types.

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61 Fig. S8. a) Juvenile and b-d) mature *Raja undulata* presence absence model

62 behaviour with the model fitted lines and the shaded area indicating ±95%

63 confidence intervals. Boxplots notch displays the confidence interval around the

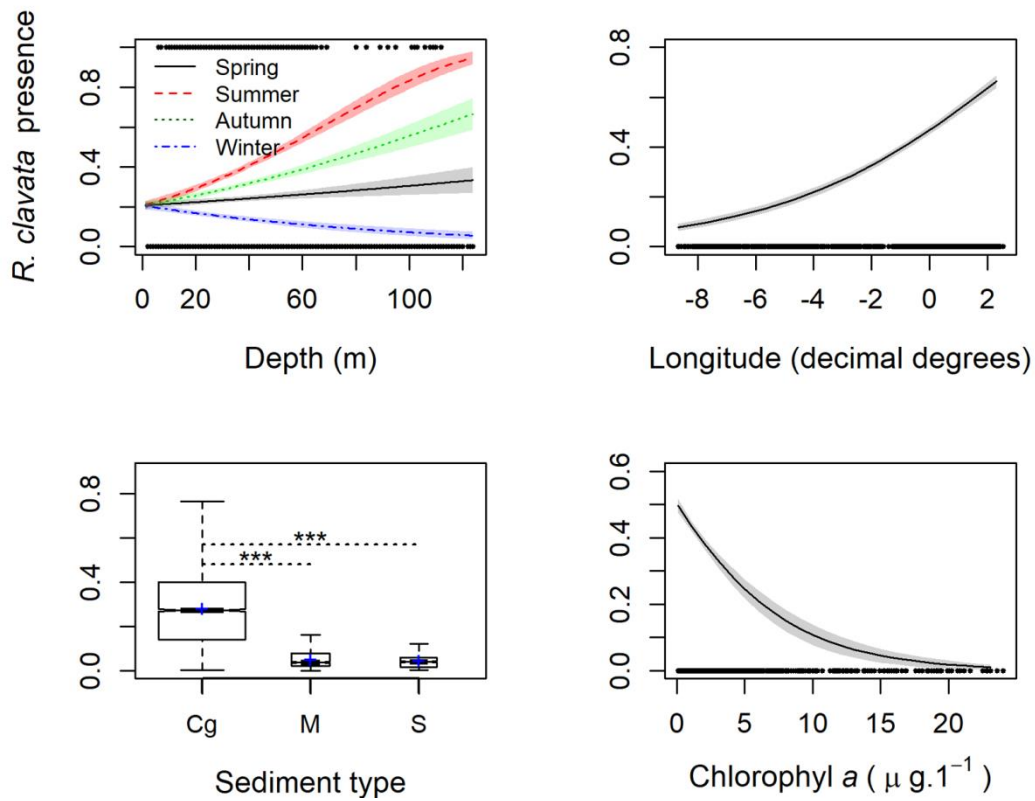
64 median, blue crosses represent the mean for each sediment type. Dotted

65 horizontal lines with * refer to Tukey test P-value significance between sediment

66 types. Cg = coarse grain; M = mud; R = rock; S = sand.

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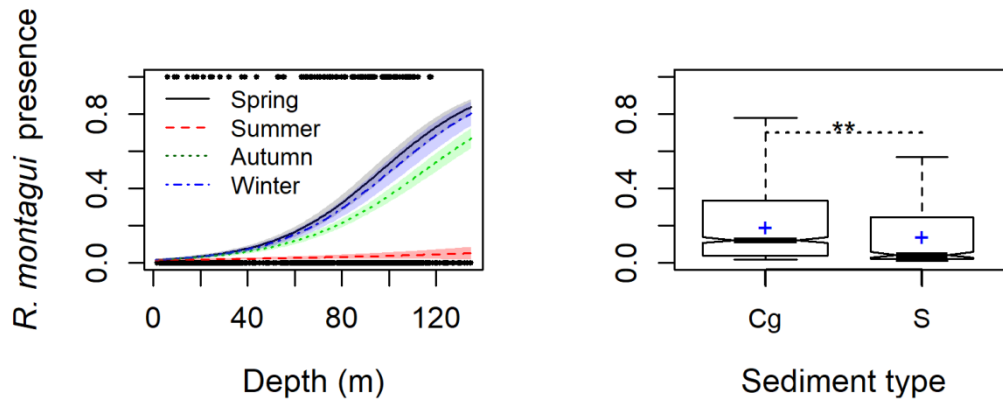


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70 Fig. S9. Mature *Raja clavata* presence absence model behaviour with the model
 71 fitted lines and the shaded area indicating $\pm 95\%$ confidence intervals. Boxplots
 72 notch displays the confidence interval around the median, blue crosses represent
 73 the mean for each sediment type. Dotted horizontal lines with * refer to Tukey test
 74 P-value significance between sediment types. Cg = coarse grain; M = mud; S = sand.

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78 Fig. S10. Mature *Raja montagui* presence absence model behaviour with the model

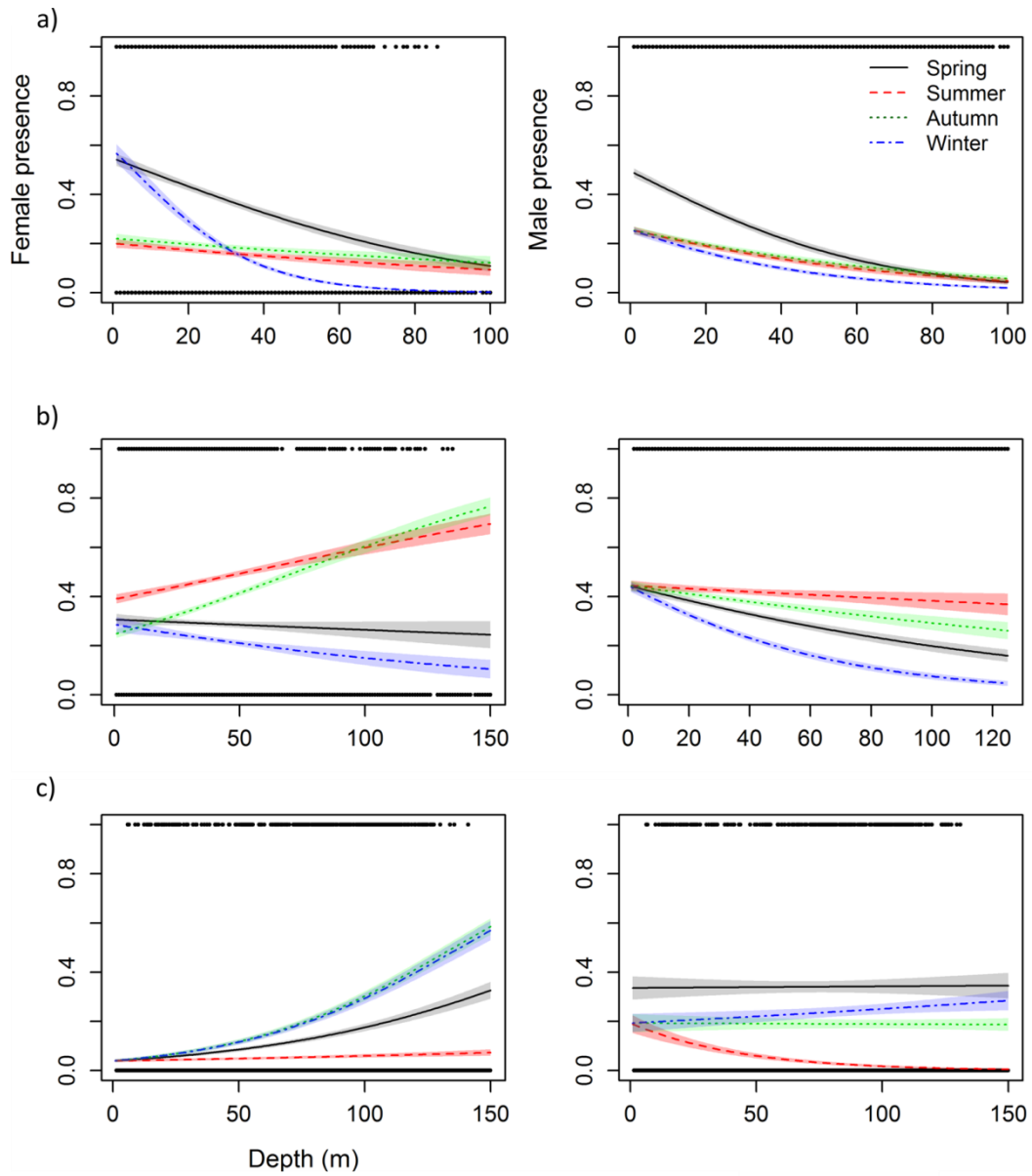
79 fitted lines and the shaded area indicating $\pm 95\%$ confidence intervals. Boxplots

80 notch displays the confidence interval around the median, blue crosses represent

81 the mean for each sediment type. Dotted horizontal lines with * refer to Tukey

82 test P-value significance between sediment types. Cg = coarse grain; S = sand.

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85 Fig. S11. Female and male a) *Raja undulata* b) *Raja clavata* c) *Raja montagui*

86 presence absence depth season interaction with the model fitted lines and the

87 shaded area indicating $\pm 95\%$ confidence intervals.

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