Journal of Zoological and Botanical Gardens

MDPI

Article – Supplemental Material 1

Common bottlenose dolphin, *Tursiops truncatus*, behavioral response to a record-breaking flood event in Pensacola Bay, Florida – Supplemental Material 1

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1. Supplemental tables for environmental sample data.

Table S1. Environmental data with source information (source abbreviation listed below).

Season	Summer 2013/Control Summer		March 2014/Pre-Flood Spring		Spring 2014/Flood Spring		Summer 2014/Flood Summer		Spring 2015/Control Spring	
Date	6/2/13 – 7/22/13		2/17/2014 – 3/27/2014		4/29/14 – 5/28/14		6/10/14 – 7/23/14		4/14/15 – 5/19/15	
Surface DO (mg/L)	40	EPA = 0 Survey = 0 WQP = 40	152	EPA = 0 Survey = 38 WQP = 114	118	EPA = 1 Survey = 36 WQP = 81	126	EPA = 14 Survey = 42 WQP = 70	82	EPA = 16 Survey = 43 WQP = 23
Bottom DO (mg/L)	20	EPA = 0 Survey = 0 WQP = 20	34	EPA = 0 Survey = 0 WQP = 34	41	EPA = 9 Survey = 0 WQP = 32	31	EPA = 16 Survey = 0 WQP = 15	48	EPA = 8 Survey = 0 WQP = 40
Surface Salinity (ppt)	97	EPA = 0 Survey = 41 WQP = 56	149	EPA = 0 Survey = 39 WQP = 110	117	EPA = 1 Survey = 35 WQP = 81	143	EPA = 14 Survey = 42 WQP = 87	83	EPA = 16 Survey = 44 WQP = 23
Bottom Salinity (ppt)	20	EPA = 0 Survey = 0 WQP = 20	36	EPA = 0 Survey = 0 WQP = 36	41	EPA = 9 Survey = 0 WQP = 32	33	EPA = 18 Survey = 0 WQP = 15	61	EPA = 8 Survey = 0 WQP = 53
Surface Temp (°C)	95	EPA = 0 Survey = 41 WQP = 54	153	EPA = 0 Survey = 39 WQP = 114	117	EPA = 1 Survey = 36 WQP = 80	126	EPA = 14 Survey = 42 WQP = 70	83	EPA = 16 Survey = 44 WQP = 23
Bottom Temp (°C)	20	EPA = 0 Survey = 0 WQP = 20	33	EPA = 0 Survey = 0 WQP = 33	42	EPA = 9 Survey = 0 WQP = 33	33	EPA = 18 Survey = 0 WQP = 15	63	EPA = 9 Survey = 0 WQP = 54
Nitrogen (mg/L)	35	EPA = 0 Survey = 0 WQP = 35	53	EPA = 0 Survey = 0 WQP = 53	22	EPA = 0 Survey = 0 WQP = 22	20	EPA = 0 Survey = 0 WQP = 20	29	EPA = 0 Survey = 0 WQP = 29
Phosphorus (mg/L)	33	EPA = 0 Survey = 0 WQP = 33	53	EPA = 0 Survey = 0 WQP = 53	20	EPA = 0 Survey = 0 WQP = 20	20	EPA = 0 Survey = 0 WQP = 20	29	EPA = 0 Survey = 0 WQP = 29

[1] Source abbreviations: EPA = Environmental Protection Agency's CTD data; Survey = Dolphin population dynamic survey data collected during dolphin observations; WQP = Water Quality Portal website data queries for Pensacola Bay system.

Table S2. Environmental sample statistics (SD = standard deviation).

Variable	Session	Sample Average (SD)	Estimated Average (SD)	RMSE
Surface DO (mg/L)	Pre-Flood Spring	8.444 (0.932)	8.172 (0.919)	0.660
	Flood Spring	6.966 (1.560)	6.431 (1.475)	1.465
	Control Spring	6.556 (2.539)	6.209 (2.192)	1.144
	Flood Summer	5.362 (2.546)	5.041 (1.772)	1.683
	Control Summer	8.054 (1.709)	7.957 (0.859)	1.369
Bottom DO (mg/L)	Pre-Flood Spring	8.408 (2.401)	7.892 (2.662)	1.316
	Flood Spring	7.280 (5.869)	6.432 (6.020)	2.214
	Control Spring	8.330 (6.218)	8.788 (5.560)	1.591
	Flood Summer	11.227 (7.943)	11.426 (7.723)	1.281
	Control Summer	5.745 (0.587)	5.746 (0.501)	0.162
Surface Salinity (ppt)	Pre-Flood Spring	11.473 (6.911)	11.065 (6.973)	3.797
	Flood Spring	3.202 (3.875)	2.926 (3.066)	2.245
	Control Spring	11.454 (8.256)	11.384 (7.337)	3.839
	Flood Summer	8.431 (5.621)	7.343 (4.358)	3.792
	Control Summer	17.067 (6.648)	15.288 (7.102)	4.493
Bottom Salinity (ppt)	Pre-Flood Spring	18.225 (6.164)	16.735 (5.486)	2.878
	Flood Spring	5.904 (10.601)	5.805 (10.621)	0.580
	Control Spring	15.459 (9.041)	15.083 (8.542)	3.231
	Flood Summer	17.350 (12.050)	17.372 (12.055)	2.565
	Control Summer	19.745 (2.354)	19.830 (2.158)	0.495
Surface Temp (°C)	Pre-Flood Spring	16.220 (1.971)	16.018 (1.601)	1.272
	Flood Spring	26.237 (1.741)	26.209 (1.554)	0.963
	Control Spring	24.722 (1.963)	24.906 (1.792)	0.988
	Flood Summer	29.547 (1.309)	29.398 (1.019)	0.935
	Control Summer	29.976 (1.071)	29.678 (0.863)	1.062
Bottom Temp (°C)	Pre-Flood Spring	15.353 (2.045)	15.043 (1.633)	0.894
	Flood Spring	25.355 (1.722)	25.165 (1.326)	0.769
	Control Spring	22.440 (1.223)	22.698 (0.983)	0.746
	Flood Summer	27.554 (1.155)	27.403 (1.071)	0.821
	Control Summer	28.910 (0.573)	28.890 (0.550)	0.087
Nitrogen (mg/L)	Pre-Flood Spring	0.359 (0.081)	0.392 (0.067)	0.075
	Flood Spring	0.457 (0.081)	0.497 (0.051)	0.097
	Control Spring	0.519 (0.178)	0.527 (0.067)	0.153
	Flood Summer	0.582 (0.151)	0.466 (0.009)	0.176
	Control Summer	0.488 (0.203)	0.461 (0.157)	0.121
Phosphorus (mg/L)	Pre-Flood Spring	0.026 (0.015)	0.031 (0.013)	0.011
	Flood Spring	0.033 (0.014)	0.039 (0.008)	0.015
	Control Spring	0.018 (0.011)	0.026 (0.013)	0.016
	Flood Summer	0.024 (0.010)	0.034 (0.012)	0.012
	Control Summer	0.021 (0.004)	0.037 (0.023)	0.024

2. **Supplemental figures for environmental sample data.**

Figures S1 through S8 were created in ArcGIS 10.X [1].

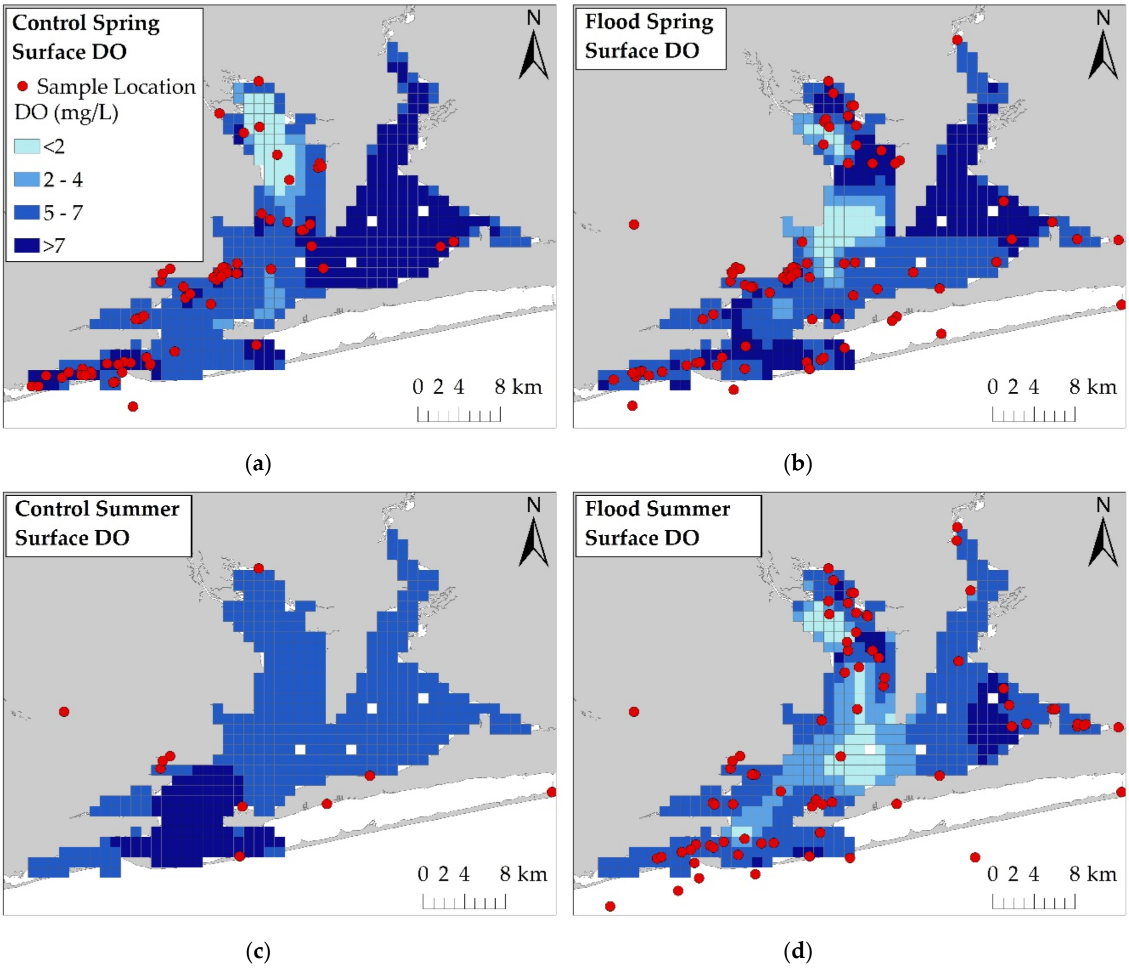


Figure S1. Surface DO sample locations and interpolated surface DO estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.

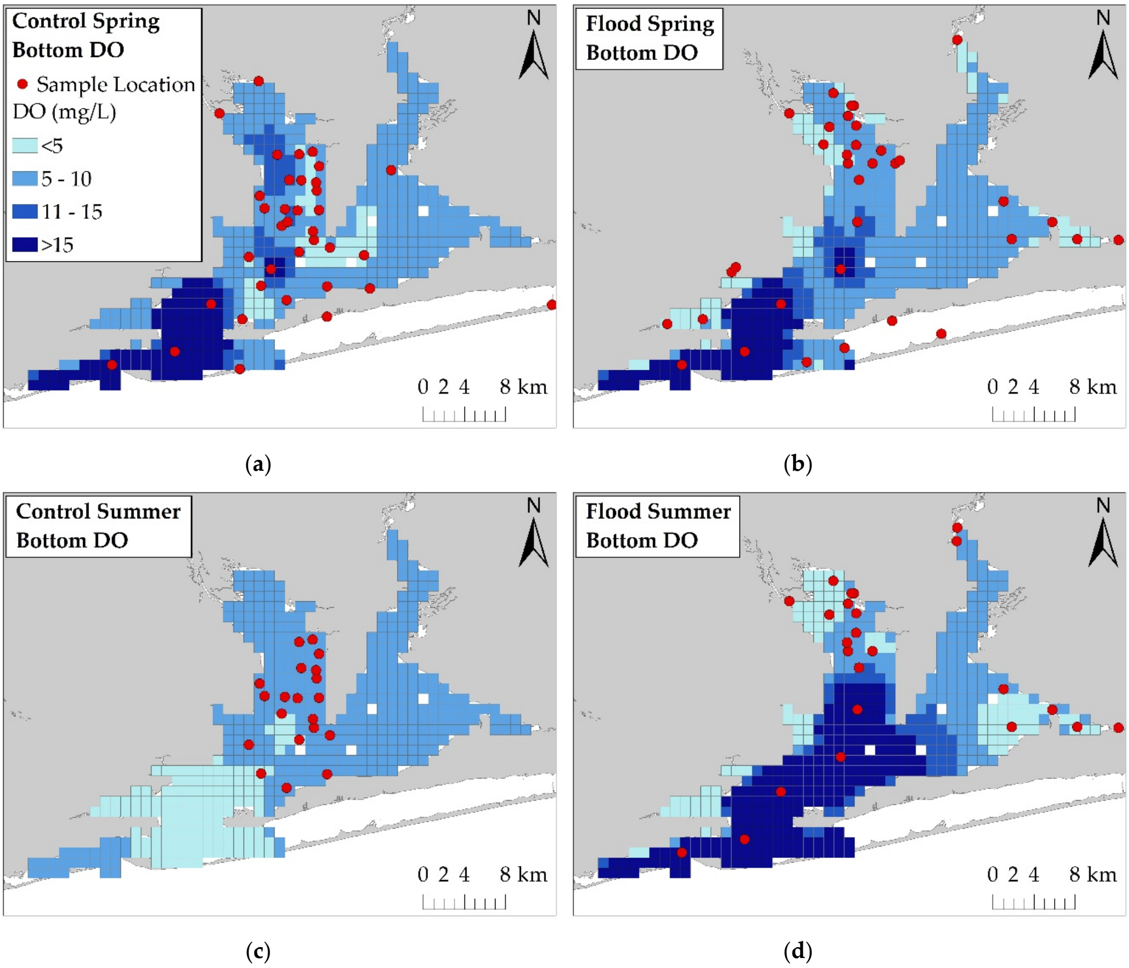


Figure S2. Bottom DO sample locations and interpolated bottom DO estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.

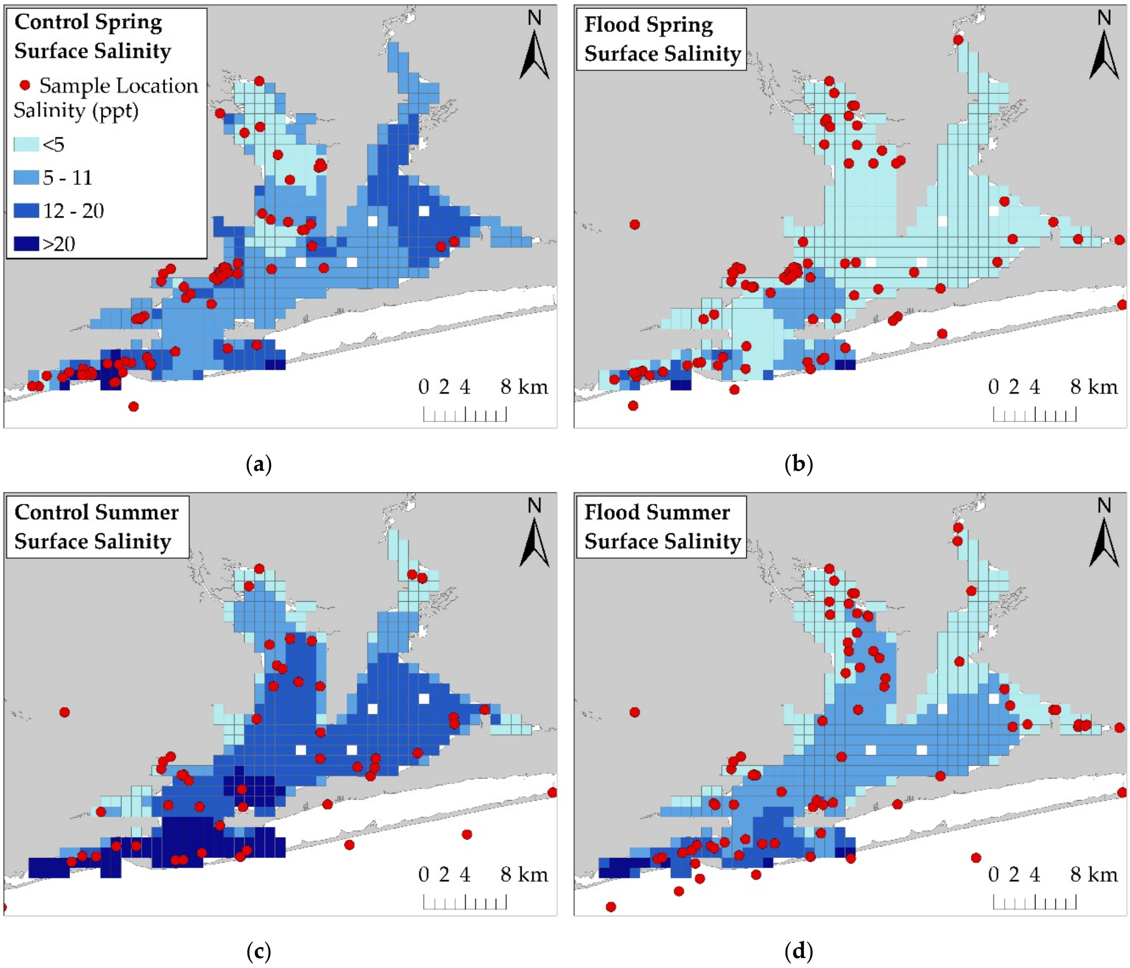
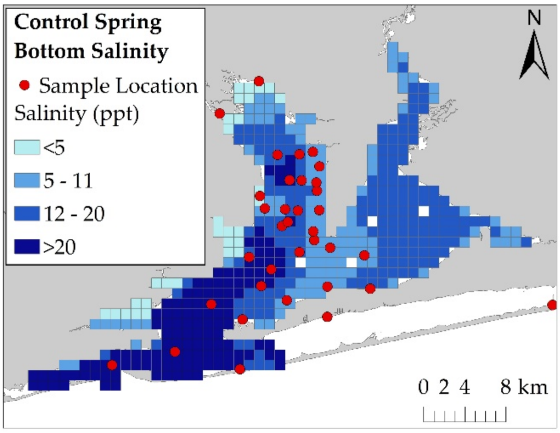
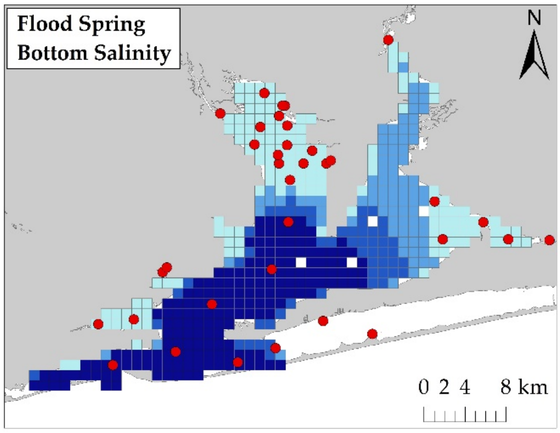


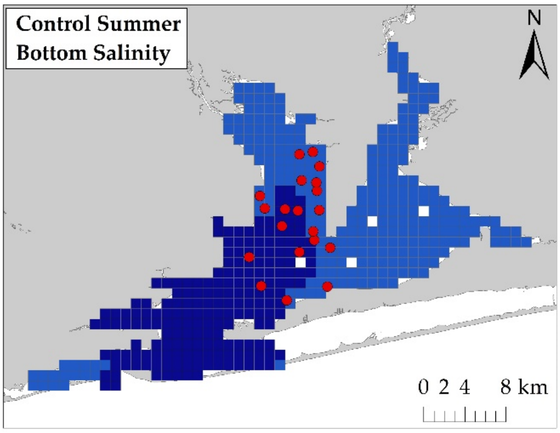
Figure S3. Surface salinity sample locations and interpolated surface salinity estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.



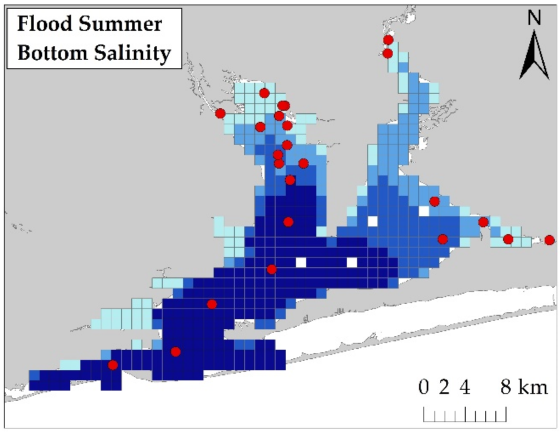
(**a**)



(**b**)



(**c**)



(**d**)

Figure S4. Bottom salinity sample locations and interpolated bottom salinity estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.

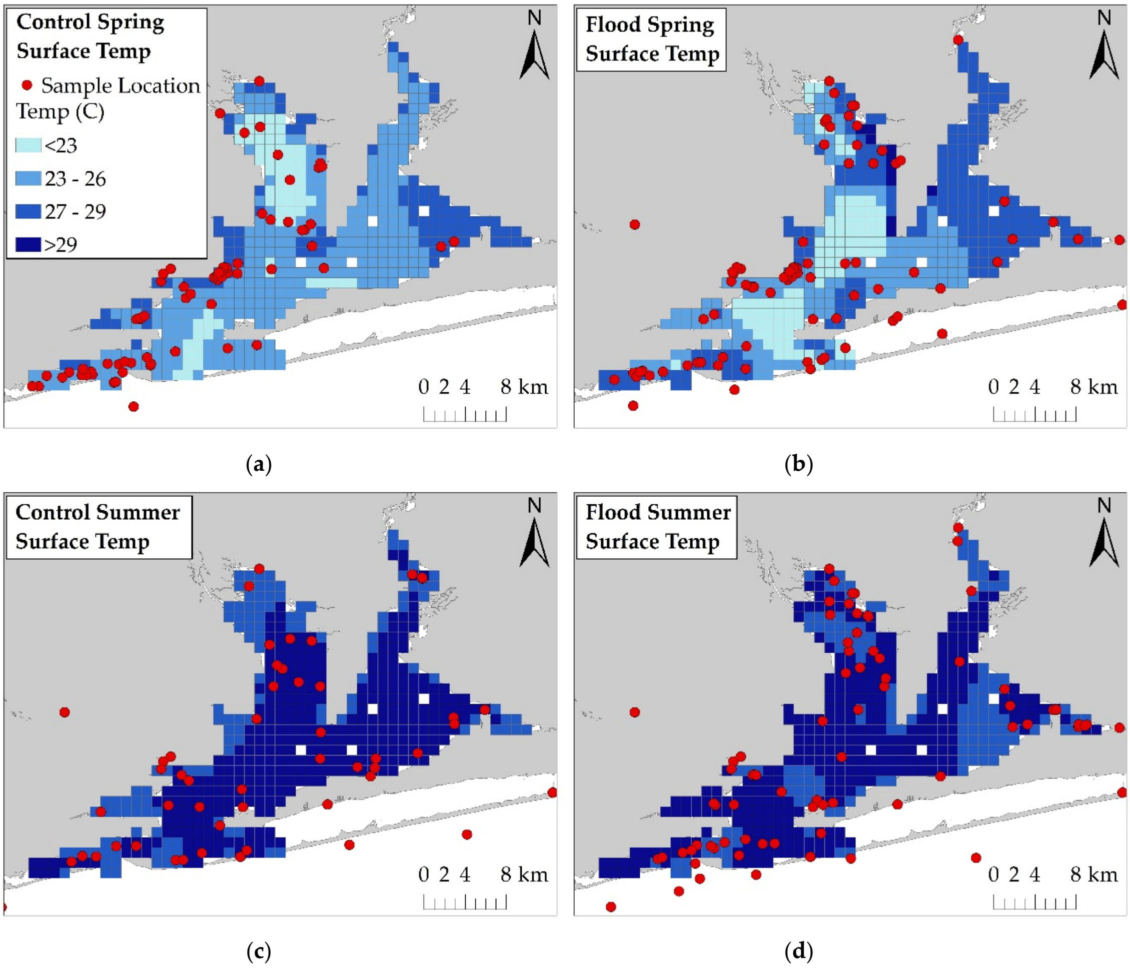
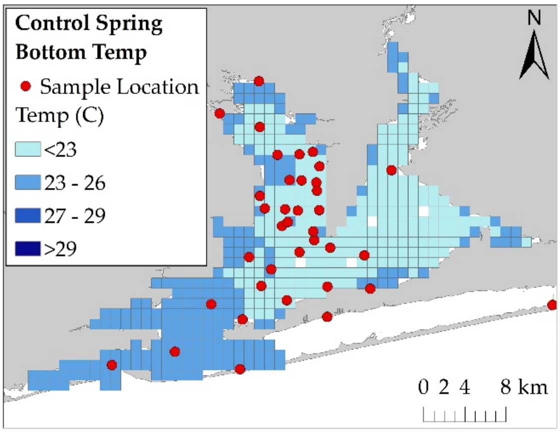
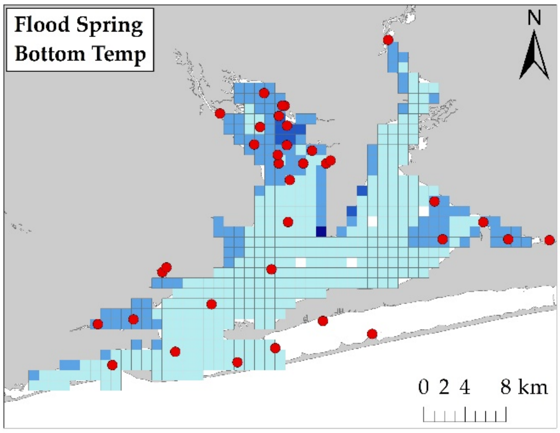


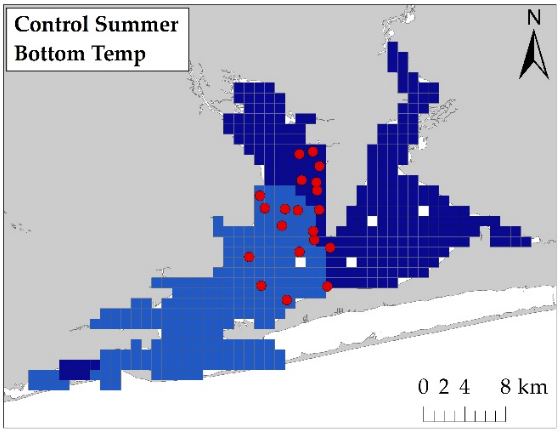
Figure S5. Surface temperature sample locations and interpolated surface temperature estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.



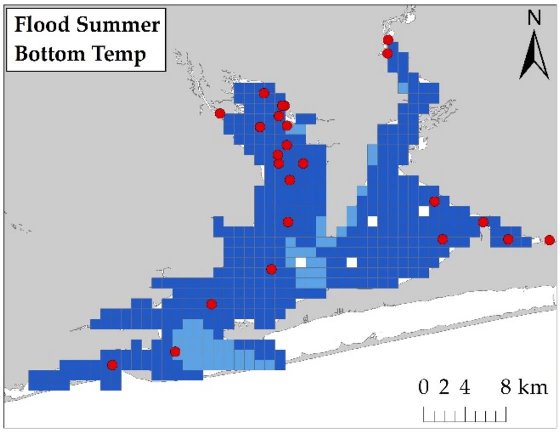
(**a**)



(**b**)

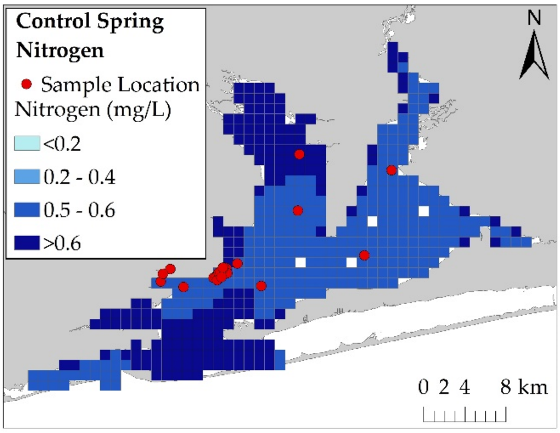


(**c**)

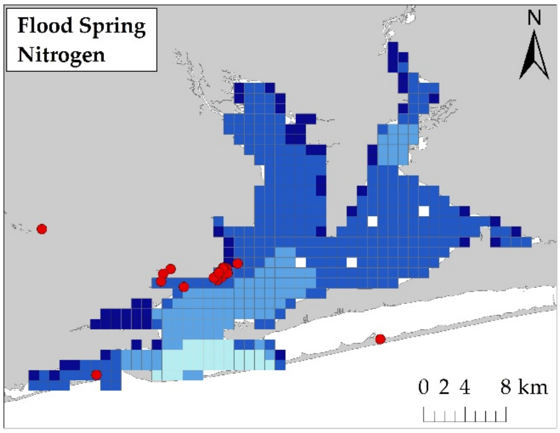


(**d**)

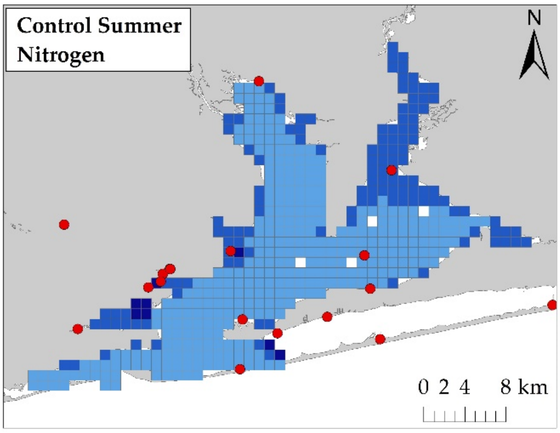
Figure S6. Bottom temperature sample locations and interpolated bottom temperature estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.



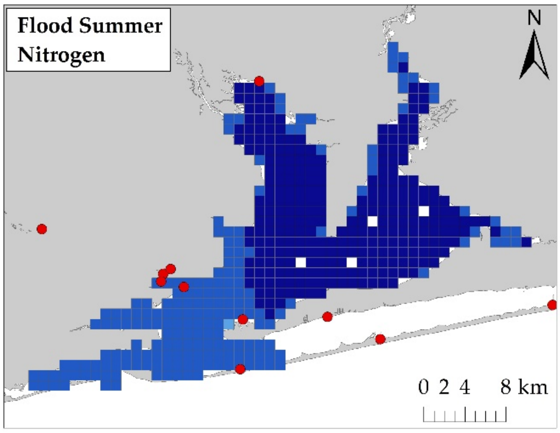
(**a**)



(**b**)



(**c**)



(**d**)

Figure S7. Kjeldahl nitrogen sample locations and interpolated nitrogen estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.

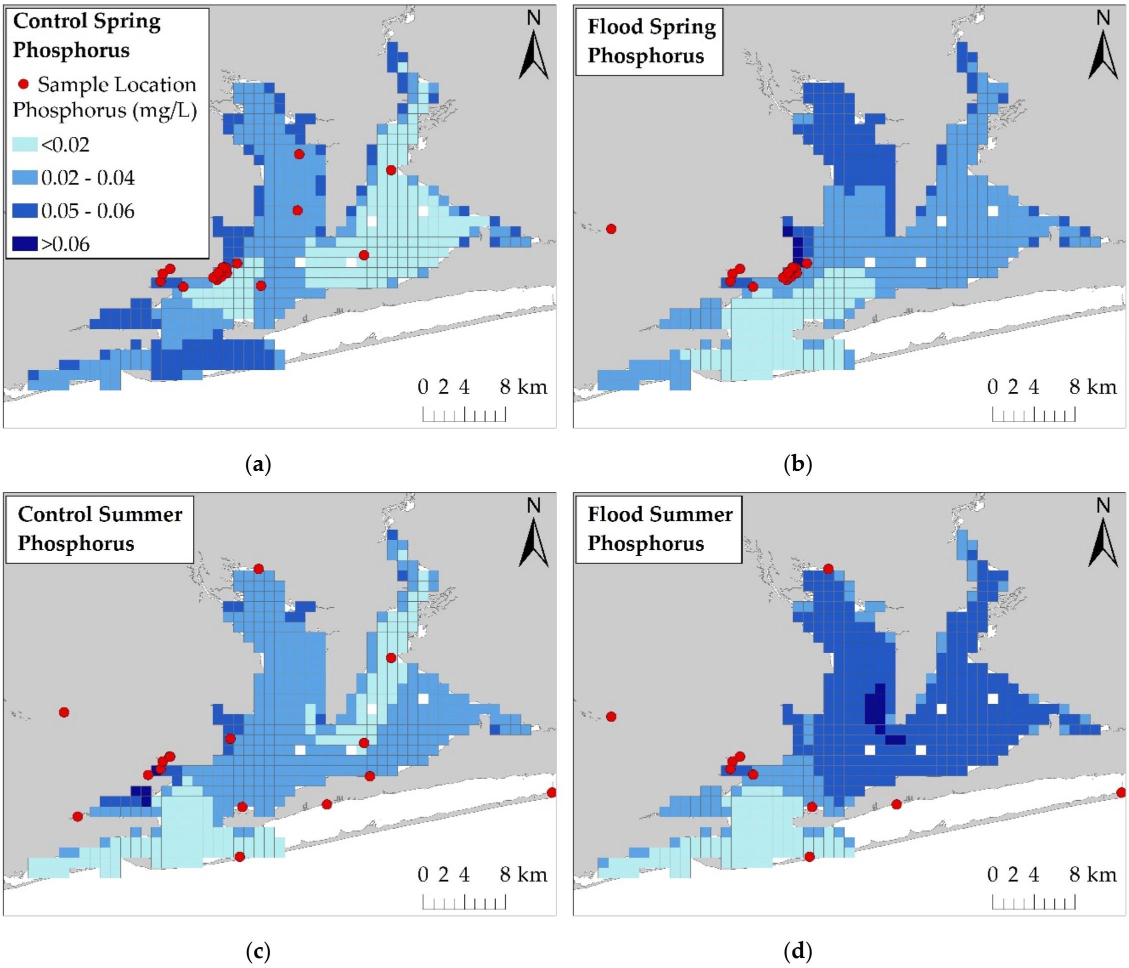


Figure S8. Phosphorus sample locations and interpolated phosphorus estimates for: (**a**) Control Spring; (**b**) Flood Spring; (**c**) Control Summer; and (**d**) Flood Summer. Legend in (**a**) applies to all figures.

3. Variable associations from ZAG model

The table below contains all of the variables and interactions between variables that were retained in the best fit presence-only ZAG model and the presence-absence ZAG model.

Table S3. Model parameters for ZAG models (significant associations in bold).

	Presence-Only Model				Presence-Absence Model			
Variable	Coefficient	*t*-value	*p*-value	↑ Group Density in Areas with:	Coefficient	*t*-value	*p*-value	↑ Presence Likelihood in Areas with:
Intercept	84.050	1.941	0.056		-12120.000	-2.565	**0.010**	
Depth	-0.144	-3.879	**<0.001**	↓ Depth	-3.332	-1.903	0.057	
Slope Standard Deviation (SD)	2.943	2.644	**0.010**	↑ Slope SD	-24.920	-4.208	**<0.001**	↓ Slope SD
Land Distance	0.001	4.683	**<0.001**	↑ Land Distance	-0.011	-2.138	**0.033**	↓ Land Distance
SAV Distance	<0.001	-1.578	0.119		-0.125	-2.071	**0.038**	↓ SAV Distance
Surface DO	-0.097	-1.407	0.164		-690.100	-3.941	**<0.001**	↓ Surface DO
Surface Salinity	N/A	N/A	N/A		28.200	1.649	0.099	
Surface Temp	-0.063	-1.238	0.220		-0.607	-2.089	**0.037**	↓ Surface Temp
Season	-186.3	-3.039	**0.003**	↑ in Spring	-1962.000	-3.023	**0.003**	↑ in Spring
Nitrogen	-0.790	-0.767	0.446		13.450	1.374	0.170	
Phosphorus	11.360	1.356	0.179		54850.000	2.811	**0.005**	↑ Phosphorus
Latitude	-2.503	-1.790	0.078		6.012	0.496	0.620	
Longitude	N/A	N/A	N/A		-136.700	-2.559	**0.011**	↑ in West
Flood Period	5.064	2.641	**0.010**	↑ in Flood	-38.310	-3.902	**<0.001**	↑ in Control
Bottom DO	N/A	N/A	N/A		8.819	3.153	**0.002**	↑ Bottom DO
Bottom Salinity	-0.020	-1.769	0.081		38.630	1.777	0.076	
Bottom Temp	-0.252	-3.447	**0.001**	↓ Bottom Temp	543.100	3.022	**0.003**	↑ Bottom Temp
SAV Distance: Flood Period	<-0.001	-1.327	0.189		N/A	N/A	N/A	
Surface DO: Flood Period	-0.186	-1.510	0.135		N/A	N/A	N/A	
Bottom Salinity: Flood Period	0.025	2.067	**0.042**	Flood: ↓ Bottom Salinity; Control: ↓ Bottom Salinity (stronger effect)	-0.220	-2.439	**0.015**	Flood: ↑ Bottom Salinity; Control: ↑ Bottom Salinity (stronger effect)
Surface Temp: Flood Period	-0.111	-2.102	**0.039**	Flood: ↓ Surface Temp; Control: ↑ Surface Temp	N/A	N/A	N/A	
Nitrogen: Flood Period	-2.445	-2.003	**0.049**	Flood: ↓ Nitrogen; Control: ↑ Nitrogen	18.190	3.715	**<0.001**	Flood: ↑ Nitrogen; Control: ↓ Nitrogen
Bottom DO: Flood Period	N/A	N/A	N/A		0.430	2.588	**0.010**	Flood: ↓ Bottom DO; Control: ↓ Bottom DO (stronger effect)
Flood Period: Bottom Temp	N/A	N/A	N/A		1.124	3.129	**0.002**	Flood: ↑ Bottom Temp; Control: ↓ Bottom Temp
Land Distance: Season	-0.001	-2.622	**0.011**	Spring: ↑ Land Distance (stronger effect); Summer: ↑ Land Distance	N/A	N/A	N/A	
SAV Distance: Season	<0.001	2.019	**0.047**	Spring: ↓ SAV Distance; Summer: ↑ SAV Distance	N/A	N/A	N/A	

Table S3 continued on next page

Variable	Coefficient	*t*-value	*p*-value	↑ Group Density in Areas with:	Coefficient	*t*-value	*p*-value	↑ Presence Likelihood in Areas with:
Surface DO: Season	0.168	1.681	0.097		0.928	2.314	**0.021**	Spring: ↓ Surface DO; Summer: No Change
Nitrogen: Season	-2.552	-2.009	**0.048**	Spring: ↑ Nitrogen; Summer: ↓ Nitrogen	N/A	N/A	N/A	
Phosphorus: Season	37.460	2.820	**0.006**	Spring: ↓ Phosphorus; Summer: ↑ Phosphorus	-108.900	-1.862	0.063	
Latitude: Season	6.109	3.051	**0.003**	Spring: ↑ in South; Summer: ↑ in North	N/A	N/A	N/A	
Longitude: Season	N/A	N/A	N/A		-22.500	-3.018	**0.003**	Spring: ↑ in East; Summer: ↑ in West
Bottom DO: Season	N/A	N/A	N/A		0.838	2.875	**0.004**	Spring: ↓ Bottom DO; Summer: No Change
Bottom Salinity: Season	0.022	1.442	0.154		-0.727	-4.558	**<0.001**	Spring: ↑ Bottom Salinity; Summer: ↓ Bottom Salinity
Depth: Surface Salinity	N/A	N/A	N/A		-0.035	-2.206	**0.027**	↑ Depth: ↓ Surface Salinity
Depth: Surface DO	N/A	N/A	N/A		0.256	3.299	**0.001**	↓ Depth: ↓ Surface DO; ↑ Depth: ↑ Surface DO
Depth: Bottom DO	N/A	N/A	N/A		0.101	4.181	**<0.001**	↑ Depth: ↑ Bottom DO; ↓ Bottom DO: No Change
Depth: Bottom Salinity	N/A	N/A	N/A		-0.086	-4.082	**<0.001**	↑ Depth: ↓ Bottom Salinity; ↑ Bottom Salinity: No Change
Depth: Bottom Temp	N/A	N/A	N/A		0.131	2.231	**0.026**	↑ Depth: ↑ Bottom Temp
Slope SD: SAV Distance	N/A	N/A	N/A		0.002	1.606	0.108	
Slope SD: Bottom DO	N/A	N/A	N/A		1.026	3.740	**<0.001**	↓ Slope SD: ↓ Bottom DO; ↑ Bottom DO: No Change
Land Distance: Surface Temp	N/A	N/A	N/A		<0.001	1.810	0.070	
SAV Distance: Surface DO	N/A	N/A	N/A		<0.001	1.832	0.067	
SAV Distance: Surface Temp	N/A	N/A	N/A		<0.001	3.128	**0.002**	↑ SAV Distance: ↑ Surface Temp; ↓ Surface Temp: No Change
SAV Distance: Latitude	N/A	N/A	N/A		0.004	2.042	**0.041**	South: ↓ SAV Distance; North: ↑ SAV Distance
SAV Distance: Bottom Temp	N/A	N/A	N/A		<-0.001	-2.596	**0.009**	↑ SAV Distance: ↓ Bottom Temp; ↓ SAV Distance: ↑ Bottom Temp
Surface Salinity: Phosphorus	N/A	N/A	N/A		9.526	2.495	**0.013**	↑ Surface Salinity: ↑ Phosphorus
Surface Salinity: Latitude	N/A	N/A	N/A		-0.942	-1.675	0.094	
Surface Salinity: Bottom DO	N/A	N/A	N/A		-0.011	-1.541	0.123	

Table S3 continued on next page

Variable	Coefficient	*t*-value	*p*-value	↑ Group Density in Areas with:	Coefficient	*t*-value	*p*-value	↑ Presence Likelihood in Areas with:
Surface Salinity: Bottom Salinity	N/A	N/A	N/A		0.014	1.902	0.057	
Surface DO: Nitrogen	N/A	N/A	N/A		-4.664	-2.798	**0.005**	↑ Surface DO: ↓ Nitrogen; ↓ Surface DO: ↑ Nitrogen
Surface DO: Phosphorus	N/A	N/A	N/A		65.190	3.546	**<0.001**	↓ Surface DO: ↓ Phosphorus; ↑ Surface DO: ↑ Phosphorus
Surface DO: Longitude	N/A	N/A	N/A		-8.060	-3.998	**<0.001**	East: ↓ Surface DO; West: ↑ Surface DO
Surface DO: Bottom DO	N/A	N/A	N/A		-0.069	-2.426	**0.015**	↓ Bottom DO: ↓ Surface DO; ↑ Bottom DO: ↓ Surface DO
Surface DO: Bottom Temp	N/A	N/A	N/A		-0.478	-3.651	**<0.001**	↓ Surface DO: ↑ Bottom Temp; ↑ Surface DO: ↓ Bottom Temp
Surface Temp: Bottom DO	N/A	N/A	N/A		0.057	3.061	**0.002**	↓ Bottom DO: ↑ Surface Temp; ↑ Bottom DO: No Change
Nitrogen: Bottom DO	N/A	N/A	N/A		-1.808	-2.828	**0.005**	↓ Nitrogen: ↓ Bottom DO; ↓ Nitrogen: ↑ Bottom DO
Nitrogen: Bottom Salinity	N/A	N/A	N/A		1.530	3.357	**0.001**	↑ Bottom Salinity: No Change; ↓ Bottom Salinity: ↓ Nitrogen
Phosphorus: Latitude	N/A	N/A	N/A		-666.800	-1.965	**0.049**	South: ↑ Phosphorus
Phosphorus: Longitude	N/A	N/A	N/A		410.000	2.219	**0.026**	East: ↑ Phosphorus
Phosphorus: Bottom DO	N/A	N/A	N/A		21.650	3.849	**<0.001**	↑ Bottom DO: ↑ Phosphorus; ↓ Bottom DO: ↓ Phosphorus
Phosphorus: Bottom Salinity	N/A	N/A	N/A		-18.970	-4.695	**<0.001**	↑ Phosphorus: ↓ Bottom Salinity; ↓ Phosphorus: ↑ Bottom Salinity
Phosphorus: Bottom Temp	N/A	N/A	N/A		33.900	1.987	**0.047**	↑ Phosphorus: ↑ Bottom Temp
Longitude: Bottom Salinity	N/A	N/A	N/A		0.523	2.073	**0.038**	East: ↑ Bottom Salinity
Longitude: Bottom Temp	N/A	N/A	N/A		6.217	3.012	**0.003**	West: ↓ Bottom Temp; East: ↑ Bottom Temp
Bottom DO: Bottom Temp	N/A	N/A	N/A		-0.388	-3.549	**<0.001**	↑ Bottom DO: ↓ Bottom Temp; ↓ Bottom DO: ↑ Bottom Temp
Bottom Salinity: Bottom Temp	N/A	N/A	N/A		0.266	4.136	**<0.001**	↑ Bottom Salinity: ↑ Bottom Temp; ↓ Bottom Salinity: ↓ Bottom Temp

The following figures present the significant model parameters for the ZAG models. All figures were created in R [2] using the ‘graphics’ package within R to plot main effects and the ‘interactions’ package [3] to plot interaction effects.

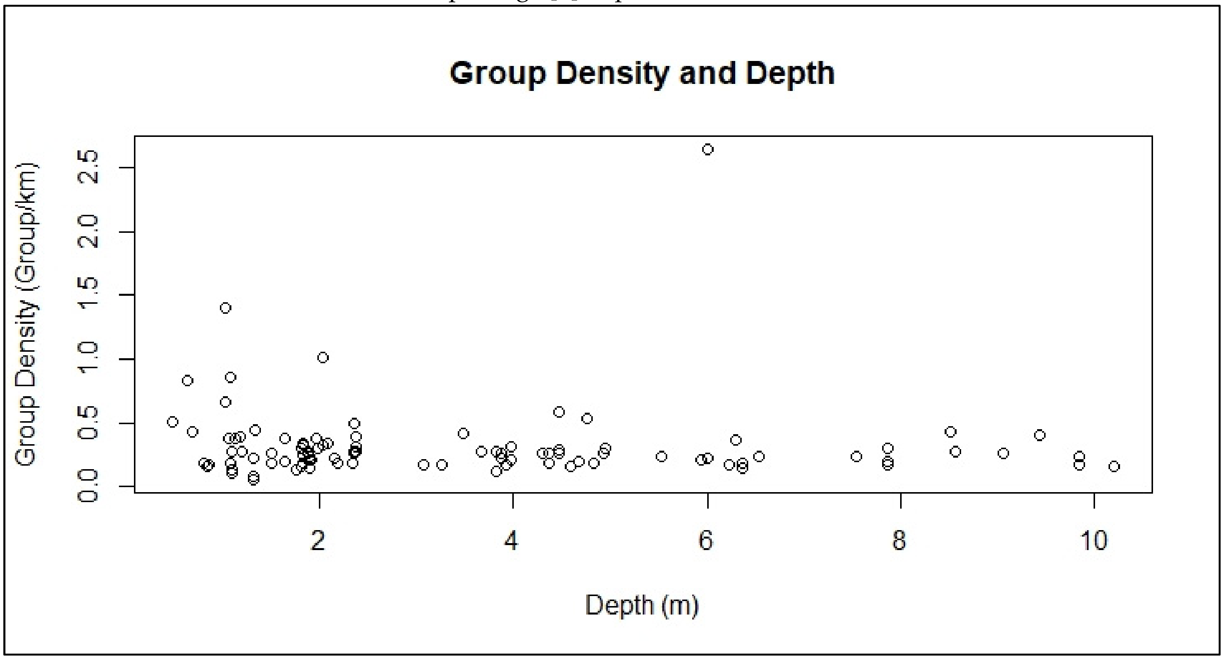
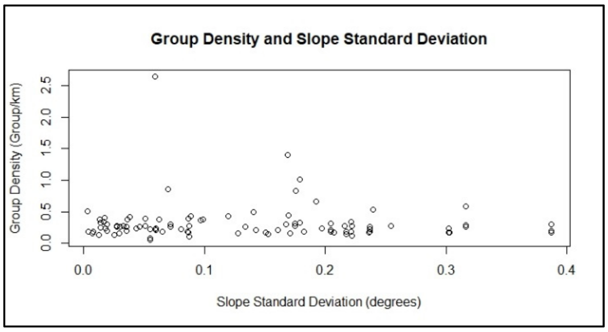
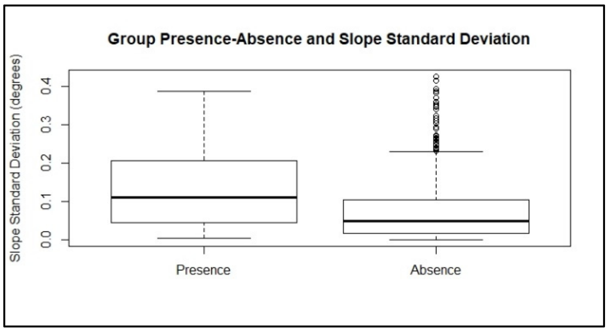


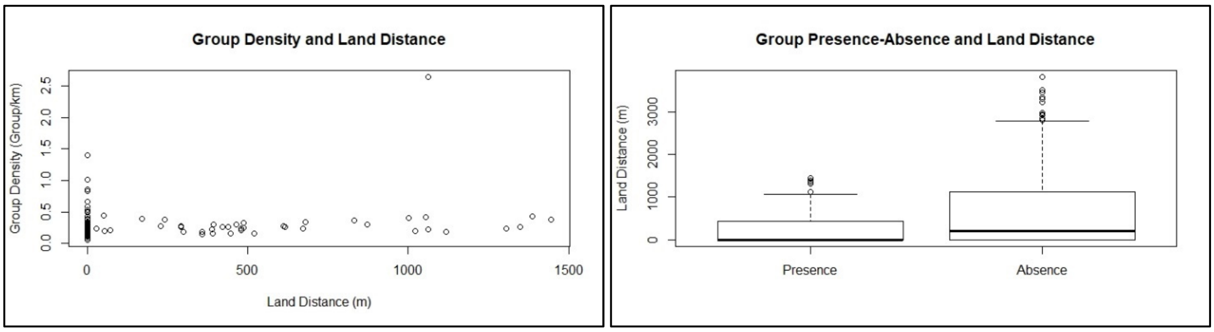
Figure S9. Presence-only group density values across depth. The ZAG model predicted that more dolphin groups used shallower depths.





(**a**) (**b**)

Figure S10. (**a**) Presence-only group density values across slope standard deviation; and (**b**) group presence-absence across slope standard deviation. The ZAG model predicted that group density was higher in areas with higher slope standard deviation; however, dolphin groups were more likely to be observed in areas with lower slope standard deviation.



(a) (b)

Figure S11. (**a**) Presence-only group density values across distance to land; and (**b**) group presence-absence across distance to land. The ZAG model predicted that dolphin group density was higher in areas further from land; however, dolphin groups were more likely to be observed in areas closer to land

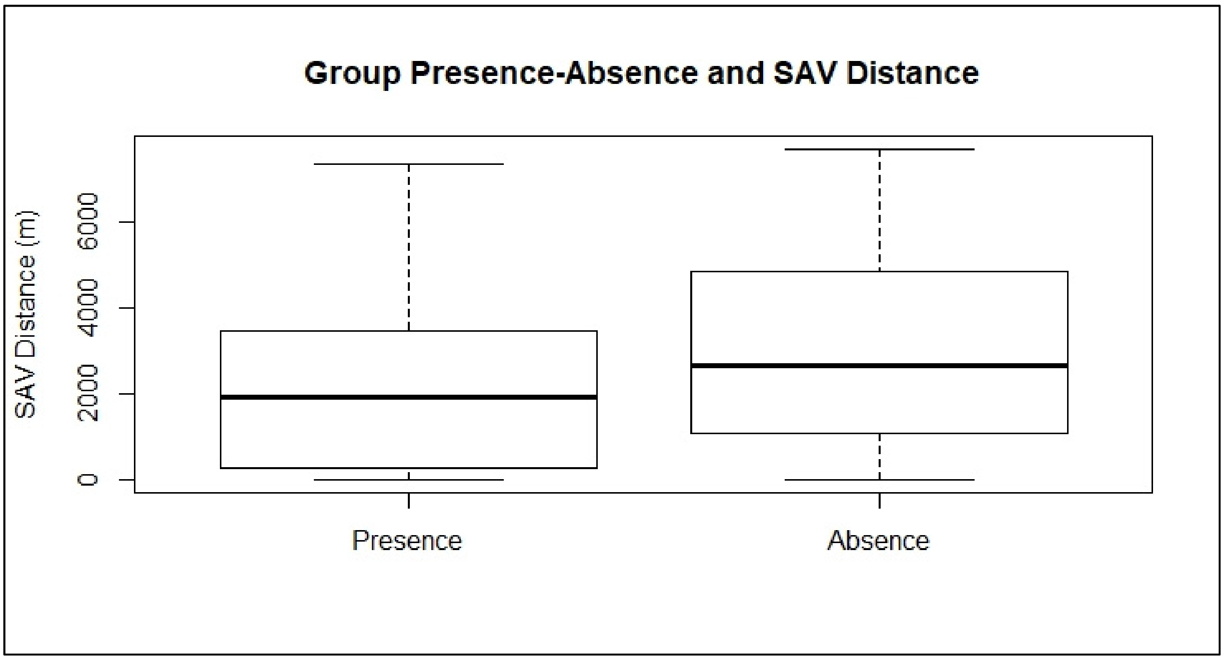


Figure S12. Group presence-absence across distance to SAV. The ZAG model predicted that dolphin groups were more likely to be observed in areas closer to SAV.

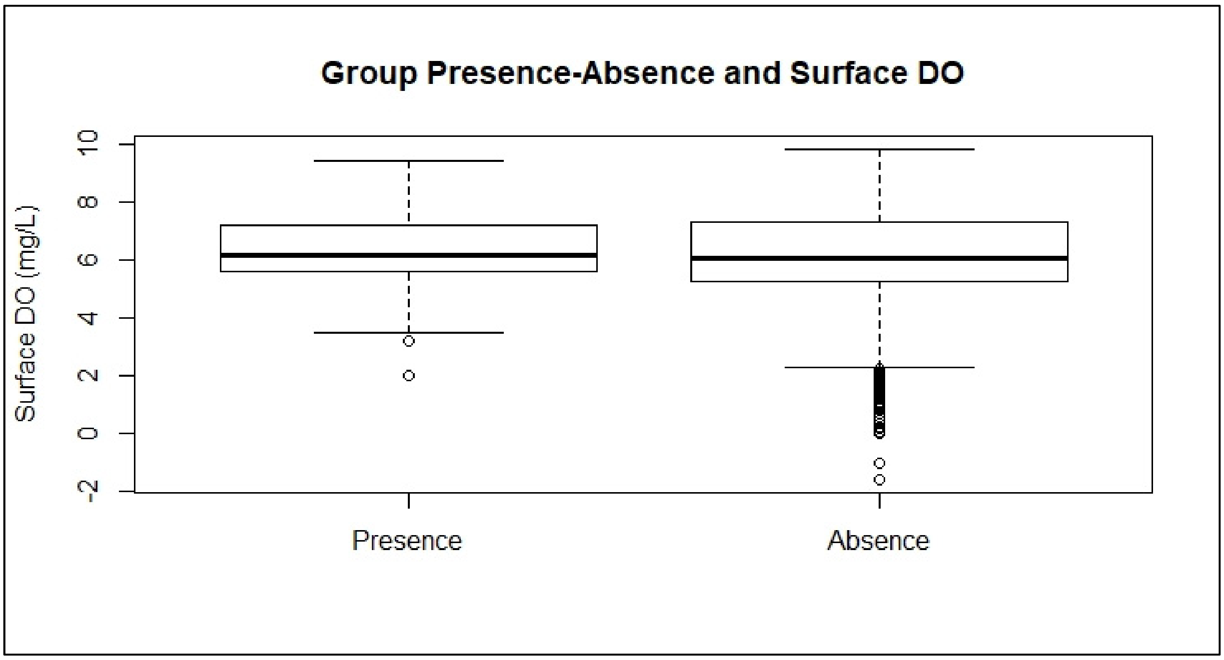


Figure S13. Group presence-absence across surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with lower surface DO. Note that maximum value for surface DO is approximately 10 mg/L compared to the maximum value for bottom DO is approximately 26 mg/L.

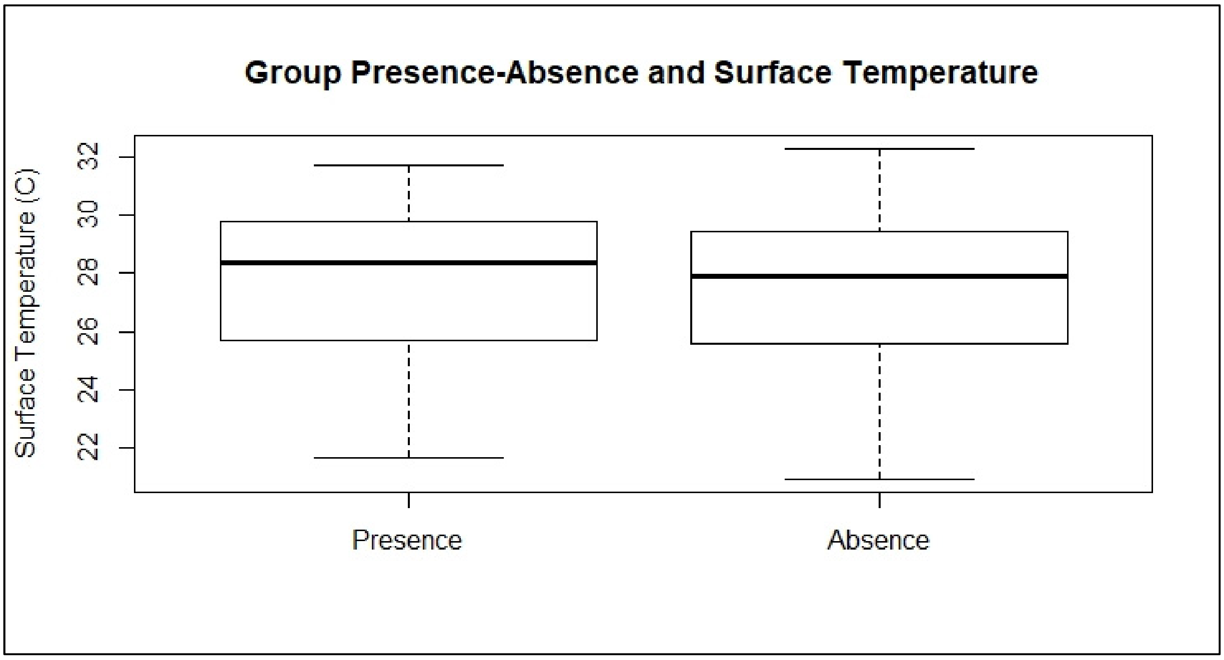
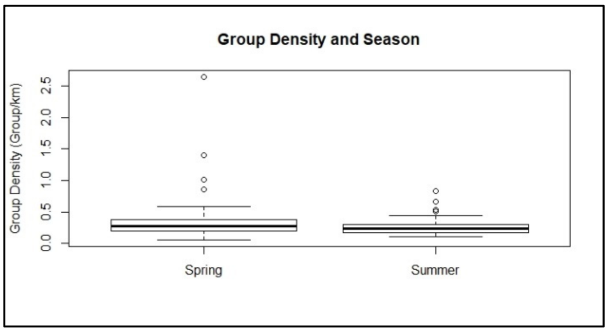
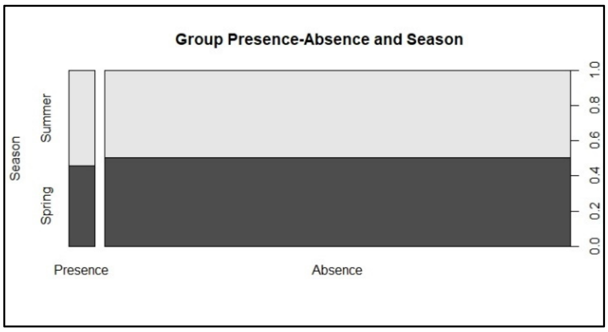


Figure S14. Group presence-absence across surface water temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with lower surface temperatures.





(**a**) (**b**)

Figure S15. (**a**) Presence-only group density values across spring and summer seasons; and (**b**) group presence-absence across spring and summer seasons. The ZAG model predicted that group density was higher in the spring and that dolphin groups were more likely to be observed in the spring compared to summer.

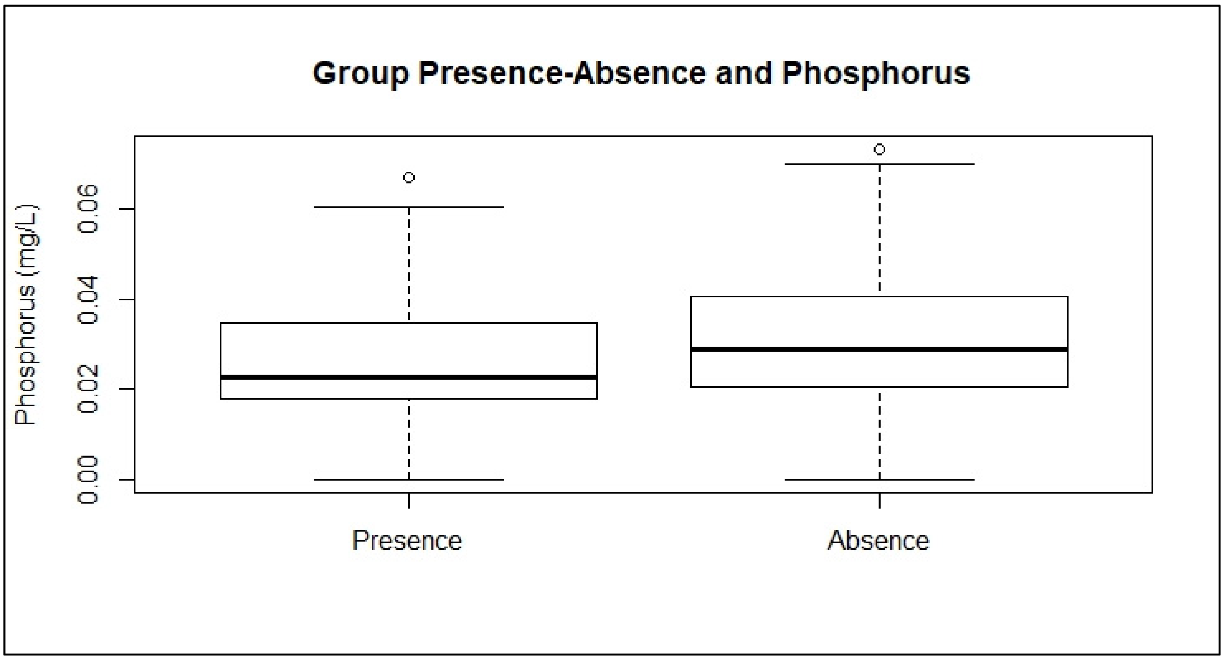


Figure S16. Group presence-absence across phosphorus concentrations. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher phosphorus concentrations.

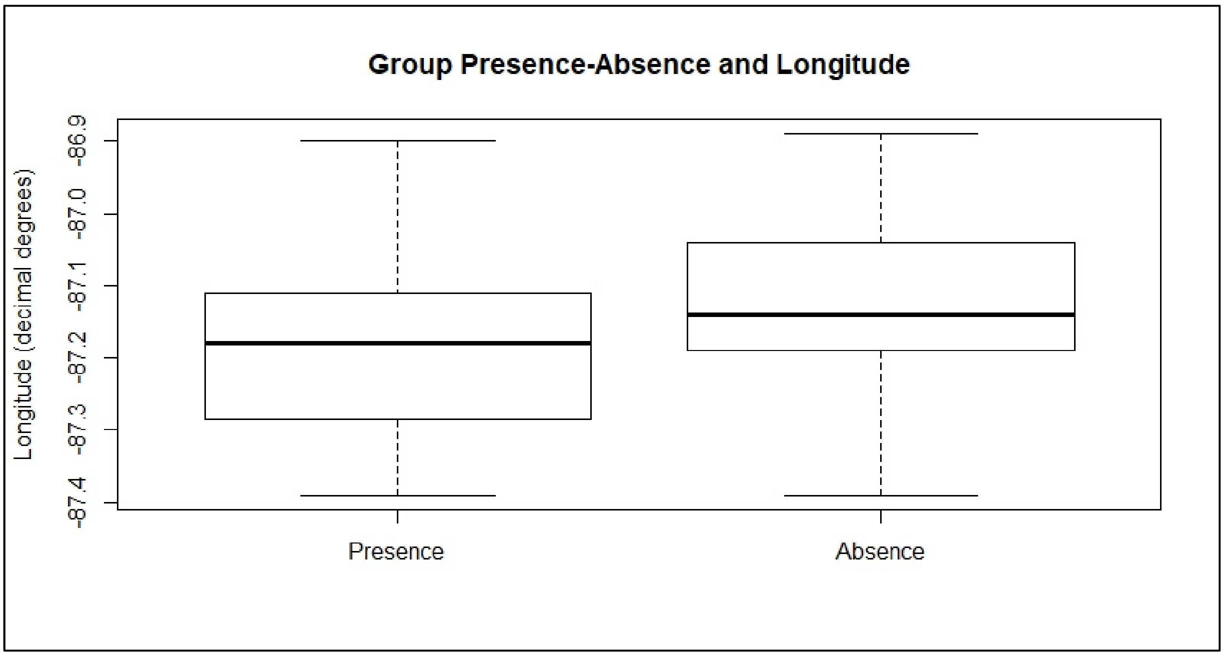
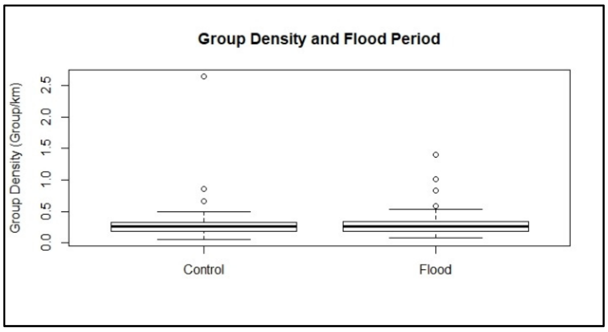
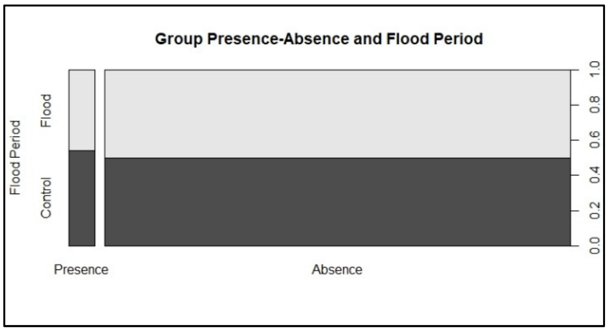


Figure S17. Group presence-absence across longitude. The ZAG model predicted that dolphin groups were more likely to be observed in areas further west.





(**a**) (**b**)

Figure S18. (**a**) Presence-only group density values across flood period; and (**b**) group presence-absence across flood period. The ZAG model predicted that group density was higher during flood-impacted sessions; however, dolphin groups were more likely to be observed during control sessions.

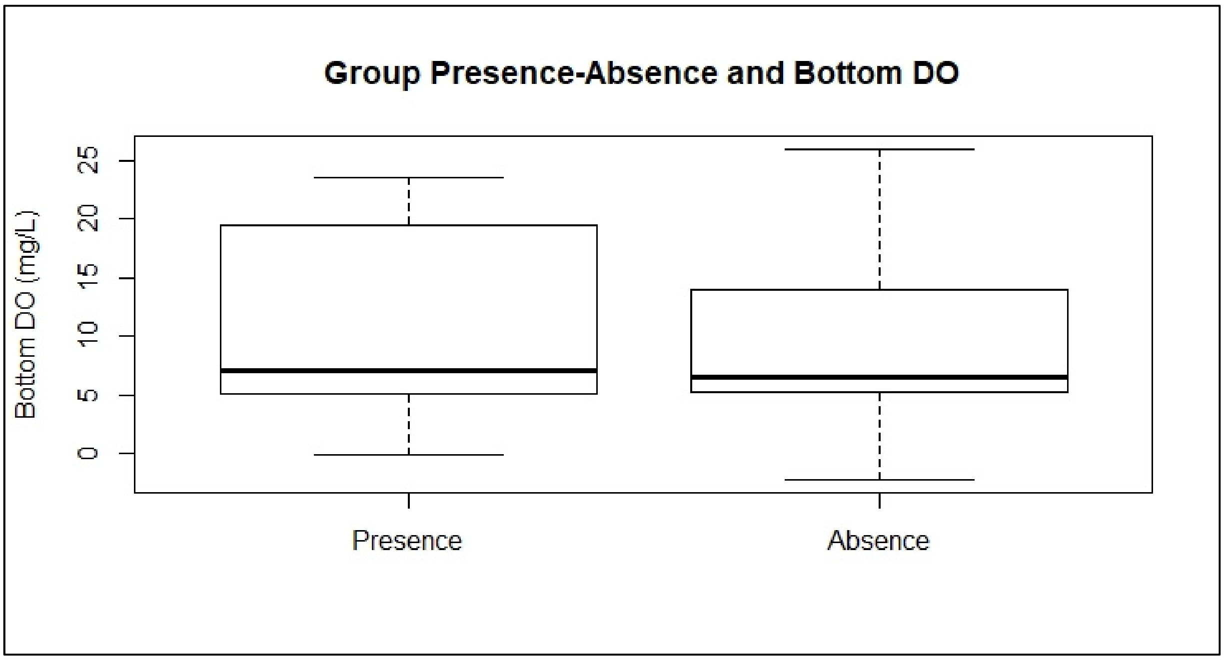
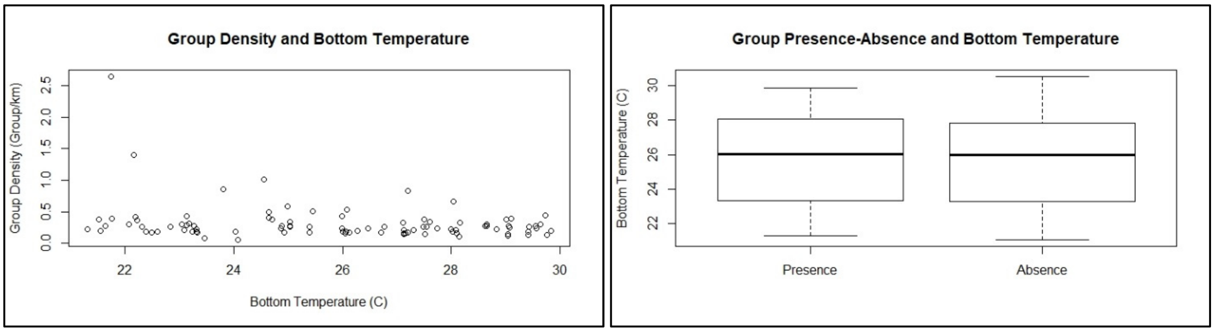
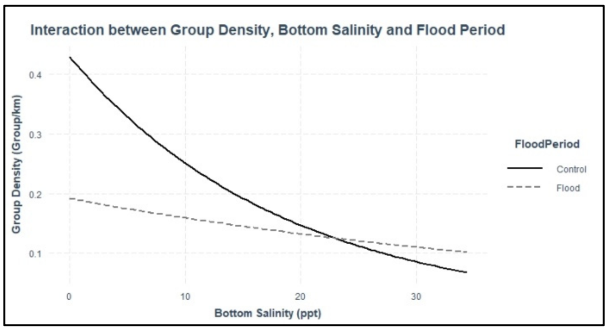


Figure S19. Group presence-absence across bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher bottom DO.

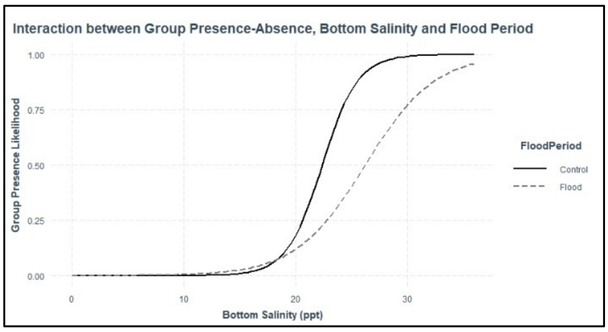


(**a**) (**b**)

Figure S20. (**a**) Presence-only group density values across bottom water temperature; and (**b**) group presence-absence across bottom water temperature. The ZAG model predicted that group density was higher in areas with lower bottom temperatures; however, dolphin groups were more likely to be observed in areas with higher bottom temperatures.



(a)



(b)

Figure S21. (**a**) Interaction between presence-only group density values, bottom salinity, and flood period; and (**b**) interaction between group presence-absence, bottom salinity, and flood period. The ZAG model predicted that group density was higher in areas with lower bottom salinities during both flood-impacted sessions and control sessions, but bottom salinity had a stronger effect on group density during control sessions. Group density decreased as bottom salinity increased during both flood-impacted sessions and control sessions, but this decline was sharper during control sessions. Conversely, the ZAG model predicted that dolphin groups were more likely to be present in areas with higher bottom salinities during both flood-impacted sessions and control sessions and bottom salinity had a stronger effect on dolphin presence during control sessions. The likelihood of group presence increased as bottom salinity increased during both flood-impacted sessions and control sessions, but this incline was sharper during control sessions.

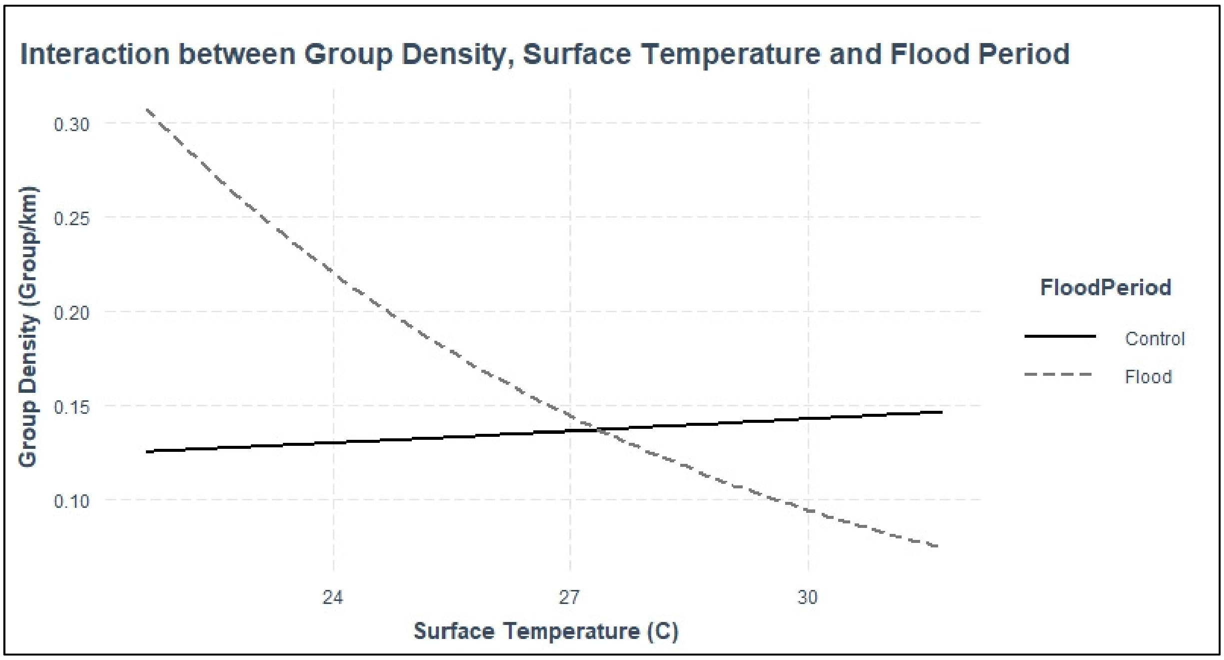
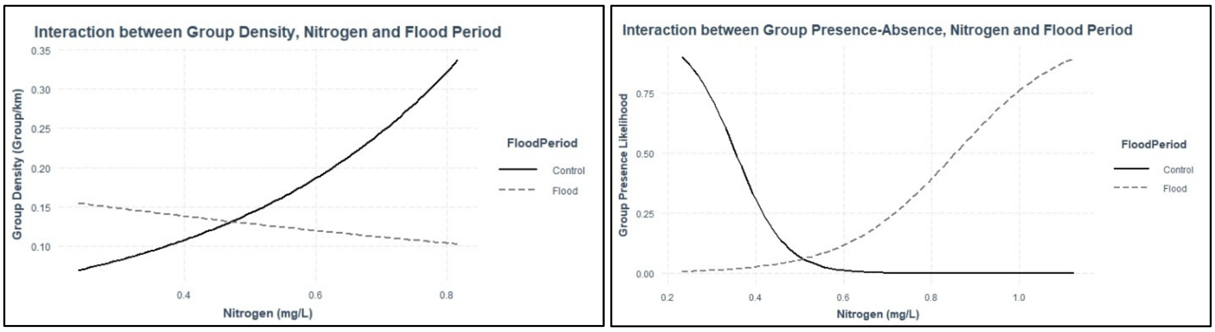


Figure S22. Interaction between presence-only group density, surface water temperature, and flood period. The ZAG model predicted that group density was higher in areas with lower surface temperatures during flood-impacted sessions compared to control sessions. Group density declined as surface temperature increased during flood-impacted sessions. Group density slightly increased as surface temperature increased during control sessions.



(**a**) (**b**)

Figure S23. (**a**) Interaction between presence-only group density values, nitrogen concentration, and flood period; and (**b**) interaction between group presence-absence, nitrogen concentration, and flood period. The ZAG model predicted that dolphin group density was higher in areas with lower nitrogen concentrations during flood-impacted sessions compared to control sessions. Group density slightly declined as nitrogen concentration increased during flood-impacted sessions. Group density increased as nitrogen concentration increased during control sessions. However, the ZAG model predicted that dolphin groups were more likely to be observed in areas with higher nitrogen concentrations during flood-impacted sessions compared to control sessions. The likelihood of dolphin presence increased as nitrogen concentration increased during flood-impacted sessions. The likelihood of dolphin presence decreased as nitrogen concentration increased during control sessions.

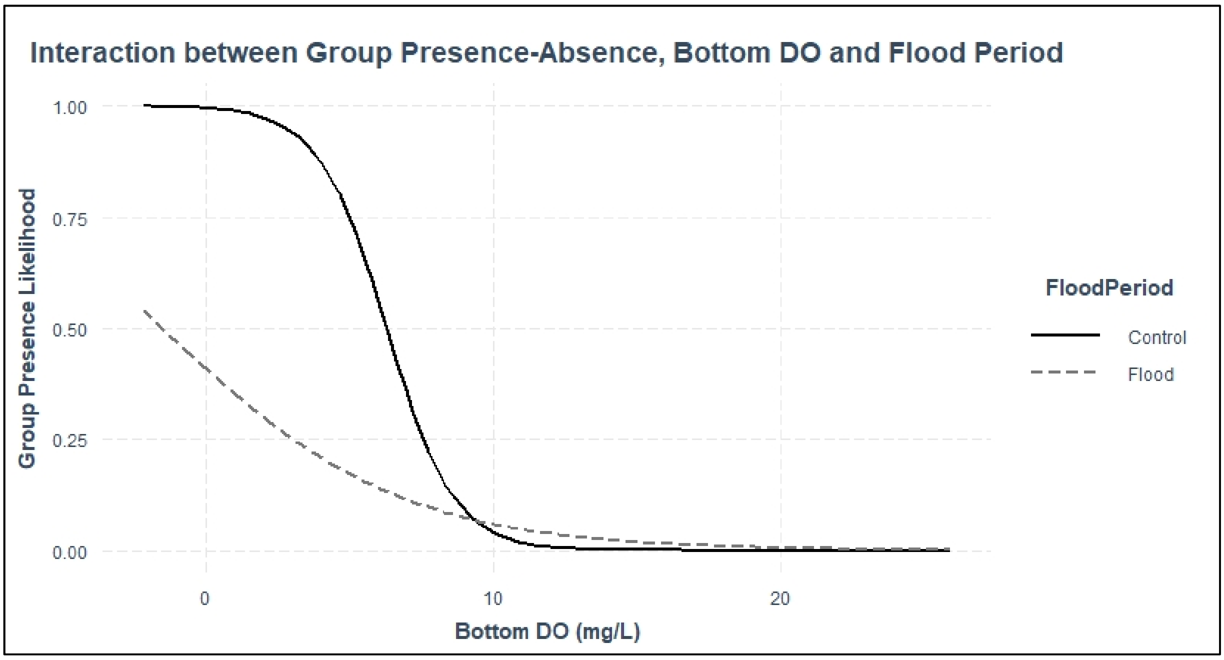


Figure S24. Interaction between group presence-absence, bottom DO, and flood period. The ZAG model predicted that dolphin groups were more likely to be observed in areas with lower bottom DO during both flood-impacted sessions and control sessions, but bottom DO had a stronger effect on dolphin presence during control sessions. The likelihood of group presence decreased as bottom DO increased during both flood-impacted sessions and control sessions, but this decline was sharper during control sessions.

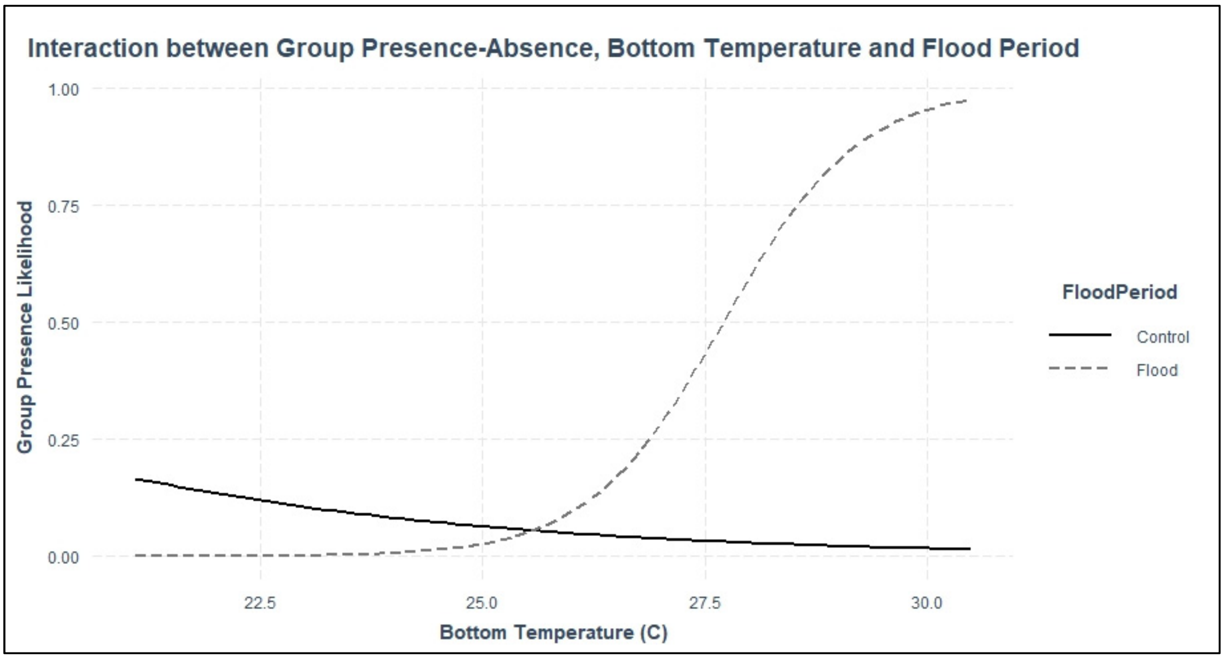


Figure S25. Interaction between group presence-absence, bottom water temperature, and flood period. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher bottom temperatures during flood-impacted sessions compared to control sessions. The likelihood of group presence increased as bottom temperature increased during flood-impacted sessions. The likelihood of group presence slightly declined as bottom temperature increased during control sessions.

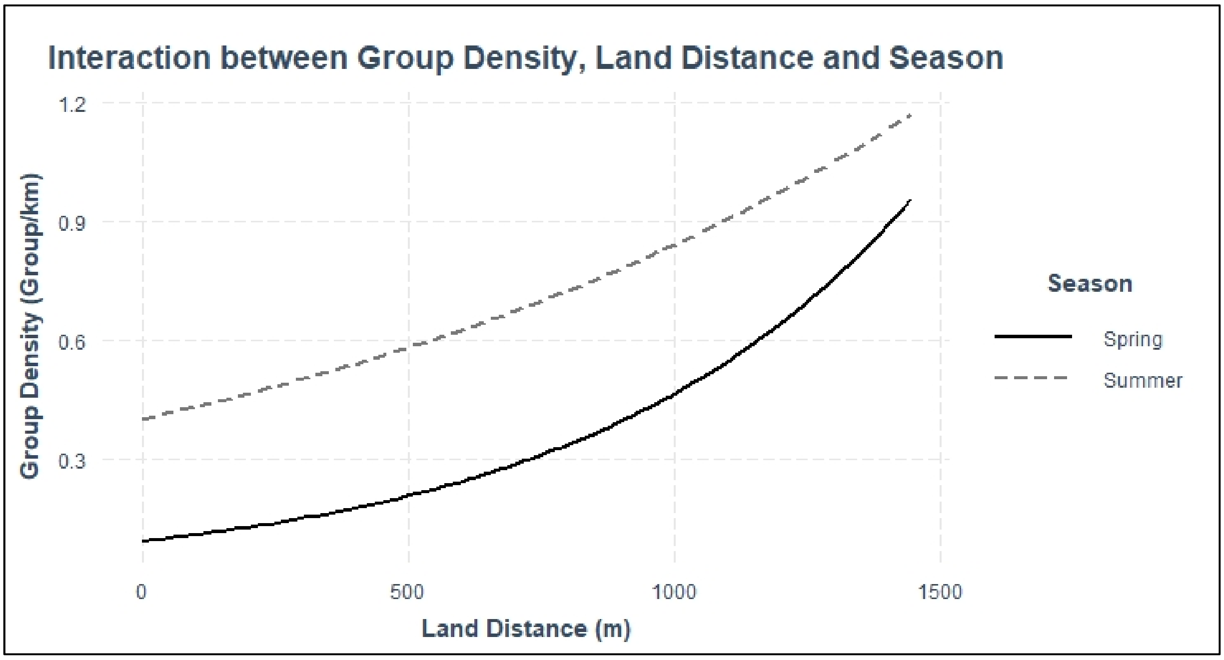


Figure S26. Interaction between presence-only group density, land distance and season. The ZAG model predicted that group density was higher in areas further from land during both spring and summer, but land distance had a stronger effect on group density during spring. Group density increased as land distance increased during both spring and summer, but this incline was sharper during spring.

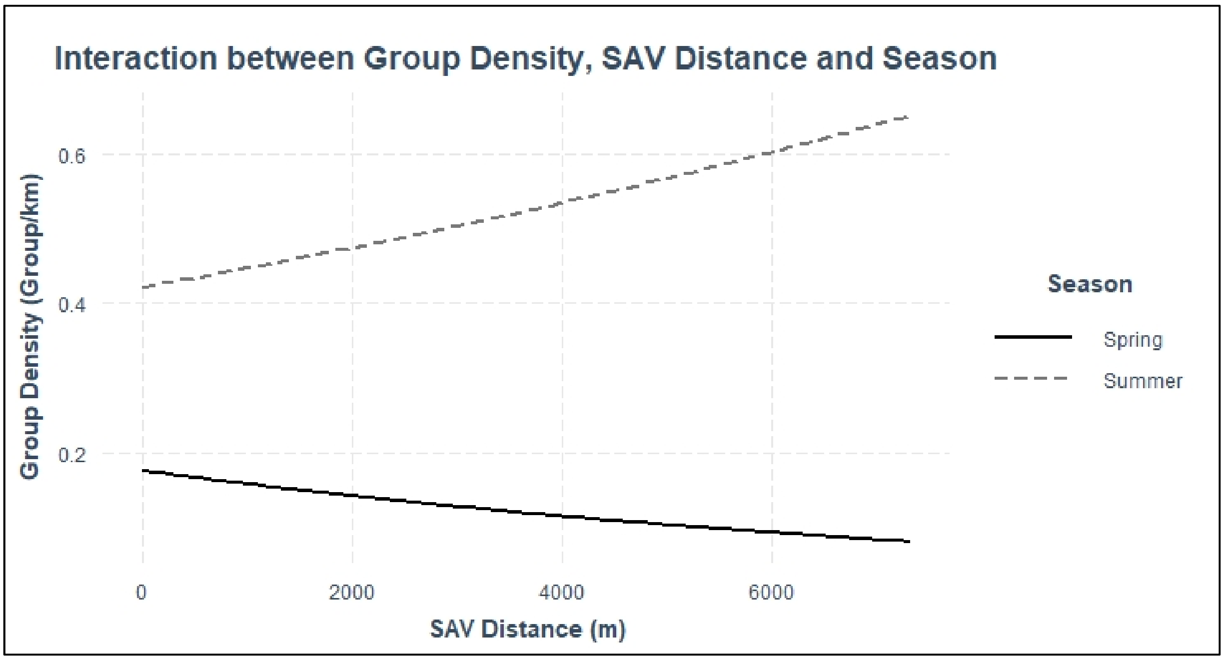


Figure S27. Interaction between presence-only group density, SAV distance, and season. The ZAG model predicted that group density was higher in areas further from SAV during summer compared to spring. Group density decreased as distance from SAV increased during spring. Group density increased as distance from SAV increased during summer.

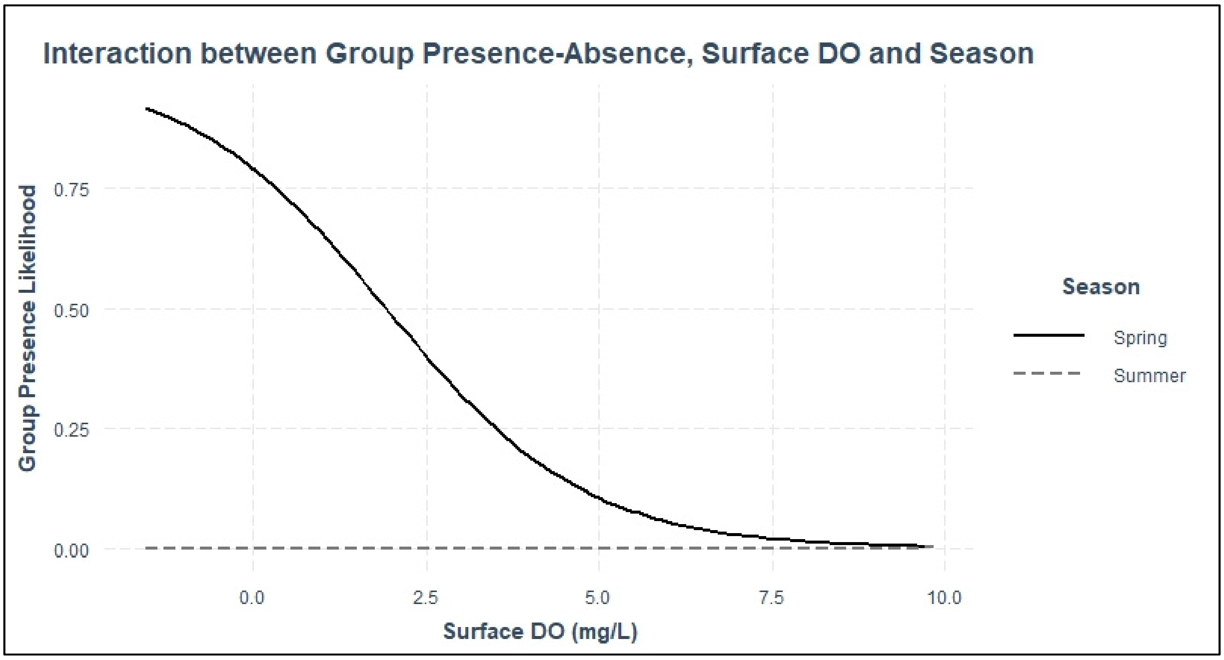


Figure S28. Interaction between group presence-absence, surface DO and season. The ZAG model predicted that dolphin groups were more likely to be observed in areas with lower surface DO during spring compared to summer. The likelihood of group presence decreased as surface DO increased during spring. The likelihood of group presence did not change as surface DO increased during summer.

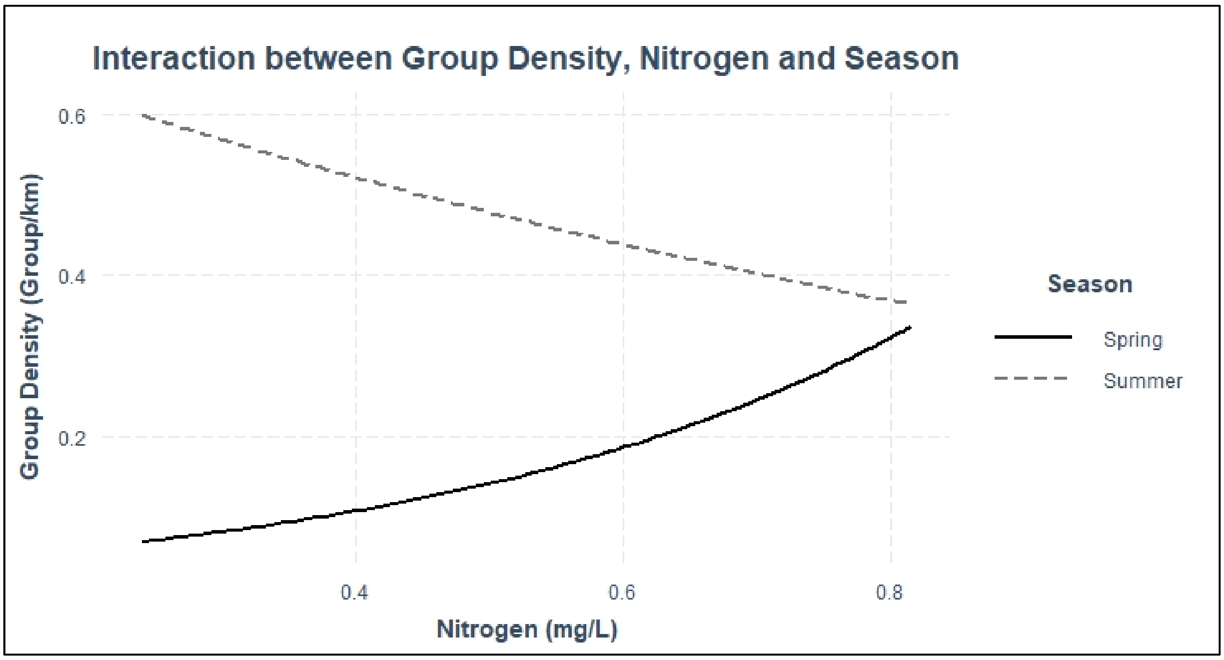


Figure S29. Interaction between presence-only group density, nitrogen, and season. The ZAG model predicted that group density was higher in areas with lower nitrogen concentrations during summer compared to spring. Group density increased as nitrogen concentration increased during the spring. Group density decreased as nitrogen concentration increased during summer.

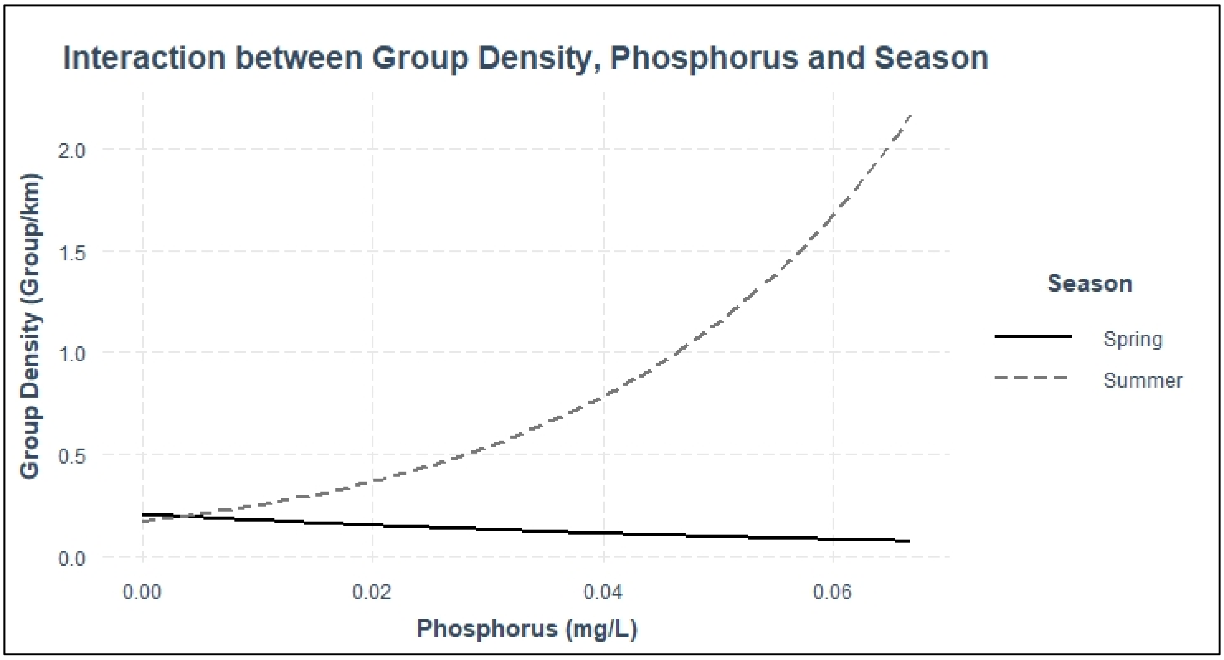


Figure S30. Interaction between presence-only group density, phosphorus and season. The ZAG model predicted that group density was higher in areas with higher phosphorus concentrations during summer compared to spring. Group density slightly decreased as phosphorus concentration increased during spring. Group density increased as phosphorus concentration increased during summer.

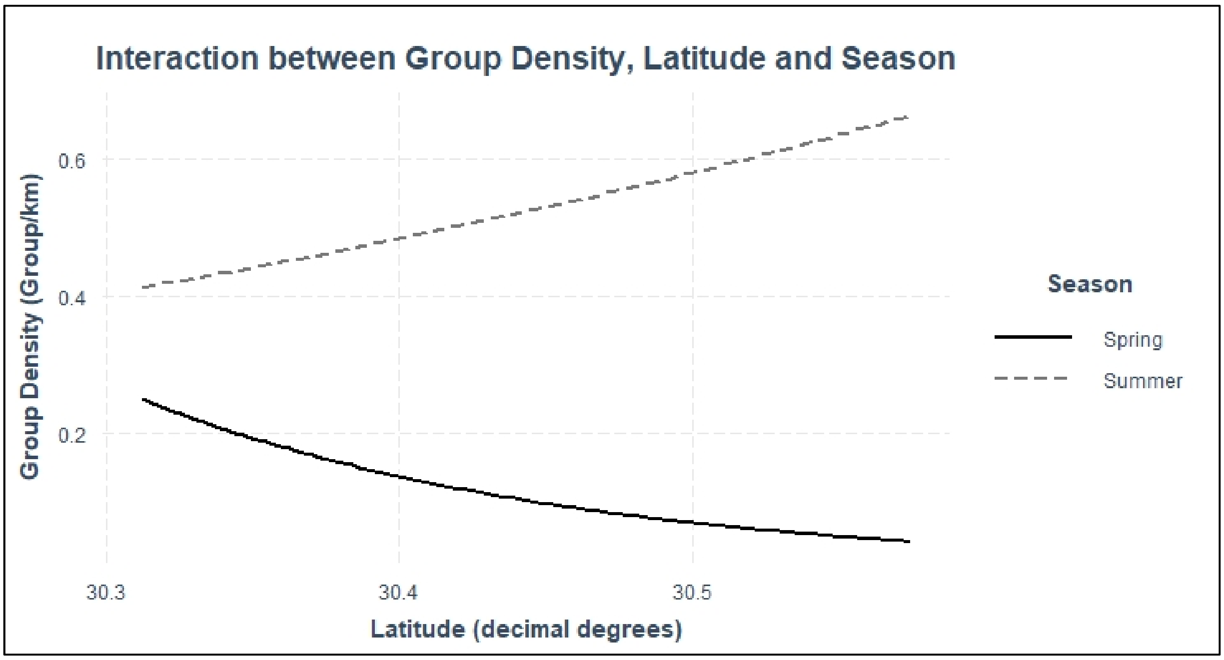


Figure S31. Interaction between presence-only group density, latitude, and season. The ZAG model predicted that group density was higher in areas further north during summer compared to spring. Group density decreased towards the north during spring. Group density increased towards the north during summer.

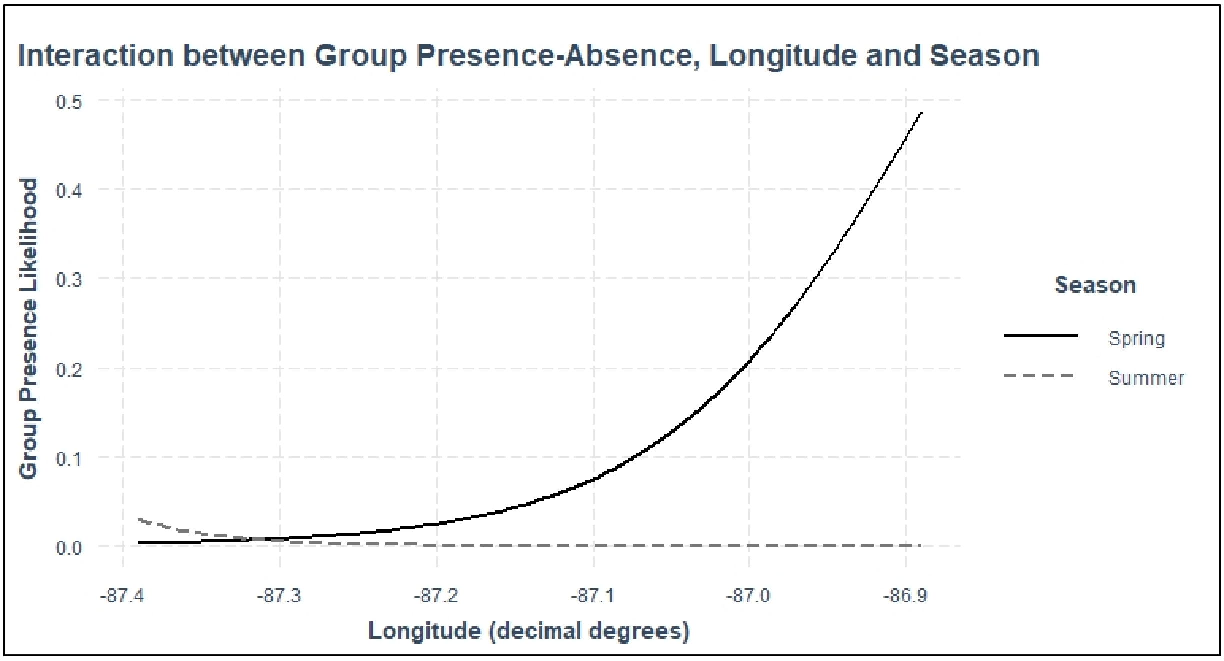


Figure S32. Interaction between group presence-absence, longitude, and season. The ZAG model predicted that dolphin groups were more likely to be observed in areas further east during spring compared to summer. The likelihood of group presence increased towards the east during spring. The likelihood of group presence slightly declined towards the east during summer.

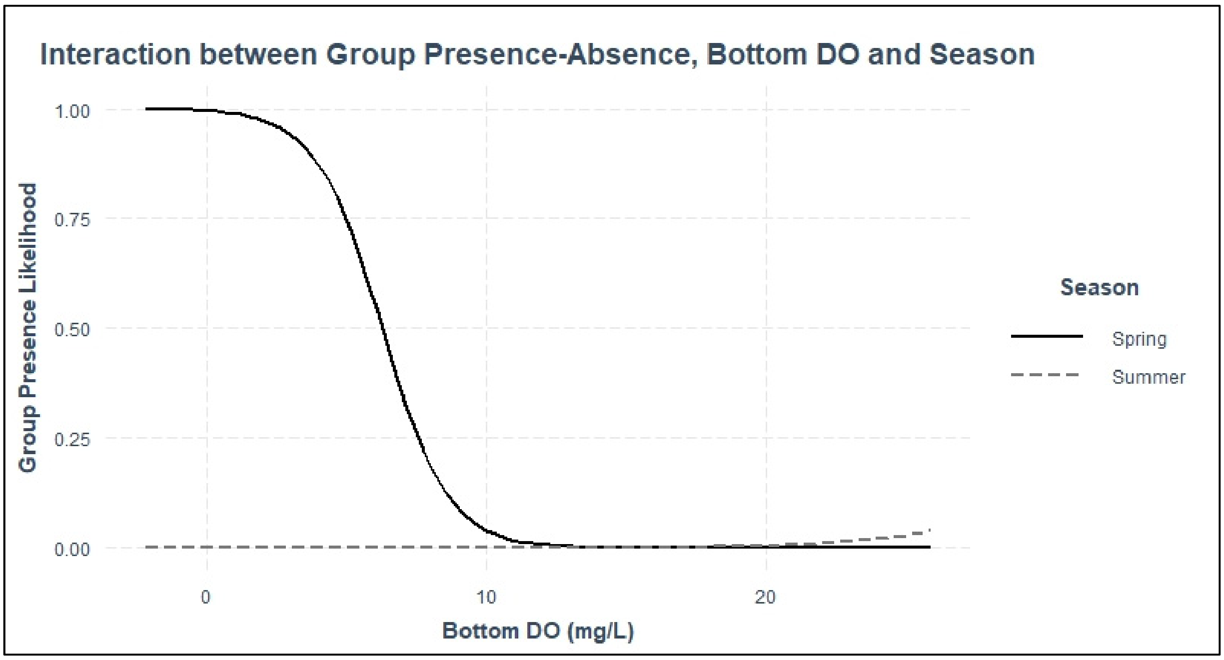


Figure S33. Interaction between group presence-absence, bottom DO, and season. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher bottom DO during spring compared to summer. The likelihood of group presence decreased as bottom DO increased during spring. The likelihood of group presence changed very little as bottom DO increased during summer.

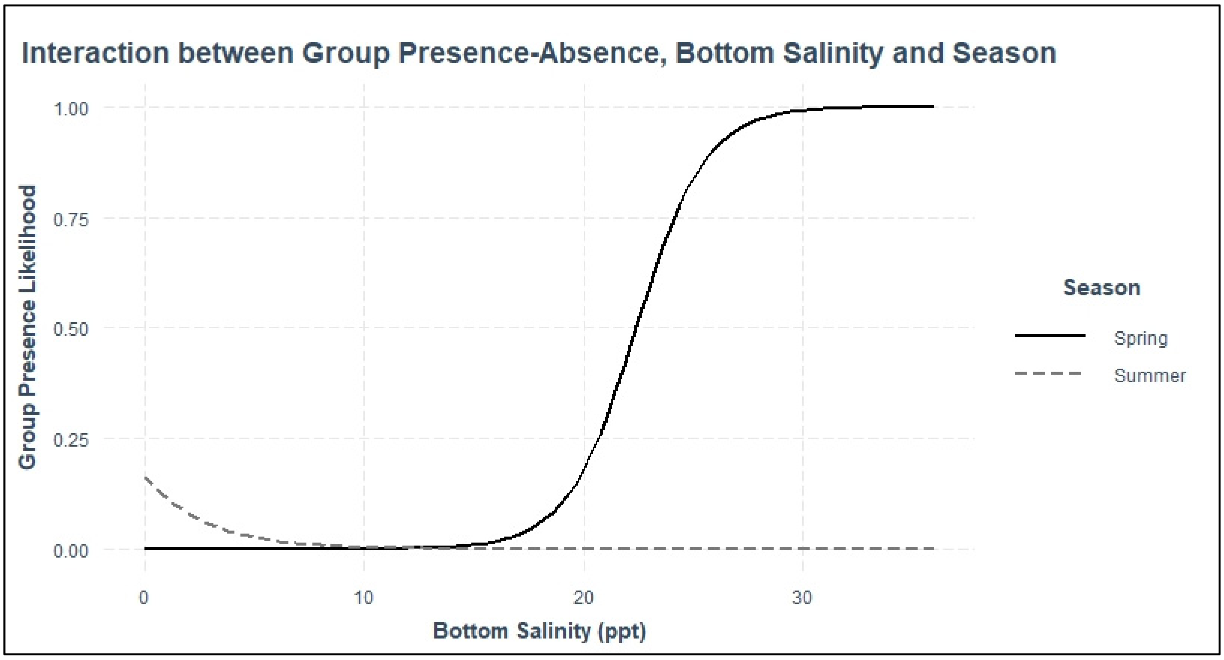


Figure S34. Interaction between group presence-absence, bottom salinity, and season. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher bottom salinities during spring compared to summer. The likelihood of group presence increased as bottom salinity increased during spring. The likelihood of group presence decreased as bottom salinity increased during summer.

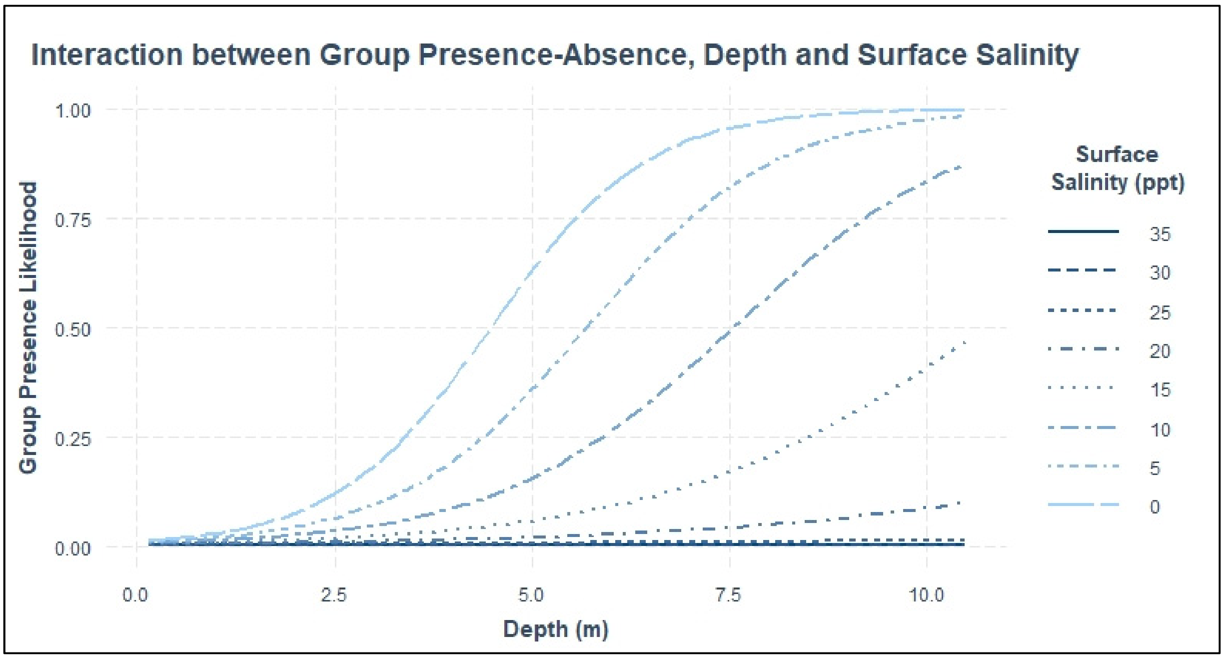


Figure S35. Interaction between group presence-absence, depth, and surface salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with higher depths and lower surface salinities. The likelihood of group presence increased as depth increased and surface salinity decreased.

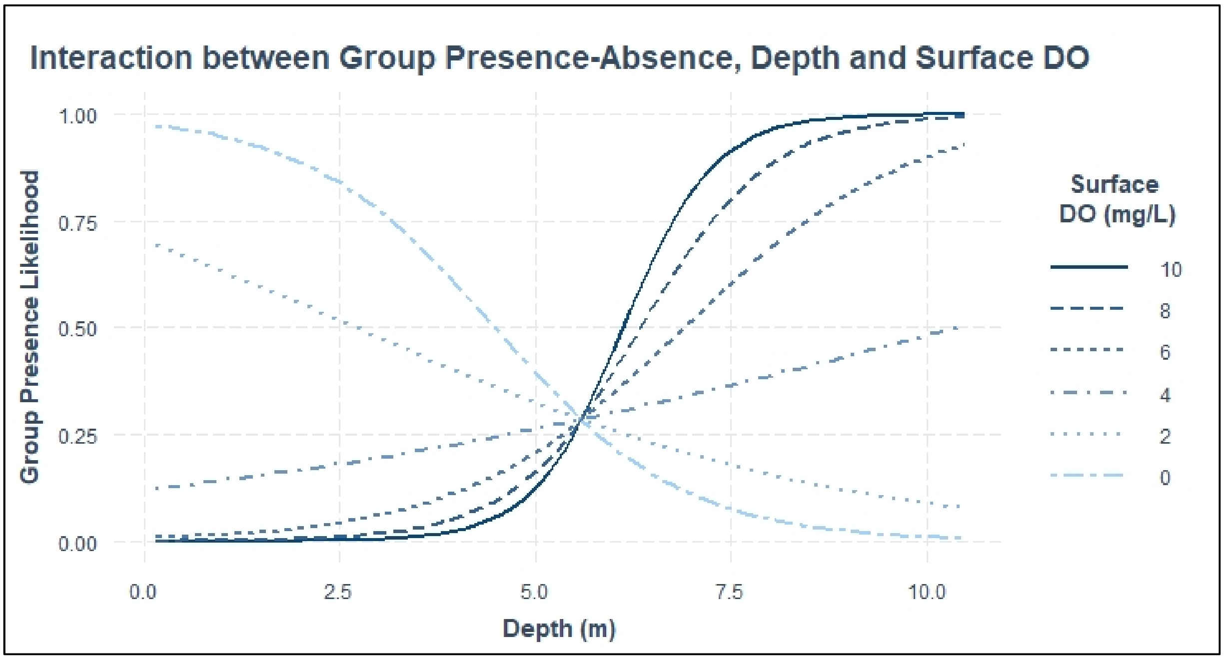


Figure S36. Interaction between group presence-absence, depth, and surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with lower depths and lower surface DO as well as areas with higher depths and higher surface DO. The likelihood of group presence in areas with low surface DO decreased as depth increased. The likelihood of group presence in areas with high surface DO increased as depth increased.

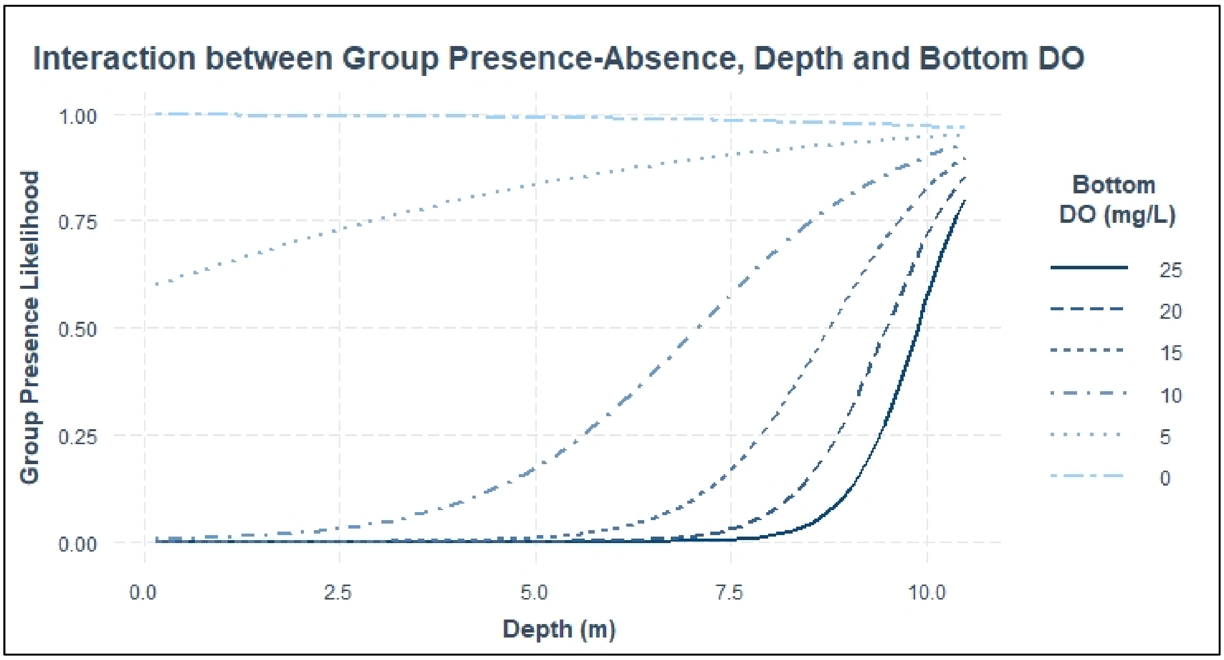


Figure S37. Interaction between group presence-absence, depth, and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom DO regardless of depth and areas with higher depths and higher bottom DO. The likelihood of group presence was high in areas with low bottom DO and it remained high as depth increased. The likelihood of group presence in areas with high bottom DO increased as depth increased.

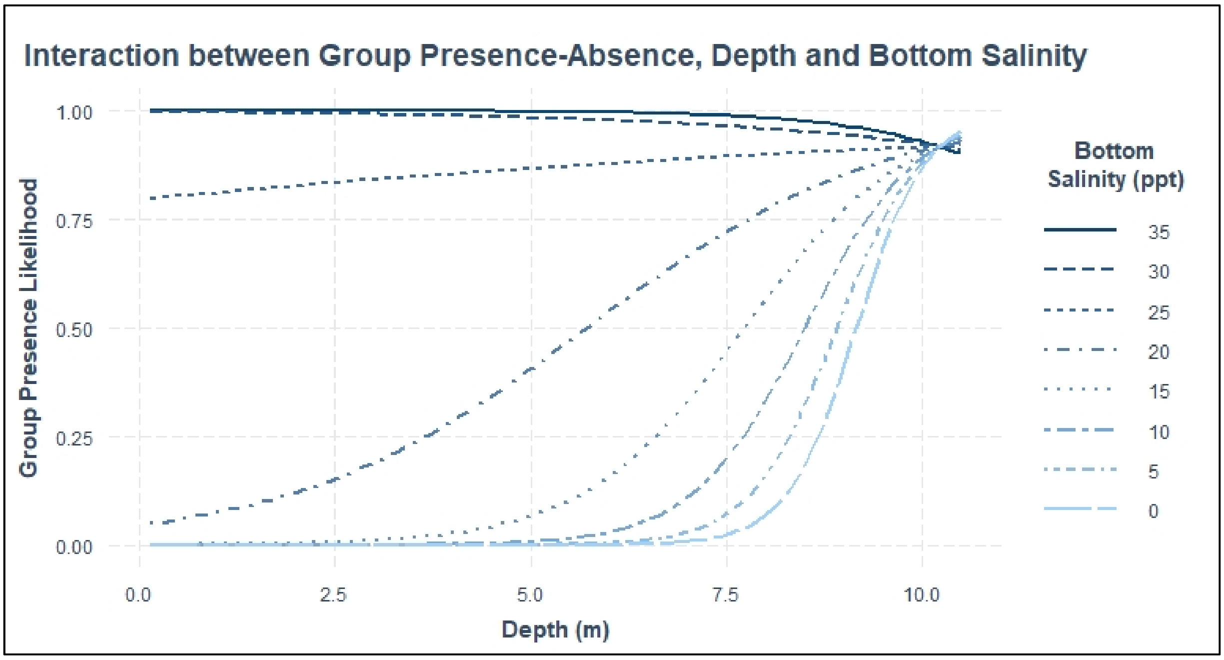


Figure S38. Interaction between group presence-absence, depth, and bottom salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high bottom salinities regardless of depth and areas with higher depths and lower bottom salinities. The likelihood of group presence was high in areas with high bottom salinities and it remained high as depth increased. The likelihood of group presence in areas with low bottom salinities increased as depth increased.

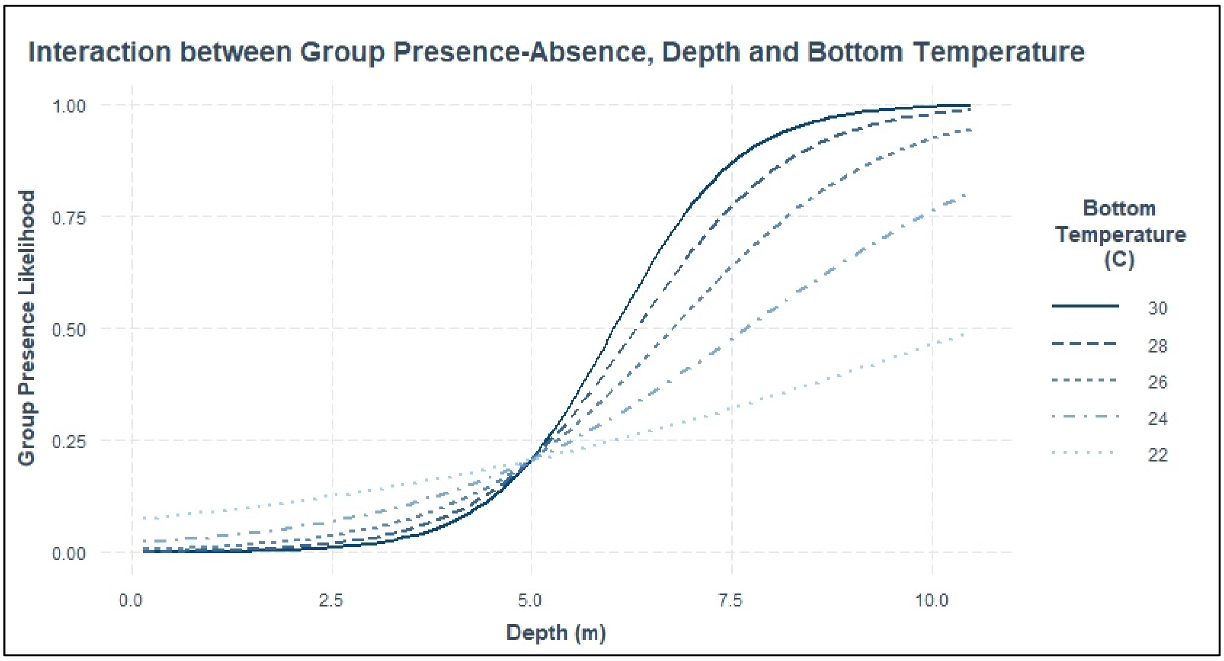


Figure S39. Interaction between group presence-absence, depth, and bottom temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high depths and high bottom temperatures. The likelihood of group presence increased as depth increased across all bottom temperatures, but this incline was sharper across higher bottom temperatures.

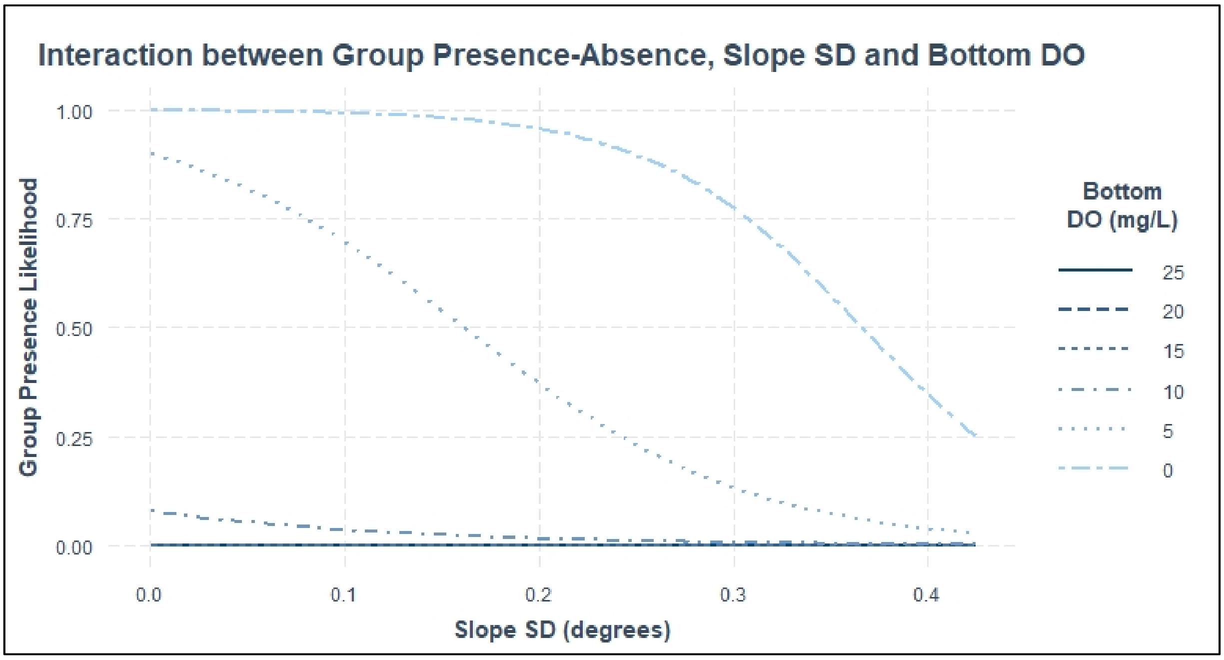


Figure S40. Interaction between group presence-absence, slope standard deviation, and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low slope standard deviation and low bottom DO. The likelihood of group presence in areas with low bottom DO decreased as slope standard deviation increased. The likelihood of group presence in areas with high bottom DO was low and it did not change as slope standard deviation increased.

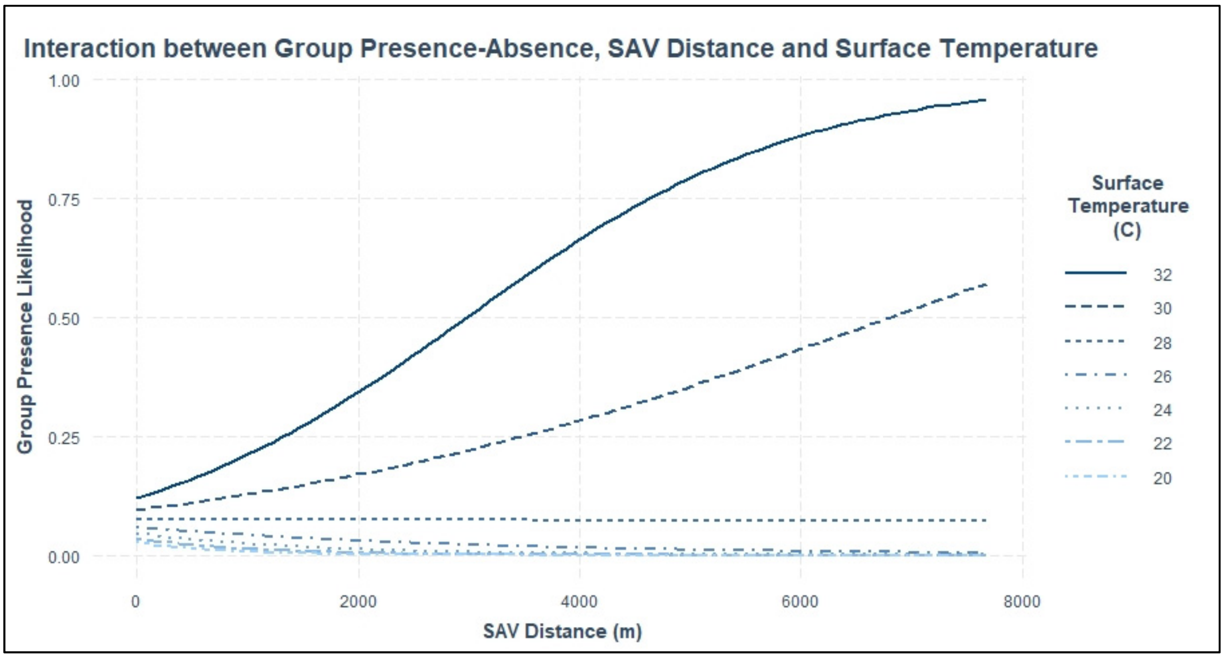


Figure S41. Interaction between group presence-absence, SAV distance, and surface temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high surface temperatures and further from SAV. The likelihood of group presence in areas with high surface temperatures increased as distance to SAV increased. The likelihood of group presence in areas with low surface temperatures was low and it did not change as distance from SAV increased.

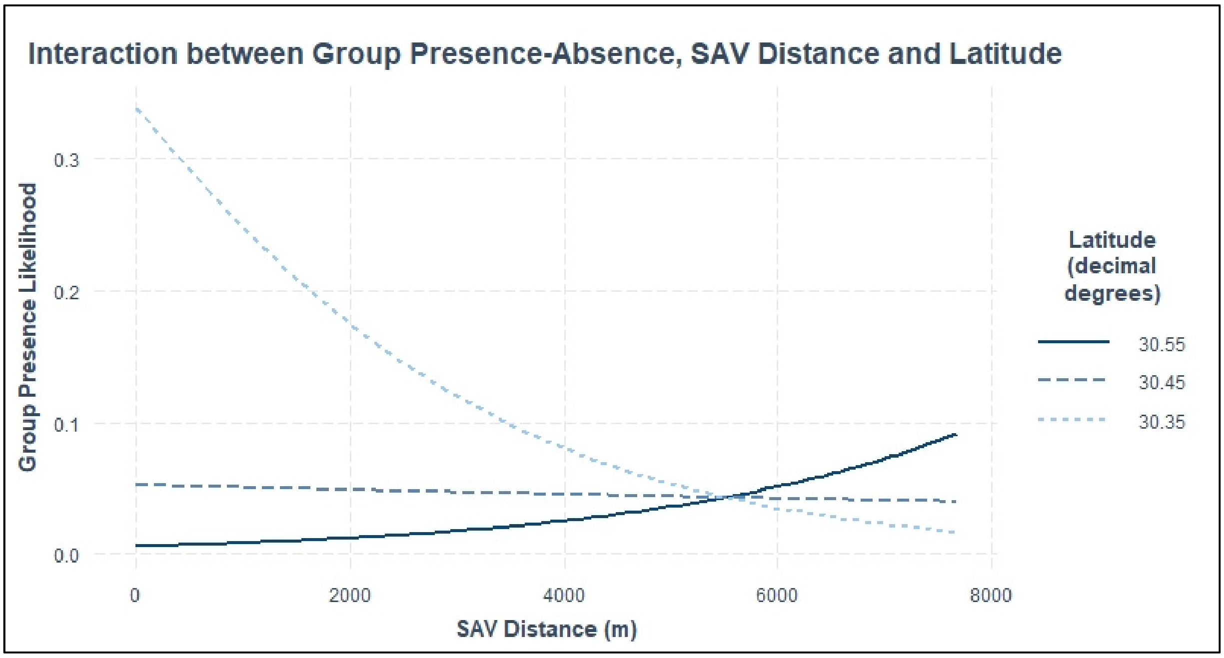


Figure S42. Interaction between group presence-absence, SAV distance, and latitude. The ZAG model predicted that dolphin groups were more likely to be observed in areas closer to SAV and areas further south. The likelihood of group presence in areas further south decreased as distance to SAV increased. The likelihood of group presence in areas further north increased slightly as distance from SAV increased.

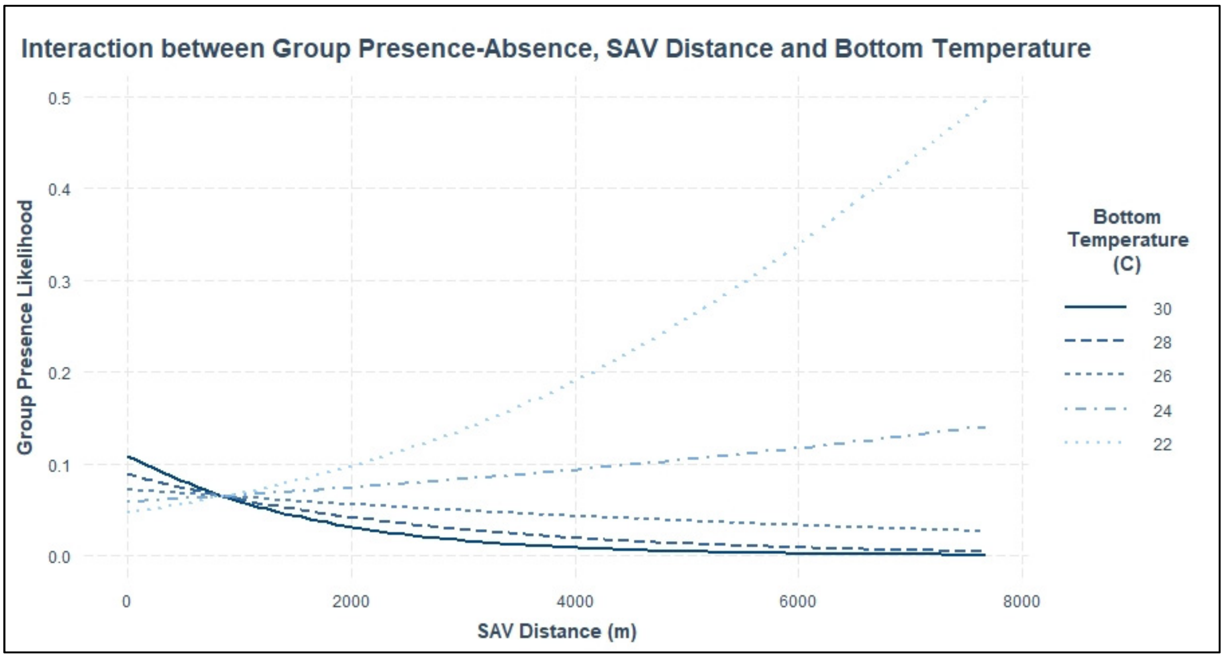


Figure S43. Interaction between group presence-absence, SAV distance, and bottom temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom temperatures and further from SAV. The likelihood of group presence in areas with low bottom temperatures increased as distance to SAV increased. The likelihood of group presence in areas with high bottom temperatures slightly decreased as distance from SAV increased.

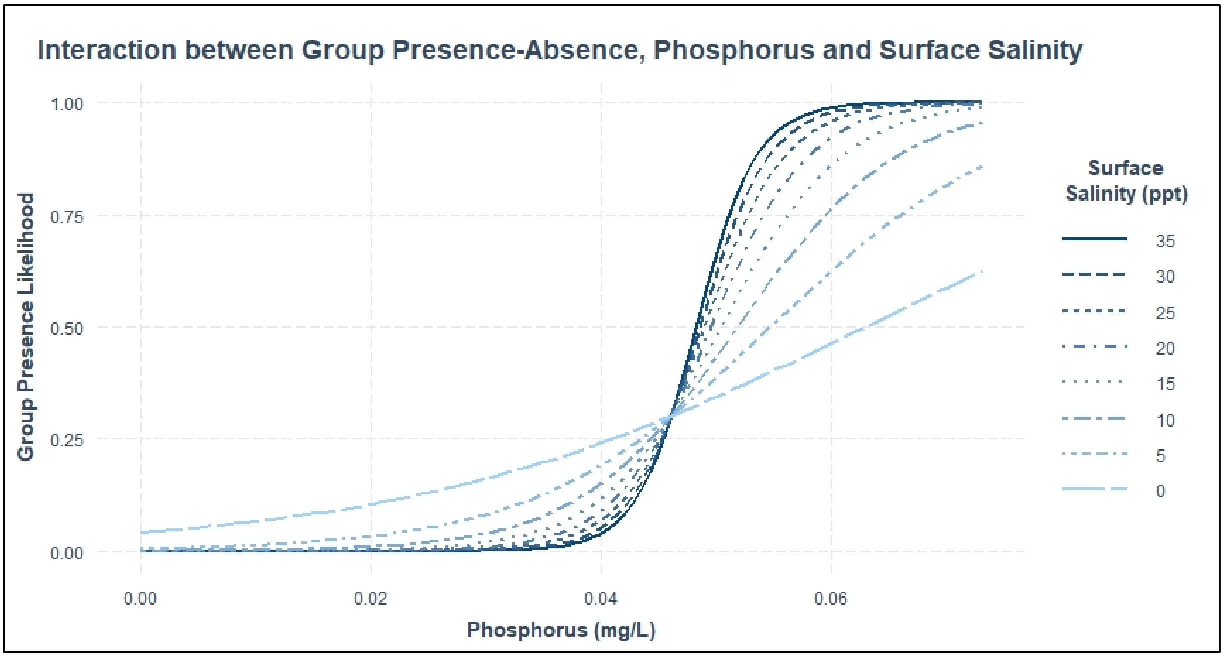


Figure S44. Interaction between group presence-absence, phosphorus, and surface salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high surface salinities and high phosphorus concentrations. The likelihood of group presence increased as phosphorus concentrations increased across all surface salinities, but this incline was sharper across higher surface salinities.

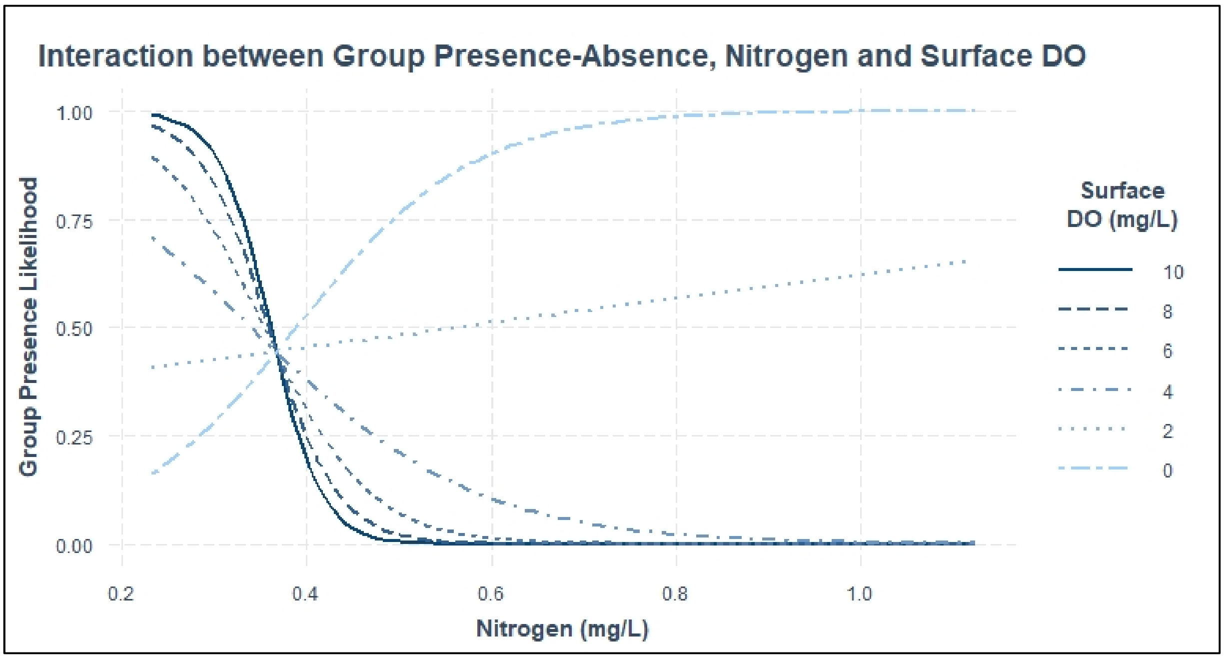


Figure S45. Interaction between group presence-absence, nitrogen and surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high surface DO and low nitrogen concentrations and areas with low surface DO and high nitrogen concentrations. The likelihood of group presence in areas with high surface DO decreased as nitrogen concentrations increased. The likelihood of group presence in areas with low surface DO increased as nitrogen concentrations increased.

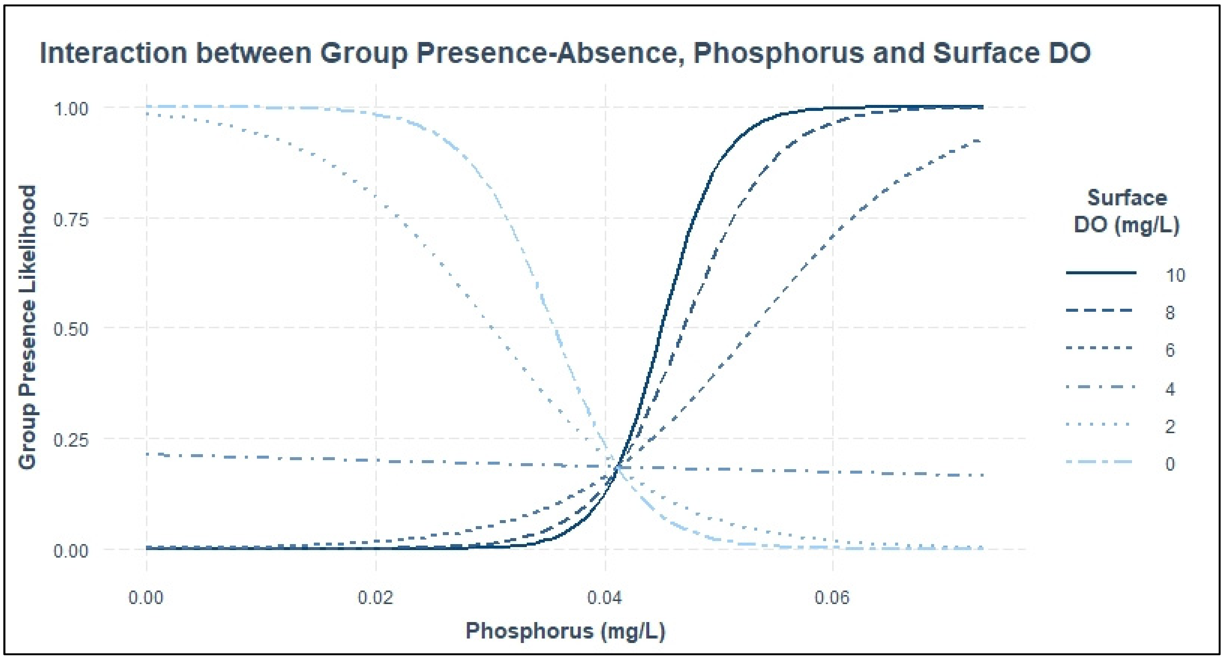


Figure S46. Interaction between group presence-absence, phosphorus and surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low surface DO and low phosphorus concentrations and areas with high surface DO and high phosphorus concentrations. The likelihood of group presence in areas with low surface DO decreased as phosphorus concentrations increased. The likelihood of group presence in areas with high surface DO increased as phosphorus concentrations increased.

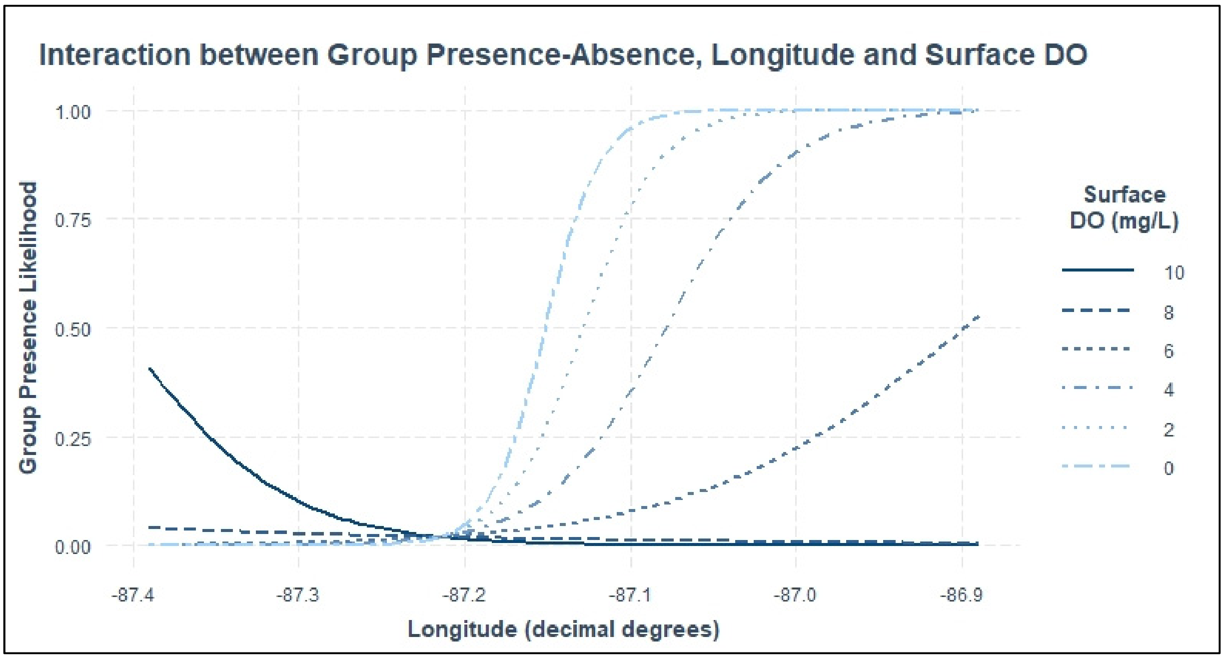


Figure S47. Interaction between group presence-absence, longitude and surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low surface DO further east. The likelihood of group presence in areas with low surface DO increased towards the east. The likelihood of group presence in areas with high surface DO decreased towards the east.

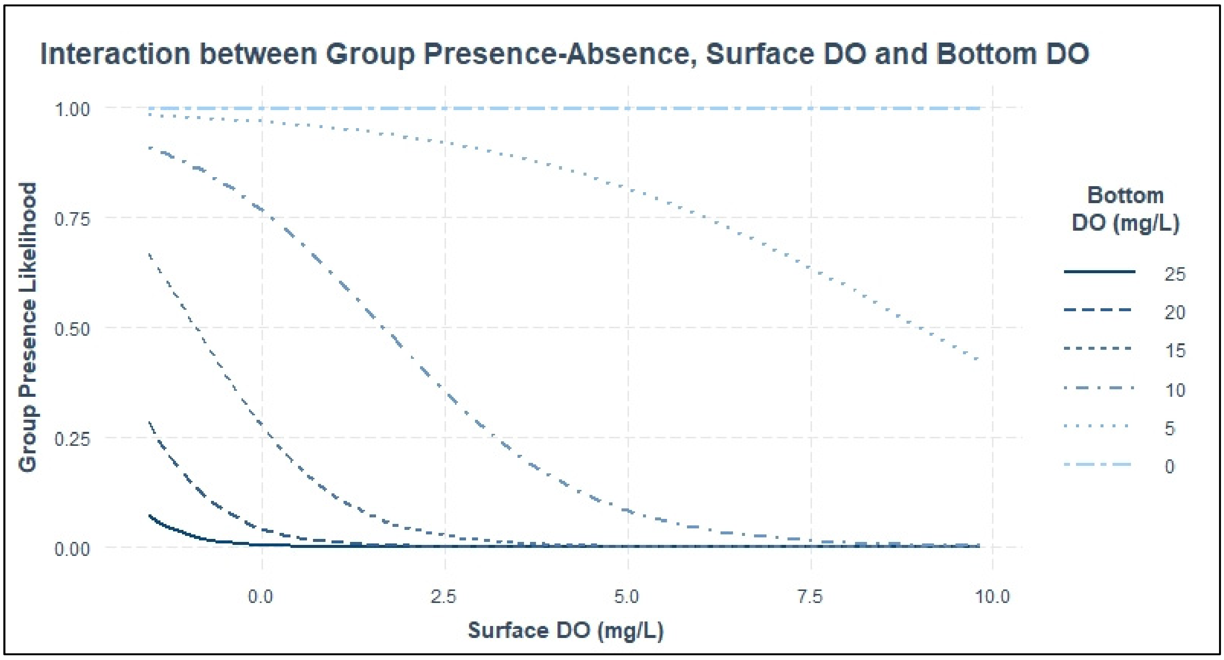


Figure S48. Interaction between group presence-absence, surface DO and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom DO and low surface DO. The likelihood of group presence in areas with low bottom DO either remained high or decreased as surface DO increased. The likelihood of group presence in areas with high bottom DO decreased as surface DO increased.

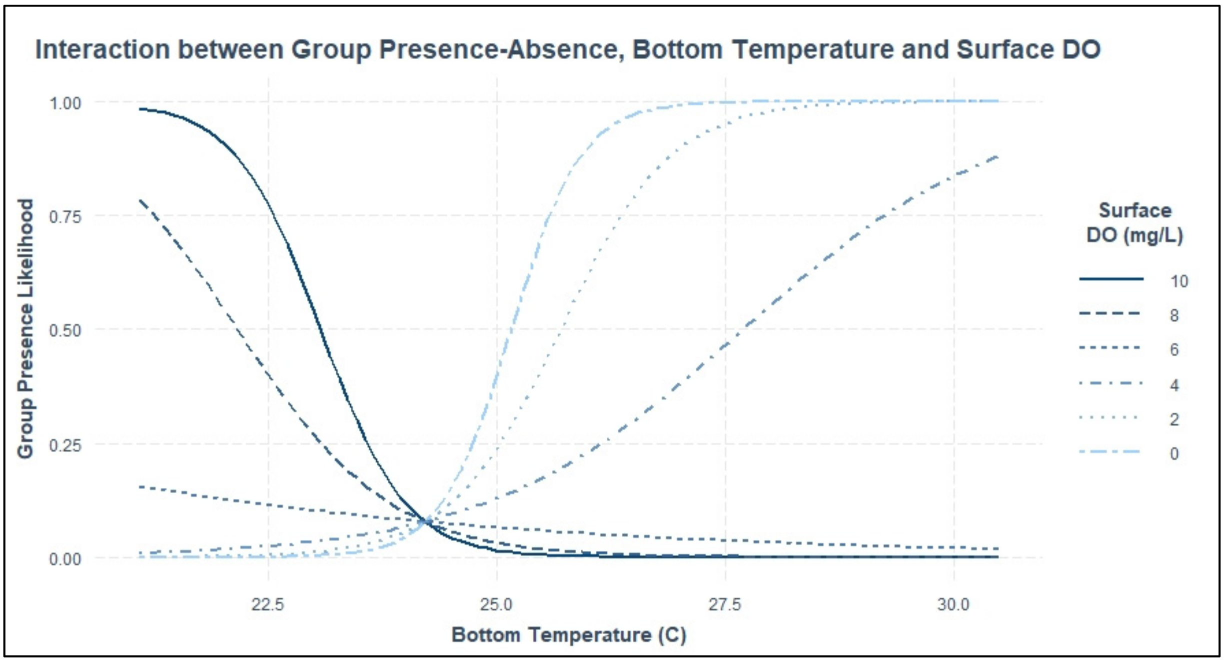


Figure S49. Interaction between group presence-absence, bottom temperature and surface DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high surface DO and low bottom temperatures and areas with low surface DO and high bottom temperatures. The likelihood of group presence in areas with high surface DO decreased as bottom temperature increased. The likelihood of group presence in areas with low surface DO increased as bottom temperatures increased.

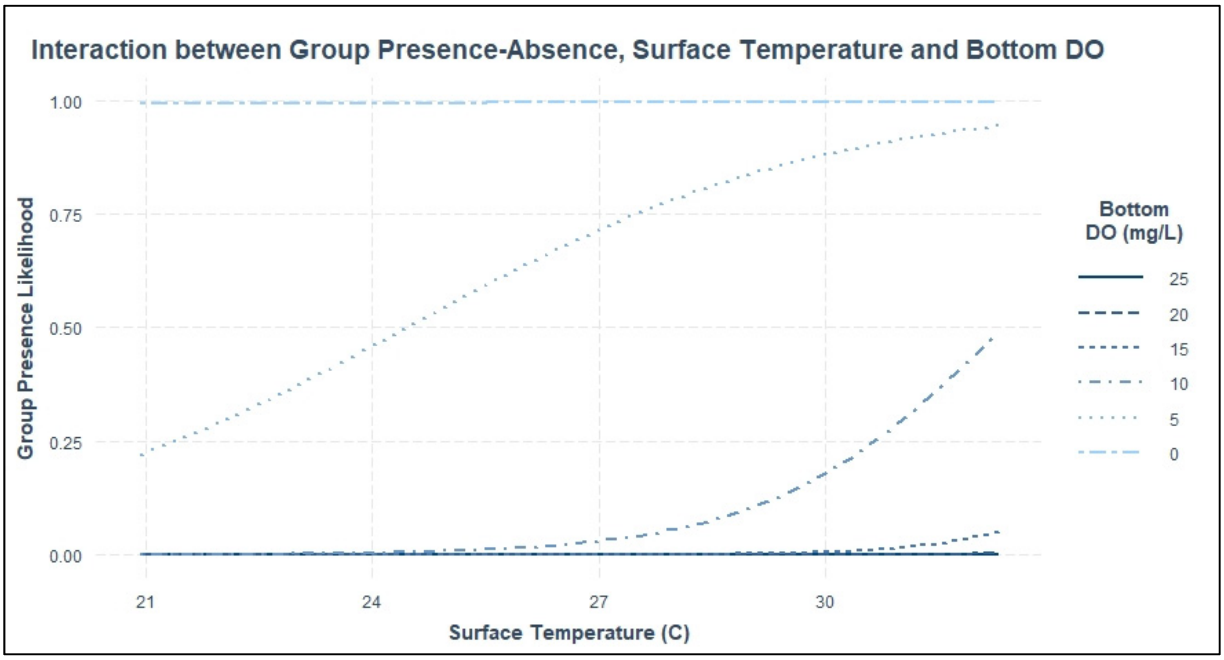


Figure S50. Interaction between group presence-absence, surface temperature and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom DO and high surface temperatures. The likelihood of group presence in areas with low bottom DO either remained high or increased as surface temperature increased. The likelihood of group presence in areas with high bottom DO either remained low or slightly increased as surface temperatures increased.

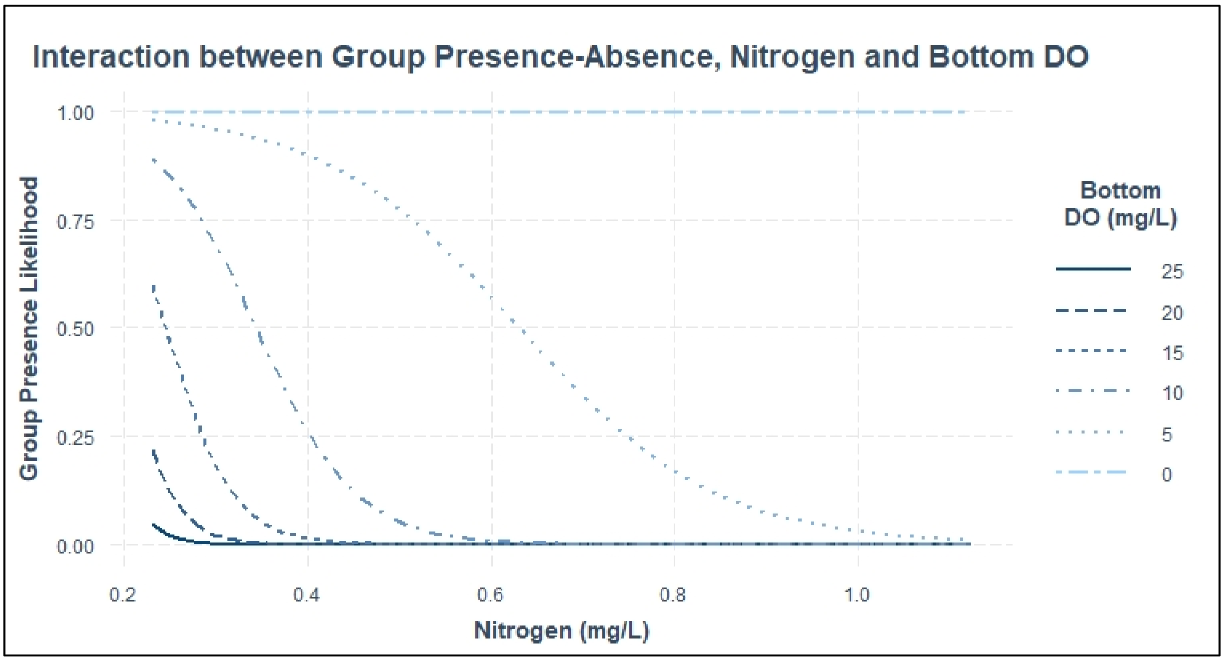


Figure S51. Interaction between group presence-absence, nitrogen and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom DO and low nitrogen concentrations. The likelihood of group presence in areas with low bottom DO either remained high or decreased as nitrogen concentration increased. The likelihood of group presence in areas with high bottom DO either remained low or decreased as nitrogen concentration increased.

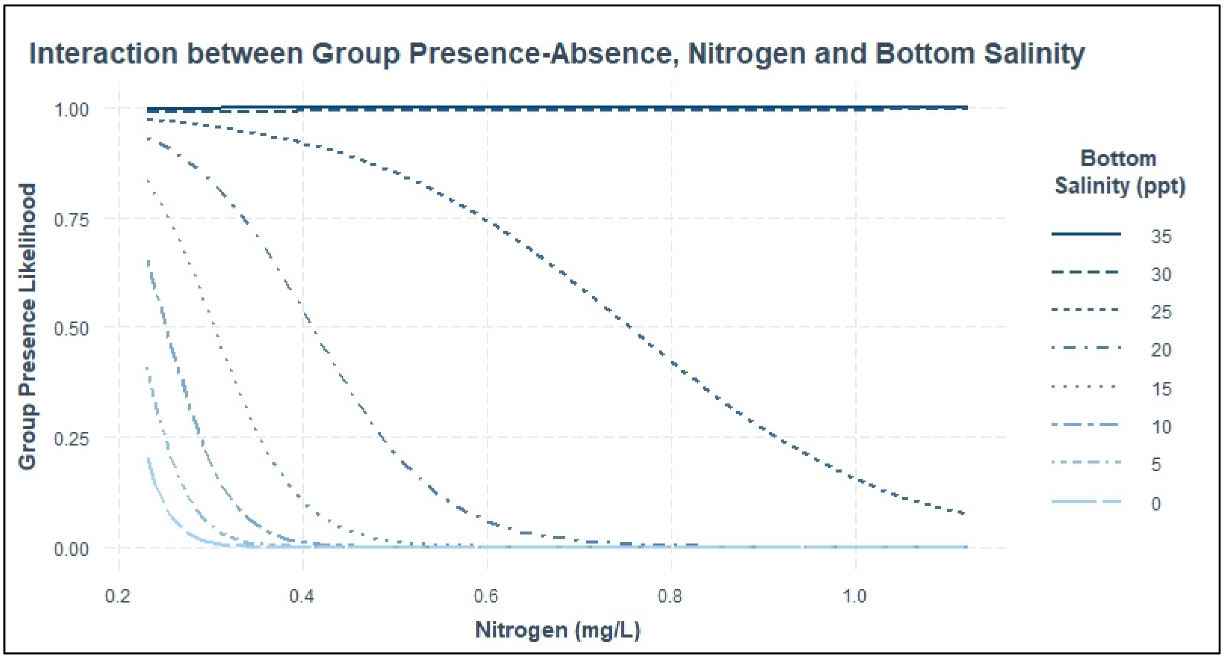


Figure S52. Interaction between group presence-absence, nitrogen and bottom salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high bottom salinities and low nitrogen concentrations. The likelihood of group presence in areas with high bottom salinities either remained high or decreased as nitrogen concentration increased. The likelihood of group presence in areas with low bottom salinities decreased as nitrogen concentration increased.

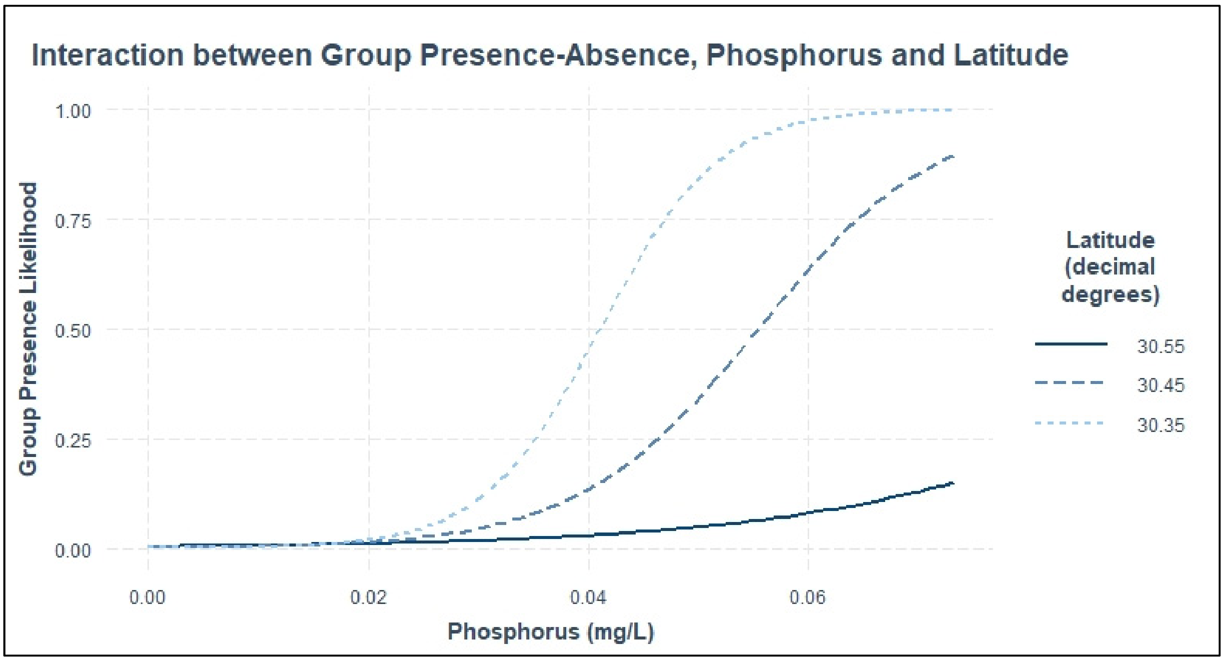


Figure S53. Interaction between group presence-absence, phosphorus and latitude. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high phosphorus concentrations towards the south. The likelihood of group presence in areas with high phosphorus concentrations increased towards the south.

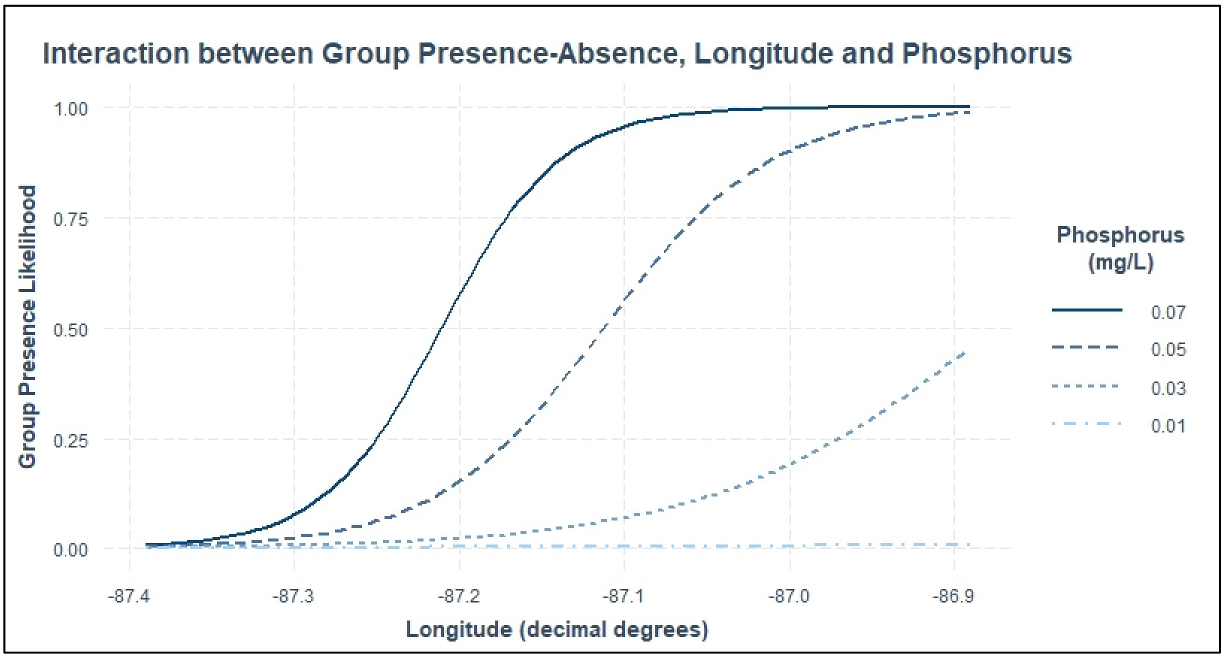


Figure S54. Interaction between group presence-absence, longitude and phosphorus. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high phosphorus concentrations towards the east. The likelihood of group presence in areas with high phosphorus concentrations increased towards the east.

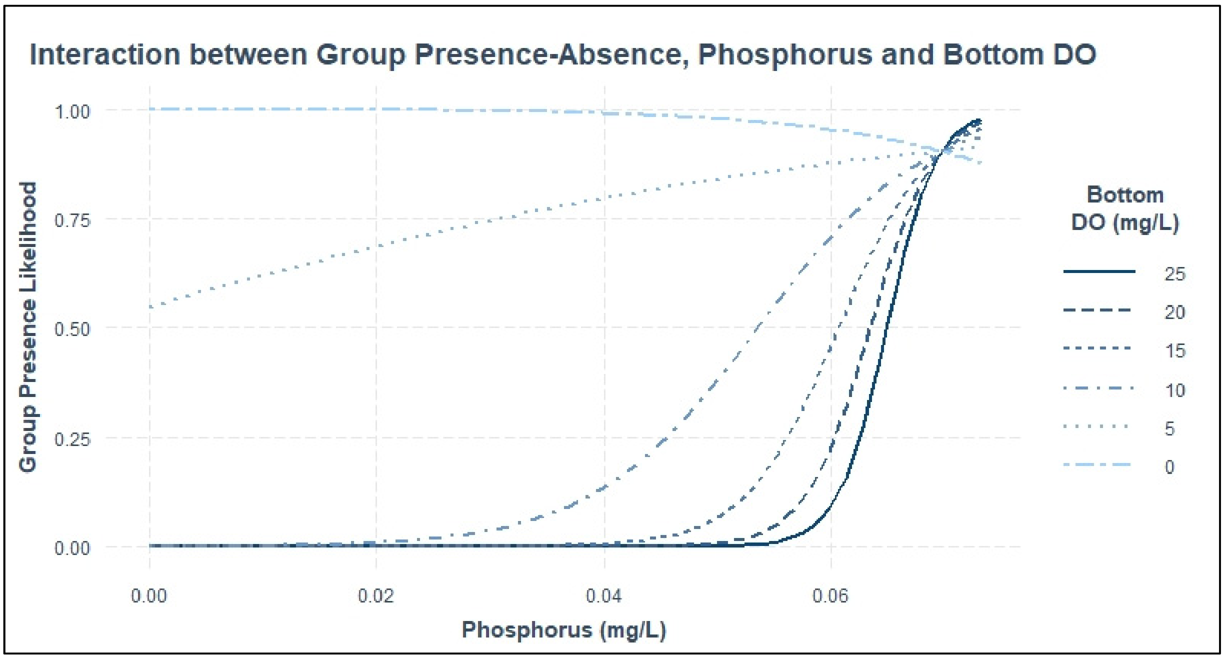


Figure S55. Interaction between group presence-absence, phosphorus and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low phosphorus concentrations and low bottom DO and areas with high phosphorus concentrations and high bottom DO. The likelihood of group presence in areas with high bottom DO increased as phosphorus concentration increased. The likelihood of group presence in areas with very low bottom DO slightly decreased as phosphorus concentration increased.

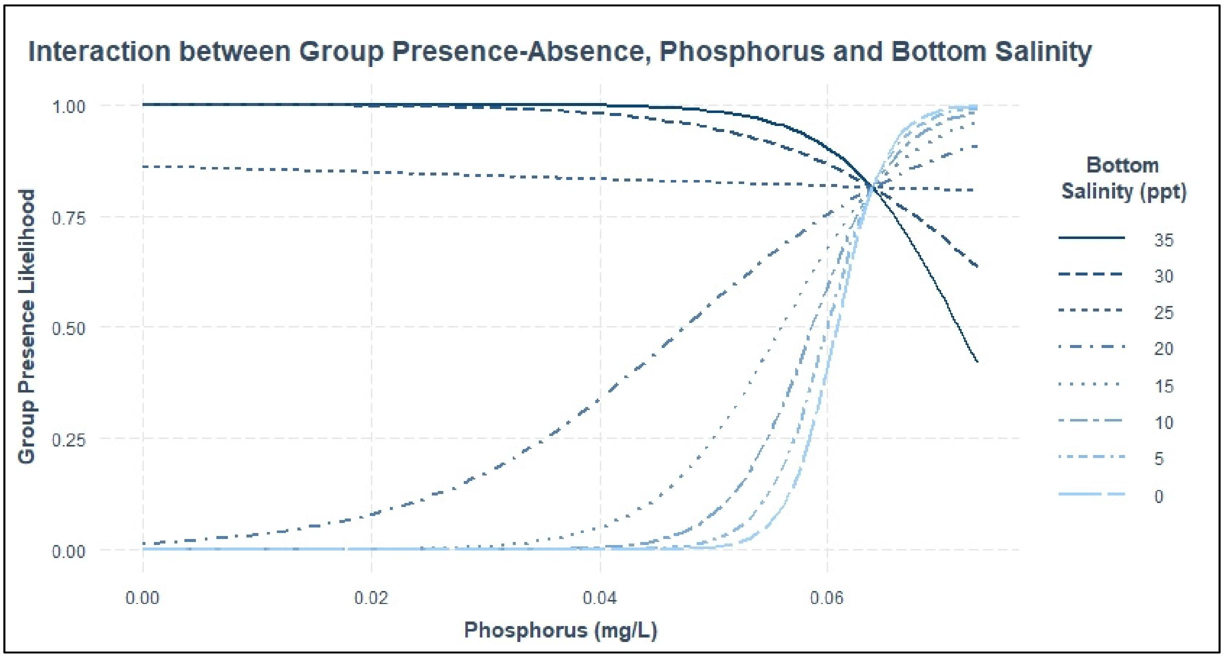


Figure S56. Interaction between group presence-absence, phosphorus and bottom salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high phosphorus concentrations and low bottom salinities and areas with low phosphorus concentrations and high bottom salinities. The likelihood of group presence in areas with high bottom salinities decreased as phosphorus concentration increased. The likelihood of group presence in areas with low bottom salinities increased as phosphorus concentration increased.

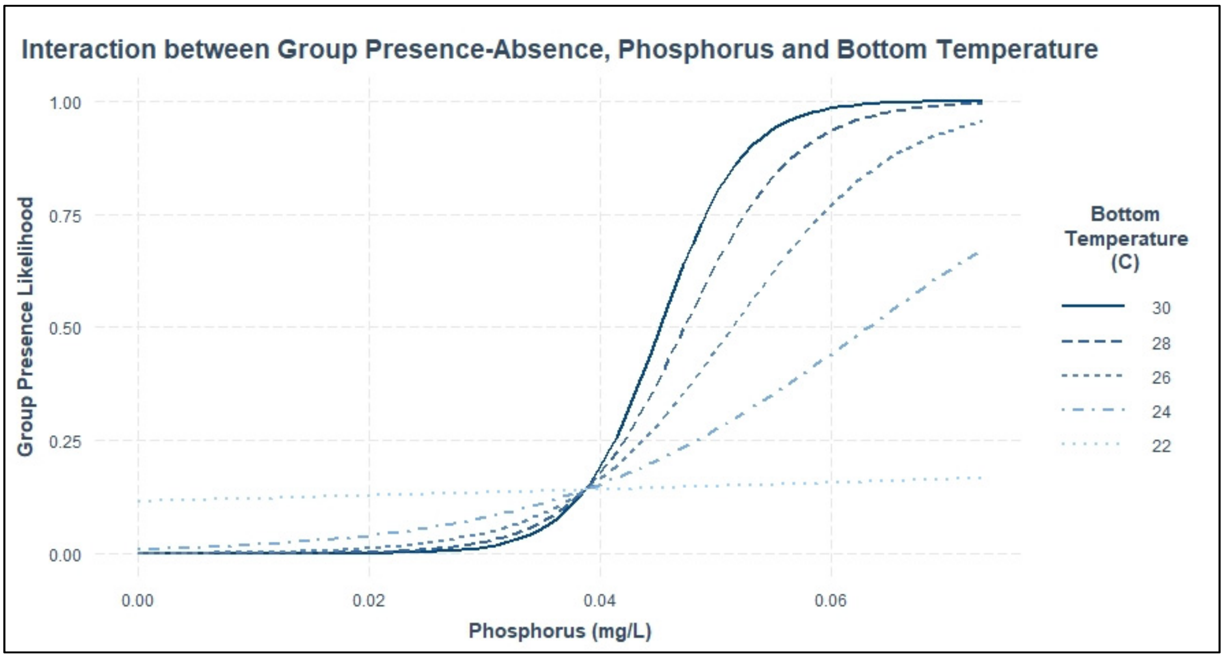


Figure S57. Interaction between group presence-absence, phosphorus and bottom temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high phosphorus concentrations and high bottom temperatures. The likelihood of group presence in areas with high phosphorus concentrations increased across all bottom temperatures, but this incline was sharper for high bottom temperatures.

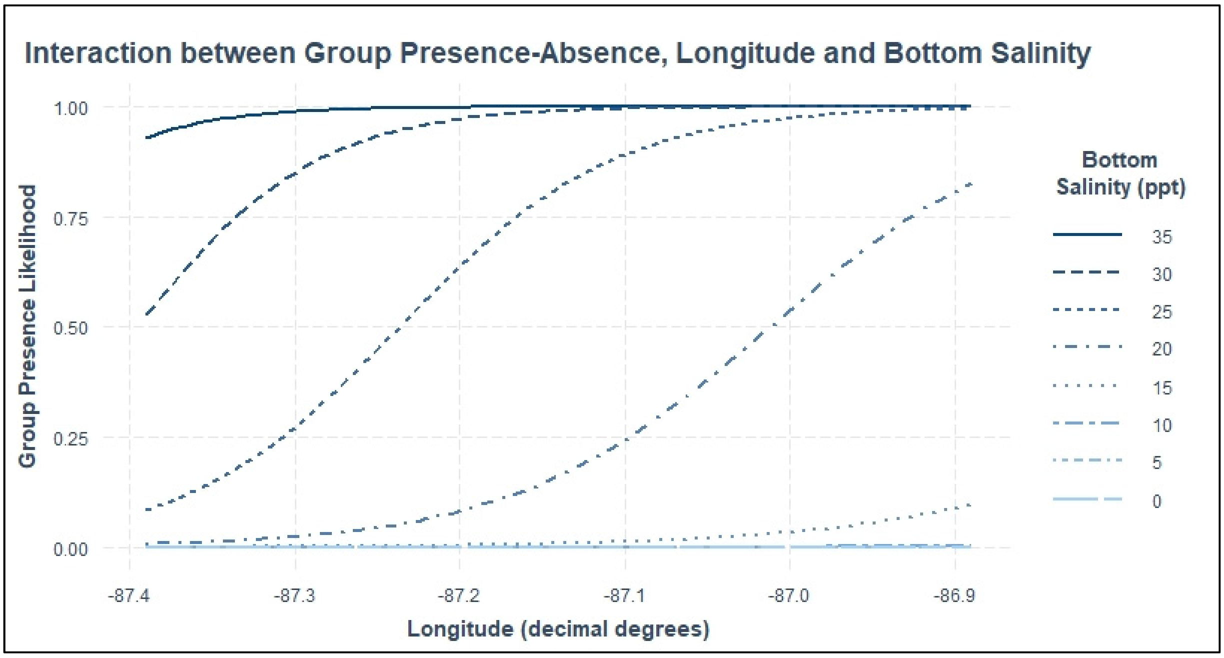


Figure S58. Interaction between group presence-absence, longitude and bottom salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with high bottom salinities towards the east. The likelihood of group presence in areas with high bottom salinities increased towards the east. The likelihood of group presence in areas with low bottom salinities either increased towards the east or remained low across longitudes.

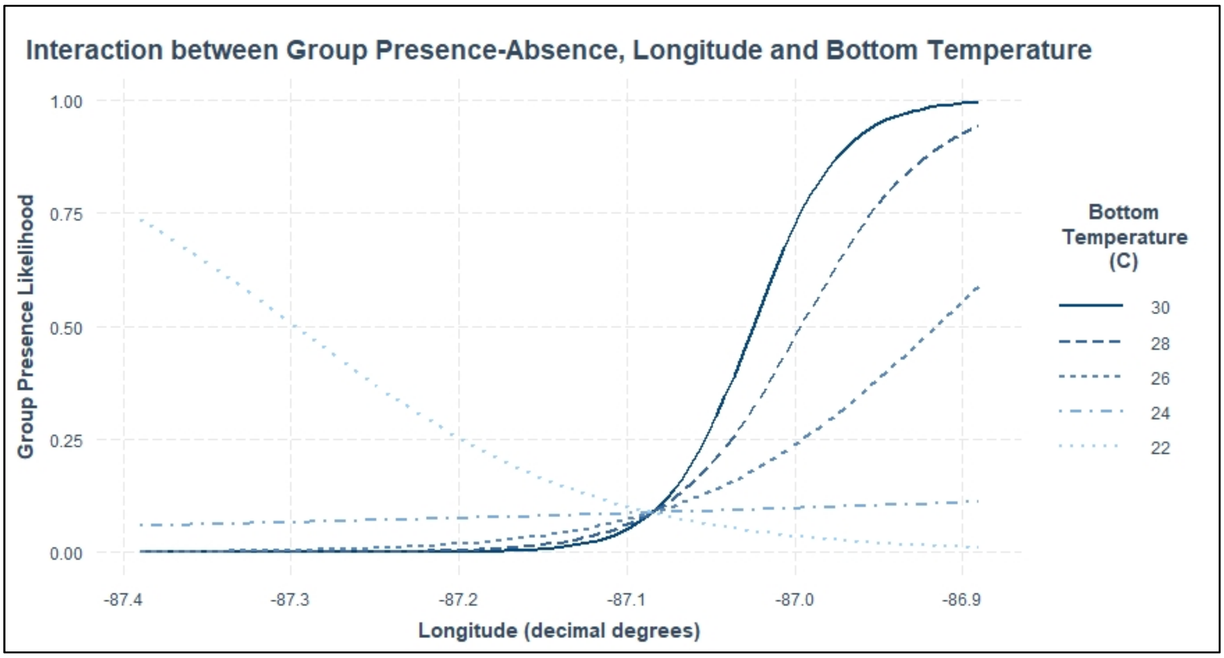


Figure S59. Interaction between group presence-absence, longitude and bottom temperature. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom temperatures towards the west and areas with high bottom temperatures towards the east. The likelihood of group presence in areas with low bottom temperatures decreased towards the east. The likelihood of group presence in areas with high bottom temperatures increased towards the east.

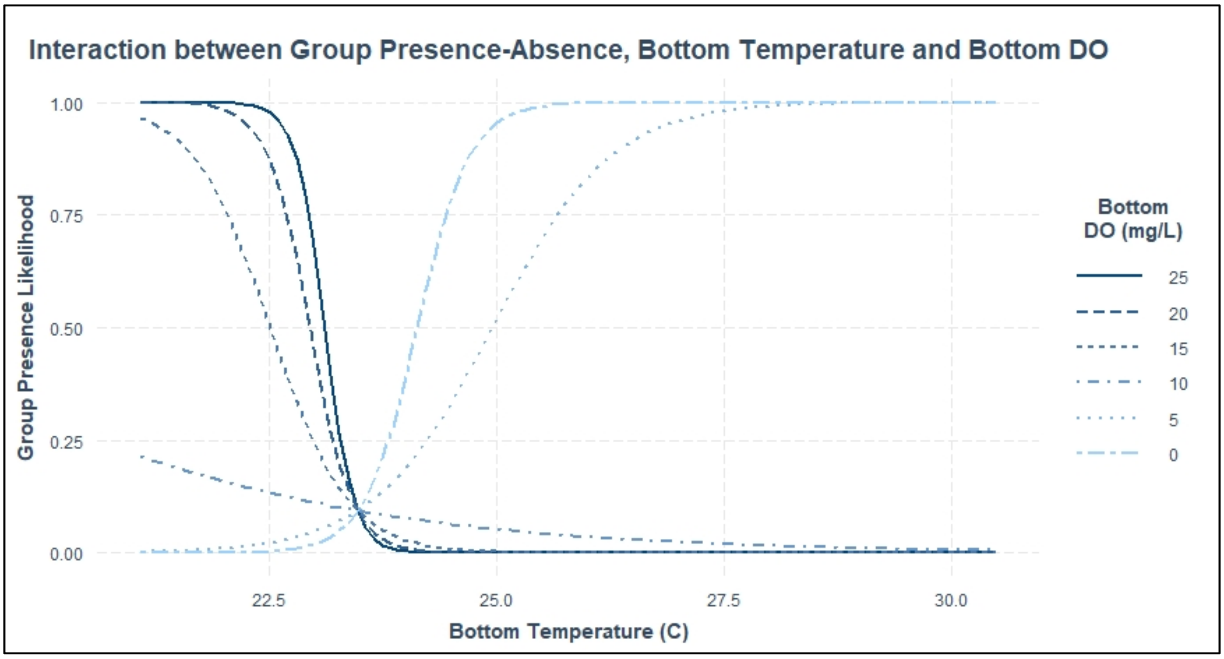


Figure S60. Interaction between group presence-absence, bottom temperature and bottom DO. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom temperatures and high bottom DO and areas with high bottom temperatures and low bottom DO. The likelihood of group presence in areas with high bottom DO decreased as bottom temperature increased. The likelihood of group presence in areas with low bottom DO increased as bottom temperature increased.

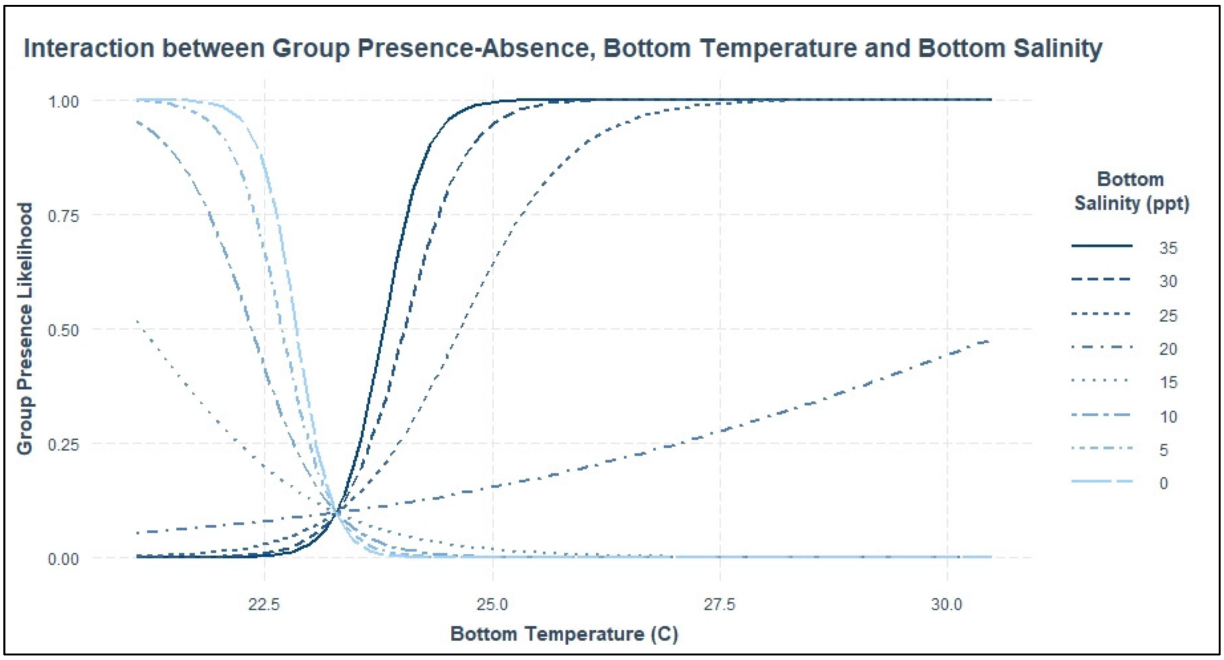


Figure S61. Interaction between group presence-absence, bottom temperature and bottom salinity. The ZAG model predicted that dolphin groups were more likely to be observed in areas with low bottom temperatures and low bottom salinities and areas with high bottom temperatures and high bottom salinities. The likelihood of group presence in areas with low bottom salinities decreased as bottom temperature increased. The likelihood of group presence in areas with high bottom salinities increased as bottom temperature increased.

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