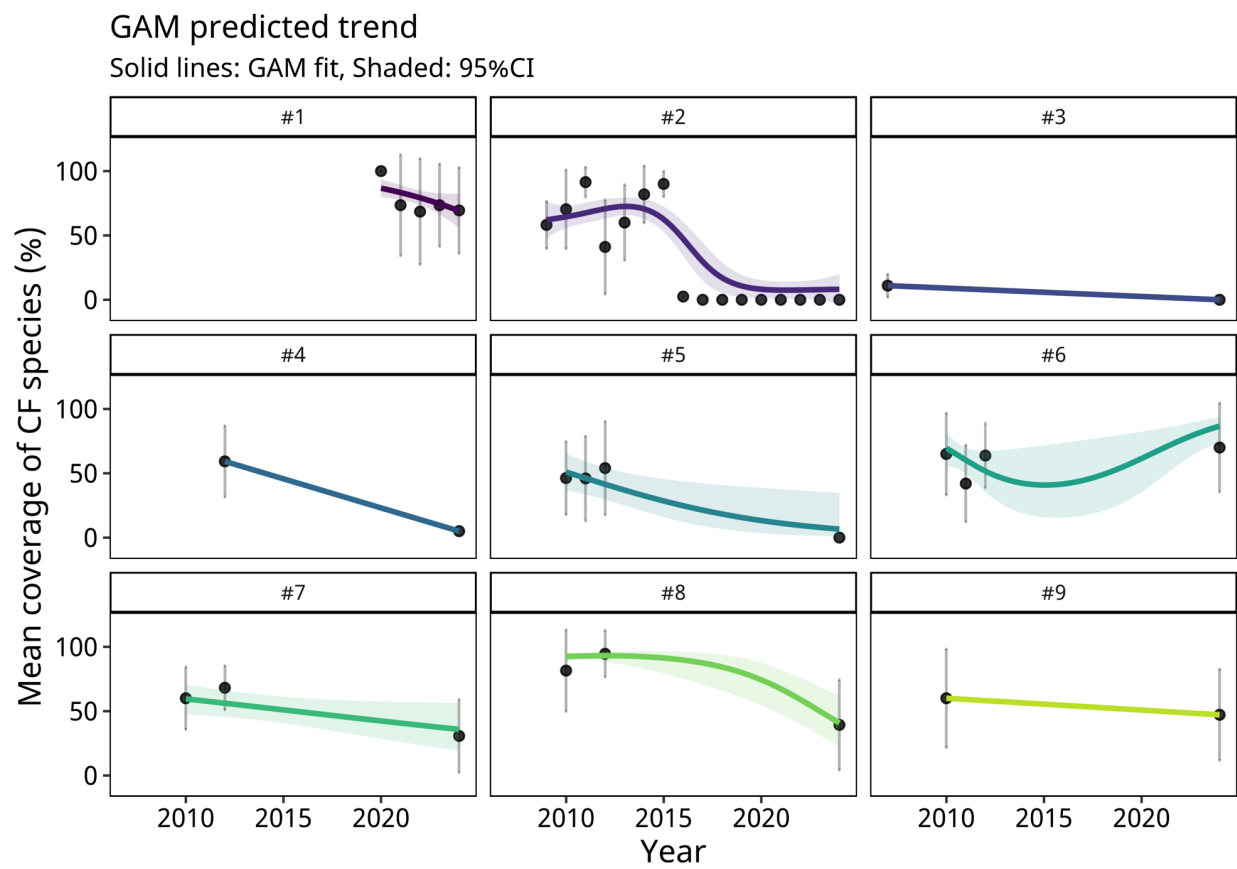
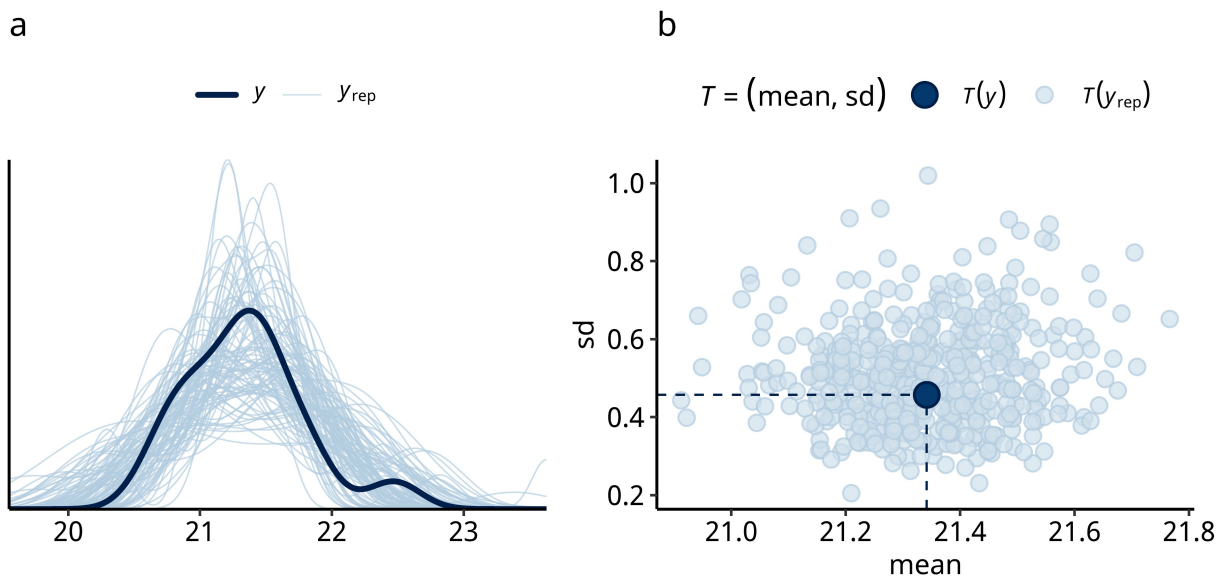
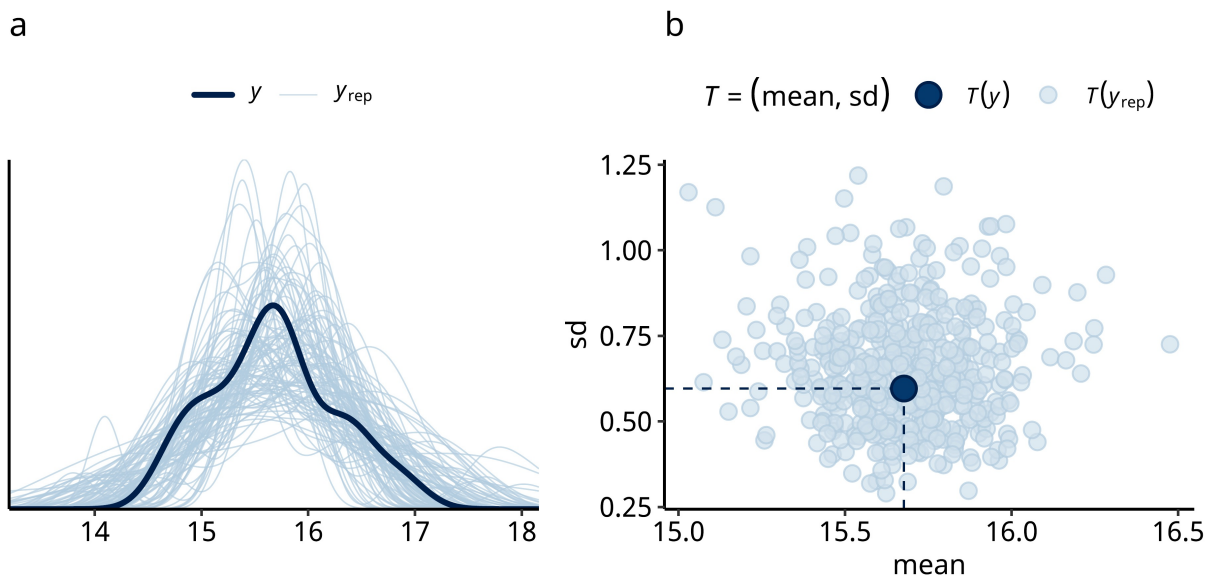




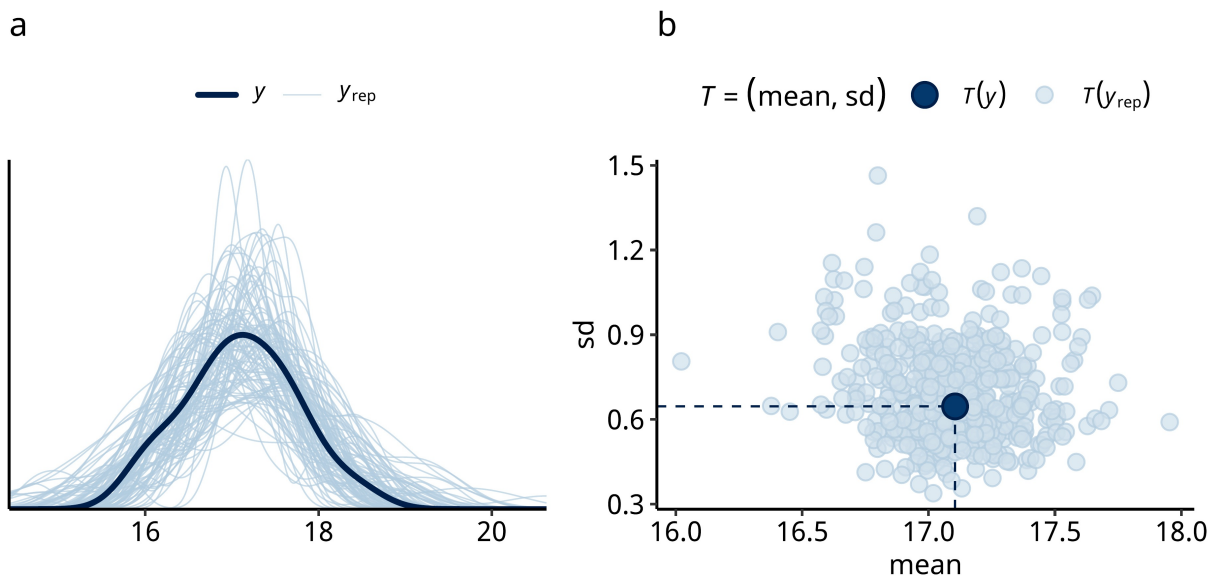
Supplementary Fig. 1. Generalized additive model (GAM)–predicted temporal trends or variations in mean percent cover of canopy-forming species at each site (#1–#9). Points represent observed mean cover values ($\pm$ SD). Solid lines indicate GAM fits, and shaded areas denote 95% confidence intervals. At sites with only two years of data, values are connected with solid lines because GAMs could not be applied.



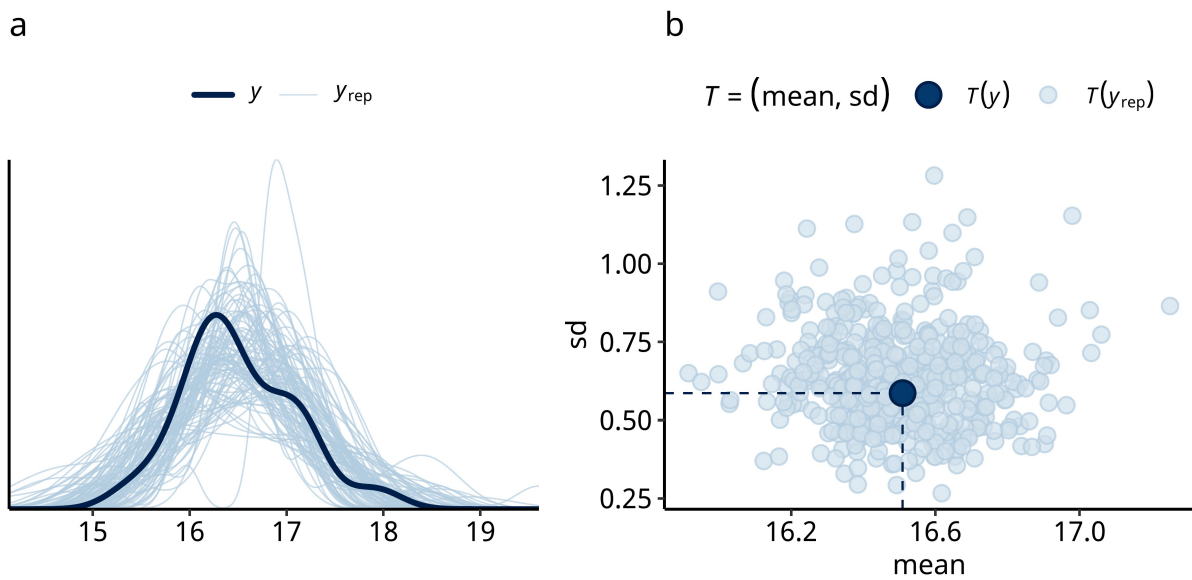
Supplementary Fig. 2. (a) Diagnostic check of 100 posterior draws from the model (y_{rep}) of annual seawater temperature compared with the distribution of the observations (y). The distributions should appear similar. (b) Mean and standard deviation of 500 posterior draws from the model (y_{rep}) compared with those of the observations (y). The mean and standard deviation of the observations and the model should also appear similar.



Supplementary Fig. 3. (a) Diagnostic check of 100 posterior draws from the model (y_{rep}) of winter seawater temperature compared with the distribution of the observations (y). The distributions should appear similar. (b) Mean and standard deviation of 500 posterior draws from the model (y_{rep}) compared with those of the observations (y). The mean and standard deviation of the observations and the model should also appear similar.



Supplementary Fig. 4. (a) Diagnostic check of 100 posterior draws from the model (y_{rep}) of February seawater temperature measured near the mouth of Kagoshima Bay compared with the distribution of the observations (y). The distributions should appear similar. (b) Mean and standard deviation of 500 posterior draws from the model (y_{rep}) compared with those of the observations (y). The mean and standard deviation of the observations and the model should also appear similar.



Supplementary Fig. 5. (a) Diagnostic check of 100 posterior draws from the model (y_{rep}) of February seawater temperature measured inner part of Kagoshima Bay compared with the distribution of the observations (y). The distributions should appear similar. (b) Mean and standard deviation of 500 posterior draws from the model (y_{rep}) compared with those of the observations (y). The mean and standard deviation of the observations and the model should also appear similar.

Supplementary Table 1. Vertical and horizontal distribution of the seaweed communities in Site1, Shoura, Nagashima Town, Kagoshima Prefecture, on May 29, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	10	20	30	40	50	60	70	80	90	100
Depth (m) ²⁾	1.5	0.6	-0.7	-2.3	-6.3	-9.2	-11.4	-13.2	-15.8	-18.5
Substrata ³⁾	B	B	B	B · C	P	P	P	P	P	C
Kelp				60	100	80	95	100	20	80
<i>Ecklonia radicata</i>				60	100	80	95	100	20	80
Temperate Fucoids		60								
<i>Sargassum thunbergii</i>		30								
<i>Sargassum fusiforme</i>		20								
<i>Sargassum hemiphyllum</i>		10								
Tropical Fucoids			10	20						
<i>Sargassum ilicifolium</i>			10							
<i>Sargassum crispifolium</i>				20						
Other Browns						+				
<i>Sporochnus keyari</i>						+				
Green algae										+
<i>Codium intricatum</i>										+
<i>Umbraulva</i> sp.										+
Red algae	5	+	10	20	+	+	+		5	+
<i>Gloiopeltis</i> sp.	5									
Nongeniculate calcareous algae		+	+	+	+	+				
<i>Kallymenia perforata</i>			10	30						
<i>Fushitsunagia catenata</i>							+			
<i>Meristotheca japonica</i>							+			
<i>Pugetia japonica</i>							+			+
<i>Solieria pacifica</i>									5	
<i>Delisea japonica</i>									+	
<i>Gracilaria incurvata</i>									+	
<i>Psaromenia</i> sp.									+	
Geniculate calcareous algae									+	
<i>Gelidium elegans</i>										+
<i>Polyopes affinis</i>										+

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 2.85m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 2. Vertical and horizontal distribution of the seaweed communities in Site 2, Dozaki, Nagashima Town, Kagoshima Prefecture, on August 2, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	30	40	50	60	70	80	90	100	110	120	130
Depth (m) ²⁾	-4.3	-4.7	-5.7	-7.3	-6.9	-8.2	-7.7	-9.5	-9.2	-9.6	-9.4
Substrata ³⁾	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
Other Browns	30	50	50	40	70	80	5	60	20	20	30
<i>Zonaria diesingana</i>	30	50	50	40	70	80		60	20	20	20
<i>Dictyota haenyeosa</i>	+	+		+	+		5			+	
<i>Dictyota</i> sp.							+				
<i>Distromium decumbens</i>											10
Red algae	50	15	50	20	+	+	20	5	20	15	30
<i>Delisea japonica</i>	30			5			+	+		+	
<i>Hypnea</i> sp.	20		10		+					5	
<i>Martensia jejuensis</i>	+	+									
<i>Pterocladia capillacea</i>		10			+	+			10	+	5
<i>Meristotheca japonica</i>		5	5	+			20				20
Geniculate calcareous algae			30	15	+	+	+	5	10	10	5
Nongeniculate calcareous algae			5				+				
<i>Gymnogongrus flabelliformis</i>							+				
<i>Yonagunia maillardii</i>							+			+	
<i>Ceratodictyon intricatum</i>										+	
corals	30								30		
Soft corals									30		
Reef-building corals		30									

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 0.70m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 3. Vertical and horizontal distribution of the seaweed communities in Site 3, Nagasakibana, Ichiki-Kushikino City, Kagoshima Prefecture, on June 17, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Depth (m) ²⁾	-2.1	-6.0	-4.8	-4.1	-5.2	-4.5	-6.1	-6.3	-6.7	-7.6	-7.9	-8.8	-8.3	-9.1	-9.4
Substrata ³⁾	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
Other Browns	80	80	95	50	90	95	75	50	80	80	90	80	80	80	90
<i>Zonaria diesingiana</i>	80	70	90	20	60	35	15		20	70	70	40	60	10	10
<i>Dictyopteris undulata</i>		10	5	30	30	60	60	50	60	10	20	10	10	+	
<i>Homoeostrichus flabellatus</i>												30	10	70	80
Red algae	+	10	+	+	5	+	+	+	+	+	10	+	+	+	+
<i>Asparagopsis taxiformis</i>	+			+											
<i>Geldium</i> sp.	+		+												
Nongeniculate calcareous algae	+	+		+		+	+	+					+	+	+
<i>Halymenia</i> sp.		10									10				
Geniculate calcareous algae		+		+	5	+	+	+	+	+	+	+	+	+	+
<i>Gelidium elegans</i>											+	+			
<i>Chondracanthus</i> sp.													+	+	
Corals		+		5	5		25	15	+		+	10			
Reef-building coral		+		5	5		25	15	+		+	10			

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 0.95m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 4. Vertical and horizontal distribution of the seaweed communities in Site 4, Fukumoto, Ibusuki City, Kagoshima Prefecture, on June 10, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	30	40	50	60	70	80	90	100	110	120	130	140	150
Depth (m) ²⁾	0.1	-0.1	-0.5	-1.0	-1.0	-1.4	-1.7	-2.1	-2.4	-2.7	-3.3	-3.6	-3.7
Substrata ³⁾	B	B	B	B	B	P B	P B	B	P	P B	P	P	P
Tropical Fucoids	5												
<i>Sargassum illicifolium</i>	5												
Other Browns													
<i>Padina arborescens</i>													
<i>Dictyota</i> sp													
<i>Dictyopteris undulata</i>													
<i>Rugulopteryx okamurae</i>													
Green algae													
<i>Caulerpa chemnitzia</i> var. <i>laetevirens</i>													
<i>Codium cylindricum</i>													
<i>Caulerpa webbiana</i> f. <i>tomentella</i>													
Red algae													
<i>Asparagopsis taxiformis</i>													
<i>Gelidium elegans</i>													
<i>Lophocladia japonica</i>													
<i>Meristotheca japonica</i>													
<i>Pterocladia capillacea</i>													
Geniculate calcareous algae													
<i>Gloiopeltis</i> sp.													
<i>Polysiphonia</i> sp.													
Peyssonneliaceae sp.													
<i>Chondracanthus</i> sp.													
<i>Kallymenia perforata</i>													
<i>Hypnea</i> sp.													

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 1.75m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 5. Vertical and horizontal distribution of the seaweed communities in Site 5, Jogasaki, Onejime Town, Kagoshima Prefecture, on June 19, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	5	10	14	20	25	30	35	40	50	60
Depth (m) ²⁾	-0.5	-1.1	-1.0	-2.5	-2.4	-2.5	-3.1	-3.7	-4.1	-4.3
Substrata ³⁾	BR	BR	BR	BR	BR	BR	BR	B P	P	P
Other Browns										
<i>Dictyota</i> sp.				5			+			
<i>Colpomenia</i> sp.							+			
Green algae										
<i>Caulerpa chemnitzia</i> var. <i>laetevirens</i>			15	15	5		+		10	
<i>Rhipidosiphon javensis</i>			+	+						
<i>Dictyosphaeria cavernosa</i>					5					
<i>Codium cylindricum</i>							+		10	
Red algae	15	40	60	30	45	15			+	
<i>Hypnea cervicornis</i>	10						+			
<i>Gloiopeltis</i> sp.	5									
Geniculate calcareous algae		40	60	10	45		+		+	
<i>Gelidium elegans</i>		10		5			15			
<i>Calliblepharis</i> sp.		+								
<i>Gracilaria incurvata</i>				10			+			
<i>Pterocladia tenuis</i>				5	+					
<i>Chondracanthus</i> sp.				+			+			
<i>Laurencia dendroidea</i>				+						
corals										
Reef-building coral					50			20		
					50			20		

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 0.50m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 6. Vertical and horizontal distribution of the seaweed communities in Site 6, Kaikura, Onejime Town, Kagoshima Prefecture, on June 19, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	10	20	30	40	50	60	70	80	90	100
Depth (m) ²⁾	-0.9	-0.9	-1.6	-3.4	-3.8	-4.3	-4.7	-4.7	-4.8	-4.9
Substrata ³⁾	BR	BR	BR	BR	BR	P B	P B	P	P	P
Tropical Fucoids	100	100	80	100	60	35	15			
<i>Sargassum glaucescens</i>	90	80	20	70	30	30	15			
<i>Sargassum illicifolium</i>	10	20	60	10						
<i>Sargassum alternato-pinnatum</i>				20	20	5				
<i>Sargassum carpophyllum</i>					10					
Other Browns			+			10				
<i>Padina</i> sp.			+			10				
<i>Dictyota</i> sp.						+				
Red algae						5	5			
<i>Geldium elegans</i>	+	+	+		+		5			
Geniculate calcareous algae	+	+	+	+	+	+	+			
<i>Asparagopsis taxiformis</i>				+		5				

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 0.70m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 7. Vertical and horizontal distribution of the seaweed communities in Site 7, Hakari, Kanoya City, Kagoshima Prefecture, on June 13, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	10	20	30	40	50	60	70	80	90	100
Depth (m) ²⁾	0.5	-0.1	-0.1	-0.6	-1.6	-1.9	-2.8	-3.4	-4.1	-4.5
Substrata ³⁾	BR	BR	BR	BR	BR	BR	BR	BR	BR	P
Tropical Fucoids			15	5	5	15	45	50	80	
<i>Sargassum glaucescens</i>			15	5	5	5	10	50	40	
<i>Sargassum piluliferum</i>			+							
<i>Sargassum carpophyllum</i>						10	10			
<i>Sargassum alternato-pinnatum</i>							10			
<i>Sargassum ilicifolium</i>							10		40	
<i>Sargassum crispifolium</i>							5			
Other Browns		+			+					
<i>Leathesia marina</i>		+								
<i>Dictyota</i> sp.					+					
Green algae				+		+		+		
<i>Parvocaulis parvulus</i>				+						
<i>Codium cylindricum</i>							+	+		
Red algae	10	+	20	25	45	30	20	5	10	
Geniculate calcareous algae	10	+	15	5	20		5	5	10	
<i>Hypnea</i> sp.	+				+					
<i>Gloiopeltis</i> sp.		+								
<i>Pterocladia tenuis</i>		+								
<i>Gelidium elegans</i>			5				+	+	+	
<i>Asparagopsis taxiformis</i>				20	25	30	15	+		
<i>Chondracanthus okamurae</i>					+					
<i>Gelidiophycus freshwateri</i>					+	+		+		

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 1.85m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 8. Vertical and horizontal distribution of the seaweed communities in Site 8, Offshore Takasu, Kanoya City, Kagoshima Prefecture, on June 13, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	0	10	20	30	40	50	60	70	80	90	100
Depth (m) ²⁾	0.5	0.2	-0.8	-1.0	-1.5	-1.7	-1.8	-1.8	-2.0	-2.2	-2.3
Substrata ³⁾	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR	BR
Temperate Fucoids	45										
<i>Sargassum fusiforme</i>	45										
Tropical Fucoids	50	60	50	55			5			5	5
<i>Sargassum glaucescens</i>	50	50	40	50			5			5	5
<i>Sargassum ilicifolium</i>		10	10	5							
Other Browns	+										
<i>Leathesia marina</i>	+										
Green algae	+				10	15	+	20	+		
<i>Cladophora</i> sp.	+										
<i>Valonia utricularis</i>	+										
<i>Caulerpa webbiana</i> f. <i>tomentella</i>					10			20	+		
<i>Codium intricatum</i>						15		+	+		
<i>Dictyosphaeria cavernosa</i>							+				
Red algae	5	5	5	+	+	+	10	5	5	10	10
<i>Gelidium elegans</i>	5	5					+		5		
<i>Chondracanthus okamurae</i>		+									
<i>Ceratodictyon spongiosum</i>			5								
Geniculate calcareous algae				+	+	+	10	5	+	10	10
<i>Gelidiophycus freshwateri</i>							+	+			+
<i>Chondracanthus</i> sp.											+

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 1.95m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 9. Vertical and horizontal distribution of the seaweed communities in Site 9, Hakamagoshi, Kagoshima City, Kagoshima Prefecture, on May 30, 2024. Values for each species indicate the coverage of the quadrat (50 cm × 50 cm). "+" indicates less than 5% coverage.

Distance from M.H.W.S.(m) ¹⁾	19	22	27	30	36	41	45	50
Depth (m) ²⁾	1.1	0.6	0.4	-0.5	-3.4	-4.9	-6.8	-9.4
Substrata ³⁾	B	B	B	BR	BR	BR	BR	BR
Temperate Fucoids	10	90	30	90	70	10	10	
<i>Sargassum fusiforme</i>	10	90	30					
<i>Sargassum piluliferum</i>				90	50	10	10	
<i>Sargassum hemiphyllum</i>					20			
Tropical Fucoids					+	20	+	
<i>Sargassum crispofolium</i>					+	20	+	
<i>Sargassum carpophyllum</i>						+		
Other Browns			+	+	+	+	20	10
<i>Padina imbricata</i>			+	+				
<i>Padina arborescens</i>				+	+		+	10
<i>Colpomenia sinuosa</i>						+	20	
Green algae	+	+			+	+	+	+
<i>Gayralia kuroshiensis</i>	+							
<i>Ulva</i> sp.	+	+						
<i>Lychaete dotyana</i>					+			+
<i>Codium cylindricum</i>						+		
<i>Codium lucasii</i>							+	
Red algae		+	+		+	+	+	+
<i>Asparagopsis taxiformis</i>		+	+		+	+		
<i>Gelidium elegans</i>		+			+	+	+	+
<i>Chondracanthus okamurae</i>					+	+	+	
<i>Gloiocladia</i> sp.							+	
<i>Chondracanthus</i> sp.								+
<i>Gymnogongrus flabelliformis</i>								+
<i>Yonagunia</i> sp.								+

¹⁾ M.H.W.S.: Maximum high water spring.

²⁾ Datum of depth: 2.10m below mean sea level.

³⁾ Substratum: BR: Beadrock; B: Boulder; C: Cobble; S: Sand; MS: Muddy Sand; P: Pebbles.

Supplementary Table 10. Summary of Model 1 and 2 GAM fitted for Sites #1 and #2 with ≥ 5 years of data. The terms “edf” indicates effective degree of freedom, “F / χ^2 ” indicates F-value and chi squared value, and “Dev. expl. (%)” indicates “deviance explained (%)” respectively.

Site	n (years)	Model name	Family (link)	Smooth term	edf	F / χ^2	p-value	Dev. expl. (%)	Adjusted R ²
#1	5	Model 1	Beta (logit)	s (year)	1	4.365	0.0367	16.8%	0.024
#2	16	Model 2	Beta (logit)	s (year)	3.726	57.73	< 0.001	47.2%	0.182

Supplementary Table 11. Summary of Model 3 GAM fitted for Sites #5, #6, #7 and #8 with 3 years of data. The terms “edf” indicates effective degree of freedom, and “F / χ^2 ” indicates F-value and chi squared value, respectively. The deviance explained of this model was 69.5% (adjusted R²: 0.182).

Site	n (years)	Family (link)	Smooth term	edf	F / χ^2	p-value
#5	3	Beta (logit)	s (year): site #5	1.000	5.687	0.0171
#6	3	Beta (logit)	s (year): site #6	1.806	13.13	0.0039
#7	3	Beta (logit)	s (year): site #7	1.000	3.553	0.0595
#8	3	Beta (logit)	s (year): site #8	1.701	41.09	< 0.001

Supplementary Table 12. Summary of Welch’s t-test at Site #9. “Mean $\pm$ SD (n)” indicates mean coverage, standard deviation, and samples number, “t (df)” means t-value (degrees of freedom), “p” indicates p-value, and “ Δ mean (95% CI)” indicates the effect size (95% credible interval) respectively.

Site	Comparison	Mean $\pm$ SD (n)	t (df)	p	Δ mean (95% CI)
#9	2010 vs 2024	60.0 $\pm$ 18.3 (7) vs 47.1 $\pm$ 22.5 (7)	0.59 (8.33)	0.570	-12.9 (-36.9 to 62.6)

Supplementary Table 13. Yearly changes in annual and winter mean surface seawater temperatures (SST) offshore of the Kagoshima Prefectural Fisheries Technology and Development Center in Ibusuki City, Kagoshima Prefecture, Japan.

Year	Annual Mean SST (°C)	Standard deviation	Mean SST in winter (°C)	Standard deviation
2008	21.42	4.68	15.78	1.03
2009	21.45	5.03	15.7	1.03
2010	20.64	4.91	14.74	1.08
2011	20.99	4.97	15.37	1.2
2012	NA	NA	NA	NA
2013	21.22	5.36	15.04	1.09
2014	20.81	4.42	15.7	0.9
2015	20.83	4.45	14.83	0.87
2016	21.5	4.89	15.47	1.12
2017	21.01	5.09	15.57	0.95
2018	21.23	4.88	15.12	1.44
2019	21.42	4.57	15.78	1.12
2020	21.27	4.44	16.34	0.64
2021	21.58	4.69	16.24	1.03
2022	21.78	5.09	15.82	1.2
2023	21.85	4.74	16.48	1.09
2024	22.47	4.91	16.86	0.89

NA: Not available

Supplementary Table 14. Regression coefficients for the intercept and temperature (°C), for the slope and temperature, Bayesian R² values of the models, and correlations between observed the temperature and time. The variable “Annual” represents the annual mean temperature, and “Winter” represents the mean temperature during the winter period (January to March) of each year.

Variable	Intercept	Slope	Coefficient of determination	Correlation
Annual	-93.74 (-173.96 to -12.84)	0.06 (0.02 to 0.10)	0.38 (0.04 to 0.60)	0.3691
Winter	-137.10 (-241.09 to -32.87)	0.08 (0.02 to 0.13)	0.39 (0.05 to 0.60)	0.3839

Supplementary Table 15. Yearly changes in winter (February) mean surface seawater temperatures (SST) at two locations in Kagoshima Bay: the mouth of the bay (offshore Chiringa-shima Island) and the inner part of the bay (Kagoshima Port).

Year	Mean SST at the mouth (°C)	Standard deviation	Mean SST at the inner part (°C)	Standard deviation
2005	17.29	1.04	16.28	0.60
2006	17.08	1.22	16.32	1.06
2007	16.62	0.49	16.47	0.27
2008	17.15	0.80	16.30	0.32
2009	17.19	0.95	16.59	0.92
2010	18.01	0.95	17.08	1.25
2011	16.93	1.19	16.20	0.86
2012	16.85	0.76	16.22	0.43
2013	15.98	0.63	15.41	0.24
2014	17.58	1.16	17.15	1.09
2015	16.23	0.57	15.76	0.32
2016	16.06	0.64	15.96	0.33
2017	17.47	0.91	16.85	0.73
2018	16.69	0.80	16.03	0.37
2019	16.57	0.67	16.16	0.20
2020	17.51	0.73	17.15	0.37
2021	17.68	0.61	16.78	0.44
2022	16.98	0.61	16.38	0.55
2023	17.80	1.29	17.18	1.03
2024	18.45	1.32	17.91	1.12

Supplementary Table 16. Regression coefficients for the intercept and temperature (°C), for the slope and temperature, Bayesian R² values of the models, and correlations between observed the temperature and time. The variable “Mouth of Kagoshima Bay” represents the February mean temperature offshore Chiringa-shima Island, and “Inner part of Kagoshima Bay” represents the February mean temperature at Kagoshima Port.

Variable	Intercept	Slope	Coefficient of determination	Correlation
Mouth of Kagoshima Bay	-39.84 (-145.11 to 63.97)	0.03 (-0.02 to 0.08)	0.10 (0.00 to 0.32)	0.0562
Inner part of Kagoshima Bay	-60.33 (-153.31 to 34.55)	0.04 (-0.01 to 0.08)	0.16 (0.00 to 0.40)	0.1324