Supplemental tables

Table S1: Model selection quantities for models fitted using 5 km binned biomass. RMSE gives the root mean squared error, p_{loo} gives the effective number of parameters, LOOIC gives the leave-one-out information criteria, and ΔLOOIC gives the LOOIC value relative to the model with the minimum value.

Age	Model	RMSE	R^2	p_{loo}	LOOIC	ΔLOOIC
All	M0	1.62	0.14	13.8	19811.1	367.3
	M1	1.56	0.20	39.3	19471.1	27.2
	M2	1.56	0.20	41.5	19473.9	30.0
	M3	1.55	0.20	44.1	19443.9	0.0
Age 2	M0	2.35	0.17	13.1	17574.2	1571.9
	M1	1.91	0.45	38.5	16022.9	20.6
	M2	1.91	0.45	43.7	16002.3	0.0
	M3	1.91	0.45	43.3	16016.5	14.1
Age 3-4	M0	1.82	0.34	14.0	19312.9	808.9
	M1	1.67	0.44	40.0	18573.1	69.1
	M2	1.67	0.44	43.6	18569.9	65.9
	M3	1.66	0.44	44.6	18504.0	0.0
Age 5+	M0	1.69	0.18	13.6	20213.7	324.6
	M1	1.64	0.24	39.9	19908.4	19.3
	M2	1.63	0.24	43.0	19900.1	11.0
	M3	1.63	0.24	44.7	19889.1	0.0

Table S2: Model selection quantities for models fitted using temperature at 100 m interpolated using a 10 km grid. RMSE gives the root mean squared error, p_{loo} gives the effective number of parameters, LOOIC gives the leave-one-out information criteria, and ΔLOOIC gives the LOOIC value relative to the model with the minimum value.

Age	Model	RMSE	R^2	p_{loo}	LOOIC	ΔLOOIC
All	M0	1.41	0.16	14.2	7927.7	170.8
	M1	1.35	0.23	37.0	7775.6	18.7
	M2	1.35	0.23	39.1	7777.8	20.9
	M3	1.34	0.23	39.5	7756.9	0.0
Age 2	M0	2.28	0.16	12.9	7328.6	770.4
	M1	1.79	0.48	34.2	6574.0	15.8
	M2	1.77	0.49	37.9	6558.2	0.0
	M3	1.78	0.48	37.9	6571.8	13.6
Age 3-4	M0	1.64	0.35	14.2	8043.4	408.5
	M1	1.49	0.47	37.5	7676.3	41.4
	M2	1.48	0.47	41.0	7675.9	41.0
	M3	1.47	0.48	41.0	7634.9	0.0
Age 5+	M0	1.52	0.22	13.7	8219.4	191.0
	M1	1.44	0.29	37.2	8044.4	16.0
	M2	1.44	0.29	40.6	8039.7	11.3
	M3	1.44	0.29	40.7	8028.4	0.0

Table S3: Model selection quantities for the age-group sensitivity analysis. RMSE gives the root mean squared error, p_{loo} gives the effective number of parameters, LOOIC gives the leave-one-out information criteria, and ΔLOOIC gives the LOOIC value relative to the model with the minimum value. Age-2 models are presented in table 3 of the main text.

Age	Model	RMSE	R^2	p_{loo}	LOOIC	ΔLOOIC
Age 3	M0	1.88	0.41	13.0	8198.3	796.5
	M1	1.53	0.61	37.2	7423.7	21.9
	M2	1.52	0.61	39.9	7421.6	19.9
	M3	1.52	0.61	40.8	7401.8	0.0
Age 4	M0	1.57	0.34	13.9	7780.8	278.1
	M1	1.48	0.41	37.9	7601.9	99.1
	M2	1.48	0.41	41.1	7594.1	91.3
	M3	1.44	0.44	42.4	7502.8	0.0
Age 5	M0	1.56	0.36	13.4	7837.0	176.5
	M1	1.49	0.41	35.8	7691.9	31.4
	M2	1.49	0.41	37.7	7692.5	31.9
	M3	1.48	0.42	39.4	7660.5	0.0
Age 6	M0	1.56	0.35	14.0	7648.5	267.9
	M1	1.45	0.43	37.4	7402.6	22.0
	M2	1.45	0.43	39.3	7403.6	23.0
	M3	1.44	0.44	41.2	7380.6	0.0
Age 7	M0	1.53	0.27	13.7	7736.6	208.4
	M1	1.46	0.33	37.2	7582.6	54.4
	M2	1.46	0.34	40.1	7571.1	42.9
	M3	1.44	0.35	41.2	7528.1	0.0
Age 8	M0	1.50	0.20	13.4	7619.4	179.4
	M1	1.43	0.27	37.2	7467.0	27.0
	M2	1.43	0.27	39.2	7468.6	28.7
	M3	1.42	0.28	41.5	7439.9	0.0
Age 9	M0	1.44	0.25	14.3	6718.6	160.7

	M1	1.37	0.31	38.1	6587.9	30.0
	M2	1.37	0.31	40.1	6591.6	33.7
	M3	1.36	0.33	43.0	6557.9	0.0
Age 10+	M0	1.57	0.17	14.8	7914.8	248.7
	M1	1.47	0.27	38.6	7681.6	15.5
	M2	1.47	0.27	41.2	7684.1	18.0
	M3	1.46	0.27	43.0	7666.1	0.0

Supplemental figures

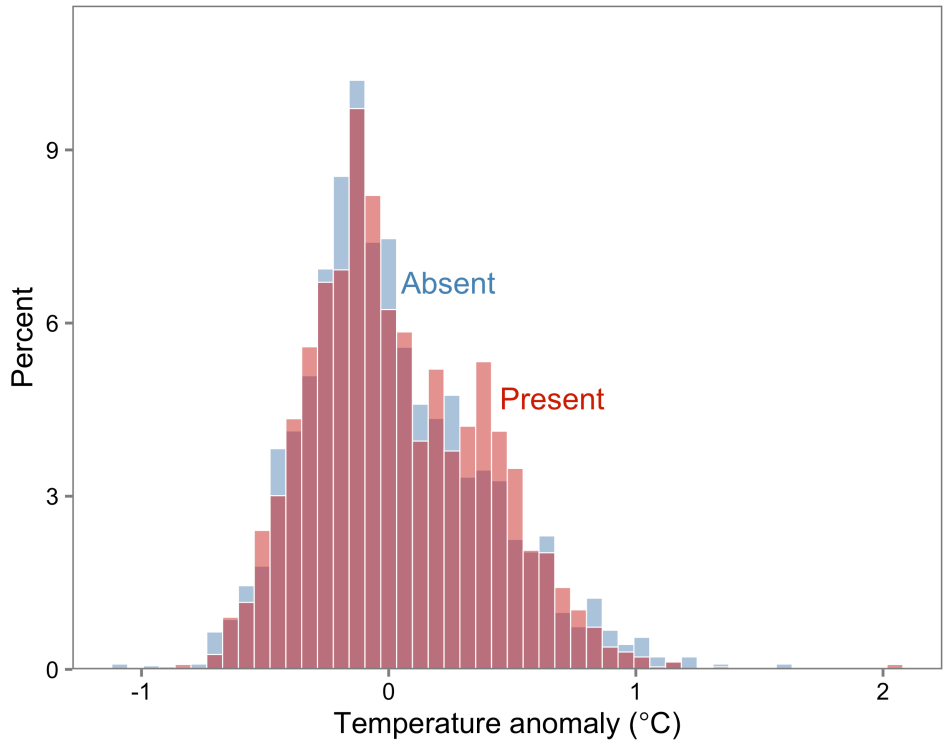

Figure S1: Histograms of temperature anomaly at 100 m for Pacific hake occurrences (red) and absences (blue).

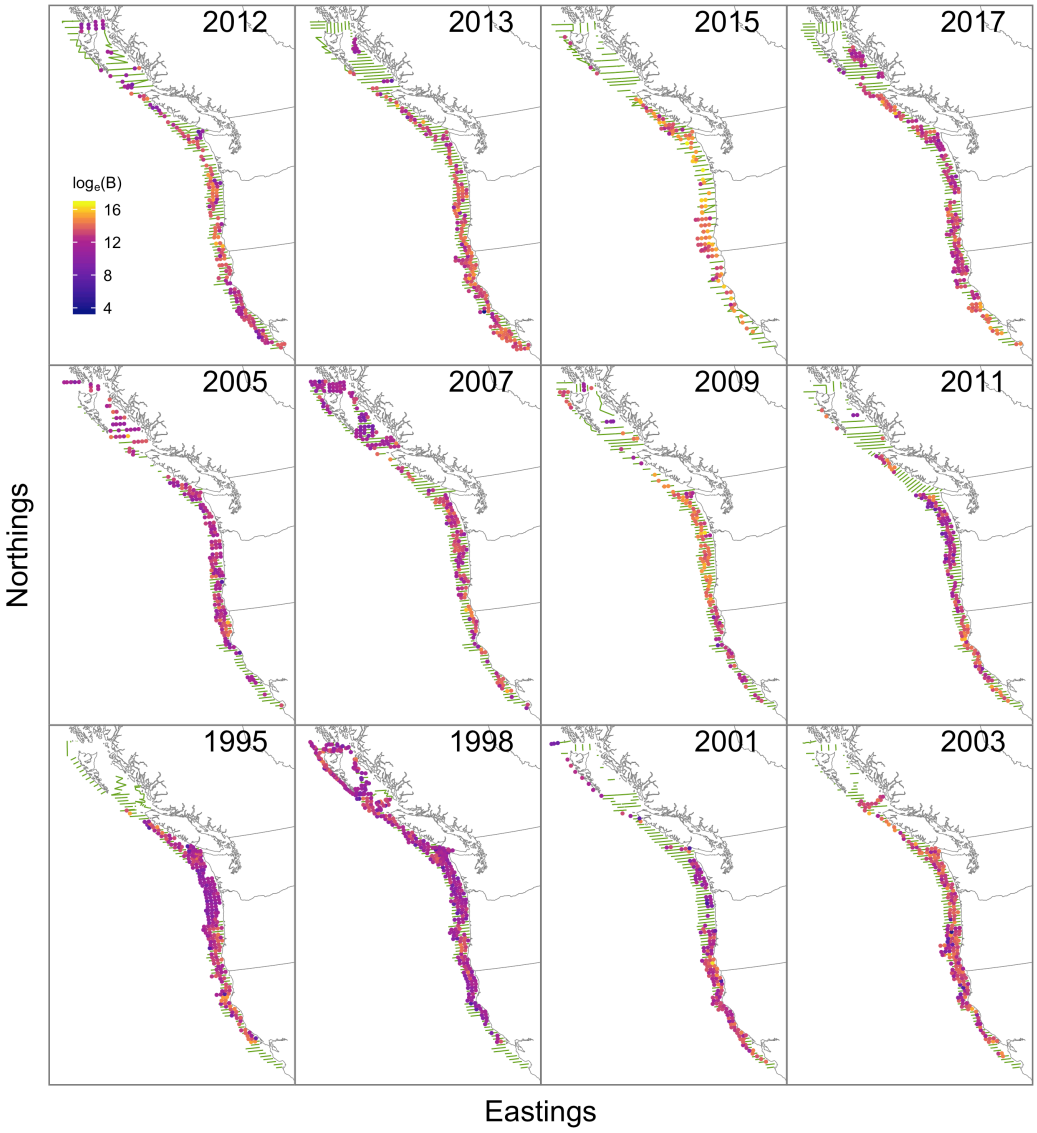

Figure S2: Spatial distribution of Pacific hake biomass derived from acoustic backscatter data. Green lines show acoustic-trawl survey transects and colored points indicate the magnitude of hake biomass in a location (20km bins along transects).

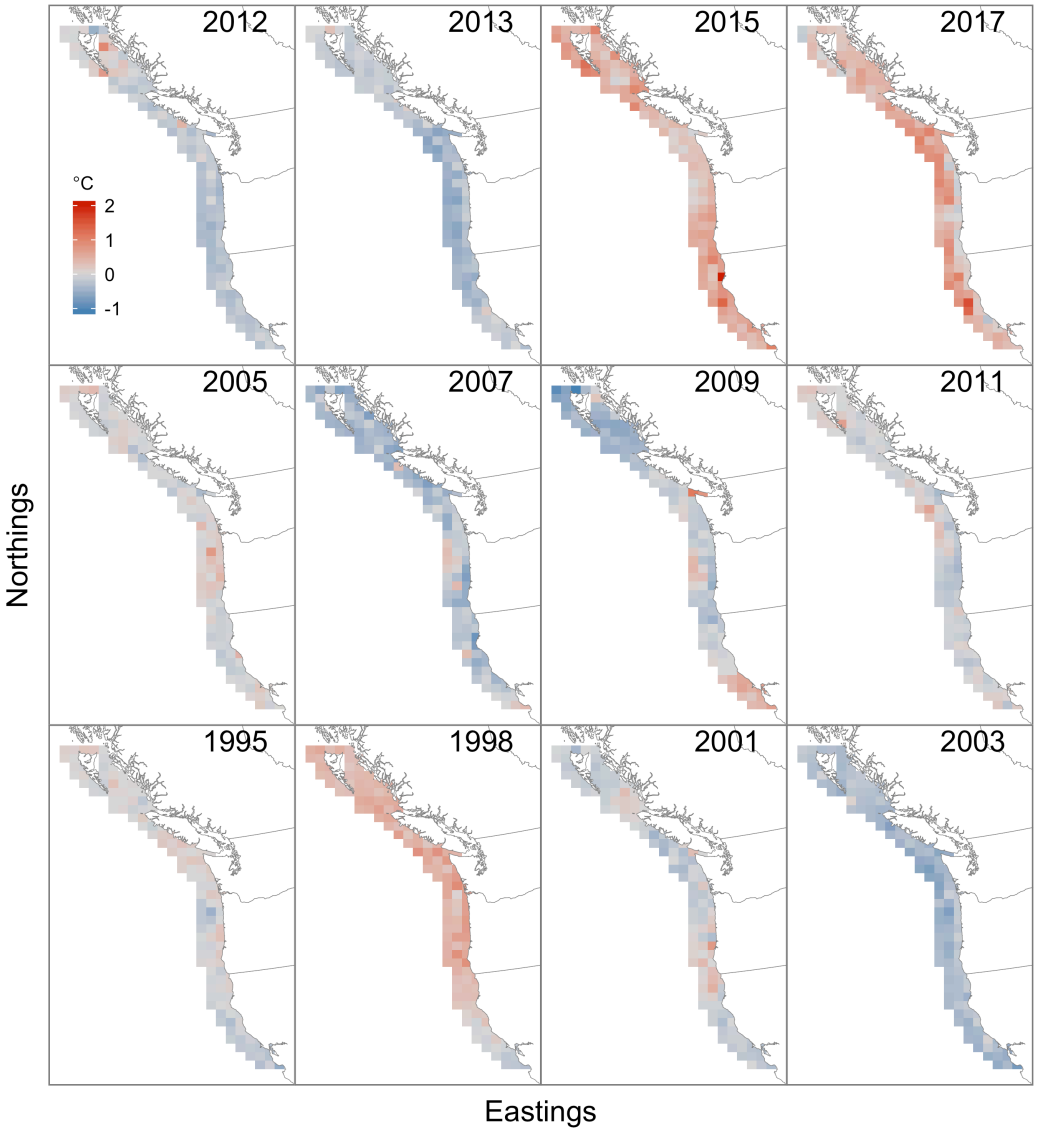

Figure S3: Interpolated temperature at 100 m anomaly surfaces. Grid resolution is 50 km x 50 km. Red shading indicates a grid cell temperature value above the long-term mean for that grid cell and blue shading indicates a below average temperature value.

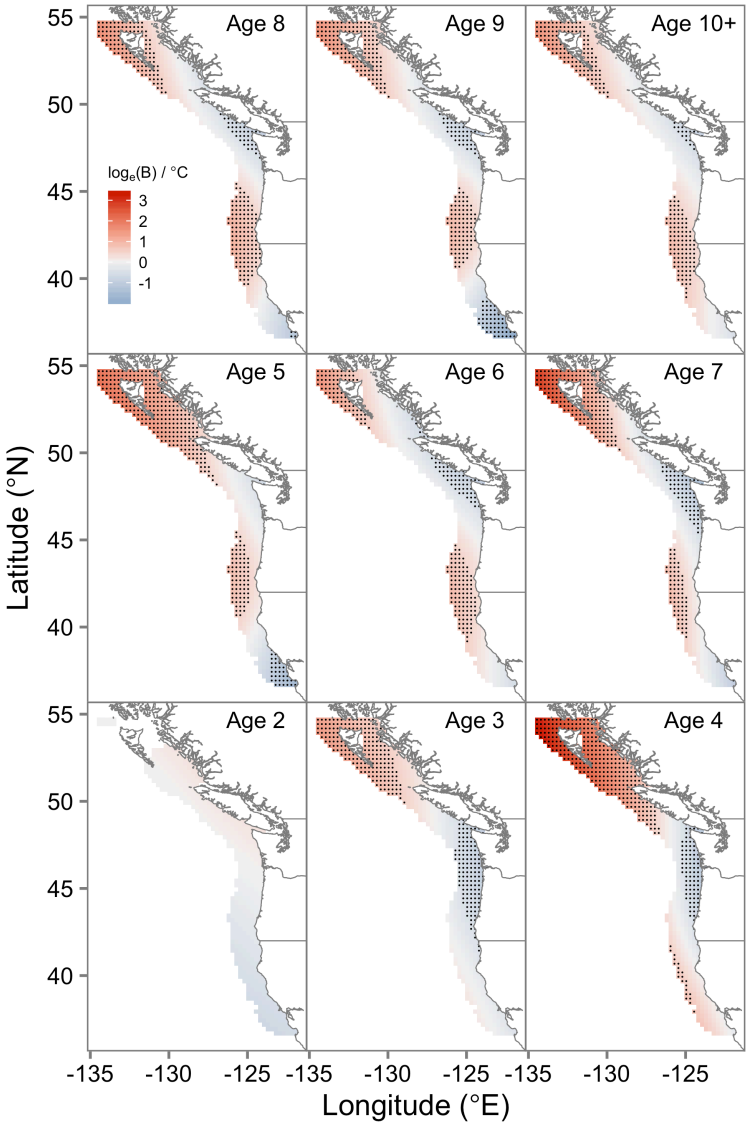

Figure S4: Spatially dependent temperature effect for the hake age-group sensitivity analysis. Shading represents the posterior median value for the non-stationary temperature effect on hake biomass given a one unit increase in temperature at a location. Red (blue) shading indicates the linear temperature effect was positive (negative). Black dots indicate locations where the 95% credibility interval for the temperature effect did not include zero. Effects only shown for locations within 50 km of an age-specific hake biomass observation.

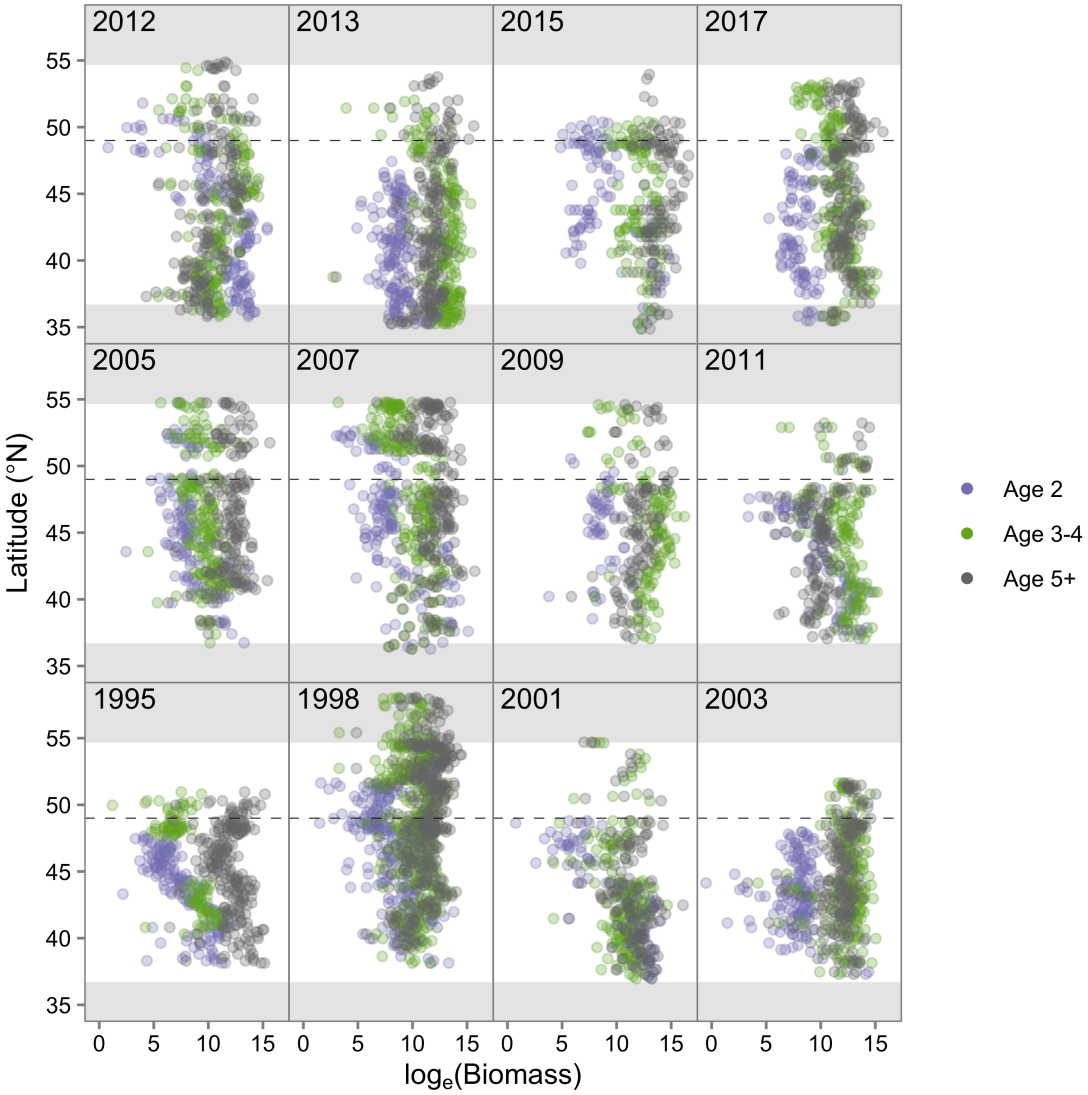

Figure S5: Latitudinal distribution of Pacific hake biomass by age-group. Horizontal dashed line indicates the border between the United States and Canada. White middle regions indicate the common survey extent across all years. Purple points show age 2 distribution, green dots show age 3–4 distribution, and grey dots show age 5+ distribution.

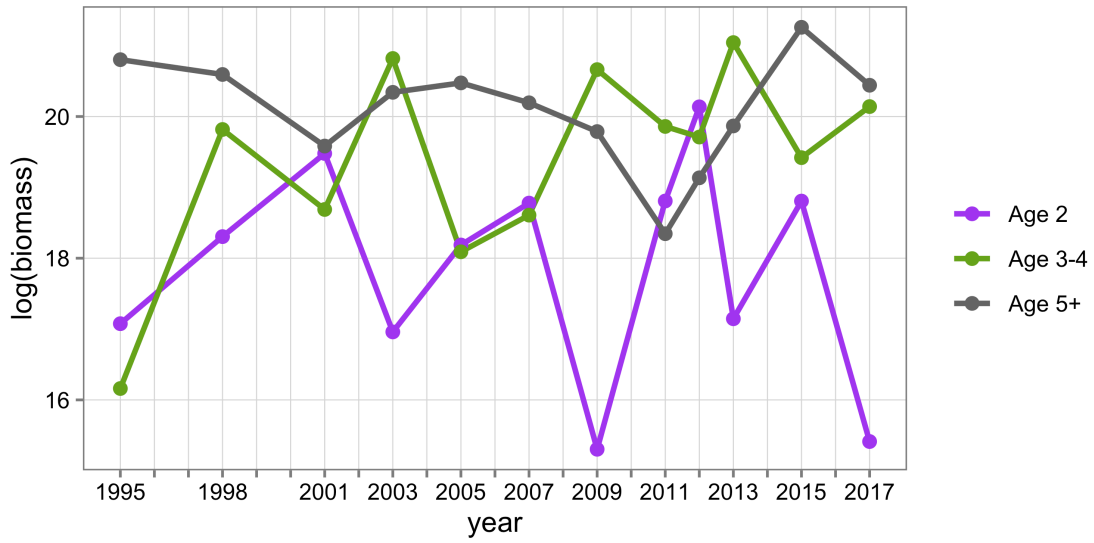

Figure S6: Time series of age-group specific total biomass.

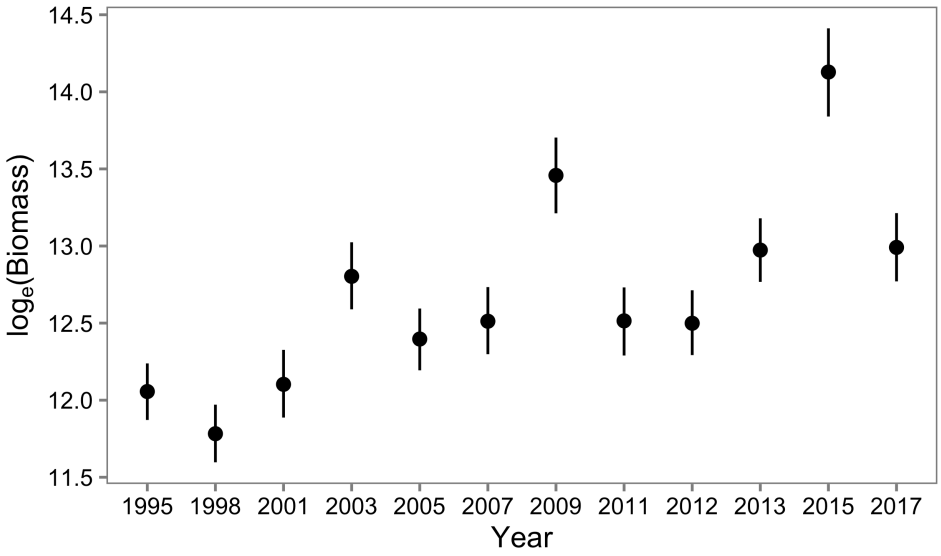

Figure S7: Estimated year effects from the total biomass M3 model. Dots give the median posterior value and vertical segments give the 95% credibility interval.

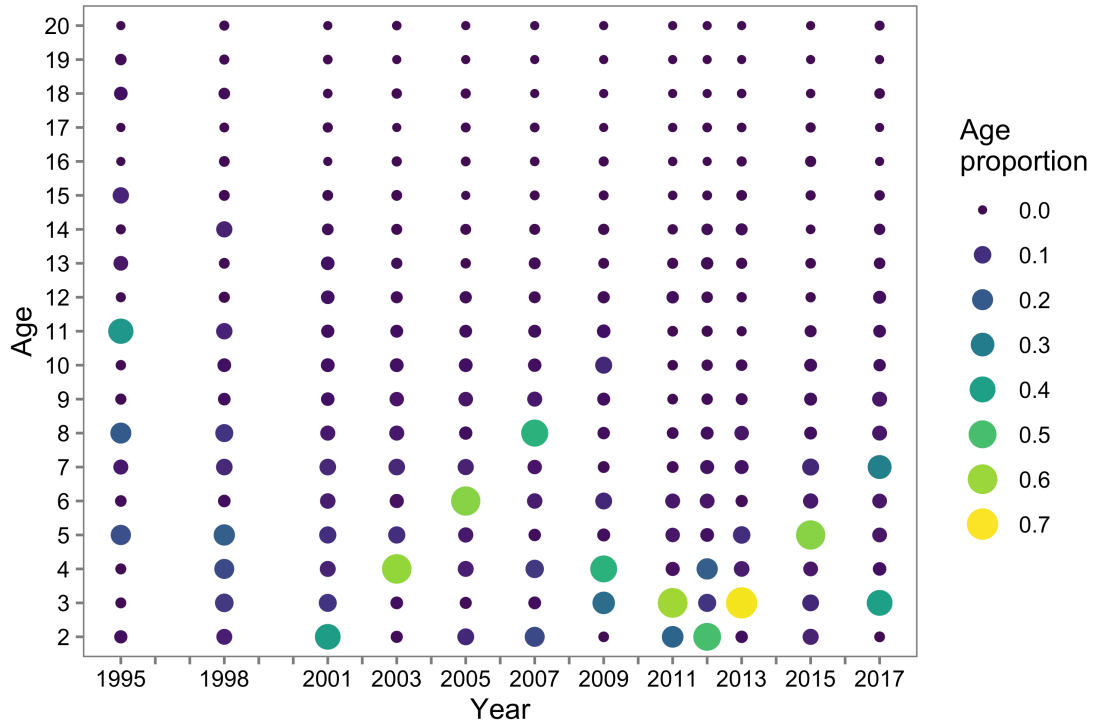

Figure S8: Pacific hake age proportions for each survey year. Larger and lighter colored bubbles indicate a higher proportion of a particular age-class in a given year.