Drivers of pelagic fish abundance in the Sacramento-San Joaquin Delta

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Supplement. Model descriptions and associated fit statistics for the zero-inflated negative binomial parameterizations applied to the Fall Midwater Trawl (FMWT) survey in the Sacramento-San Joaquin Delta for delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), age-0 striped bass (*Morone saxatilis*), and threadfin shad (*Dorosoma petenense*).

Table S1. Results of models fitted for the development of standardized indices of relative abundance. Covariate abbreviations: Year (Y), Month (M), Area (A), and Secchi (S), and n/a indicates model failed to converge successfully.

Model	Count covariates	False zero covariates	No. par.	Delta smelt		Longfin smelt		Age-0 striped bass		Threadfin shad	
				AIC	ΔAIC	AIC	ΔAIC	AIC	ΔAIC	AIC	ΔAIC
M_1	Y	Y	89	n/a	n/a	30253.0	944.1	36708.6	1299.4	24364.7	1334.3
M_2	Y+M	Y+M	95	20844.2	1348.6	29751.4	442.5	36630.4	1221.2	24319.7	1289.4
M_3	Y+M+A	Y+M+A	103	19872.9	377.3	29602.4	293.6	36038.7	629.5	23336.2	305.8
M_4	Y+M+A+S	Y+M+A+S	105	19495.6	0.0	29308.9	0.0	35409.2	0.0	23030.3	0.0
M_5	Y+M+A+S	Y+M+A	104	19501.5	5.9	29323.0	14.1	35423.5	14.3	23246.9	216.7
M_6	Y+M+A+S	Y+M	100	19795.0	299.4	29356.0	47.1	35537.2	128.0	n/a	n/a
M_7	Y+M+A+S	Y	97	19801.9	306.3	29690.6	381.7	n/a	n/a	23332.8	302.3
M_8	Y+M+A	Y+M+A+S	104	19635.3	139.7	29497.7	188.8	35677.2	268.0	23045.0	14.6
M_9	Y+M	Y+M+A+S	100	19795.2	299.6	29588.6	279.7	35988.1	578.9	23956.3	926.0
M_{10}	Y	Y+M+A+S	97	19834.8	339.2	29601.4	292.5	36137.9	728.7	23993.2	962.8

Table S2. Results of models fitted to evaluate annualized covariates.

Model	Annual covariate	Delta smelt		Longfin smelt		Age-0 striped bass		Threadfin shad	
		AIC	ΔAIC	AIC	ΔAIC	AIC	ΔAIC	AIC	ΔAIC
A_1	Adult calanoid copepods	15122.3	304.1	24968.2	1642.2	27545.5	691.4	19325.6	263.8
A_2	Adult cyclopoid copepods	15080.4	262.2	24419.8	1093.8	27420.7	566.6	19247.5	185.7
A_3	Adult calanoid, adult cyclopoid combined	15105.3	287.1	24896.4	1570.3	27433.2	579.1	19310.9	249.1
A_4	Mysids	15164.8	346.6	24145.5	819.4	27125.5	271.4	19322.2	260.4
A_5	Chl-*a*	15070.8	252.5	23758.9	432.9	26932.9	78.7	19326.7	264.9
A_6	Summer temperature	15113.2	295.0	24633.0	1306.9	27536.3	682.2	19311.5	249.7
A_7	Winter temperature	15095.2	277.0	24282.6	956.5	27472.6	618.5	19325.3	263.5
A_8	Total suspended solids	14818.2	0.0	23326.1	0.0	26854.1	0.0	19061.8	0.0
A_9	Volatile suspended solids	15074.5	256.3	24612.9	1286.8	27106.2	252.1	19213.2	151.3
A_{10}	Turbidity	14853.1	34.8	23449.7	123.6	27493.2	639.0	19196.7	134.9
A_{11}	Historical Outflow Jan-Jun	14974.3	156.0	23509.0	183.0	27390.9	536.8	19288.4	226.6
A_{12}	Historical Outflow Mar-May	15067.4	249.1	23766.1	440.0	27396.4	542.3	19318.2	256.4
A_{13}	Historical Outflow Jan-Jun, 1yr. lag	15164.2	346.0	24872.2	1546.1	27521.8	667.7	19316.3	254.5
A_{14}	Historical Outflow Mar-May, 1yr. lag	15158.5	340.3	24925.1	1599.0	27536.0	681.8	19330.4	268.6

A_{15}	Historical Inflow Jan-Jun	14975.6	157.3	23497.8	171.8	27394.6	540.5	19290.8	229.0
A_{16}	Historical Inflow Mar-May	15065.6	247.4	23707.9	381.9	27387.8	533.6	19317.2	255.3
A_{17}	Historical Inflow Jan-Jun, 1 yr. lag	15162.8	344.6	24879.9	1553.8	27524.4	670.2	19315.9	254.1
A_{18}	Historical Inflow Mar-May, 1 yr. lag	15158.4	340.1	24929.6	1603.5	27531.7	677.6	19329.0	267.2
A_{19}	Unimpaired Outflow Jan-Jun	14989.8	171.6	23615.2	289.1	27436.2	582.1	19315.2	253.3
A_{20}	Unimpaired Outflow Mar-May	15025.4	207.2	23968.6	642.5	27451.5	597.4	19331.6	269.8
A_{21}	Unimpaired Outflow Jan-Jun, 1yr. lag	15167.2	349.0	24899.4	1573.3	27549.8	695.7	19317.4	255.5
A_{22}	Unimpaired Outflow Mar-May, 1yr. lag	15152.6	334.4	24944.6	1618.5	27557.8	703.7	19329.1	267.3
A_{23}	Unimpaired Inflow Jan-Jun	14989.9	171.7	23613.4	287.3	27436.7	582.6	19315.4	253.5
A_{24}	Unimpaired Inflow Mar-May	15025.5	207.2	23969.1	643.0	27452.3	598.1	19331.6	269.8
A_{25}	Unimpaired Inflow Jan-Jun, 1 yr. lag	15167.1	348.9	24899.4	1573.3	27550.0	695.9	19317.4	255.6
A_{26}	Unimpaired Inflow Mar-May, 1 yr. lag	15152.7	334.5	24944.3	1618.2	27558.3	704.2	19329.0	267.2
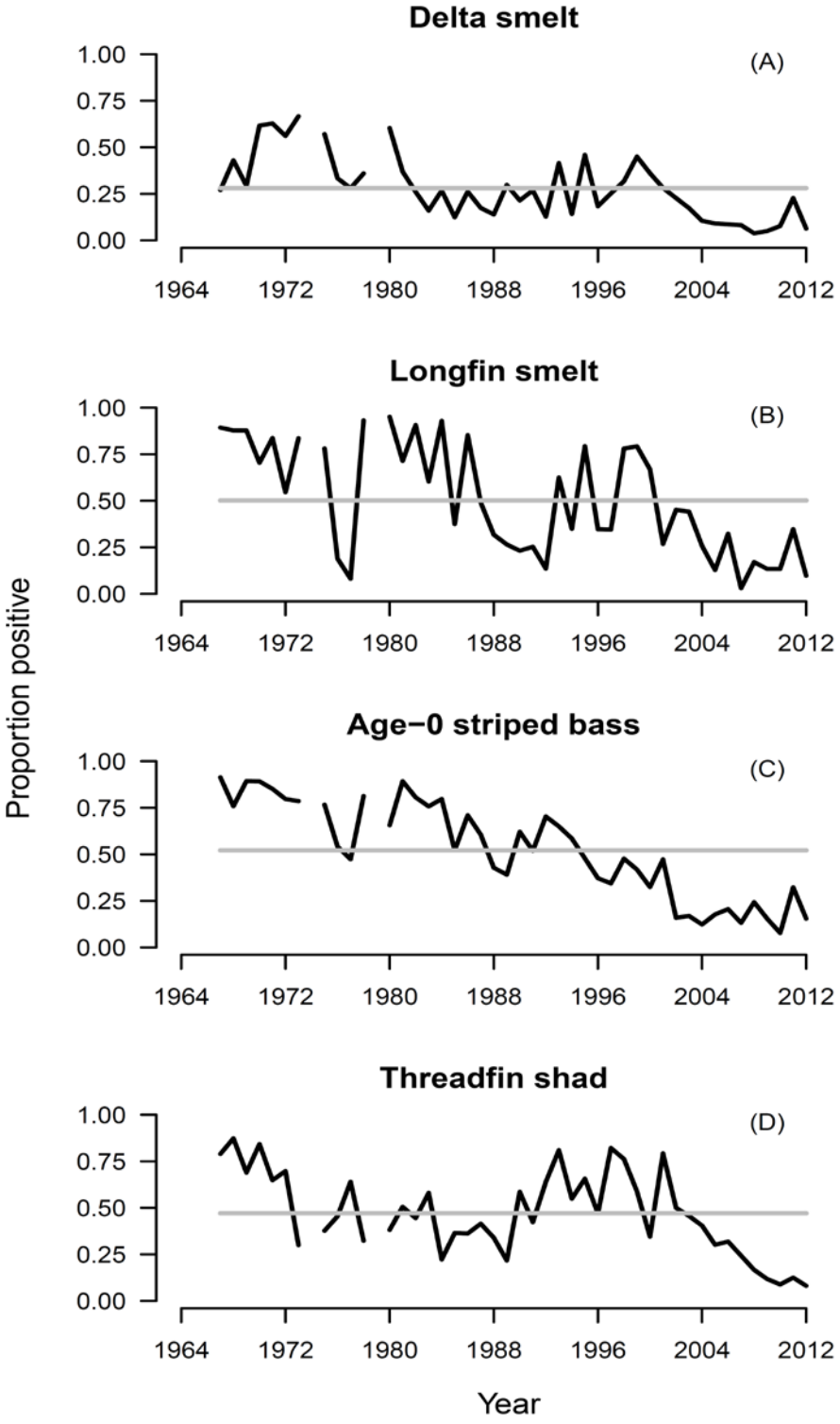
Fig. S1. Yearly proportions of positive tows (at least one target animal captured) based on the Fall Midwater Trawl survey, 1967-2012, for (A) delta smelt, (B) longfin smelt, (C) age-0 striped bass, and (D) threadfin shad. No sampling occurred in 1974, September 1976, December 1976, and 1979. Horizontal line is the time-series mean proportion positive.