Non-Spawner (Oct-May Catch) Covariates Analysis

Table 1: Table B1. Model selection tests of GPCP precipitation as an explanatory variable for the catch (N_t) during post-monsoon months (Oct-May) using 1983 to 2014 data. The data range is determined by the years for which SST was available in order to use a consistent dataset across covariate tests. The base model (M) with prior catch dependency was selected independently (Appendix A). N_{t-1} is the post-monsoon catch in prior season, and S_{t-2} is the catch during Jul-Sep two seasons prior. To the base model, covariates are added. V_t is the covariate in the calendar year, and V_{t-1} is the covariate in the prior calendar year. The specific hypothesis (Table 1) being tested is noted in parentheses. The models are tested as nested sets. Thus 1, 2a, 3a is a set and 1, 2b, 3b is another set.

Model	Residual df	MASE	Adj. R2	F	p value	AIC
base model (M) 1983-2014 data						
1. $ln(N_t) = \alpha + s(ln(N_{t-1})) + s(ln(S_{t-2})) + \epsilon_t$	25.6	0.748	57.3			80.76
V_t = Jun-Jul Precipitation (S1)						
2a. $ln(N_t)$ = M + βV_t	24.7	0.762	57.6	1.18	0.286	81.29
3a. $ln(N_t)$ = M + $s(V_t)$	23.2	0.752	56.4	0.19	0.753	82.98
2b. $ln(N_t)$ = M + βV_{t-1}	24.6	0.748	55.7	NA	NA	82.73
3b. $ln(N_t)$ = M + $s(V_{t-1})$	23.1	0.701	57.7	1.54	0.235	82.01
V_t = Apr-May Precipitation (S2)						
2a. $ln(N_t)$ = M + βV_t	24.7	0.749	55.7	0.02	0.87	82.69
3a. $ln(N_t)$ = M + $s(V_t)$	22.8	0.741	54.2	0.21	0.789	84.7
2b. $ln(N_t)$ = M + βV_{t-1}	24.6	0.733	56.8	0.66	0.424	81.94
3b. $ln(N_t)$ = M + $s(V_{t-1})$	22.9	0.704	56.4	0.57	0.554	83.09

Table 2: Table B2. Model selection tests of average sea surface temperature off the Kerala coast (up to 80km offshore in boxes 2-5 in Figure 1) as the explanatory variable (V_t) for the catch during post-monsoon months (Oct-May) using 1983 to 2014 data. The hypothesis tested (Table 1) is noted in parentheses. See Table B1 for an explanation of the models.

Model	Residual df	MASE	Adj. R2	F	p value	AIC
base model (M) 1983-2014 data						
1. $ln(N_t) = \alpha + s(ln(N_{t-1})) + s(ln(S_{t-2})) + \epsilon_t$	25.6	0.748	57.3			80.76
V_t = Ave Mar-May SST (S5)						
2a. $ln(N_t)$ = M + βV_t	24.7	0.711	59.7	2.91	0.102	79.69
3a. $ln(N_t)$ = M + $s(V_t)$	22.9	0.687	63.7	2.28	0.13	77.22
2b. $ln(N_t)$ = M + βV_{t-1}	24.7	0.761	57.7	1.29	0.267	81.22
3b. $ln(N_t)$ = M + $s(V_{t-1})$	22.8	0.753	58	0.77	0.464	81.96
V_t = Ave Oct-Dec SST (L1)						
2. $ln(N_t)$ = M + βV_{t-1}	24.7	0.751	55.7	NA	NA	82.72
3. $ln(N_t)$ = M + $s(V_{t-1})$	23.3	0.743	56.6	1.09	0.33	82.68

Table 3: Table B3. Model selection tests of upwelling intensity off Cochi as the explanatory variable. See Table B1 for an explanation of the models. Two upwelling indices were tested. The nearshore-offshore temperature diferential (UPW), which is the offshore (box 13) minus nearshore (box 4) SST, and the average nearshore SST along the Kerala coast (boxes 2-5). These are highly correlated but not identical.

Model	Residual df	MASE	Adj. R2	F	p value	AIC
base model (M) 1983-2014 data						
1. $ln(N_t) = \alpha + s(ln(N_{t-1})) + s(ln(S_{t-2})) + \epsilon_t$	25.6	0.748	57.3			80.76
V_t = Ave. Jun-Sep UPW (L2)						
2a. $ln(N_t)$ = M + βV_t	24.7	0.756	63	5.22	0.033	76.93
3a. $ln(N_t)$ = M + $s(V_t)$	22.2	0.728	63.1	0.76	0.503	78.12
2b. $ln(N_t)$ = M + βV_{t-1}	24.7	0.744	55.7	0.02	0.893	82.71
3b. $ln(N_t)$ = M + $s(V_{t-1})$	22.3	0.722	57.1	1.09	0.363	82.92
V_t = Ave. Jun-Sep SST (L2)						
2a. $ln(N_t)$ = M + βV_t	24.7	0.719	63.5	5.52	0.029	76.5
3a. $ln(N_t)$ = M + $s(V_t)$	22.7	0.715	62.7	0.41	0.662	78.26
2b. $ln(N_t)$ = M + βV_{t-1}	24.7	0.75	56	0.18	0.668	82.49
3b. $ln(N_t)$ = M + $s(V_{t-1})$	22.7	0.761	55.4	0.53	0.594	83.95