

Table S1. Spearman’s ρ correlation matrix for breeding parameters

	BB	Ch	BS
BB	1.00	0.21	-0.28
Ch	0.21	1.00	0.83
BS	-0.28	0.83	1.00

BB = number of breeding birds, Ch = number of chicks, BS = breeding success. Values in **bold** represent correlated relationships.

Table S2. Spearman’s ρ correlation matrix for climate indices affecting the breeding birds arriving to Fisher Island

	PDO PB⁻¹	SOI PB⁻¹	NPI PB⁻¹	SAM PB⁻¹	PDO⁰	NPI PB⁰	SOI PB⁰	SAM PB⁰	PDO^{-0.5}	NPI PB^{-0.5}	SOI PB^{-0.5}	SAM PB^{-0.5}
PDO PB⁻¹	1.000	-0.540	-0.685	-0.018	0.891	-0.062	-0.344	0.184	0.966	-0.477	-0.321	0.153
SOI EB⁻¹	-0.540	1.000	0.378	0.049	-0.515	0.232	0.783	-0.128	-0.548	0.262	0.809	-0.166
NPI PB⁻¹	-0.685	0.378	1.000	-0.054	-0.589	0.146	0.086	-0.201	-0.736	0.753	0.079	-0.108
SAM EB⁻¹	-0.018	0.049	-0.054	1.000	-0.025	0.193	0.129	0.339	0.012	0.030	0.018	0.601
PDO PB⁰	0.891	-0.515	-0.589	-0.025	1.000	-0.235	-0.373	0.098	0.928	-0.484	-0.348	0.063
NPI PB⁰	-0.062	0.232	0.146	0.193	-0.235	1.000	0.249	0.074	-0.087	0.366	0.274	0.103
SOI PB⁰	-0.344	0.783	0.086	0.129	-0.373	0.249	1.000	0.009	-0.308	-0.017	0.946	-0.021
SAM PB⁰	0.184	-0.128	-0.201	0.339	0.098	0.074	0.009	1.000	0.173	0.029	-0.074	0.756
PDO^{-0.5}	0.966	-0.548	-0.736	0.012	0.928	-0.087	-0.308	0.173	1.000	-0.569	-0.290	0.756
NPI PB^{-0.5}	-0.477	0.262	0.753	0.030	-0.484	0.366	-0.017	0.029	-0.569	1.000	-0.023	-0.015
SOI PB^{-0.5}	-0.321	0.809	-0.201	0.339	-0.348	0.074	0.009	-0.074	-0.290	0.029	1.000	0.756
SAM PB^{-0.5}	0.153	-0.166	-0.108	0.601	0.063	0.103	-0.021	0.756	0.119	-0.015	-0.133	1.000

Breeding Periods: Pre-breeding/migration = PB, Early-breeding = EB. Climate Indices: Pacific Decal Oscillation = PDO, Northern Pacific Index = NPI, Southern Oscillation Index = SOI, Southern Annual Mode = SAM. Temporal Lag One: climate indices average between May to August (PB⁰), climate indices average between September to November (EB⁰); Temporal Lag Two: climate indices average between February to August (PB^{-0.5}), climate indices average between June to November (EB^{-0.5}); Temporal Lag Three = climate indices average between November to October (PB⁻¹), climate indices average between December to November (EB⁻¹). Values in **bold** represent correlated relationships (greater than > 0.75).

Table S3. Spearman's ρ correlation matrix for climate indices affecting breeding success at Fisher Island.

	Rainfall CR ⁰	SOI CR ⁰	SAM CR ⁰	SOI CR ^{-0.5}	SAM CR ^{-0.5}	SOI CR ⁻¹	SAM CR ⁻¹
Rainfall CR ⁰	1.000	0.156	-0.046	0.027	-0.179	0.047	-0.161
SOI CR ⁰	0.156	1.000	0.297	-0.145	0.144	-0.214	0.196
SAM CR ⁰	-0.046	0.297	1.000	-0.068	0.245	-0.131	0.238
SOI CR ^{-0.5}	0.027	-0.145	-0.068	1.000	0.287	0.944	0.220
SAM CR ^{-0.5}	-0.179	0.144	0.245	0.287	1.000	0.212	0.843
SOI CR ⁻¹	0.047	-0.214	-0.131	0.944	0.212	1.000	0.127
SAM CR ⁻¹	-0.161	0.196	0.238	0.220	0.843	0.127	1.000

Climate Indices: Pacific Decadal Oscillation = PDO, Northern Pacific Index = NPI, Southern Oscillation Index = SOI, Southern Annual Mode = SAM. Temporal lags: Temporal Lag One = 3 to 4 months⁽⁰⁾, Temporal Lag Two = 6 to 7 months^(-0.5), Temporal Lag Three = 12 months⁽⁻¹⁾. Rainfall CR⁰ = rainfall averaged between December to March during the chick rearing period; SOI CR⁰ = SOI averaged between December to March during the chick rearing period; SAM CR⁰ = SAM averaged between December to March during the chick rearing period; SOI CR^{-0.5} = SOI averaged between September to March, the same year as the chick rearing period; SAM CR^{-0.5} = SAM averaged between September to March, the same year as the chick rearing period; SOI CR⁻¹ = SOI averaged April the previous year to March, the same year as the chick rearing period; SAM CR⁻¹ = SAM averaged between April the previous year to March the same year as the chick rearing period. Values in **bold** represent correlated relationships.

Table S4. Coefficient values of each climate index for the response variable number of breeding birds arriving to Fisher Island

	Estimate	SE	t value	Pr (> t)
Intercept	11907.927	6817.288	1.747	0.087
NPI PB⁰	-5.356	5.370	-0.997	0.323
SAM EB⁻¹	10.738	5.477	1.961	0.055
NPI PB⁻¹	-6.297	5.268	-1.195	0.237
PDO PB⁻¹	-13.671	7.532	-1.815	0.075
SOI EB⁻¹	-0.389	0.674	-0.577	0.566

NPI PB⁰ = North Pacific Index averaged from November to October during the pre-breeding/migration period, SOI EB⁻¹ = Southern Oscillation Index averaged from December the previous year to November the same year as the early-breeding period, SAM EB⁻¹ = SAM averaged between December the previous year to November the same year as the early-breeding period, NPI PB⁻¹ = North Pacific Index averaged from November the previous year to October the same year as the pre-breeding/migration period, and PDO PB⁻¹ = Pacific Decadal Oscillation averaged from November the previous year to October the same year as the pre-breeding/migration period.

Table S5: Coefficient values of each climate index for the response variable breeding success at Fisher Island

	Estimate	SE	t value	Pr (> t)
Intercept	0.632	0.085	7.396	2.33e-09
SOI CR⁰	-0.004	0.003	-1.116	0.250
SAM CR⁰	-0.005	0.025	-0.198	0.844
SOI CR⁻¹	0.003	0.003	0.982	0.331
SAM CR⁻¹	-0.012	0.040	-0.313	0.755
Rainfall CR⁰	-0.003	0.002	-2.00	0.033

Rainfall CR⁰ = rainfall averaged between December to March (the chick rearing period); SOI CR⁰ = SOI averaged between December to March (the chick rearing period); SAM CR⁰ = SAM averaged between December to March (the chick rearing period); SOI CR⁻¹ = SOI averaged April the previous year to March the same year as the chick rearing period; SAM CR⁻¹ = SAM averaged between April the previous year to March the same year as the chick rearing period. Significant < 0.05 are in **bold**.