The following supplement accompanies the article

Non-stationary seabird responses reveal shifting ENSO dynamics in the northeast Pacific

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Supplement. Table of data sources, supporting figures showing autocorrelation of data, and correlations between seabird reproductive success and additional variables.

Table S1. Data sources and additional information for all oceanographic indices used. All variables were eventually averaged over 2 mo running intervals from October to June

Data	Time scale	Source	URL	Processing
Sea surface temperature (SST)	Daily	Point Blue Conservation Science, Scripps Institution of Oceanography Shore Station Program	http://shorestation.ucsd.edu/active/index_active.html	Calculated a monthly mean from daily values. If more than 15 d were missing in a month, we did not calculate mean for that month and instead interpolated between monthly values for that year (applied to 13 mo total, <3% of the monthly values)
Sea level height (SLH)	Monthly	University of Hawaii, Sea Level Center	http://ilikai.soest.hawaii.edu/uhslc/htmld/d0551W.html	Used data from the San Francisco station
Upwelling index (UI)	Daily	NOAA Pacific Fisheries Environmental Laboratory	www.pfeg.noaa.gov/products/PFEL/modeled/indices/upwelling/NA	Daily values averaged to obtain monthly mean from 39°N on the West Coast of North America
Pacific Decadal Oscillation (PDO)	Monthly	Nathan Mantua, JISAO, University of Washington	http://jisao.washington.edu/pdo/PDO.latest	None
North Pacific Gyre Oscillation Index (NPGO)	Monthly	Emmanuele Di Lorenzo, Georgia Institute of Technology	www.o3d.org/npgo/	None
Northern Oscillation Index (NOI)	Monthly	NOAA Pacific Fisheries Environmental Laboratory	www.pfel.noaa.gov/products/PFEL/modeled/indices/NOIx/noix.html	None
Multivariate El Niño Southern Oscillation Index (MEI)	Monthly	NOAA Earth System Research Laboratory	www.esrl.noaa.gov/psd/enso/mei/table.html	None

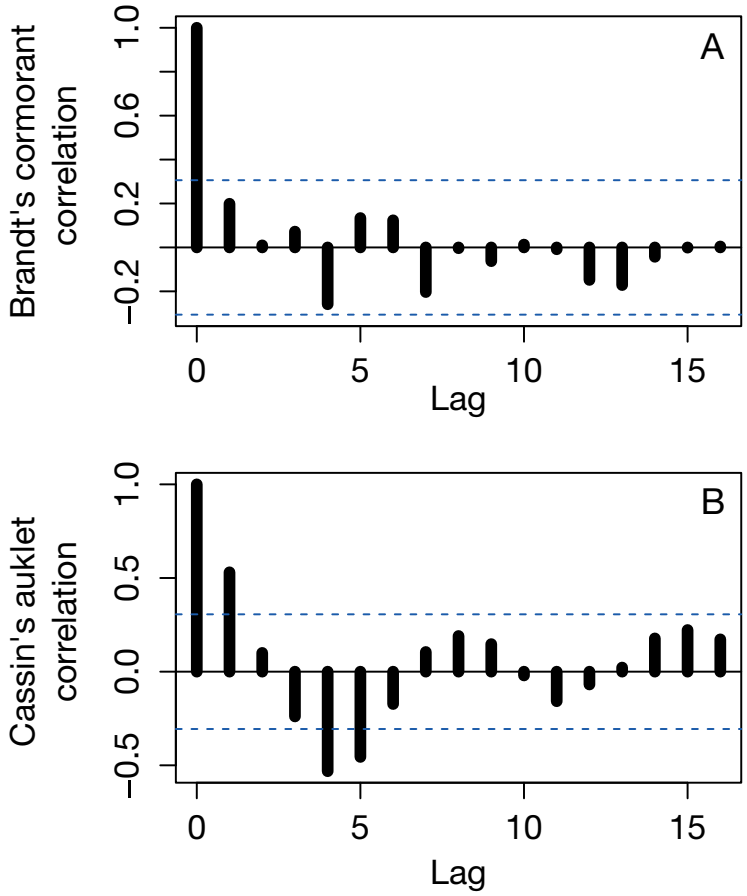

Fig. S1. Autocorrelation of (A) Brandt's cormorant and (B) Cassin's auklet reproductive success time series

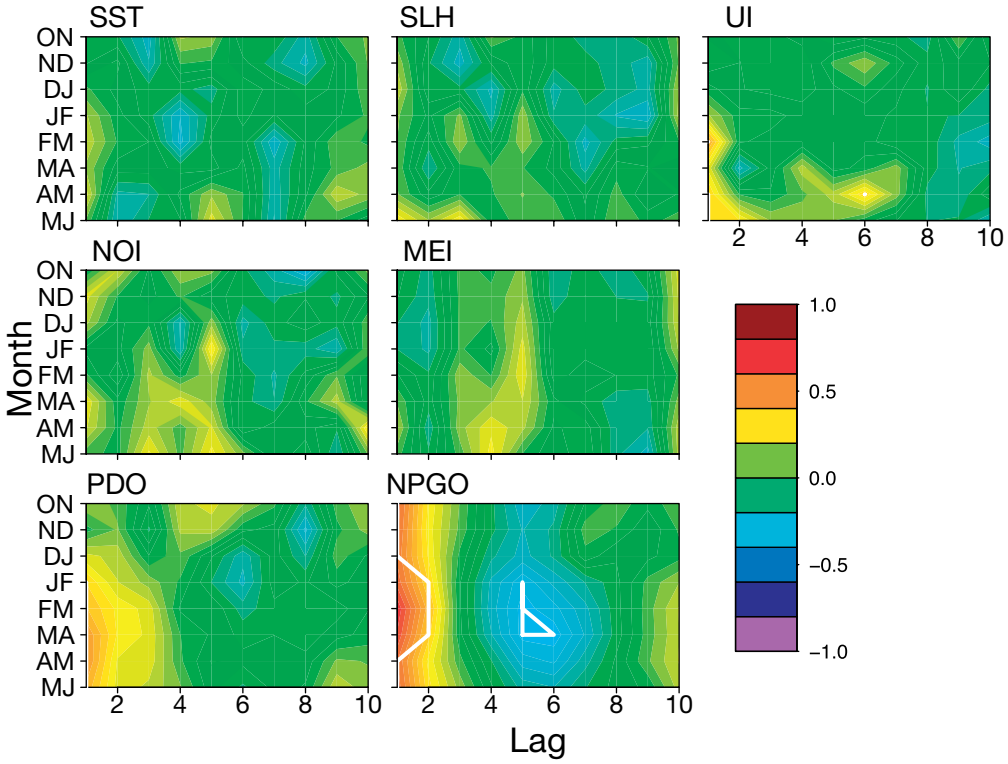

Fig. S2. Autocorrelation of the oceanographic variables used. Each panel shows the autocorrelation of each bi-monthly time series of oceanographic data at lags of up to 10 yr. The color represents the correlation coefficient. The Pacific Decadal Oscillation (PDO) shows some autocorrelation at a lag of 1 yr for some months (Jan–Jun). The North Pacific Gyre Oscillation (NPGO) also shows significant autocorrelation at lags of 1, 2, 5 and 6 yr. The white line represents areas of significant autocorrelation. SST: sea surface temperature; SLH: sea level height; UI: Bakun's Upwelling Index; NOI: Northern Oscillation Index; MET: Multivariate El Niño Index

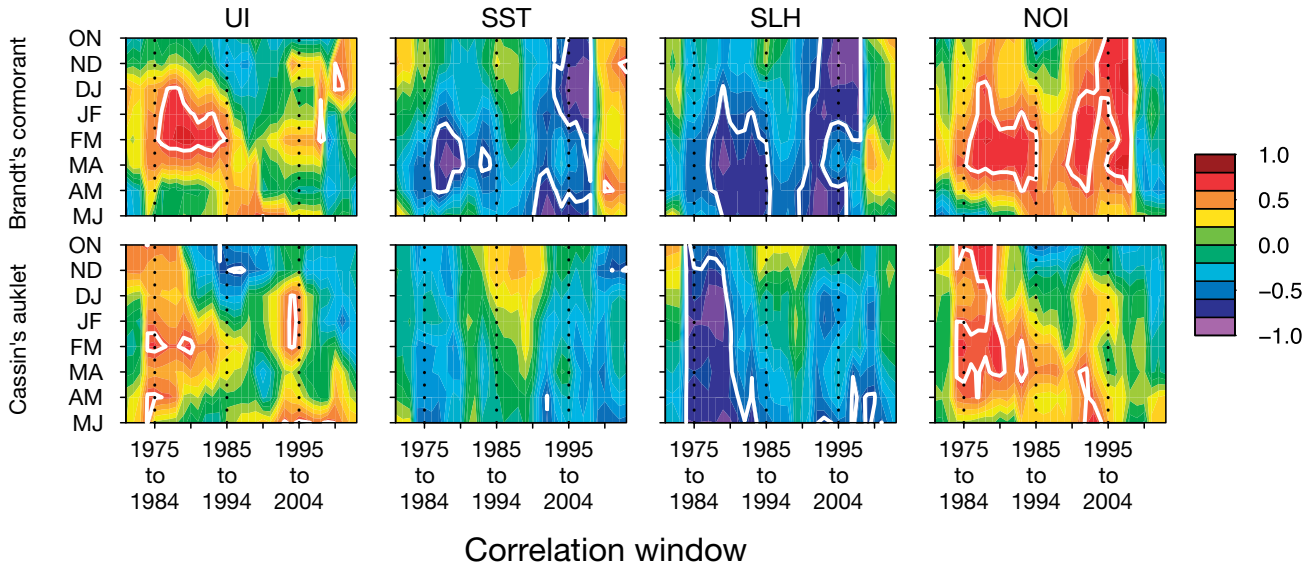

Fig. S3. The 10 yr sliding correlation between seabird reproductive success and 4 oceanographic variables: Bakun's Upwelling Index (UI), local sea surface temperature (SST), sea level height (SLH), and the Northern Oscillation Index (NOI). Each panel shows the results from correlating the bi-monthly averages of a single variable to seabird reproductive success. The months are shown on the *y*-axis and the *x*-axis is the 10-yr correlation window. Correlation coefficients are plotted in color, and the white line represents the p = 0.05 contour (within the contour p < 0.05)

Table S2. Correlation between Brandt's cormorant reproductive success and the 2 mo mean of each oceanographic variable. Variables shown are Bakun's Upwelling Index (UI), sea surface temperature (SST), sea level height (SLH), and Northern Oscillation Index (NOI). The 2 mo period shown in left column, variable along the top. Correlation coefficients are shown with significant correlation (p < 0.05) in bold with an astrisk

Brandt's cormorant	UI	SST	SLH	NOI
ON	–0.15	–0.01	–0.15	0.00
ND	0.20	0.07	–0.20	0.08
DJ	0.02	0.00	–0.21	0.16
JF	–0.04	–0.06	–0.26	0.25
FM	0.13	–0.11	–0.28	**0.33***
MA	0.04	–0.16	–0.27	0.29
AM	–0.18	–0.10	–0.28	0.08
MJ	0.06	–0.12	–0.29	–0.01

Table S3. Correlation between Cassin's auklet reproductive success and the 2 mo mean of each oceanographic variable. Variables shown are Bakun's Upwelling Index (UI), sea surface temperature (SST), sea level height (SLH), and Northern Oscillation Index (NOI). The 2 mo period shown in left column, variable along the top. Correlation coefficients are shown with significant correlation (p < 0.05) in bold with an astrisk

Cassin's auklet	UI	SST	SLH	NOI
ON	–0.11	–0.13	–0.04	0.01
ND	–0.15	–0.18	–0.08	0.03
DJ	0.02	–0.12	–0.14	0.06
JF	0.07	–0.12	–0.15	0.10
FM	0.09	–0.19	–0.18	0.20
MA	0.02	–0.17	–0.24	0.22
AM	0.10	–0.23	**–0.31***	**0.32***
MJ	0.30	–0.27	**–0.31***	0.30