**Supplemental Material**

Table SI. Zooplankton samples used in the analysis. Each line of the table reports the total number of tows collected (*N*) for each net (20 or 60 cm) during the listed sampling dates.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Survey | Year | 20 cm (*N*) | 60 cm (*N*) | Date |
| 2MF90 | 1990 | 16 | 17 | 8-9, 24 May, 4-5 Jun |
| 3MF91 | 1991 | 7 | 7 | 1-2 May |
| 4MF92 | 1992 | 9 | 10 | 2, 27 May |
| 4MF93 | 1993 | 13 | 13 | 11-12, 27 May |
| 6MF94 | 1994 | 12 | 12 | 4, 24 May |
| 8MF95 | 1995 | 6 | 6 | 28 May |
| 8MF96 | 1996 | 16 | 16 | 3-4, 31 May |
| 7MF97 | 1997 | 6 | 6 | 20 May |
| 4MF98, 5MF98 | 1998 | 14 | 14 | 5-6, 22-23 May |
| 1WE99 | 1999 | 6 | 6 | 7-8 May |
| 6MF00 | 2000 | 6 | 6 | 2 Jun |
| 2MF01 | 2001 | 6 | 6 | 6 May |
| 4MF02 | 2002 | 6 | 6 | 30 May |
| 5MF03 | 2003 | 6 | 6 | 1 Jun |
| 5MF04 | 2004 | 6 | 6 | 30-31 May |
| 6MF05 | 2005 | 6 | 6 | 30 May |
| 4MF06 | 2006 | 6 | 6 | 29 May |
| 5MF07 | 2007 | 6 | 6 | 27 May |
| 4DY08 | 2008 | 6 | 6 | 28-29 May |
| 4DY09 | 2009 | 6 | 6 | 2-3 Jun |
| 3DY10 | 2010 | 6 | 6 | 28 May |
| 2DY11 | 2011 | 6 | 6 | 7-8 Jun |
| DY13-06 | 2013 | 6 | 6 | 25-26 May |
| DY15-05 | 2015 | 5 | 15 | 25-26 May |
| DY17-05 | 2017 | 7 | 9 | 20-21 May |

Table SII. Species and life history stages retained quantitatively in various mesh sizes. Taken from (Seifert & Incze, 1989)

|  |  |  |  |
| --- | --- | --- | --- |
| Taxon | 153 μm | 333 μm | 505 μm |
| *Acartia* spp. | C6 |  |  |
| *C. marshallae* | C1-C6 | C3-C6 | C6 |
| *C. pacificus* | C1-C6 | C3-C6 |  |
| *E. bungii* | C1-C6 | C3-C6 | C4-C6 |
| *M. pacifica* | C2-C6 | C5-C6 |  |
| *Neocalanus* spp. | C1-C6 | C2-C6 | C3-C5 |
| *N. cristatus* | C1-C6 | C2-C6 | C3-C6 |
| *Oithona* spp. | C6 |  |  |
| *Pseudocalanus* spp.  | C3-C5 |  |  |

Table SIII. Taxa and life history stages taken from different mesh sizes prior to 2012 and after the 2012 protocol change.

|  |  |  |
| --- | --- | --- |
| Taxon | Pre-2012 (μm) | Post-2012 (μm) |
| *C. marshallae* C5 | 333 | 153 |
| *C. pacificus* C5 | 333 | 153 |
| *E. bungii* C4 | 333 | 505 |
| *M. pacifica* C5 | 333 | 153 |
| *Neocalanus* spp. C4 | 333 | 505 |
| *N. cristatus* C4 | 333 | 505 |

Table SIV. Climate and environmental variables included in the Dynamic Factor Analysis (abbreviation), source, reference, and hyperlink.

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Source | Reference | Link |
| Arctic Oscillation (AO) | NOAA CPC1 | Thompson and Wallace (1998) | <https://www.ncdc.noaa.gov/teleconnections/ao/data.csv> |
| North Pacific Index (NPI) | NCAR/UCAR2 | Trenberth and Hurrell (1994) | <https://climatedataguide.ucar.edu/climate-data/north-pacific-np-index-trenberth-and-hurrell-monthly-and-winter> |
| Pacific Decadal Oscillation (PDO) | JISAO3 | Mantua and Hare (2002) | <http://research.jisao.washington.edu/pdo/PDO.latest.txt> |
| Alongshore Upwelling Index (Along UWI) and Offshore Upwelling Index (Off UWI) at 60N, 149W | PFEL4 | Bakun (1973) | <http://orpheus.pfeg.noaa.gov/products/PFELData/upwell/6_hourly/upwell60N149W> |
| Water temperature 0 m (0 m T)Salinity 0 m (0 m Sal) | EcoFOCI |  | <https://ferret.pmel.noaa.gov/pmel/erddap/tabledap/Shelikof_line8_3695_0ada_d066.html>*In situ* measurements |
| *U* (UWind) and *V* (VWind) components | NCEP6/NCAR2 reanalysis | Kalnay *et al.* (1996) | <https://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.surface.html> |
| Shelikof Strait current | NOPP/GODAE/HYCOM5 | Bleck (2002) | <https://www.hycom.org/> |

1Climate Prediction Center

2National Center for Atmospheric Research/University Corporation for University Research

3Joint Institute for the Study of the Atmosphere and Ocean, University of Washington

4NOAA Pacific Fisheries Environmental Laboratory

5National Ocean Partnership Program, US Global Ocean Data Assimilation Experiment, Hybrid Coordinate Ocean Model

6National Center for Environmental Prediction

Table SV. Correlation matrix of environmental variables used in the statistical analyses. Variables: Pacific Decadal Oscillation (PDO), North Pacific Index (NPI), Arctic Oscillation (AO), Alongshore upwelling index (Along. UW), Offshore upwelling index (Off. UW), temperature< 100 m (T < 100 m), salinity < 100 m (S < 100 m), temperature > 100 m (T > 100 m), salinity > 100 m (S > 100 m), winter wind vector (W wind), spring wind vector (S winds), Shelikof transport vector (Shel. T). Correlation with *p*-values < 0.05 are in bold. Superscripts: 1 *p* < 0.05; 2 *p* < 0.01; 3 *p* < 0.001; 4 *p* < 0.0001.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | PDO | NPI | AO | Along. UW | Off. UW | T < 100 m | S <100 m | T > 100 m | S > 100 m | W wind | S wind | Shel. T |
| PDO | 1 |  |  |  |  |  |  |  |  |  |  |  |
| NPI | **0.522** | 1 |  |  |  |  |  |  |  |  |  |  |
| AO | -0.05 | **0.411** | 1 |  |  |  |  |  |  |  |  |  |
| Along. UW | 0.12 | 0.11 | 0.19 | 1 |  |  |  |  |  |  |  |  |
| Off. UW | **0.552** | -0.28 | -0.13 | 0.10 | 1 |  |  |  |  |  |  |  |
| T < 100 m | **0.441** | **-0.63** | -0.20 | 0.09 | 0.32 | 1 |  |  |  |  |  |  |
| S < 100 m | -0.35 | **0.441** | 0.07 | -0.07 | -0.28 | **-0.532** | 1 |  |  |  |  |  |
| T >100 m | **0.461** | **-0.683** | -0.17 | 0.17 | 0.24 | **0.824** | **-0.421** | 1 |  |  |  |  |
| S > 100 m | -0.31 | **0.461** | 0.37 | 0 | -0.15 | -0.21 | **0.481** | -0.22 | 1 |  |  |  |
| W Wind | 0.11 | -0.02 | -0.02 | **-0.461** | -0.01 | 0.19 | -0.22 | 0.10 | -0.11 | 1 |  |  |
| S Wind | 0.18 | -0.03 | 0.10 | **0.431** | 0.23 | **0.421** | **-0.461** | 0.15 | 0.07 | -0.06 | 1 |  |
| Shel. T | 0.36 | **-0.501** | -0.10 | 0.08 | **0.451** | **0.572** | -0.39 | 0.38 | 0.16 | -0.02 | **0.532** | 1 |

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