### Ocean Acidification

**Layer type:** Pressure

**Data description:** Ocean acidification data were obtained from the [East Coast Ocean Acidification Product Suite](https://www.coral.noaa.gov/accrete/east-coast-oaps.html) (ECOAPS)[[1]](#footnote-22), which is produced by the NOAA Coral Health and Monitoring Program. This data includes monthly aragonite saturation state () values from 2014 - 2017 along the East Coast of the United States in a gridded format with a cell resolution of 0.15 degrees.

**Methods summary:** The raw data was cropped to our region of interest, reprojected to a US Albers Equal Area Conic projection, resampled using nearest neighbor interpolation to a cell size of 1km2. Mean annual aragonite saturation state concentrations were calculated for each year from the monthly data and then rescaled from 0 to 1 using a step-wise conditional function based on known thresholds for calcifying organisms.

* If is less than or equal to 1, the cell is assigned the highest pressure score of 1. This is a widely accepted saturation lethal threshold for calcifying marine organisms although indivdual responses vary
* Cells with = 1.5 are assigned a pressure value of 0.5. This saturation level is when mild dissolution begins to occur (Bednaršek et al. 2019)
* Cells with = 2.5 are assigned a pressure of 0. This is the lowest saturation level where few organims are affected (Ries et al. 2009).

Functionally this method of rescaling each cell to get a pressure value () between 0 and 1 can be described by the following equation:

Pressure layer scores were calculated as the mean of rescaled cell values by region and year.

**Gapfilling:** Unfortunately this dataset only included the most recent 4 years of data, requiring gapfilling methods for years 2005-2013. Ideally we could have gapfilled from a global dataset used in other Ocean Health Index Assessments (WHOI 2017), but after comparisons between the two datasets for the overlapping years (2014-2017) it became clear that the differences were too significant to justify gapfilling with this dataset. Therefore all values from 2005 - 2013 are gapfilled with the 2014 scores. We recognize this introduces uncertainty to the Index for those years.

**References**

Bednaršek, Nina, et al. “Systematic Review and Meta-Analysis Toward Synthesis of Thresholds of Ocean Acidification Impacts on Calcifying Pteropods and Interactions With Warming.” Frontiers in Marine Science, vol. 6, 2019, <doi:10.3389/fmars.2019.00227>.

Ries, J. B., et al. “Marine Calcifiers Exhibit Mixed Responses to CO2-Induced Ocean Acidification.” Geology, vol. 37, no. 12, 2009, pp. 1131–1134., <doi:10.1130/g30210a.1>.

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Wang, Z. A., G. L. Lawson, C. H. Pilskaln, and A. E. Maas (2017), Seasonal controls of aragonite saturation states in the Gulf of Maine, J. Geophys. Res. Oceans, 122, <doi:10.1002/2016JC012373>.

Woods Hole Oceanographic Institution (WHOI). 2017 update to data originally published in: Feely, R.A., S.C. Doney, and S.R. Cooley. 2009. Ocean acidification: Present conditions and future changes in a high-CO2 world. Oceanography 22(4):36–47

1. NOAA Coral Health and Monitoring Program, Ocean Acidification Product Suite, <https://www.coral.noaa.gov/accrete/oaps.html> [↑](#footnote-ref-22)