

# pH data from Virginia Aquarium Climate Change Facility, Virginia Beach VA; 2011-2015 (Impact of Climate on Eelgrass project)

**Website:** <https://www.bco-dmo.org/dataset/504885>

**Version:** 13 March 2015

**Version Date:** 2015-03-13

## Project

» [Impact of Climate Warming and Ocean Carbonation on Eelgrass \(\*Zostera marina\* L.\)](#) (Impact of Climate on Eelgrass)

Contributors	Affiliation	Role
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## Dataset Description

Eelgrass Climate Impacts  
Experimental conditions, growth and survival of eelgrass  
pH Data - Date, Tank pH readings

## Methods & Sampling

**pH data** were recorded using Cole Parmer 350 pH/ORP controller units and Oakton epoxy body pH electrodes (UX-35801-00) calibrated weekly to a precision of 0.01 pH unit using NBS buffers. Output signals (4-20 mA) from the pH controllers were recorded at 10 minute intervals using the same NI data logger system and LabView software system used for the temperature data.

## Data Processing Description

**pH** - Mean daily values of pH for each tank were calculated from the 10 minute records and provided in this spreadsheet. 10 minute records of the processed data, along with raw data files are available from the PIs, upon request.

## BCO-DMO Processing Notes

- Generated from original file: "BORG\_SeaGrass\_Full\_data\_Records.xlsx" Sheet: "pH" contributed by David Ruble
- Approx Lat/Lon of Virginia Aquarium Climate Change Facility appended to enable data discovery in MapServer
- Parameters modified to conform to BCO-DMO parameter naming conventions ([Choosing a Parameter Name](#))

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## Data Files

File
<b>pH_Data.csv</b> (Comma Separated Values (.csv), 71.34 KB) MD5:c494e00e521b077a09634285bb0b50f4 Primary data file for dataset ID 504885

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## Parameters

Parameter	Description	Units
Lab_Id	Lab Id - Lab identifier where experiments were conducted	text
Lat	Approximate Latitude Position of Lab; South is negative	decimal degrees
Lon	Approximate Longitude Position of Lab; West is negative	decimal degrees
date	Date	yyyymmdd
tank01_pH6point5	tank01 pH6.5	pH
tank02_pH6point5	tank02 pH6.5	pH
tank03_pH6point0	tank03 pH6.0	pH
tank04_pH6point0	tank04 pH6.0	pH
tank05_pH7point5	tank05 pH7.5	pH
tank06_pH7point5	tank06 pH7.5	pH
tank07_pH8point0	tank07 pH8.0	pH
tank08_pH8point0	tank08 pH8.0	pH
tank09_pH7point0	tank09 pH7.0	pH
tank10_pH7point0	tank10 pH7.0	pH
tank11_pH7point5	tank11 pH7.5	pH
tank12_pH7point5	tank12 pH7.5	pH
tank13_pH8point0	tank13 pH8.0	pH
tank14_pH8point0	tank14 pH8.0	pH
tank15_pH6point0	tank15 pH6.0	pH
tank16_pH6point0	tank16 pH6.0	pH
tank17_pH7point0	tank17 pH7.0	pH
tank18_pH7point0	tank18 pH7.0	pH
tank19_pH6point5	tank19 pH6.5	pH
tank20_pH6point5	tank20 pH6.5	pH

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## Instruments

<b>Dataset-specific Instrument Name</b>	Cole Parmer 350 pH/ORP controller units
<b>Generic Instrument Name</b>	pH Sensor
<b>Dataset-specific Description</b>	pH data were recorded using Cole Parmer 350 pH/ORP controller units and Oakton epoxy body pH electrodes (UX-35801-00) calibrated weekly to a precision of 0.01 pH unit using NBS buffers. Output signals (4-20 mA) from the pH controllers were recorded at 10 minute intervals using the same NI data logger system and LabView software system used for the temperature data.
<b>Generic Instrument Description</b>	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H <sup>+</sup> ) or basic (less H <sup>+</sup> ).

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## Deployments

### lab\_Virginia\_Aquarium\_Climate\_Change\_Facility

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/504835">https://www.bco-dmo.org/deployment/504835</a>
<b>Platform</b>	Virginia Aquarium Climate Change Facility
<b>Start Date</b>	2011-02-01
<b>End Date</b>	2015-01-31
<b>Description</b>	Laboratory experiments conducted from 1 May 2013 to 31 Jan 2013 at Virginia Aquarium Climate Change Facility, Virginia Beach VA

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## Project Information

### Impact of Climate Warming and Ocean Carbonation on Eelgrass (*Zostera marina* L.) (Impact of Climate on Eelgrass)

**Website:** <http://sci.odu.edu/oceanography/directory/faculty/zimmerman/researchpage/index.shtml>

**Coverage:** Virginia Beach, VA and Southern Chesapeake Bay region 36° 49' 32.84" N 75° 58' 58.17" W

*Project abstract from the NSF proposal:*

The past few decades have accumulated mounting evidence of profound anthropogenic effects on fundamental biogeochemical processes across the planet, especially in coastal environments that support a diverse array of highly productive ecosystems including coral reefs, seagrass meadows, and estuaries. The ecological significance of seagrasses is largely due to the remarkable degree of adaptation they exhibit to a submerged aquatic existence. Despite numerous successful adaptations, however, seagrasses have high light requirements that make them vulnerable to anthropogenic disturbances. The paradoxical vulnerability results largely from their high reliance on dissolved aqueous CO<sub>2</sub> for photosynthesis. The potential for rising atmospheric CO<sub>2</sub> concentrations to have significant warming impacts on the global climate has long been recognized, but the potential impacts of the "other CO<sub>2</sub> problem", also known as ocean acidification, have only

recently begun to be appreciated. As with other impacts of climate change, the increased concentrations of dissolved aqueous CO<sub>2</sub> [CO<sub>2</sub> (aq)] in the oceans of the world will elicit both negative and positive responses among organisms, ultimately potentiating ecological losers and winners. This project will explore the response of eelgrass to increased CO<sub>2</sub> (aq) within the context of a warming coastal ocean using a combination of manipulative experiments, physiological/biochemical investigations and mathematical modeling. The investigators hypothesize that rising CO<sub>2</sub>(aq) will increase the high temperature tolerance of plants by improving the Q10 response of photosynthesis relative to respiration, thereby leading to higher growth rates, improved survival of vegetative shoots at high temperature, and even flowering output and seed production. This project will investigate the key relationships between environmental parameters that have both negative (ocean warming) and positive (ocean carbonation) impacts on the light requirements and dynamics of carbon balance in these critically important marine angiosperms. By focusing on Chesapeake populations growing near the southern limit of eelgrass distribution on the Atlantic coast, the investigators will gain predictive insight into how climate change may alter the geographic distribution of this critically important species in other coastal environments that may be subjected to less temperature stress but similar levels of ocean carbonation.

**Objectives:** The overall goal of the proposed research will be to develop a predictive mechanistic understanding of the simultaneous impacts of water temperature, [CO<sub>2</sub>(aq)] and [HCO<sup>3-</sup>] on the photosynthetic metabolism, vegetative growth and reproductive success of *Zostera marina* L. We will address the following questions, (1) To what extent is the upper thermal limit of eelgrass controlled by CO<sub>2</sub>(aq) availability, (2) Will prolonged CO<sub>2</sub>(aq) enrichment affect the ability of eelgrass to utilize HCO<sup>3-</sup> for photosynthesis, (3) Does prolonged CO<sub>2</sub>(aq) enrichment increase seed production and viability, and (4) Does CO<sub>2</sub>(aq) enrichment affect nutritional quality of seagrass tissue, particularly C:N ratios and protein content?

These experiments will be carried out at an experimental CO<sub>2</sub>(aq) enrichment facility which is being constructed at the [Virginia Aquarium & Marine Science Center](#), adjacent to Owl Creek and Rudee Inlet, in Virginia Beach, VA.

## Data Inventory

- 1) Weather and hydrographic data for Owl Creek Experimental Facility. Metadata and time series observations of irradiance, water temperature, pH, salinity, alkalinity, CO<sub>2</sub> and dissolved nutrients will be posted on our web site, and final version data will be supplied to NODC for permanent archive.
- 2) Experimental metadata from the tanks (pH, temperature, eelgrass abundance and survival, growth rates, metabolic rates, etc.) will also be posted on our website listed above. Final data will be supplied to NODC and/or other databases as appropriate and as they become available.

Project data will also be contributed to thematic databases, including SeaBASS operated by NASA, WOOD operated by ONR, as well as NODC.

Preliminary results may be posted at the group's Web site hosted at ODU:

<http://sci.odu.edu/oceanography/directory/faculty/zimmerman/researchpage/index.shtml>

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1061823</a>

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