

# Demography of coral in the future and various physical parameter predictions.

**Website:** <https://www.bco-dmo.org/dataset/735069>

**Data Type:** Other Field Results

**Version:** 1

**Version Date:** 2018-09-18

## Project

» [The ecophysiological basis of the response of coral larvae and early life history stages to global climate change](#)  
(Climate\_Coral\_Larvae)

Contributors	Affiliation	Role
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<a href="#">Bramanti, Lorenzo</a>	Laboratoire d'Écogéochimie des Environnements Benthiques (LECOB)	Scientist
<a href="#">Ake, Hannah</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

## Abstract

Demography of coral in the future and various physical parameter predictions.

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## Coverage

**Spatial Extent:** Lat:21.942 Lon:120.748

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## Dataset Description

Data published in Coral Reefs paper entitled “Using demographic models to project the effects of climate change on scleractinian corals: Pocillopora damicornis as a case study”.

## Acquisition Description

Methodology described in the associated paper.

## Processing Description

### BCO-DMO processing notes:

- Reformatted column names to comply with BCO-DMO standards

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## Related Publications

Bramanti, L., Iannelli, M., Fan, T. Y., & Edmunds, P. J. (2015). Using demographic models to project the effects of climate change on scleractinian corals: Pocillopora damicornis as a case study. Coral Reefs, 34(2), 505–515.  
doi:[10.1007/s00338-015-1269-z](https://doi.org/10.1007/s00338-015-1269-z)

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## Parameters

Parameter	Description	Units
Simulation	Type of simulation	unitless
Year	Year of simulation	count
colony_density_stochastic1	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic2	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic3	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic4	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic5	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic6	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic7	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic8	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic9	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_stochastic10	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count
colony_density_deterministic11	11 simulations, 10 of which based on the variability of the parameters fecundity and survival	Reference: percent survival; Temperature: Celsius; pCO2: Pa; Metapopulation: count

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## Deployments

## lab\_Edmunds\_NMMBA

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58892">https://www.bco-dmo.org/deployment/58892</a>
<b>Platform</b>	Natl Museum Mar. Bio. and Aquar. Taiwan
<b>Start Date</b>	2010-03-18
<b>End Date</b>	2010-03-24
<b>Description</b>	Experiments related to the research project: 'RUI- The ecophysiological basis of the response of coral larvae and early life history stages to global climate change' were conducted at the laboratories of the National Museum of Marine Biology and Aquarium in Southern Taiwan.

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## Project Information

### The ecophysiological basis of the response of coral larvae and early life history stages to global climate change (Climate\_Coral\_Larvae)

**Coverage:** Moorea, French Polynesia; Southern Taiwan; California State University Northridge

Tropical coral reefs face a suite of environmental assaults ranging from anchor damage to the effects of global climate change (GCC). The consequences are evident throughout the tropics, where many coral reefs have lost a substantial fraction of their coral cover in a few decades. Notwithstanding the importance of reducing the impacts of environmental stresses, the only means by which these ecosystems can recover (or simply persist) is through the recruitment of scleractinians, which is a function of successful larval development, delivery, settlement, metamorphosis, and post-settlement events. Despite wide recognition of the importance of these processes, there are few pertinent empirical data, and virtually none that address the mechanisms mediating the success of early coral life stages in a physical environment varying at multiple spatio-temporal scales. The objective of this research is to complete one of the first comprehensive ecophysiological analyses of the early life stages of corals through a description of: (1) their functionality under 'normal' conditions, and (2) their response to the main drivers of GCC. These analyses will be completed for 2 species representative of a brooding life history strategy, and the experiments will be completed in two locations, one (Taiwan) that provides unrivalled experience in coral reproductive biology, and superb microcosm facilities, and the other (Moorea), with access to a relatively pristine environment, a well described ecological and oceanographic context (through the MCR-LTER), and the capacity to bring a strong biogeographic contrast to the project. The results of the study will be integrated through modeling to explore the effects of GCC on coral community structure over the next century. The following publications and data resulted from this project: 2013 Wall CB, Fan TY, Edmunds PJ. Ocean acidification has no effect on thermal bleaching in the coral *Seriatopora caliendrum*. *Coral Reefs* 33: 119-130. Symbiodinium\_ *Seriatopora* photosynthesis Symbiodinium\_ *Seriatopora* PI curve Symbiodinium\_ *Seriatopora* temp-salinity-light Symbiodinium\_ *Seriatopora* water chemistry- Download complete data for this publication (Excel file) 2013 Wall CB, Edmunds PJ. In situ effects of low pH and elevated HCO<sub>3</sub><sup>-</sup> on juvenile *Porites* spp. in Moorea, French Polynesia. *Biological Bulletin* 225:92-101. Data at MCR and PANGAEA: doi.pangaea.de/10.1594/PANGAEA.833913- Download complete data for this publication (Excel file) 2013 Vivian R Cumbo, Peter J Edmunds, Christopher B Wall, Tung-Yung Fan. Brooded coral larvae differ in their response to high temperature and elevated pCO<sub>2</sub> depending on the day of release. *Marine Biology* DOI 10.1007/s00227-013-2280-y. Data also at PANGAEA: doi.pangaea.de/10.1594/PANGAEA.831612 brooded coral larvae 2 - carbonate

chemistrybrooded coral larvae 2 - larval release March 2003-2008brooded coral larvae 2 - respiration\_photosynth\_mortality- Download complete data for this publication (Excel file) 2013 Edmunds PJ, Cumbo VR, Fan TY. Metabolic costs of larval settlement and metamorphosis in the coral *Seriatopora caliendrum* under ambient and elevated pCO<sub>2</sub>. *Journal Experimental Marine Biology and Ecology* 443: 33-38 Data also at PANGAEA: doi:10.1594/PANGAEA.821644Coral post-settlement physiology- Download complete data for this publication (Excel file) 2013 Aaron M Dufault, Aaron Ninokawa, Lorenzo Bramanti, Vivian R Cumbo, Tung-Yung Fan, Peter J Edmunds. The role of light in mediating the effects of ocean acidification on coral calcification. *Journal of Experimental Biology* 216: 1570-1577.coral-light expt.- PARcoral-light expt.- carbonate chemistrycoral-light expt.- temp\_salinitycoral-light expt.- growthcoral-light expt.- proteincoral-light expt.- survival- Download complete data for this publication (Excel file) 2012 Cumbo, VR, Fan TY, Edmunds PJ. Effects of exposure duration on the response of *Pocillopora damicornis* larvae to elevated temperature and high pCO<sub>2</sub>. *J Exp Mar Biol Ecol* 439: 100-107. Data is also at PANGAEA: doi:10.1594/PANGAEA.823582brooded coral larvae 3 - carbonate chemistrybrooded coral larvae 3 - lightbrooded coral larvae 3 - mortalitybrooded coral larvae 3 - proteinbrooded coral larvae 3 - respiration and proteinbrooded coral larvae 3 - respiration raw databrooded coral larvae 3 - symbiont densitybrooded coral larvae 3 - tank temperature- Download part 1 of data for this publication (Excel file)- Download tank parameters data for this publication (Excel file) 2012 Cumbo, VR, Fan TY, Edmunds PJ. Physiological development of brooded larvae from two pocilloporid corals in Taiwan. *Marine Biology* 159: 2853-2866.brooded coral - carbonate chemistrybrooded coral - releasebrooded coral - respirationbrooded coral - settlement competencybrooded coral - size\_Julybrooded coral - size\_protein\_symbionts\_photosynth- Download complete data for this publication (Excel file) 2012 Dufault, Aaron M; Vivian R Cumbo; Tung-Yung Fan; Peter J Edmunds. Effects of diurnally oscillating pCO<sub>2</sub> on the calcification and survival of coral recruits. *Royal Society of London (B)* 279: 2951-2958. doi:10.1098/rspb.2011.2545 Data is also at PANGAEA: doi:10.1594/PANGAEA.830185recruit\_growth\_arearecruit\_growth\_weightrecruit\_seawater\_chemistryrecruit\_survival- Download complete data for this publication (Excel file) 2011 Edmunds PJ, Cumbo V, Fan TY. Effects of temperature on the respiration of brooded larvae from tropical reef corals. *Journal of Experimental Biology* 214: 2783-2790. CoralLarvae\_comparison\_respirCoralLarvae\_releaseCoralLarvae\_respirCoralLarvae\_size- Download complete data for this publication (Excel file)

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0844785</a>

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