

# Experimental results of coral larvae release data from the field and laboratory, collected from the Natl Museum Mar. Bio. and Aquar., Taiwan in 2010 (MCR LTER project, Climate\_Coral\_Larvae project)

Website: <https://www.bco-dmo.org/dataset/3809>

Version: 2012-11-30

## Project

- » [Moorea Coral Reef Long-Term Ecological Research site](#) (MCR LTER)
- » [The ecophysiological basis of the response of coral larvae and early life history stages to global climate change](#) (Climate\_Coral\_Larvae)

## Program

- » [Long Term Ecological Research network](#) (LTER)

Contributors	Affiliation	Role
<a href="#">Edmunds, Peter J.</a>	California State University Northridge (CSUN)	Lead Principal Investigator
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## Dataset Description

These data describe the number of brooded larvae released from colonies of two species of corals (*Pocillopora damicornis*, *Seriatopora hystrix*) freshly collected and retained in the lab at the National Museum of Marine Biology and Aquarium in Taiwan, as part of a study that describes the effects of temperature on the respiration of brooded larvae of scleractinian corals, and evaluates the implications of these effects relative to seawater temperature when peak larval release occurs.

These data are published in [Edmunds et al. \(2011\). J. Exp. Biol. 214, 2783-2790.](#)

Related datasets:

- [CoralLarvae\\_size](#)
- [CoralLarvae\\_respiration](#)
- [CoralLarvae\\_comparison\\_respiration](#)

## Methods & Sampling

The number of larvae released daily was recorded for *Pocillopora damicornis* and *Seriatopora hystrix* retained in aquaria for month-long periods spanning multiple lunar phases in up to 5 years between 2003 and 2008. For each sampling, colonies were collected monthly from ~6m depth in Nanwan Bay and returned to the National Museum of Marine Biology and Aquarium in Taiwan where they were placed into larval collection apparatus. Corals were replaced monthly to ensure that the laboratory measurement of larval release reflected larval release in situ, and to avoid acclimatization to laboratory conditions. Larvae were collected daily from each coral, pooled within species, and counted to evaluate larval release by day throughout each lunar month. Seawater temperature on the day of larval release was assessed from records obtained from thermistors placed at 5m depth in Nanwan Bay. The hourly values were averaged by day to describe the seawater temperature on the day of larval release.

The cumulative number of larvae released daily by *P. damicornis* and *S. hystrix* was expressed as a function of the daily seawater temperature on the day of release. Temperature was partitioned in 0.5 degree Celsius increments.

These data are published in [Edmunds et al. \(2011\). J. Exp. Biol. 214, 2783-2790.](#) Please see publication for additional information on methods and results.

## Data Processing Description

### BCO-DMO Processing Notes:

- Original file: "Date in Edmunds et al. JEB 2011 copy.xls" contained several sheets. This file was split into four separate datasets
- Resultant datasets were edited in excel by adding BCO-DMO convention header line, PI and comment lines. The following edits were made to the file coral\_larvae\_release.dat:
  - Reorganized format of data to include all values in one columnar dataset.
  - Added BCO-DMO header:
    - added parameter column and header name for species
    - edited '#Larvae' to 'count'
    - edited 'Temperature' to 'temp'
    - edited 'Temperature bin' to 'temp\_bin'
    - edited 'TOTAL RELEASED' to 'count\_total'
  - Added 'lat' and 'lon' parameter column and header (for lab location)
  - Added columns and parameter header names for 'year\_begin' and 'year\_end' for experimental data collection years.
  - Added title and PI lines
  - Added line for publication reference information to file header

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## Data Files

File
<b>CorallLarvae_release.csv</b> (Comma Separated Values (.csv), 6.84 KB) MD5:3e5c8508530dbde77dc7b19fcc0d2d93
Primary data file for dataset ID 3809

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## Parameters

Parameter	Description	Units
species	Taxonomic name of coral employed in experiment.	dimensionless
lat	Latitude component of geographic position where experiments were conducted.	decimal degrees
lon	Longitude component of geographic position where experiments were conducted.	decimal degrees
year_begin	Year beginning experimental and <i>in situ</i> data collection.	dimensionless
year_end	Year ending experimental and <i>in situ</i> data collection.	dimensionless
count_total	The summed number of larvae released in seawater over all analysis temperatures and time periods.	dimensionless
temp	Daily <i>in situ</i> seawater temperature at 5 m depth on the day larvae were released.	degrees Celsius
temp_bin	Five degree Celsius increments of mean daily seawater temperature, created for analysis purposes.	degrees Celsius
count	Number of larvae released in seawater at recorded temperatures, pooled over the indicated collection periods, and for 1-8 coral colonies.	dimensionless
deploy_id	Unique descriptor for experiments, indicating physical location where they were conducted (lab), lead investigator and lab location.	alphanumeric

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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

### Moorea Coral Reef Long-Term Ecological Research site (MCR LTER)

**Website:** <http://mcr.lternet.edu/>

**Coverage:** Island of Moorea, French Polynesia

**From** <http://www.lternet.edu/sites/mcr/> and <http://mcr.lternet.edu/>:

The Moorea Coral Reef LTER site encompasses the coral reef complex that surrounds the island of Moorea, French Polynesia (17°30'S, 149°50'W). Moorea is a small, triangular volcanic island 20 km west of Tahiti in the Society Islands of French Polynesia. An offshore barrier reef forms a system of shallow (mean depth ~ 5-7 m), narrow (~0.8-1.5 km wide) lagoons around the 60 km perimeter of Moorea. All major coral reef types (e.g., fringing reef, lagoon patch reefs, back reef, barrier reef and fore reef) are present and accessible by small boat.

The MCR LTER was established in 2004 by the US National Science Foundation (NSF) and is a partnership between the University of California Santa Barbara and California State University, Northridge. MCR researchers include marine scientists from the UC Santa Barbara, CSU Northridge, UC Davis, UC Santa Cruz, UC San Diego, CSU San Marcos, Duke University and the University of Hawaii. Field operations are conducted from the UC Berkeley Richard B. Gump South Pacific Research Station on the island of Moorea, French Polynesia.

**MCR LTER Data:** The Moorea Coral Reef (MCR) LTER data are managed by and available directly from the MCR project data site URL shown above. The datasets listed below were collected at or near the MCR LTER sampling locations, and funded by NSF OCE as ancillary projects related to the MCR LTER core research themes.

#### This project is supported by continuing grants with slight name variations:

- LTER: Long-Term Dynamics of a Coral Reef Ecosystem
- LTER: MCR II - Long-Term Dynamics of a Coral Reef Ecosystem
- LTER: MCR IIB: Long-Term Dynamics of a Coral Reef Ecosystem
- LTER: MCR III: Long-Term Dynamics of a Coral Reef Ecosystem
- LTER: MCR IV: Long-Term Dynamics of a Coral Reef Ecosystem

### 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:10.1594/PANGAEA.833913](https://doi.org/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:10.1594/PANGAEA.831612](https://doi.org/10.1594/PANGAEA.831612)

[brooded coral larvae 2 - carbonate chemistry](#)

[brooded coral larvae 2 - larval release March 2003-2008](#)

[brooded 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.821644](https://doi.org/10.1594/PANGAEA.821644)

[Coral 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.- PAR](#)

[coral-light expt.- carbonate chemistry](#)

[coral-light expt.- temp\\_salinity](#)

[coral-light expt.- growth](#)

[coral-light expt.- protein](#)

[coral-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.823582](https://doi.org/10.1594/PANGAEA.823582)

[brooded coral larvae 3 - carbonate chemistry](#)

[brooded coral larvae 3 - light](#)

[brooded coral larvae 3 - mortality](#)

[brooded coral larvae 3 - protein](#)

[brooded coral larvae 3 - respiration and protein](#)

[brooded coral larvae 3 - respiration raw data](#)

[brooded coral larvae 3 - symbiont density](#)

[brooded 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 chemistry](#)

[brooded coral - release](#)

[brooded coral - respiration](#)

[brooded coral - settlement competency](#)

[brooded coral - size July](#)

[brooded 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.830185](https://doi.org/10.1594/PANGAEA.830185)

[recruit\\_growth\\_area](#)

[recruit\\_growth\\_weight](#)

[recruit\\_seawater\\_chemistry](#)

[recruit\\_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\\_respir](#)

[Corallarvae\\_release](#)

[Corallarvae\\_respir](#)

[Corallarvae\\_size](#)

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## Program Information

### Long Term Ecological Research network (LTER)

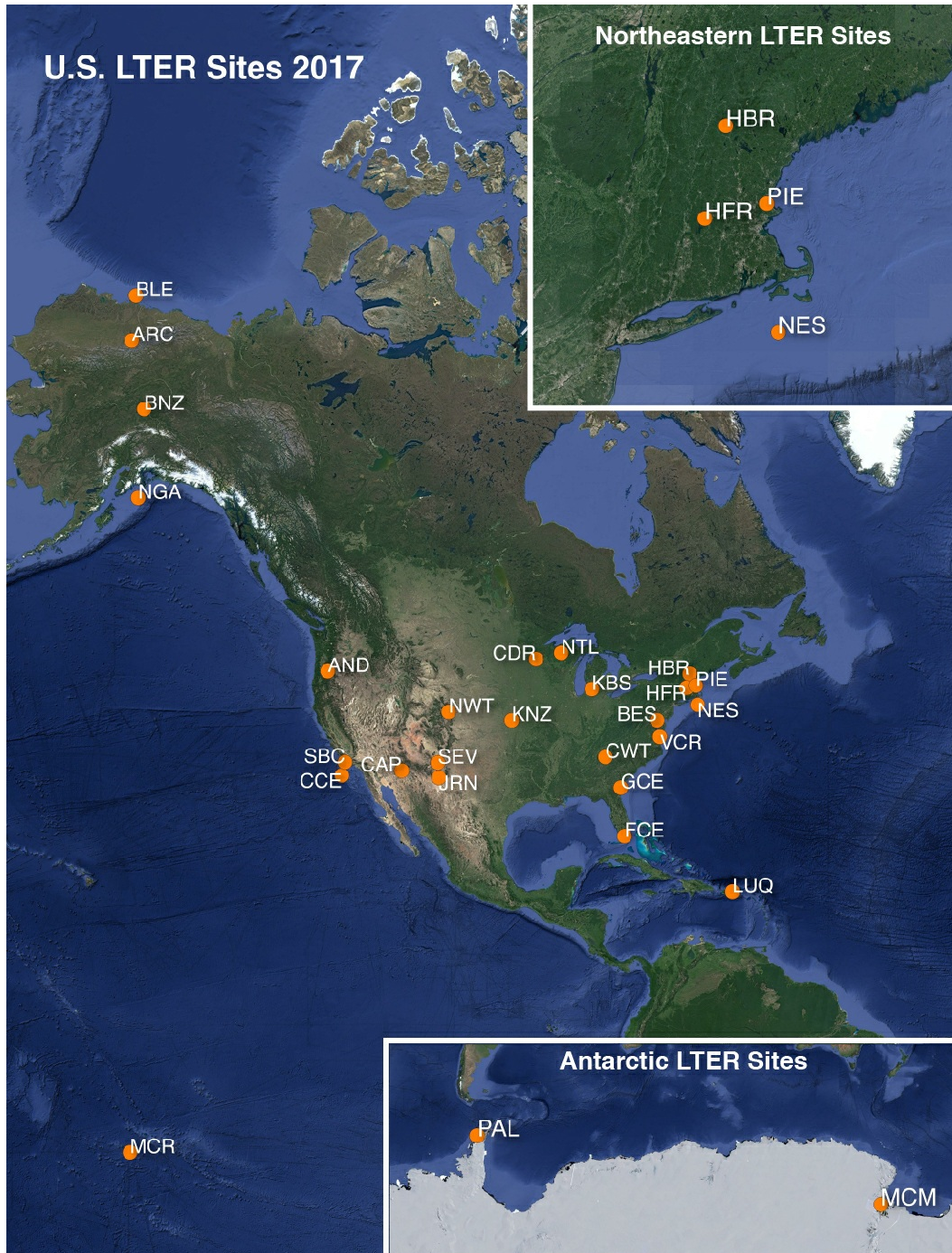
**Website:** <http://www.lternet.edu/>

**Coverage:** United States

adapted from <http://www.lternet.edu/>

The National Science Foundation established the LTER program in 1980 to support research on long-term ecological phenomena in the United States. The Long Term Ecological Research (LTER) Network is a collaborative effort involving more than 1800 scientists and students investigating ecological processes over long temporal and broad spatial scales. The LTER Network promotes synthesis and comparative research across sites and ecosystems and among other related national and international research programs. The LTER research sites represent diverse ecosystems with emphasis on different research themes, and cross-site communication, network publications, and research-planning activities

are coordinated through the LTER Network Office.



### Site Codes

- AND Andrews Forest LTER
- ARC Arctic LTER
- BES Baltimore Ecosystem Stu
- BLE Beaufort Lagoon
- Ecosystems LTER
- BNZ Bonanza Creek LTER
- CCE California Current
- Ecosystems LTER
- CDR Cedar Creek Ecosystem
- Science Reserve
- CAP Central Arizona-
- Phoenix LTER
- CWT Coweeta LTER
- FCE Florida Coastal
- Everglades LTER
- GCE Georgia Coastal
- Ecosystems LTER
- HFR Harvard Forest LTER
- HBR Hubbard Brook LTER
- JRN Jornada Basin LTER
- KBS Kellogg Biological
- Station LTER
- KNZ Konza Prairie LTER
- LUQ Luquillo LTER
- MCM McMurdo Dry Valleys LT
- MCR Moorea Coral Reef LTER
- NWT Niwot Ridge LTER
- NTL North Temperate Lakes I
- NES Northeast U.S. Shelf LTER
- NGA Northern Gulf of Alaska I
- PAL Palmer Antarctica LTER
- PIE Plum Island
- Ecosystems LTER
- SBC Santa Barbara Coastal L
- SEV Sevilleta LTER
- VCR Virginia Coast Reserve L

2017 LTER research site map obtained from <https://lternet.edu/site/lter-network/>

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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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