

The influence of structural refuge, competition and their interaction on the early post-settlement survival of transplanted *Thalassoma hardwicke* (the sixbar wrasse) in Moorea, French Polynesia from 2005-2007 (CDD_in_Reef_Fish project)

Website: <https://www.bco-dmo.org/dataset/726353>

Data Type: experimental, Other Field Results

Version: 1

Version Date: 2017-10-05

Project

» [Cryptic density dependence: the effects of spatial, ontogenetic, and individual variation in reef fish](#)
(CDD_in_Reef_Fish)

Contributors	Affiliation	Role
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Abstract

The influence of structural refuge, competition and their interaction on the early post-settlement survival of transplanted *Thalassoma hardwicke* (the sixbar wrasse) in Moorea, French Polynesia from 2005-2007. This data was collected as a part of the Cryptic density dependence: the effects of spatial, ontogenetic, and individual variation in reef fish project.

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Coverage

Spatial Extent: Lat:-17.5 Lon:-149.8333333

Temporal Extent: 2005 - 2007

Dataset Description

This dataset is from a study examining the influence of structural refuge, competition and their interaction on the early post-settlement survival of transplanted *Thalassoma hardwicke* (the sixbar wrasse).

This dataset specifically refers to the field experiment used to test how competition with larger residents and structural refuge interact to influence survival of transplanted *T. hardwicke*. Please see Related Datasets below for additional data associated with this project.

Methods & Sampling

Results from the field assay identified larger *Thalassoma quinquevittatum* as strongly competing with focal *T. hardwicke*. A factorial experiment was used to evaluate the effect of competition with larger *T. quinquevittatum* and the provisioning of structural refuge on the survival of transplanted *T. hardwicke*. Structural refuge was increased by adding *Turbinaria ornata* (a structurally complex, locally common, macroalga) to reefs. Twenty reefs were haphazardly selected, with an average surface area of 5.46 m² (SE = 0.36), a mean height of 0.79 m (SE = 0.03) and isolated from their nearest neighbour by 3.02 m (SE = 0.19). All reefs initially had three to five (mean = 3.38; SE = 0.16) resident *Thalassoma quinquevittatum* (22.1 mm SL, SE = 0.56) and lacked *Turbinaria ornata*. The presence/absence of *T. ornata* was cross-factored with the presence/absence of *T. quinquevittatum* and treatments were randomly assigned to reefs. On reefs assigned to the presence of *T. quinquevittatum*, selective removals were conducted so that each reef had three, similarly sized, *T. quinquevittatum* individuals that were larger than focal *T. hardwicke* individuals. For *T. ornata* present treatments, whole *T. ornata* plants were attached to recipient reefs with cable ties, so that ~15% of habitat cover was *T. ornata*. Before the experiment, all resident *T. hardwicke* were removed from the reefs. Three *Thalassoma hardwicke* individuals (13.69 mm SL, SE = 0.51: collected and tagged as per the field assay) were transplanted onto each reef and their survival surveyed daily (~ 9 a.m.) for five days. Each morning, immigrant *T. quinquevittatum* (three immigrants were observed) and new *T. hardwicke* that had settled the previous night (a total of eight settlers) were removed. Neighboring non-experimental reefs were also searched for tagged *T. hardwicke* immigrants. No tagged immigrants were found; therefore, the disappearance of a tagged fish was assumed due to mortality rather than migration (as for the field assay). Using the same reefs, the experiment was run in two temporal blocks (beginning 12 June 2005 and 12 May 2007), yielding ten replicates (five in each temporal block) for each of the four treatments. The mean proportion of *T. hardwicke* remaining in each treatment on the last day of the experiment was used as the response variable because by the end of each experimental run survival trajectories had stabilized.

Data Processing Description

Processing notes from the researcher:

This is raw data.

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

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Data Files

File
Geange_2010_LargerHeterospecifics_Factorialexp.csv (Comma Separated Values (.csv), 1.77 KB) MD5:50b7229d266d54f1e76bf49b43d03d24
Primary data file for dataset ID 726353

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Related Publications

Geange, S. (2010). Effects of larger heterospecifics and structural refuge on the survival of a coral reef fish, *Thalassoma hardwicke*. *Marine Ecology Progress Series*, 407, 197–207. doi:[10.3354/meps08569](https://doi.org/10.3354/meps08569)
General

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Related Datasets

IsRelatedTo

Geange, S. (2021) **Field assay experiment data to determine if the presence of larger individuals of *T. hardwicke* adversely affects the survival of focal individuals in Moorea, French Polynesia from 2005-2007 (CDD_in_Reef_Fish project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-10-05 doi:10.26008/1912/bco-dmo.726693.1 [[view at BCO-DMO](#)]

Geange, S. (2021) **Survey to quantify habitat association for juvenile *T. hardwicke* in Moorea, French Polynesia from 2005-2007 (CDD_in_Reef_Fish project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-10-05 doi:10.26008/1912/bco-dmo.726717.1 [[view at BCO-DMO](#)]

Geange, S. (2021) **Survey to quantify habitat availability for juvenile *T. hardwicke* in Moorea, French Polynesia from 2005-2007 (CDD_in_Reef_Fish project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-10-05 doi:10.26008/1912/bco-dmo.726732.1 [[view at BCO-DMO](#)]

Geange, S. (2021) **The influence of structural refuge, competition and their interaction on the early post-settlement survival of transplanted *Thalassoma hardwicke* (the sixbar wrasse) in Moorea, French Polynesia from 2005-2007 (CDD_in_Reef_Fish project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-10-05 doi:10.26008/1912/bco-dmo.726353.1 [[view at BCO-DMO](#)]

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Parameters

Parameter	Description	Units
site	unique identifier for each reef in survey	unitless
area	reef area in m2	square meters (m2)
thqu	presence/absence of <i>Thalassoma quinquevittatum</i>	unitless
turbinaria	presence/absence of turbinaria	unitless
run	experimental run	unitless
alive	number of focal individuals alive at the end of the assay	unitless
survival	proportional survival of focal individuals at the end of the assay	unitless

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Deployments

Osenberg_et_al_Moorea

Website	https://www.bco-dmo.org/deployment/644752
Platform	Osenberg et al Moorea
Start Date	2003-05-19
End Date	2015-07-12

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Project Information

Cryptic density dependence: the effects of spatial, ontogenetic, and individual variation in reef fish (CDD_in_Reef_Fish)

Coverage: Moorea, French Polynesia (-17.48, -149.82)

Description from NSF award abstract:

Ecologists have long been interested in the factors that drive spatial and temporal variability in population density and structure. In marine reef systems, attention has focused on the role of settlement-the transition of pelagic larvae to a benthic stage-and on density-dependent processes affecting recently settled juveniles. Recent data suggest that co-variance in settlement and subsequent density-dependent survival can obscure the patterns of density dependence at larger scales, a phenomenon called cryptic density dependence. This research will explore the mechanisms that underlie the spatial covariance of settlement and site quality - a process that has received little attention in the standard paradigm. These mechanistic studies of cryptic density dependence will facilitate the development of new frameworks for fish population dynamics that incorporate larval ecology, habitat quality, density dependence, life history, and the patterns and implications of spatial covariance among these factors. More generally, the work provides a specific empirical context, and a general theoretical treatment, of cryptic heterogeneity (hidden individual variation in demographic rates).

Note: Drs. Craig W. Osenberg and Ben Bolker were at the University of Florida at the time the NSF award was granted. Dr. Osenberg moved to the University of Georgia during the summer of 2014 ([current contact information](#)). Dr. Bolker moved to McMaster University in 2010 ([current contact information](#)).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0242312

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