# 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)

**Website**: https://www.bco-dmo.org/dataset/726693
**Data Type**: experimental
**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**
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).

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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 specially refers to a field assay used to determine if the presence of larger individuals of *T. hardwicke* adversely affects the survival of focal individuals. Please see Related Datasets below for additional data associated with this project.

**Related Datasets:**

- Geange_2010 Larger Heterospecifics Factorial Experiment: https://www.bco-dmo.org/dataset/726353
- Geange_2010 Larger Heterospecifics Field Assay Experiment: https://www.bco-dmo.org/dataset/726693 (Current page)
- Geange_2010 Larger Heterospecifics Habitat Association: https://www.bco-dmo.org/dataset/726717

- Geange_2010 Larger Heterospecifics Habitat Availability: https://www.bco-dmo.org/dataset/726732

### Methods & Sampling

A field assay was used to identify whether the presence of larger individuals of each of three candidate species (*Gomphosus varius, Pseudocheilinus hexataenia* and *Thalassoma quinquevittatum*; the three species most similar to *T. hardwicke* in terms of habitat use; see Results) negatively effected the survival of transplanted *T. hardwicke*. 32 reefs within 80 m of the reef crest were selected. Reefs consisted of a live Porites base, surmounted by 1-2 *Pocillopora verrucosa* colonies and small patches (< 10% surface area) of macroalgae. Reefs had an average area of 5.43 m2 (SE = 0.34), a mean height of 0.77 m (SE = 0.04), and were isolated from their nearest neighbour by 4.71 m (SE = 0.25). Of these 32 reefs, eight were inhabited by two to five (mean = 2.8; SE = 0.4) *T. quinquevittatum*; eight were inhabited by two to five (mean = 3.4; SE = 0.4) *G. varius*; and eight were inhabited by two to four (mean = 3; SE = 0.3) *P. hexataenia*. The SL of individuals of all candidate species ranged between 12 and 30 mm. All reefs lacked fish of the other species (e.g., reefs with *G. varius* did not have *P. hexataenia* or *T. quinquevittatum*). In addition, eight reefs lacked *G. varius*, *P. hexataenia* and *T. quinquevittatum*. All reefs were interspersed with each other within the lagoon. Before the field assay, all resident *T. hardwicke* were removed from all reefs. *Thalassoma hardwicke* settlers were collected from reefs ~ 600 m from the study site using the fish anaesthetic eugenol (clove oil) and hand nets. All fish were held in tanks with running seawater for 12 h, then individually tagged with different colors of Visible Implant Elastomer (VIE) (Northwest Marine Technology, Shaw Island, Washington) forward of the caudal peduncle. VIE tags are clearly visible through the skin of the fish by observers in the field so it was not necessary to recapture individuals to determine their identity. VIE tags do not have adverse effects on other fishes (Beukers et al. 1995, Imbert et al. 2007, Simon 2007), have been used to tag fish as small as 8 mm (Frederick 1997), and a preliminary study confirmed no tag-induced mortality of 20 tagged *T. hardwicke* held in aquaria for 72 h. Tagging and handling effects were therefore assumed negligible. After tagging, fish were returned to aerated aquaria for 12 h before being measuring to the nearest 0.1 mm SL. Three tagged *T. hardwicke* individuals (14.8 mm SL; SE = 0.2; approximately two weeks post-settlement age) were then transplanted onto each reef (which is representative of natural densities). To estimate the survival rates of transplanted individuals, reefs were surveyed daily (~ 9 a.m.) for five days (beginning June 1 2005). At the same time, the abundance of competitors was recorded and any untagged T. hardwicke (two untagged *T. hardwicke* were removed, both < 10 mm) were removed. Neighboring non-experimental reefs were also searched for tagged immigrant *T. hardwicke*, none were found. Previous research has suggested that recent *T. hardwicke* settlers rarely move between reefs separated by as little as three meters (Shima 2001b). The disappearance of a tagged fish was therefore assumed to be due to mortality rather than migration. The mean proportion of *T. hardwicke* remaining in each treatment on the last day of the assay was used as the response variable because by the end of the assay survival trajectories had stabilized.

### Data Processing Description

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_FieldAssay.csv** | (Comma Separated Values (.csv), 1.50 KB) MD5:8f3721292725b36b857a12d38302b57f |
| Primary data file for dataset ID 726693 | |

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## Related Publications

Beukers, J., Jones, G., & Buckley, R. (1995). Use of implant microtags for studies on populations of small reef fish. Marine Ecology Progress Series, 125, 61–66. doi:10.3354/meps125061
*Methods*

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
*General*

Im, J. H., Gil, H. W., Park, I.-S., Choi, C. Y., Lee, T. H., Yoo, K. Y., … Kim, B. S. (2017). Evaluation of visible fluorescent elastomer tags implanted in marine medaka, Oryzias dancena. Fisheries and Aquatic Sciences, 20(1). doi:10.1186/s41240-017-0066-8 https://doi.org/https://doi.org/10.1186/s41240-017-0066-8
*Methods*

Imbert, H., Beaulaton, L., Rigaud, C., & Elie, P. (2007). Evaluation of visible implant elastomer as a method for tagging small European eels. Journal of Fish Biology, 71(5), 1546–1554. doi:10.1111/j.1095-8649.2007.01617.x
*Methods*

Shima, J. S. (2001). Regulation of local populations of a coral reef fish via joint effects of density- and number-dependent mortality. Oecologia, 126(1), 58–65. doi:10.1007/s004420000486
*Methods*

Simon, J. (2007). Evaluation of marking European silver eels with visible implant elastomer tags and alcian blue. Journal of Fish Biology, 70(1), 303–309. doi:10.1111/j.1095-8649.2006.01260.x
*Methods*

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## Related Datasets

### IsRelatedTo

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) |
| competitor | Genus and species | unitless |
| abundance | abundance of heterospecific competitors | 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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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | aerated aquaria |
| **Generic Instrument Name** | Aquarium |
| **Dataset-specific Description** | After tagging, fish were returned to aerated aquaria for 12 h before being measuring to the nearest 0.1 mm SL. |
| **Generic Instrument Description** | Aquarium - a vivarium consisting of at least one transparent side in which water-dwelling plants or animals are kept |

| | |
|---|---|
| **Dataset-specific Instrument Name** | hand net |
| **Generic Instrument Name** | Hand Net |
| **Dataset-specific Description** | Thalassoma hardwicke settlers were collected from reefs ~ 600 m from the study site using the fish anaesthetic eugenol (clove oil) and hand nets. |
| **Generic Instrument Description** | A hand net (also called a scoop net or dip net) is a net or mesh basket held open by a hoop. They are used for scooping fish near the surface of the water. |

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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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