# Current velocities from 4 depths recorded by ADCP deployed in Kimbe Bay, New Britain, Papua New Guinea from 2010-2011 (Pop connectivity of coral reef fishes project)

**Website**: https://www.bco-dmo.org/dataset/546069
**Version**: 01 May 2014
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**Project**
» Larval Dispersal and Retention Among Sub-populations of Coral Reef Fishes: A Multi-Technique Approach (Pop connectivity of coral reef fishes)


| Contributors | Affiliation | Role |
|---|---|---|
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## Table of Contents



## Dataset Description

Current velocities from 4 depths recorded by acoustic Doppler current profilers (ADCP) deployed at locations in Kimbe Bay, New Britain, Papua New Guinea.

Original MatLab files are provided.

### Methods & Sampling

Standard bottom-mounted (i.e. looking up) deployment of ADCPs.

### Data Processing Description

Current velocities from the ADCPs have been processed into u (east-west) and v (north-south) components.

These datasets contain the results from the deployment of bottom-mounted acoustic Doppler current profilers to measure depth-stratified currents at a number of locations in Kimbe Bay. Variables as follows: site name; lat; lon; time (serial date); u (cm/sec); v (cm/sec).

[ table of contents | back to top ]

## Data Files

| File |
| --- |
| **Kimbe_Bay_ADCP.csv** (Comma Separated Values (.csv), 545 bytes)<br>MD5:c5bf50c24f0de5564005e3f9adf326ba<br>Primary data file for dataset ID 546069 |

[ table of contents | back to top ]

## Parameters

| Parameter | Description | Units |
| --- | --- | --- |
| depth | Depth in meters. | meters |
| matlab_file | Link to MatLab file for download. | text |

[ table of contents | back to top ]

## Instruments

| | |
| --- | --- |
| **Dataset-specific Instrument Name** | Bottom-mounted ADCP |
| **Generic Instrument Name** | Acoustic Doppler Current Profiler |
| **Dataset-specific Description** | Standard bottom-mounted (i.e. looking up) ADCPs were deployed at locations in Kimbe Bay. |
| **Generic Instrument Description** | The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing). |

[ table of contents | back to top ]

## Deployments

**Thorrold_ADCP_Kimbe**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/546113 |
| **Platform** | Kimbe Bay |
| **Start Date** | 2010-11-18 |
| **End Date** | 2011-07-18 |

[ table of contents | back to top ]

## Project Information

**Larval Dispersal and Retention Among Sub-populations of Coral Reef Fishes: A Multi-Technique Approach (Pop connectivity of coral reef fishes)**

**Coverage**: Kimbe Bay, Papua New Guinea

*Description from NSF award abstract:*

Population connectivity, the degree to which geographically-separated groups are linked by dispersal, is a critical parameter in the dynamics of marine populations. Connectivity rates determine colonization patterns of new habitats, the resiliency of populations to harvest, and the design of networks of No Take Marine Reserves (NTMRs). Quantifying exchange rates in marine organisms is extremely difficult because natal origins of adults are almost invariably unknown. This lack of knowledge is primarily due to the difficulty of conducting mark-recapture studies in species with large numbers of small pelagic offspring that suffer high initial mortality rates. This project will continue a multi-technique approach combining mass-marking of fish embryos using TRAnsgenerational Isotope Labeling (TRAIL) of otoliths and paternity analyses based on hypervariable microsatellite DNA markers to measure dispersal distances of coral reef fishes. Population connectivity will be estimated for two species (*Amphiprion percula* and *Chaetodon vagabundus*) in Kimbe Bay, Papua New Guinea.

Coral reef organisms are usually distributed across a mosaic of reefs that are sometimes separated by the ocean. It has been presumed that at small scales, reefs must be open populations, with significant exchange of larvae among neighboring reefs. At larger scales, populations must effectively be closed, with late-stage larvae returning to the same population as their parents. The scale over which this transition takes place is unknown. Recent evidence suggests that ecologically significant self-recruitment may occur at scales of individual reefs or islands. If accurate, these findings have important implications for management strategies for marine species, including the design of networks of NTMRs, because knowledge of dispersal distances determines the scale over which populations can be completely protected. It also determines the appropriate spacing of reserves to allow protected populations to replenish adjacent fished areas. This project will quantify population connectivity of coral reef fishes in Kimbe Bay, Papua New Guinea and broaden the spatial scale from examining the fate of larvae spawned at a single location (Kimbe Island) to examining connectivity among 5 designated NTMRs.

This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

**Publications Produced as a Result of this Project:**

Saenz-Agudelo, P., G. P. Jones, S. R. Thorrold, and S. Planes. 2011. Detrimental effects of host anemone bleaching on anemonefish populations. *Coral Reefs*, v.30, p. 497. doi: 10.1007/s00338-010-0716-0

Saenz-Agudelo, P., G. P. Jones, S. R. Thorrold, and S. Planes. 2011. Connectivity dominates larval replenishment in a coastal reef fish metapopulation. *Proc. Royal Soc. B*, v.278, p. 2954. doi: 10.1098/rspb.2010.2780

Saenz-Agudelo, P., G. P. Jones, S. R. Thorrold, and S. Planes. 2012. Patterns and persistence of larval retention and connectivity in a marine fish metapopulation. *Molecular Ecology*, v.21, p. 4695. doi: 10.1111/j.1365-294X.2012.05726.x

Buston, P. M., G. P. Jones, S. Planes, and S. R. Thorrold. 2011. Probability of successful larval dispersal declines fivefold over 1 kilometre in a coral reef fish. *Proc. Royal Soc. B*, v.279. doi: 10.1098/rspb.2011.2041

Berumen, M. L., H. J. Walsh, N. Raventos, S. Planes, G. P. Jones, V. Starczak, and S. R. Thorrold. 2010. Otolith

geochemistry does not reflect dispersal history of clownfish larvae. *Coral Reefs*, v.29, p. 883. doi: 10.1007/s00338-010-0652-z

Berumen, M. L., G. Almany, S. Planes, G. P. Jones, and S. R. Thorrold. 2012. Persistence of self-recruitment and patterns of larval connectivity in a marine protected area network. *Ecology and Evolution*, v.2. doi: 10.1002/ece3.208

Dixson, D. L., G. P. Jones, P. L. munday, M. S. Pratchett, M. Srinivasan, S. Planes, and S. R. Thorrold. 2011. Terrestrial chemical cues help coral reef fish larvae locate settlement habitat surrounding islands. *Ecology and Evolution*, v.1, p. 586. doi: 10.1002/ece3.53

Harrison, H. B., D. H. Williamson, R. D. Evans, G. R. Almany, S. R. Thorrold, G. R. Russ, K. A. Feldheim, L. van Herwerden, S. Planes, M. Srinivasan, M. L. Berumen, and G. P. Jones. 2012. Larval export from marine reserves benefits fish and fisheries. *Current Biology*, v.22, p. 1023. doi: 10.1016/j.cub.2012.04.008

Roy, A. S., A. J. Frisch, C. Sims, S. R. Thorrold, and G. P. Jones. 2012. Retention of a transgenerational marker (137Ba) in tissues of adult female anemone fish and assessment of physiological stress. *Environmental Biology of Fishes*. doi: 10.1007/s10641-012-0029-y

[ table of contents | back to top ]

## Funding


| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0928442 |


[ table of contents | back to top ]