

Time series of avg daily phytoplankton concentration offshore of Carmel River State Beach, Carmel Bay California in 2011 (Surf zone larval transport project)

Website: <https://www.bco-dmo.org/dataset/561650>

Version: 30 June 2015

Version Date: 2015-06-30

Project

» [Does coupling between the inner shelf and surf zone regulate larval supply to intertidal populations?](#) (Surf zone larval transport)

| Contributors | Affiliation | Role |
|---------------------------------|---|--------------------------------------|
| Shanks, Alan L. | University of Oregon (OIMB) | Lead Principal Investigator, Contact |
| MacMahan, Jamie | Naval Postgraduate School (NPS) | Co-Principal Investigator |
| Morgan, Steven | University of California-Davis (UC Davis-BML) | Co-Principal Investigator |
| Reniers, Ad | Delft University of Technology (TU Delft) | Co-Principal Investigator |
| Rauch, Shannon | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

Table of Contents

- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Deployments](#)
- [Project Information](#)
- [Funding](#)

Dataset Description

Time series of average daily phytoplankton concentration offshore of Carmel River State Beach, CA (36.53833 degrees N, 121.92861 degrees W).

Related references:

Shanks, A.L., S. G. Morgan, J. MacMahan, Ad J.H.M Reniers, M. Jarvis, J. Brown, and C. Griesemer (2014). Onshore transport of plankton by internal tides and upwelling-relaxation events. Marine Ecology Progress Series. DOI:[10.3354/meps10717](https://doi.org/10.3354/meps10717)

Shanks, A.L., S. G. Morgan, J. MacMahan, Ad J.H.M Reniers, M. Jarvis, J. Brown, and C. Griesemer (2015). Transport of Larvae and Detritus Across the Surf Zone of a Steep Reflective Pocket Beach. Marine Ecology Progress Series. DOI:[10.3354/meps11223](https://doi.org/10.3354/meps11223)

Methods & Sampling

From 15 June to 15 July we sampled phytoplankton 125 m offshore of the Carmel River State Beach. We also sampled phytoplankton 20 m offshore, just outside the breaker line, during the last 18 days (starting 28 June) of the time series. At the two offshore sites, samples were collected from a kayak in the morning when winds were light. Three replicate 1-L phytoplankton samples were collected from approximately 5 m depth using a stainless steel well sampling bailer. Samples were preserved in acid Lugols. Phytoplankton were identified to

genus and counted on Sedgwick Rafter slides using standard techniques (Sournia 1978).

Data Processing Description

Three samples were collected each day. Counts from the microscopic analysis of the samples were converted to number per liter and the average and 95% confidence interval for each daily set of samples were calculated.

BCO-DMO Processing:

- Re-formatted date, and added separate columns for month, day, year, and year-day.
- Added column containing site name.
- Added lat and lon (from metadata form).
- Modified parameter names to conform with BCO-DMO naming conventions.
- Created new column for distance offshore.

[[table of contents](#) | [back to top](#)]

Data Files

| File |
|--|
| CarmelRiver_Offshore_Phyto2011.csv (Comma Separated Values (.csv), 6.93 KB) MD5:16925ee7700019c1913be8d5ff0a2bf4 |
| Primary data file for dataset ID 561650 |

[[table of contents](#) | [back to top](#)]

Parameters

| Parameter | Description | Units |
|--------------------|--|--------------------------|
| site_name | Name of the sampling site. | text |
| lat | Latitude of the sampling site. | decimal degrees |
| lon | Longitude of the sampling site. | decimal degrees |
| date | Month/day/year of sample collection. | mm/dd/yyyy |
| PseudoN | PseudoN Ave #/L (mean of the 3 replicate samples). | average number per liter |
| PseudoN_95CI | PseudoN 95% confidence interval. | average number per liter |
| Chaetoceros | Chaetoceros Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Chaetoceros_95CI | Chaetoceros 95% confidence interval. | average number per liter |
| Thalassionema | Thalassionema Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Thalassionema_95CI | Thalassionema 95% confidence interval. | average number per liter |
| Skeletonema | Skeletonema Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Skeletonema_95CI | Skeletonema 95% confidence interval. | average number per liter |
| Thalassiosira | Thalassiosira Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Thalassiosira_95CI | Thalassiosira 95% confidence interval. | average number per liter |
| mon | 2-digit month of year. | mm (01 to 12) |
| day | 2-digit day of month. | dd (01 to 31) |
| year | 4-digit year. | YYYY |
| yrday | Consecutive day of year (Jan 1st = 1) | |
| dist_offshore | Distance offshore. | meters (m) |
| Pennate | Pennate Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Pennate_95CI | Pennate 95% confidence interval. | average number per liter |
| Rhizoselenia | Rhizoselenia Ave #/L (mean of the 3 replicate samples). | average number per liter |
| Rhizoselenia_95CI | Rhizoselenia 95% confidence interval. | average number per liter |

[[table of contents](#) | [back to top](#)]

Deployments

CRSB_2011

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/561647 |
| Platform | Carmel_River_State_Beach |
| Start Date | 2011-06-19 |
| End Date | 2011-07-15 |

[[table of contents](#) | [back to top](#)]

Project Information

Does coupling between the inner shelf and surf zone regulate larval supply to intertidal populations? (Surf zone larval transport)

Coverage: Sand City Beach and Carmel River State Beach, Monterey Bay, CA

Description from NSF award abstract:

Many intertidal invertebrates and fishes have complex life cycles that include a planktonic larval phase. At the end of their pelagic development, larvae must return to shore and cross the surf zone. The purpose of this study is to investigate for the first time the role of surf zone hydrodynamics in the rate of delivery of cyprids of intertidal barnacles to the shore. To exploit the greater physical oceanographic understanding of the hydrodynamics of sandy beach surf zones, this initial study will focus on cyprid settlement on hard substrates in surf zones associated with sandy beaches. In the first two years of the study, the investigators will carry out an intensive two-month physical and biological study of a reflective and dissipative surf zone, respectively. At each site they will sample cyprids in the waters of the inner-shelf, just outside the surf zone, and within the surf zone and they will measure settlement on plates in the intertidal zone. At the same time they will collect physical oceanographic data with both in-situ instruments and a fleet of GPS-equipped surface drifters to describe the hydrodynamics of the surf zone. The time series of the physical and biological data will be correlated to investigate mechanisms of delivery of cyprids to the shore. To simulate the hydrodynamic processes responsible for the transport of larvae, the investigators will use a 3D model, resolving both the horizontal and vertical structure of the unsteady nearshore flow. To evaluate potential transport of larvae through the surf zone, a biological module describing the spatial distribution of the larvae will be coupled to the hydrodynamic module to predict the pathways of the larvae and compare with observations. Intensive sampling will help provide insight into the actual processes transporting cyprids from the inner shelf, through the surf zone, and to the intertidal zone. During each summer, weekly barnacle recruitment and daily cyprid settlement will be measured for two months to settlement plates at reflective and dissipative beaches in central California and southern Oregon. Population densities at many beaches along the West Coast will be surveyed each year to determine if a latitudinal gradient in wave energy is correlated with adult barnacle population densities.

Because the fundamentals of surfzone dynamics are universal, results of this research will be broadly applicable not only along the West Coast, but worldwide. This project will have significant impacts on education and public outreach. It will support three graduate students and nine undergraduate students and will create new research opportunities for students of diverse backgrounds from three undergraduate institutions, local high schools and the public. The research will be included in the curriculum of intensive hands-on courses, and undergraduates will participate in the research while learning how a real-world research project addresses fundamental questions. Both a website that highlights findings and an interactive display for visitors to the Bodega Marine Laboratory will be developed. A model coupling nearshore hydrodynamics and onshore transport across the surf zone will be made available to the community to stimulate research into this emerging research topic.

[[table of contents](#) | [back to top](#)]

Funding

| Funding Source | Award |
|--|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0926923 |

[[table of contents](#) | [back to top](#)]