

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

**Website:** <https://www.bco-dmo.org/dataset/561724>

**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
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## Dataset Description

Time series of average daily phytoplankton concentration in the surf zone at 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

Daily phytoplankton samples were collected between 15 June and 15 July, 2011 with a pump system. A 6-cm dia. hose was attached to pipes that were jetted into the sand; the hose extended into the surf zone. A gas-powered pump sampled about 240 L of water per min, and three replicate (n=3) 1-L phytoplankton samples were collected from this system. Samples were collected within one hour of high tide each day. Depending on the wave height on a given day these samples were collected within the breakers or just a few meters seaward

of the breakers. 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.

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## Data Files

File
<b>CarmelRiver_SurfZone_Phyto2011.csv</b> (Comma Separated Values (.csv), 3.93 KB) MD5:6f212676fc17ad3d9626f29afd495503
Primary data file for dataset ID 561724

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## 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)	
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

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## Deployments

### CRSB\_2011

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/561647">https://www.bco-dmo.org/deployment/561647</a>
<b>Platform</b>	Carmel_River_State_Beach
<b>Start Date</b>	2011-06-19
<b>End Date</b>	2011-07-15

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## 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.

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0926923</a>

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