

Composition and abundance of macrophyte wrack at six Santa Barbara beaches quantified during surveys conducted from 2015-2017

Website: <https://www.bco-dmo.org/dataset/815092>

Data Type: Other Field Results

Version: 1

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Project

» [Linking nearshore kelp forest dynamics to sandy beach ecosystems](#) (Linking Kelp to Beaches)

Contributors	Affiliation	Role
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Abstract

Composition and abundance of macrophyte wrack at six Santa Barbara beaches quantified during surveys conducted from 2015-2017. Wrack composition and cover were recorded for each of six shore-normal transects of variable length that extended from the lower edge of terrestrial vegetation or the bluff to the lowest intertidal level exposed by swash at each location.

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Coverage

Spatial Extent: N:34.4173 E:-119.7469 S:34.4037 W:-119.8857

Temporal Extent: 2015-10-07 - 2017-11-01

Dataset Description

Composition and abundance of macrophyte wrack at six Santa Barbara beaches quantified during surveys conducted from 2015-2017.

Acquisition Description

We quantified composition and abundance of macrophyte wrack of the six study beaches during each survey from 2015-2017. Wrack composition and cover were recorded for each of six shore-normal transects of variable length that extended from the lower edge of terrestrial vegetation or the bluff to the

lowest intertidal level exposed by swash at each location. The transects were randomly assigned to locations within the first 100 m of shoreline from the access point using a random number table and a distance measuring wheel. We used a line-intercept method along each transect tape to quantify wrack cover. The presence and extent (length, depth) of each type of macrophyte, driftwood, carrion, tar, trash and any other beach-cast wrack was recorded along each transect tape, yielding total wrack cover by wrack type for each transect. Data are reported as m²/m of shoreline.

Processing Description

BCO-DMO Processing:

- joined site coordinates to the data using Site Name as the key;
- converted Date field to yyyy-mm-dd format;
- renamed original 'Type' column to 'Type_Code' and added the definition to new column 'Type';
- replaced commas with semi-colons in the Notes column;
- removed commas from the Type column.

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Parameters

Parameter	Description	Units
Site	Unique site name	unitless
Latitude	Latitude of survey site; positive values = North	decimal degrees North
Longitude	Longitude of surveysite; positive values = East	decimal degrees North
Year	The year that the survey was done. This year is expressed in YYYY format. Dates reflect measurements taken in local time. For sites in Alaska, local time is Alaska Standard Time except during months when Alaska Daylight time is effective. For all other Pacific Coast sites, local time is Pacific Standard Time except during months when Pacific Daylight Time is effective.	unitless
Month	The month that the survey was done. Dates reflect measurements taken in local time. For sites in Alaska, local time is Alaska Standard Time except during months when Alaska Daylight time is effective. For all other Pacific Coast sites, local time is Pacific Standard Time except during months when Pacific Daylight Time is effective.	unitless
Date	Date of survey; format: YYYY-MM-DD	unitless
Transect	A letter representing one of 6 shore normal transects (A-F) within the study beach. The transect letter is determined by the order from the beach access point.	unitless
Start	start point (meters) of wrack unit on transect	meters (m)
End	end point (meters) of wrack unit on transect	meters (m)
Length	length (meters) of wrack unit (end-start)	meters (m)
Type_Code	type of wrack or non-sand substrate as code	unitless
Type	type of wrack or non-sand substrate	unitless
Depth	depth (cm) of wrack	centimeters (cm)
Investigator	name of investigator	unitless
Notes	notes on site or transect	unitless

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Instruments

Dataset-specific Instrument Name	distance measuring wheel
Generic Instrument Name	Measuring Tape
Generic Instrument Description	A tape measure or measuring tape is a flexible ruler. It consists of a ribbon of cloth, plastic, fibre glass, or metal strip with linear-measurement markings. It is a common tool for measuring distance or length.

Deployments

Dugan_UCSB_2015-2017

Website	https://www.bco-dmo.org/deployment/737386
Platform	lab_UCSB
Start Date	2015-07-02
End Date	2017-11-01
Description	Study of exported kelp fate and transport.

Project Information

Linking nearshore kelp forest dynamics to sandy beach ecosystems (Linking Kelp to Beaches)

Coverage: Santa Barbara Channel, California, USA 34 N, 119 W

This project is affiliated with the Santa Barbara Coastal LTER project. Description from NSF award abstract: Primary producers, such as plants and algae, form the basis of most food webs and their productivity and fate fundamentally shape ecosystems. Often, however, food and other resources are delivered to a food web from an outside source, providing a subsidy to the recipient ecosystem. Understanding these types of trophic connections and exchanges between ecosystems is necessary for predicting how food webs may respond to change, whether environmental or anthropogenic. Despite their potential importance, quantitative evaluations of cross-ecosystem material fluxes, variation of these fluxes in time and space, and ecological responses of recipient communities are lacking, particularly for marine ecosystems. By investigating links between a source ecosystem, kelp forests, and a recipient ecosystem, sandy beaches, this project will expand and transform our understanding of cross-ecosystem fluxes in the coastal ocean. Nearshore kelp forests are highly productive marine ecosystems characterized by large seasonal and interannual variations in net primary production (NPP). More than 90% of kelp forest NPP is exported to adjacent ecosystems including the intertidal zone. Lacking attached plants and algae, sandy beach ecosystems near kelp forests depend heavily on imported drift kelp (wrack) to support complex and diverse food webs. Although sandy beaches are a dominant shoreline type along all U.S. coasts, provide habitat and prey for wildlife, including endangered species, and are highly valued by society as recreational and cultural resources that drive vibrant coastal economies, they receive little ecological study compared to other shoreline types. This lack of knowledge hinders the conservation and management of beaches as ecosystems. Perched on the narrow rim between land and sea, beaches are highly vulnerable to climate change, particularly sea level rise, and will be impacted by changes in climate, as will kelp forests. This project integrates biological and physical approaches to achieve an understanding of the fate and transport of exported kelp, and how variability in this resource subsidy shapes the community structure and function of recipient beach ecosystems. Graduate and undergraduate students will be integral members of the research team, receiving scientific training and mentoring in coastal marine ecology and in public outreach and education. The training and participation of local residents and coastal managers in regular shoreline surveys for beached kelp plants will provide an essential research component of the study and enhance public awareness of scientific research, coastal ecology and the role of links between kelp forest and beach ecosystems. The results of this project will provide new insights into the dynamics of connectivity between coastal marine ecosystems that can be applied to their conservation and management. The project seeks to understand trophic connectivity between a donor ecosystem, kelp

forests, and a recipient ecosystem, sandy beaches, with two primary goals: 1) an evaluation of how variation in kelp wrack input affects patterns and processes in beach ecosystems and 2) a quantitative understanding of trophic connectivity through physical transport and input of drift kelp biomass from kelp forests to sandy beaches. The project will begin with two years of intensive work at a well-studied kelp forest in the Santa Barbara Channel, Mohawk Reef, and along 10 km of adjacent coastline, where the research team will measure intertidal community structure over time in response to variability in kelp inputs. To assess effects of variation in wrack input on ecosystem function, they will also measure kelp consumption and secondary production rates of intertidal consumers on adjacent beaches. They will directly observe fate and transport of kelp using complimentary approaches: 1) tracking kelp plants tagged at Mohawk Reef using drifters with GPS; and 2) tagging large numbers of kelp plants (2000) with "drift cards" at Mohawk Reef for recovery by the project team and trained volunteer beachcombers. Ending distributions of recovered drift cards and drifter tracks along the shoreline will then be computed. These data will be used to inform and validate a kelp forest-to-beach kelp transport model based on numerical simulations of coastal surface currents from the Regional Oceanic Modeling System (ROMS). Using predicted kelp beaching rates from this model run regionally, the investigators will then sample community structure and wrack biomass at a larger set of beaches spanning 100 km of the southern California shoreline to test the generality of research findings. This combination of fate and transport observations, beach community surveys and process measurements, and modeling will allow the investigators to characterize temporal variability in kelp subsidy inputs and the consequences of this variability for community structure and function of recipient beach ecosystems.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1458845

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