Physical characteristics of six Santa Barbara beaches quantified during surveys conducted from 2015-2017

Website: https://www.bco-dmo.org/dataset/815025
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
Physical characteristics of six Santa Barbara beaches quantified during surveys conducted from 2015-2017. Physical characteristics 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

Physical characteristics of six Santa Barbara beaches quantified during surveys conducted from 2015-2017.

Methods & Sampling

We quantified physical characteristics of the six study beaches during each survey conducted from 2015-2017. Physical characteristics 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. To characterize the beach, surf and swash zones we measured the beach width from lower edge of terrestrial vegetation or the bluff to the lowest intertidal level exposed by swash, recording locations of the water table outcrop (WTO) and high tide strand line (HTS) and beach slope at these two locations.

Data Processing Description

BCO-DMO Processing:
- replaced "N/A" with "nd" as missing data value;
- joined site coordinates to the data using Site Name as the key;
- replaced oct with October and nov with November for consistency in month field;
- added date field in yyyy-mm-dd format;
- replaced spaces with underscores in field names.

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Data Files

File
beach_characteristics.csv (Comma Separated Values (.csv), 16.75 KB) MD5:460efb4f4091b175a8f730097691fa96 Primary data file for dataset ID 815025

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Parameters

Parameter	Description	Units
Site_Name	Unique site name	unitless
Latitude	Latitude of the survey site; positive values = North	decimal degrees North
Longitude	Longitude of the survey site; positive values = East	decimal degrees East
Date	Date of survey; format: YYYY-MM-DD	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
Day	Day of month of survey	unitless
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
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
HTS	A number representing distance (meters) from back beach limit to the 24-hour high tide strand line	meters (m)
HTS_Slope	A number representing slope (degrees) of beach at the 24-hour high tide strand line	degrees
WTO	A number representing distance (meters) from back beach limit to the water table outcrop	meters (m)
WTO_Slope	A number representing slope (degrees) of beach at the water table outcrop	degrees

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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.

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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.

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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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