Sedimentary benthic fauna and plastic abundance at the Carlsbad Desalination Plant, Southern California 2014-2016 (Effluent Impacts on Coastal Ecology project)

Website: https://www.bco-dmo.org/dataset/716366
Data Type: Other Field Results
Version:
Version Date: 2017-10-04

Project
» Brine Discharge From Desalination Plants - Impacts On Coastal Ecology, Public Perception, and Public Policy (Effluent Impacts on Coastal Ecology)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **N**:33.1459 **E**:-117.336641 **S**:33.1355 **W**:-117.35295
Temporal Extent: 2014-12-01 - 2016-11-30

Dataset Description

This dataset contains the total count of benthic Annelida and Crustaceans and of plastic pieces, normalized to the volume of sediment collected at the Carlsbad Desalination Plant, obtained in December 2014, Sept. 2015, May 2016 and November 2016.

Related datasets:
Benthic macrofaunal abundance
Macrofauna species distribution
Phytoplankton cell count
Sediment grain size
Water chemistry

Methods & Sampling

Samples were collected in a perimeter of ~1 km offshore of the discharge channel of Carlsbad Desalination Plant, Carlsbad Beach, California (33°08'18.9"N 117°20'21.3"W).

Samples were collected in four trips:
Pre-discharge: Dec 2nd-4th 2014 and Sep 21st-24th 2015.
Post-discharge: May 9th-12th 2016 and Nov 8th-11th 2016

Transect lines were deployed going from the discharge channel (Outflow) and the Intake to 1000 m offshore. Sampling was done every 25 m until 200 m offshore, then at 400, 600, 800 and 1000 m (“stations”). The "Parallel" transect ran continuous parallel to the beach ~200 m offshore and samples stations were deployed every ~100 m. Station 1 is the southern-most sampling point (south of discharge channel). At each station surface (~1 m depth) and bottom water samples were taken and a sediment sample. Bottom samples were collected at a depth range of 4m - 17m.

The benthic surveys were done continuously at the first 200 m offshore if water conditions allowed. At station 400, 600, 800 and 1000 and on the parallel stations, ten 1x1m quadrates were deployed.

Sediment analysis: 300-500 g of sediment was collected at certain stations. The sediment was kept at -20 degrees C. Upon analysis, the sediment was thawed and rinsed in 90% ethanol.

The ethanol was obtained and surveyed through a microscope to count the organisms present. The counted individuals were summed and normalized to the weight of the sample.

The sediment was dried and weighed and the grain size analyzed through sieving.

Data Processing Description

BCO-DMO Processing:
- added conventional header with dataset name, PI name, version date
- modified parameters to BCO-DMO standard
- renamed parameter: Fieldtrip to date_Fieldtrip
- added year column
- sorted by date, site, and station

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Data Files

File
sediment_organisms.csv (Comma Separated Values (.csv), 3.43 KB) MD5:8eaecfd10a3dada867d285396391e3db Primary data file for dataset ID 716366

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Parameters

Parameter	Description	Units
year	year of sampling	unitless
date_Fieldtrip	local date formatted as Mon-yyyy	unitless
Site	sampling location relative to inflow and outflow	unitless
Station	distance along transect line from site 0	meters
Latitude	latitude either at start or transect of at actual position; north is positive	decimal degrees
Longitude	longitude either at start or transect of at actual position; east is positive	decimal degrees
individ_kg_sed	The sum of annelida and crustaceans for each collected sample normalized to the amount of sediment collected	individuals/kilogram sediment
plastic_kg_sed	The amount of identified plastic pieces in each sample normalized to the amount of sediment collected	plastic pieces/kilogram sediment

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Microscope - Optical
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

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Deployments

Paytan_2014

Website	https://www.bco-dmo.org/deployment/564163
Platform	shoreside Carlsbad Desalination Plant
Start Date	2014-12-02
End Date	2014-12-04
Description	study of desalination plant effluent

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Project Information

Brine Discharge From Desalination Plants - Impacts On Coastal Ecology, Public Perception, and Public Policy (Effluent Impacts on Coastal Ecology)

Website: http://desalinationucsc.weebly.com

Coverage: Carlsbad, California

Description from NSF award abstract:
Desalination of seawater accounts for a worldwide water production of about 70 million cubic meters per day. Despite the many benefits the technology has to offer, there are concerns over potential negative impacts on the environment. A key issue that has not been thoroughly investigated is the impact of effluent discharge on coastal marine ecosystems. This project will provide quantitative scientific assessment of the potential impacts of effluent discharge on coastal ecosystems in California and assess how such data influences public perception and public policy. The team of social and natural scientists has experience related to coastal pollution, California coastal ecology, marine biogeochemistry, toxicology, environmental policy and economics, water policy and management, and utility-stakeholder communications. Established relations with desalination facilities in California will ensure an integrative framework for research on the human and environmental aspects related to the increasing abundance of desalination facilities along the California coast, and contribute to both securing freshwater resources and sustaining productive and healthy coastal communities and coastal environments.

The objectives of this project are to (1) determine how effluent discharges from facilities for seawater desalination by reverse osmosis affect key organisms of the California coastal ecosystem with implications for ecosystem structure and function, (2) describe the spatial extent of the effect for different discharge schemes, and (3) evaluate how results from this and similar environmental impact studies influence public perception and decision making regarding desalination plant construction and operation. The project will combine in situ field chemical and biological measurements, controlled laboratory experiments, and assessments of how people and organizations interpret and use this data for making environmentally sound and sustainable decisions. Field studies will be performed at three different desalination plants to identify and quantify the possible effects of stressors associated with effluent discharge on local biota. Observed effects will be validated through controlled laboratory bioassay experiments. The scientific results will be communicated to the general public and decision makers to assess how scientific data is used by different stakeholders.

This project is supported under NSF's Coastal SEES (Science, Engineering and Education for Sustainability) program.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1325649

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