

Average sediment grain size at in- and out-flow at Carlsbad Desalination Plant, Southern California, 2014-2016 (Effluent Impacts on Coastal Ecology project)

Website: <https://www.bco-dmo.org/dataset/716181>

Data Type: Other Field Results

Version:

Version Date: 2017-10-11

Project

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

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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 sediment grain size, mean sediment grain size and sorting values (sigma)

Related datasets:

[Benthic macrofaunal abundance](#)
[Macrofauna species distribution](#)
[Phytoplankton cell count](#)
[Sediment fauna and plastic](#)
[Water chemistry](#)

Methods & Sampling

Samples collected in a perimeter of ~1 km offshore of the discharge channel (33°08'18.9"N 117°20'21.3"W). Bottom samples collected at depth range 4m – 17m

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.

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, 10 1x1m quadrates were deployed.

Sediment analysis:

300-500 g of sediment was collected at certain stations. The sediment was kept at -20 degC. 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 Sieving pots ranging from +0.5 Φ Phi to +4.75 Φ Phi (+0.5 being bigger particles and +4.75 being smaller) were used. A weighted amount of sediment (between 75-90 g) was stirred for 15 min. and the amount of sediment in each pot was weighted (Folk 1966).

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- sorted data by date
- transposed data to fit BCO-DMO formatted rows and columns

Version 1: 2015-08-03

Version 2: 2015-08-11 (added lat_site/lon_site for mapping purposes)

Version 3: 2016-09-21 (added 2015 data)

Version 4: 2017-09-22 (revised 2014 data and added 2016 data)

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Data Files

File
grain_size.csv (Comma Separated Values (.csv), 2.70 KB) MD5:125d0b59c279613f3177fc091223981d
Primary data file for dataset ID 716181

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Related Publications

FOLK, R. L. (1966). A REVIEW OF GRAIN-SIZE PARAMETERS. Sedimentology, 6(2), 73–93. doi:[10.1111/j.1365-3091.1966.tb01572.x](https://doi.org/10.1111/j.1365-3091.1966.tb01572.x)

Parameters

Parameter	Description	Units
date_Fieldtrip	local date of field sampling formatted as Mon-yyyy	unitless
Site	sampling location: either near intake or outfall	unitless
Phi	Krumbien Phi scale grain size category	unitless
sediment	The average amount of sediment collected at that particular phi size.	grams
mean_mz	the calculated mean phi-size out of 16% and 50% percentiles	Phi scale units
mean_mm	the mean grain size	millimeters
sorting_sigma	unique number to classify which type of sediment and how well it is sorted	unitless
non_inclusive_stdev	standard deviation for sigma	unitless

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Nutrient Autoanalyzer
Dataset-specific Description	flow injection nutrient auto-analyser (Lachat)
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	handheld pH probe
Generic Instrument Name	pH Sensor
Generic Instrument Description	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+).

Dataset-specific Instrument Name	
Generic Instrument Name	Salinometer
Dataset-specific Description	Guideline Portasal
Generic Instrument Description	A salinometer is a device designed to measure the salinity, or dissolved salt content, of a solution.

Dataset-specific Instrument Name	Shimadzu TOC-V CHS
Generic Instrument Name	Shimadzu TOC-V Analyzer
Dataset-specific Description	Used to measure dissolved organic carbon concentrations
Generic Instrument Description	A Shimadzu TOC-V Analyzer measures DOC by high temperature combustion method.

Dataset-specific Instrument Name	TD-700 flourometer
Generic Instrument Name	Turner Designs 700 Laboratory Fluorometer
Dataset-specific Description	Used to measure chlorophyll-a
Generic Instrument Description	The TD-700 Laboratory Fluorometer is a benchtop fluorometer designed to detect fluorescence over the UV to red range. The instrument can measure concentrations of a variety of compounds, including chlorophyll-a and fluorescent dyes, and is thus suitable for a range of applications, including chlorophyll, water quality monitoring and fluorescent tracer studies. Data can be output as concentrations or raw fluorescence measurements.

Dataset-specific Instrument Name	
Generic Instrument Name	Water Quality Multiprobe
Dataset-specific Description	YSI 85 Handheld Oxygen, Conductivity, Salinity, mg/L C and Temperature System
Generic Instrument Description	An instrument which measures multiple water quality parameters based on the sensor configuration.

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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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