# Sperm whale skin tissue samples analyzed for C and N at UC-Santa Cruz: date and location of collection from the California Current System

**Website**: https://www.bco-dmo.org/dataset/653118
**Data Type**: Other Field Results
**Version**: 1
**Version Date**: 2016-08-02

**Project**
» A novel approach for evaluating temporal and spatial changes in trophic structure of the mesopelagic eastern Pacific (Sperm Whale SI Ratios)



| Contributors | Affiliation | Role |
|---|---|---|
| Koch, Paul L. | University of California-Santa Cruz (UCSC) | Principal Investigator |
| McCarthy, Matthew D. | University of California-Santa Cruz (UCSC) | Co-Principal Investigator |
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**Abstract**
Sperm whale skin tissue samples analyzed for C and N at UC-Santa Cruz: date and location of collection from the California Current System, 1972 to 2005.

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## Coverage

**Spatial Extent**: **N**:46.97 **E**:-117.35 **S**:32.47 **W**:-129.82
**Temporal Extent**: 1972-12 - 2005-07

### Data Processing Description

**BCO-DMO Processing:**
- added conventional header with dataset name, PI name, version date, reference information
- renamed parameters to BCO-DMO standard
- reformatted date from Mon-yy to yyyy-mm
- reformatted longitude from decimal degrees west to east
- replaced hyphens with nd (no data); replaced commas with semi-colons

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## Data Files

| File |
| --- |
| **skin_samples.csv** (Comma Separated Values (.csv), 1.59 KB)<br>MD5:4e2cfe4f118a79772abc0947e1c1456a<br>Primary data file for dataset ID 653118 |

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## Related Publications

Ruiz-Cooley, R. I., Koch, P. L., Fiedler, P. C., & McCarthy, M. D. (2014). Carbon and Nitrogen Isotopes from Top Predator Amino Acids Reveal Rapidly Shifting Ocean Biochemistry in the Outer California Current. PLoS ONE, 9(10), e110355. doi:10.1371/journal.pone.0110355
*Results*

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## Related Datasets

### IsRelatedTo

Koch, P. L., McCarthy, M. D. (2021) **Compound-specific carbon isotopes from sperm whale skin tissue from the UC-Santa Cruz labs of P. Koch and M. McCarthy (Sperm Whale SI Ratios project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-08-02 doi:10.26008/1912/bco-dmo.653106.1 [view at BCO-DMO]

Koch, P. L., McCarthy, M. D. (2021) **Compound-specific nitrogen isotopes from sperm whale skin tissue from the UC-Santa Cruz labs of P. Koch and M. McCarthy (Sperm Whale SI Ratios project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-08-02 doi:10.26008/1912/bco-dmo.653061.1 [view at BCO-DMO]

Koch, P. L., McCarthy, M. D. (2021) **Sperm whale skin bulk C and N isotopes from the California Current System, 1972 to 2005.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-08-02 doi:10.26008/1912/bco-dmo.653047.1 [view at BCO-DMO]

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| SWFSC_id | identification number assigned to sample at Southwest Fisheries Science Center | unitless |
| UCSC_id | identification number assigned to sample at UC Santa Cruz | unitless |
| tissue | type of tissue sample | unitless |
| preservation | how the sample was stored; either by dimethyl sulfide (DMSO) or freezing | unitless |
| sex | sex of animal: F=female; M=male; U=unknown | unitless |
| source | how the sample was collected (either from stranded animals or by biopsy) and where the sample was archived | unitless |
| date_collected | date sample was collected; format: yyyy-mm | year; month |
| site_collected | location of sample collection | unitless |
| lat | latitude; north is positive | decimal degrees |
| lon | longitude; east is positive | decimal degrees |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | |
| **Generic Instrument Name** | Gas Chromatograph |
| **Generic Instrument Description** | Instrument separating gases, volatile substances, or substances dissolved in a volatile solvent by transporting an inert gas through a column packed with a sorbent to a detector for assay. (from SeaDataNet, BODC) |

| | |
|---|---|
| **Dataset-specific Instrument Name** | |
| **Generic Instrument Name** | Isotope-ratio Mass Spectrometer |
| **Dataset-specific Description** | Thermo Finnigan DeltaPlus XP isotope ratio mass spectrometer (Thermo Scientific, Bremen, Germany) |
| **Generic Instrument Description** | The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer). |

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## Deployments

**lab_UCSC_Koch**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/652950 |
| **Platform** | UCSC |
| **Start Date** | 2012-03-01 |
| **End Date** | 2016-03-01 |
| **Description** | whale isoptope studies |

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## Project Information

**A novel approach for evaluating temporal and spatial changes in trophic structure of the mesopelagic eastern Pacific (Sperm Whale SI Ratios)**

**Coverage**: California Current, Eastern Tropical Pacific, and the Peru-Humboldt Current

*Description from NSF award abstract:*
Anthropogenic and natural climatic perturbations drive changes in population dynamics of species, the structure and function of food webs, and biogeochemical processes. The PIs propose a comparative analysis of three major ecosystems to investigate temporal change in the structure of mesopelagic food webs.

The PIs will investigate temporal changes in the structure of mesopelagic food webs in three major ecosystems: the California Current, Eastern Tropical Pacific, and the Peru-Humboldt Current over the past 50 years using a globally distributed apex predator as an indicator species. The predator is the sperm whale, *Physeter macrocephalus*, and the PIs will use stable isotope ratios of carbon and nitrogen as indicators of habitat and diet. Isotope values from bulk tissues of teeth and skin (C and N) as well as specific amino acids (N) will be used to address two primary objectives: (a) examine temporal patterns in the trophic position of sperm whales (as an indicator of changes in mesopelagic trophic structure) and baseline isotopic values (as indicators of nutrient cycling); and (b) use isotopic values, which vary among systems, to define the population structure of sperm whales from past and present times, and connectivity among populations.

This project will be conducted by researchers from academia and NOAA/NMFS with expertise in stable isotope analysis, trophic ecology, and ecosystem-based management of protected species. As such, it represents an opportunity for collaboration between scientists with complementary skills and from diverse institutions to compare structure and function of ecosystems across the eastern Pacific. Moreover, it represents a

collaboration between academia and a federal agency with research and management responsibilities. The project will support a postdoctoral scholar (Iliana Ruiz-Cooley), a Ph.D. student, and undergraduate students to enhance their career and collaborative opportunities. The PIs anticipate that the results of their study will provide unique data to evaluate the effects of perturbations within and among mesopelagic ecosystems. This information may allow the scientific community to relate trends in climate to changes in trophic position of top predators and nutrient cycling, allowing more robust understanding of possible responses to future warming. Finally, as the first systematic applications of compound-specific stable isotope analysis to marine mammals, the project should be highly instructive for future evaluations of the feeding ecology, population structure and dynamics of endangered marine mammals. As such, this novel approach and unique historic perspective will be directly applicable for stock assessment and management.

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## Funding


| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1155728 |


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