

# Nautical Area Scattering Coefficients (NASC) from an R/V BIP cruise in the Guaymas Basin, Gulf of California in 2013 (Jumbo Squid El Nino Response project)

Website: <https://www.bco-dmo.org/dataset/520594>

Data Type: Cruise Results

Version: 1

Version Date: 2014-07-23

## Project

» [Adaptable life history strategy of a migratory large predator in response to El Nino and climate change](#) (Jumbo Squid El Nino Response)

| Contributors                       | Affiliation   | Role                   |
|------------------------------------|---|------------------------|
| <a href="#">Benoit-Bird, Kelly</a> | Oregon State University (OSU-CEOAS)                 | Principal Investigator |
| <a href="#">Waluk, Chad</a>        | Oregon State University (OSU-CEOAS)                 | Contact                |
| <a href="#">Rauch, Shannon</a>     | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager   |

## Abstract

Integrated, area scattering values, or Nautical Area Scattering Coefficients (NASC) are provided from one cruise in the Guaymas Basin that occurred October 2013. Also included are the time (UTC) and location at the start and end of each integration bin, mean depth of the exclusion line for each bin, and the average thickness of the integrated cell. Note that noise removal from this data set (e.g. splash down, electrical interference, and CTD casts) was minimal before integration. Raw acoustic scattering data (.raw files) are extremely large. These are archived at Oregon State University and will be shared using physical media upon request.

---

## Table of Contents

- [Coverage](#)
- [Dataset Description](#)
  - [Acquisition Description](#)
  - [Processing Description](#)
- [Related Publications](#)
- [Parameters](#)

- [Instruments](#)
  - [Deployments](#)
  - [Project Information](#)
  - [Funding](#)
- 

## Coverage

**Spatial Extent:** N:28.8857926 E:-111.3343637 S:27.24179 W:-113.3081006

**Temporal Extent:** 2013-10-20 - 2013-10-25

---

## Dataset Description

Integrated, area scattering values, or Nautical Area Scattering Coefficients (NASC) are provided from one cruise in the Guaymas Basin that occurred October 2013. Also included are the time (UTC) and location at the start and end of each integration bin, mean depth of the exclusion line for each bin, and the average thickness of the integrated cell.

Note that noise removal from this data set (e.g. splash down, electrical interference, and CTD casts) was minimal before integration. Raw acoustic scattering data (.raw files) are extremely large. These are archived at Oregon State University and will be shared using physical media upon request.

Related References:

See Benoit-Bird & Gilly (2012) and Hoving et al. (2013).

Related project: [Hypoxia and the ecology, behavior and physiology of jumbo squid, \*Dosidicus gigas\*](http://www.bco-dmo.org/project/2279) (<http://www.bco-dmo.org/project/2279>)

## Acquisition Description

Acoustic data were collected nearly continuously using Simrad EK60s at 4 frequencies (38, 70, 120, and 200 kHz). Split beam transducers (Simrad model numbers: 38-12, 70-7c, 120-7c, 200-7c) were mounted 1.5 m below the surface on a rigid pole. Each transmitted a 512 us pulse as frequently as possible for the water depth. Raw data were stored using Simrad ER60 software.

Acoustic backscattering values at 38 kHz that were greater than -75 dB were integrated in 1 km horizontal bins from depths of 5m to 500m or 1 m above the bottom, whichever was shallower. These integrated, area scattering values or Nautical Area Scattering Coefficients (NASC:  $m^2 nmi^{-2}$ ) are provided. Noise removal from this data set (e.g. splash down, electrical interference, and CTD casts) was minimal before integration.

## Processing Description

BCO-DMO Processing Notes:

- Modified parameter names to conform with BCO-DMO naming conventions.
- Reformatted display of time from HH:MM:SS to HHMM.mmmm

[ [table of contents](#) | [back to top](#) ]

---

## Related Publications

Benoit-Bird, K., & Gilly, W. (2012). Coordinated nocturnal behavior of foraging jumbo squid *Dosidicus gigas*. *Marine Ecology Progress Series*, 455, 211–228. doi:[10.3354/meps09664](https://doi.org/10.3354/meps09664)

Hoving, H.-J. T., Gilly, W. F., Markaida, U., Benoit-Bird, K. J., -Brown, Z. W., Daniel, P., ... Campos, B. (2013). Extreme plasticity in life-history strategy allows a migratory predator (jumbo squid) to cope with a changing climate. *Global Change Biology*, 19(7), 2089–2103. doi:[10.1111/gcb.12198](https://doi.org/10.1111/gcb.12198)

[ [table of contents](#) | [back to top](#) ]

---

## Parameters

| Parameter                        | Description  | Units                            |
|----------------------------------|--|----------------------------------|
| date_start                       | Date at start of integration bin.  | YYYYmmdd                         |
| time_start                       | Time (UTC) at start of integration bin in hours, minutes, and decimal minutes. | HHMM.mmmm                        |
| date_end                         | Date at end of integration bin.  | YYYYmmdd                         |
| time_end                         | Time (UTC) at end of integration bin in hours, minutes, and decimal minutes.   | HHMM.mmmm                        |
| NASC                             | Nautical Area Scattering Coefficient (NASC).                                   | m <sup>2</sup> nmi <sup>-2</sup> |
| lat_start                        | Latitude at start of integration bin.  | decimal degrees                  |
| lon_start                        | Longitude at start of integration bin.   | decimal degrees                  |
| lat_end                          | Latitude at end of integration bin.  | decimal degrees                  |
| lon_end                          | Longitude at end of integration bin.   | decimal degrees                  |
| exclusion_line_mean_depth        | Mean depth of the exclusion line for each bin.                                 | meters                           |
| integration_layer_thickness_mean | Average thickness of the integrated cell.                                      | meters                           |

[ [table of contents](#) | [back to top](#) ]

---

## Instruments

|   |  |
|---|--|
| <b>Dataset-specific Instrument Name</b> | Simrad EK-60 echosounder   |
| <b>Generic Instrument Name</b>          | Simrad EK-60 echosounder   |
| <b>Dataset-specific Description</b>     | Acoustic data were collected nearly continuously using Simrad EK60s at 4 frequencies (38, 70, 120, and 200 kHz). Split beam transducers (Simrad model numbers: 38-12, 70-7c, 120-7c, 200-7c) were mounted 1.5 m below the surface on a rigid pole.   |
| <b>Generic Instrument Description</b>   | A split-beam scientific echosounder primarily designed for fisheries research. It can operate seven frequencies simultaneously ranging from 18 to 710 kHz. Real time echo integration and target strength analysis in an unlimited number of layers is provided as well as storage of raw data for replay or analysis in one of several post-processing software packages such as Simrad's BI60. |

[ [table of contents](#) | [back to top](#) ]

---

## Deployments

### BIPXII\_10\_2013

|                    |  |
|--------------------|--|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/520503">https://www.bco-dmo.org/deployment/520503</a>                            |
| <b>Platform</b>    | R/V BIP XII  |
| <b>Start Date</b>  | 2013-10-20   |
| <b>End Date</b>    | 2013-10-25   |
| <b>Description</b> | Central Gulf of California, Mexico: Santa Rosalia (27.3N 112.1W) to Bahia Las Animas (28.9N 113.3W to Guaymas (27.8N 111.3W) |

[ [table of contents](#) | [back to top](#) ]

---

## Project Information

**Adaptable life history strategy of a migratory large predator in response to El Nino and**

## climate change (Jumbo Squid El Nino Response)

**Coverage:** Gulf of California and Monterey Bay

Description from NSF award abstract: This project will examine the response of *Dosidicus gigas* (Humboldt squid) to an El Niño event in 2009-2010 that was accompanied by a collapse of the commercial fishery for this squid in the Guaymas Basin within the Gulf of California. This large squid is a major predator of great ecological and economic importance in the Gulf of California, the California Current, and Peru Current systems. In early 2010, these squid abandoned their normal coastal-shelf habitats in the Guaymas Basin and instead were found in the Salsipuedes Basin to the north, an area buffered from the effects of El Niño by the upwelling of colder water. The commercial fishery also relocated to this region and large squid were not found in the Guaymas Basin from 2010-2012, instead animals that matured at an unusually small size and young age were abundant. A return to the large size-at-maturity condition has still not occurred, despite the apparent return of normal oceanographic conditions. The El Niño of 2009-2010 presented an unforeseen opportunity to reveal an important feature of adaptability of *Dosidicus gigas* to an acute climatic anomaly, namely a large decrease in size and age at maturity. Now these investigators will have the opportunity to document recovery to the normal large size-at-maturity condition. The specific aims of this project are: 1) continue a program of acoustic surveys and direct sampling of squid that has already been established in the Gulf of California in order to assess distribution, biomass, life history strategy diet, and migratory and foraging behaviors relative to pre-El Niño conditions and 2) conduct analogous surveys in Monterey Bay, California in conjunction with long-term remote operated vehicle surveys of squid abundance. The data from these studies will provide a comparison of recovery in the two different squid populations and yield valuable insights into what ecological effects an area is expected to experience with an invasion of either small or large Humboldt squid. As long-term climate change progresses, squid of both forms may expand northward into the California Current System. Related Project: Hypoxia and the ecology, behavior and physiology of jumbo squid, *Dosidicus gigas*

[ [table of contents](#) | [back to top](#) ]

---

## Funding

| Funding Source   | Award                       |
|--|-----------------------------|
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-1338432</a> |

[ [table of contents](#) | [back to top](#) ]

