

Collected Larval *Sebastes* spp. Otolith and Morphometric Data from R/V Bob and Betty Beyster, R/V Shearwater BBB2102, BBB2104, SW2104, BBB2101 from January to April 2021 (RAPID Anchovy Response project)

Website: <https://www.bco-dmo.org/dataset/940324>

Data Type: Cruise Results

Version: 1

Version Date: 2024-10-11

Project

» [RAPID: Understanding the unprecedented anchovy response to warm-water conditions in the California Current](#) (RAPID Anchovy Response)

Contributors	Affiliation	Role
Semmens, Brice X.	University of California-San Diego (UCSD-SIO)	Principal Investigator
Landry, Michael R.	University of California-San Diego (UCSD-SIO)	Co-Principal Investigator
Swailethorp, Rasmus	University of California-San Diego (UCSD-SIO)	Scientist
Newman, Sawyer	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract

This dataset includes the morphometrics of Rockfish (*Sebastes* spp.) larvae from Bongo plankton net tows conducted in the subtropical Southern California Bight from January to April 2021. Net tows were carried out on several cruises aboard R/V Bob and Betty Beyster and R/V Shearwater. The dataset include species names, morphometrics and larval development stage, age, otolith cores size and width or each growth increment.

Table of Contents

- [Coverage](#)
- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
 - [BCO-DMO Processing Description](#)
 - [Problem Description](#)
- [Related Publications](#)
- [Related Datasets](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Funding](#)

Coverage

Location: Southern California Bight and the Surrounding Coastal Areas

Spatial Extent: N:33.88995 E:-117.3841 S:32.848 W:-119.37

Temporal Extent: 2021-01-24 - 2021-04-06

Methods & Sampling

Specimen Collection

Larval rockfish were collected using a 71cm diameter dual Bongo plankton net system with 505 µm mesh nets and equipped with a small CTD to record depth and physical variables during horizontal net tows at a ship speed of 1.5-2.5 knots down to 28.9-36 m depth.

Collection Location Details

This study is carried out within the temperate to subtropical Southern California Bight and surrounding coastal areas between 32° and 35° N, and 117° and 120° W. Specific locations sampled fall within the CalCOFI and CCE-LTER programs quarterly survey grid from lines 76.7 to 93.4 and stations 26 to 55.

Specimen Processing and Measurement Methods

Once the net was retrieved the nets were gently rinsed with saltwater. The content of the cod-ends were concentrated onto a 300 µm mesh sized sieve, transferred into glass jars and preserved in tris-buffered 95% ethanol. Rockfish larvae were sorted from the 505 µm samples. Sagittal otoliths were extracted from 80 larvae selected to represent a range of sample stations and growth stages. Otoliths were mounted with varnish on labeled microscope slide, photographed using a microscope with an oil immersion lens at 100x magnification and rendered via HeliconFocus v8.1.2. The otolith with the clearest resolution from each larva was selected.

Deployment Details

Each cruise is composed of one or more day trips using one of the two research vessels. The two-three letters indicate the research vessel, the four digits indicates YYYY.

- Winter 2021 sampling took place during cruises BBB2101 and BBB2102
- Spring 2021 sampling took place during cruises BBB2104 and SW2104

Data Processing Description

Otolith microstructure was measured using the RFishBC package in R. Age (days) and increment widths were measured by two readers. Otoliths were reexamined in cases where measurements varied substantially between readers. Otolith information from larvae 3 days or younger and/or larvae with empty gut contents were excluded.

Otoliths were mounted with varnish on labeled microscope slide, photographed using a microscope with an oil immersion lens at 100x magnification and rendered via HeliconFocus v8.1.2. The otolith with the clearest resolution from each larva was selected.

BCO-DMO Processing Description

- Data from 2021 and 2022 was merged from two original data files into one data table represented by the primary data file of this dataset. Year data is still retained within the HATCH_OR_CAPTURE_DATE column of this data file.
- Removed units from column names (unit information can be found in the parameters section of the BCO-DMO metadata page).
- Spaces in column names replaced with underscores ("_").

Problem Description

For some larvae, only 1 sagitta was successfully recovered. Some otoliths rotated slightly on their central axis during the mounting process before the varnish had hardened.

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

Related Publications

Walsh, K. A., Thompson, A. R., Kwan, G. T., Semmens, B. X., Fennie, H. W., & Swalethorp, R. (2024). Diet and Size-at-Birth Affect Larval Rockfish Condition and Survival. <https://doi.org/10.1101/2024.04.07.588270>
Results

Related Datasets

IsRelatedTo

Semmens, B. X., Landry, M. R. (2023) **Zooplankton abundance and size data from Bongo plankton net tows conducted in the subtropical Southern California Bight during February and April 2021.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-11-30 doi:10.26008/1912/bco-dmo.915900.1 [[view at BCO-DMO](#)]
Relationship Description: Associated in situ zooplankton abundance and size information.

Semmens, B. X., Landry, M. R., Swalethorp, R. (2022) **CTD data from Bongo plankton net tows from RV Bob and Betty Beyster and RV Shearwater cruises in the Southern California Bight from fall 2020 to spring 2021.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-03-10 doi:10.26008/1912/bco-dmo.871003.1 [[view at BCO-DMO](#)]
Relationship Description: CTD data collected during the associated Bongo plankton net tows.

Semmens, B. X., Landry, M. R., Swalethorp, R. (2023) **Abundances of larval Northern Anchovy (*Engraulis mordax*), Rockfish (*Sebastes* spp.), and other/unidentified larvae from Bongo plankton net tows conducted in the subtropical Southern California Bight from January to April 2021.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-05-02 doi:10.26008/1912/bco-dmo.895121.1 [[view at BCO-DMO](#)]
*Relationship Description: Associated larval *Sebastes* spp. abundance data.*

Semmens, B. X., Landry, M. R., Swalethorp, R. (2024) **Larval *Sebastes* Diet and Morphometric Data from R/V Bob and Betty Beyster, R/V Shearwater BBB2102, BBB2104, SW2104, BBB2101 from January to April 2021 (RAPID Anchovy Response project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-10-11 <http://lod.bco-dmo.org/id/dataset/940302> [[view at BCO-DMO](#)]
*Relationship Description: Associated diet data from the same collection of larval *Sebastes* spp.*

Parameters

Parameters for this dataset have not yet been identified

Instruments

Dataset-specific Instrument Name	Bongo Plankton Net System
Generic Instrument Name	Bongo Net
Dataset-specific Description	Larval fish were collected using a 71-centimeter (cm diameter dual Bongo plankton net system equipped with a small CastAway-CTD. The Bongo was equipped with two 505-micrometer (μm) mesh-size nets and a flowmeter mounted in the center of one of them.
Generic Instrument Description	A Bongo Net consists of paired plankton nets, typically with a 60 cm diameter mouth opening and varying mesh sizes, 10 to 1000 micron. The Bongo Frame was designed by the National Marine Fisheries Service for use in the MARMAP program. It consists of two cylindrical collars connected with a yoke so that replicate samples are collected at the same time. Variations in models are designed for either vertical hauls (OI-2500 = NMFS Paivovet-Style, MARMAP Bongo, CalVET) or both oblique and vertical hauls (Aquatic Research). The OI-1200 has an opening and closing mechanism that allows discrete "known-depth" sampling. This model is large enough to filter water at the rate of 47.5 m ³ /minute when towing at a speed of two knots. More information: Ocean Instruments, Aquatic Research, Sea-Gear

Dataset-specific Instrument Name	Zeiss Stemi 2000-C Dissecting Microscope
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Larvae were measured, dissected, and prey identified and measured under a Zeiss Stemi 2000-C dissecting microscope with x50 magnification equipped with a digital camera.
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".

Dataset-specific Instrument Name	Microscope with x100 magnification equipped with a digital camera
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Otoliths were mounted with varnish on labeled microscope slide, photographed using a microscope with an oil immersion lens at 100x magnification and rendered via HeliconFocus v8.1.2.
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".

Dataset-specific Instrument Name	CastAway-CTD
Generic Instrument Name	SonTek CastAway-CTD
Dataset-specific Description	Larval fish were collected using a dual Bongo plankton net system equipped with a small CTD to record depth and physical variables during horizontal net tows at a ship speed of 1.5 to 2.5 knots down to 14 to 36 meters (m) depth, depending on bottom depth.
Generic Instrument Description	The Sontek CastAway-CTD (manufactured by Xylem) is a handheld castable instrument that provides instantaneous profiles of temperature, salinity, and sound speed. Each cast is referenced with both time and location using its built-in GPS receiver. The CastAway software displays profiles of the casts in addition to mapping the locations of the data collection points. The CastAway-CTD has a 5 Hz response and sampling rate, accurate to 0.1 (PSS-78), 0.05° Celsius. Conductivity range is 0 to 100,000 µS/cm. Temperature range is -5° to 45° Celsius. Pressure range is 0 to 100 decibars. Further specs and information can be found on the manufacturer's website: https://www.xylem.com/en-us/brands/wtw/wtw-products/castaway-ctd/

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

Deployments

BBB2102

Website	https://www.bco-dmo.org/deployment/871650
Platform	R/V Bob and Betty Beyster
Start Date	2021-02-01
End Date	2021-02-01

BBB2104

Website	https://www.bco-dmo.org/deployment/871651
Platform	R/V Bob and Betty Beyster
Start Date	2021-04-06
End Date	2021-04-07

SW2104

Website	https://www.bco-dmo.org/deployment/871652
Platform	R/V Shearwater
Start Date	2021-04-13
End Date	2021-04-15

BBB2101

Website	https://www.bco-dmo.org/deployment/871649
Platform	R/V Bob and Betty Beyster
Start Date	2021-01-23
End Date	2021-01-24

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

Project Information

RAPID: Understanding the unprecedented anchovy response to warm-water conditions in the California Current (RAPID Anchovy Response)

Coverage: Southern California Bight and surrounding coastal areas between 32° and 35° N, and 117° and 120° W

NSF Award Abstract:

Like many species of small pelagic marine fish, recruitment and productivity of Northern Anchovy fluctuate by orders of magnitude among years. When abundant, the anchovy support a wide range of marine species, including marine mammals, seabirds and a diverse group of marine fishes. Anchovy, which previously thrived during periods of cool-water temperatures and strong coastal upwelling, are currently booming with abundances far in excess of any historical record, even though the California Current Ecosystem is experiencing an unprecedented marine heat wave. This unexpected occurrence challenges the most basic understanding of the mechanisms driving population dynamics in the species. This project is investigating the effects of trophic relationships on population productivity by capitalizing on the immediate research opportunity afforded by the novel, yet ephemeral, state of a local marine heat wave. Findings from the work are being used to develop a mechanistic model of coastal pelagic fish population dynamics generally, and anchovy dynamics in particular. Funded field and lab work are supporting opportunities for undergraduate training and research, and are generating open-access data that serve the research and teaching/training communities into the future.

This RAPID project augments the scheduled Fall research cruises jointly run by the California Cooperative Oceanic Fisheries Investigation and the California Current Ecosystem Long-Term Ecological Research programs. Together, these programs conduct regional oceanographic surveys that include anchovy spawning grounds and larval nursery areas. The RAPID-augmented sampling is designed to test the emerging hypothesis that anchovy populations are trophodynamically mediated at the larval stage, whereby high recruitment results from increased trophic transfer efficiency from the base of the food web. Larval diets and prey selection analyses are being paired with amino acid compound-specific isotope analysis ($\delta^{15}\text{N}$) of the larvae and prey field to generate detailed information on larval trophic ecology. Larval diets and plankton community structure are being related to available data on upwelling and productivity to assess environmental and biological drivers to trophic transfer efficiency. Collectively, these analyses are revealing how food chain length is regulated at the larval level through prey selection, at the prey level through community composition, and at the base of the food chain via coastal upwelling and primary production. Furthermore, this project is establishing whether the current trophic level of anchovy larvae is equal to that of historic population booms and if this is the result of favorable feeding conditions throughout their habitat. Findings from the study are generating a mechanistic understanding of the trophic underpinnings of small pelagic fish population productivity in coastal upwelling systems.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Location Description:

This study is carried out within the temperate to subtropical Southern California Bight and surrounding coastal areas between 32° and 35° N, and 117° and 120° W. Specific locations sampled fall within the CalCOFI and CCE-LTER programs quarterly survey grid from lines 76.7 to 93.4 and stations 26 to 55.

Project Affiliations:

[California Current Ecosystem Long-term Ecological Research Program \(CCE-LTER\)](#)

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

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2053719

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