

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

Website: <https://www.bco-dmo.org/dataset/895121>

Data Type: Cruise Results

Version: 1

Version Date: 2023-05-02

Project

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

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Abstract

This dataset includes 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. Net tows were carried out on several cruises aboard R/V Bob and Betty Beyster and R/V Shearwater.

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Coverage

Spatial Extent: N:34.45 E:-117.279 S:32.8468 W:-120.8

Temporal Extent: 2021-01-23 - 2021-04-15

Methods & Sampling

This study was carried out within the temperate to subtropical Southern California Bight and surrounding coastal areas between 32° and 35° North, and 117° and 120° West. 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.

Sampling took place from January to April 2021 on R/V Bob and Betty Beyster cruises BBB2101, BBB2102, and BBB2104 and on R/V Shearwater cruise SW2104. Each cruise number is composed of one or more day trips using one of the two research vessels. The two-three letters indicate the research vessel, and the four digits indicate YYYYMM.

Larval fish were collected using a 71-centimeter (cm) diameter 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. The Bongo was equipped with two 505-micrometer (μm) mesh-size nets and a flowmeter mounted in the center of one of them.

Once the net was retrieved the cod-ends were immediately placed in a saltwater ice bath and the nets were gently rinsed with saltwater. The content of the cod-ends was then concentrated onto a 200-300 μm mesh-size sieve, transferred into glass jars, and preserved in Tris-buffered 95% ethanol as quickly as possible. After a few days of storage, the alcohol was exchanged. The samples were sorted under a dissecting microscope and fish larvae were identified based on body shape and pigmentation patterns.

Known Problems/Issues:

The Rockfish data contain some gaps for samples where they were not identified and counted. In those cases, any Rockfish present will be included in the Other / Unidentified category.

Data Processing Description

Data Processing:

CastAway-CTD software version 1.3 (firmware version v026_r2818) was used for data acquisition and processing using default correction algorithms and binned over 0.3 decibar changes. For more information on data processing, please see the manual at <https://www.sontek.com/castaway-ctd>.

The flowmeter was calibrated between cruises to accurately calculate the volume of water strained by the net and the abundance of fish larvae. It was assumed the volume would be the same for both the starboard and port side net.

BCO-DMO Processing:

- converted date-time fields to ISO 8601 format;
- renamed fields to comply with BCO-DMO naming conventions;
- corrected typo in dataset: changed "Andhovy" to "Anchovy" in the Common_name column.

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Data Files

File
larval_fish_abundance_from_bongo_plankton_tows.csv (Comma Separated Values (.csv), 25.84 KB) MD5:6515892a9cf8bdcabc102409b88ed7387
Primary data file for dataset ID 895121.

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Related Datasets

IsRelatedTo

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: Datasets were collected during the same cruises.

Semmens, B. X., Landry, M. R., Swalethorp, R. (2024) **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)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-10-11 <http://lod.bco-dmo.org/id/dataset/940324> [[view at BCO-DMO](#)]

Relationship Description: Associated larval Sebastes otolith and morphometric 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 larval Sebastes spp. diet and morphometric data.

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Parameters

Parameter	Description	Units
Cruise	Cruise identifier	unitless
ISO_DateTime_UTC	Date and time (UTC) in ISO 8601 format	unitless
ISO_DateTime_PDT	Date and time (PDT) in ISO 8601 format	unitless
Line	CalCOFI line	unitless
St	CalCOFI station	unitless
Lat	Latitude	decimal degrees North
Long	Longitude	decimal degrees East
Tow_depth	Maximum depth of net	meters (m)
Net	Indicates starboard (STB) or port (PORT) net	unitless
Taxa	Latin name of larval fish	unitless
Common_name	Common name of larval fish	unitless
Count	Number of larvae caught in net	number of individuals
ind_per_cubic_m	Larval abundance per cubic meter	individuals per cubic meter
ind_per_ten_sq_m	Larval abundance per 10 square meters	individuals per ten square meters

Instruments

Dataset-specific Instrument Name	71 cm diameter dual Bongo plankton net system
Generic Instrument Name	Bongo Net
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 Pairovet-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	General Oceanic Inc. Flowmeter
Generic Instrument Name	Flow Meter
Generic Instrument Description	General term for a sensor that quantifies the rate at which fluids (e.g. water or air) pass through sensor packages, instruments, or sampling devices. A flow meter may be mechanical, optical, electromagnetic, etc.

Dataset-specific Instrument Name	SonTek CastAway CTD model CC1403002
Generic Instrument Name	SonTek CastAway-CTD
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/

Deployments

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

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

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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 \(CCE-LTER\)](#)
[California Cooperative Oceanic Fisheries Investigations \(CalCOFI\)](#)

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Funding

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

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