
23 May 2007

References to the data, published in annual ichthyoplankton data reports are given in the introduction to the Atlas. In addition, these data are available in PDF format on the SWFSC web site at [http://swfsc.noaa.gov/publications/swcpub/qryPublications.asp](http://swfsc.noaa.gov/publications/swcpub/qryPublications.asp), enter "ichthyoplankton" in the Subject line and "California Cooperative Oceanic Fisheries Investigations" in the Title line. Checking the ALL YEARS button will produce the entire list of available data.

The report for each year usually is published about 7-9 months after the fall cruise, and includes notes about nomenclature changes, etc. The ultimate goal is to update the old ichthyoplankton identifications to current standards; the database is updated as re-identifications for each cruise are completed.
STATE OF CALIFORNIA
MARINE RESEARCH COMMITTEE

CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS

ATLAS No. 12
Pacific Sardine
*Sardinops caerulea*
CALIFORNIA
COOPERATIVE
OCEANIC
FISHERIES
INVESTIGATIONS

Atlas No. 12

STATE OF CALIFORNIA
MARINE RESEARCH COMMITTEE

Cooperating Agencies:
CALIFORNIA ACADEMY OF SCIENCES
CALIFORNIA DEPARTMENT OF FISH AND GAME
STANFORD UNIVERSITY, HOPKINS MARINE STATION
U. S. FISH AND WILDLIFE SERVICE, BUREAU OF COMMERCIAL FISHERIES
UNIVERSITY OF CALIFORNIA, SCRIPPS INSTITUTION OF OCEANOGRAPHY

June, 1970
This is the twelfth in a series of atlases containing data on the hydrography and plankton from the region of the California Current. The field work was carried out by the California Cooperative Oceanic Fisheries Investigations, a program sponsored by the State of California under the direction of the State's Marine Research Committee. The cooperating agencies in the program are:

California Academy of Sciences
California Department of Fish and Game
Stanford University, Hopkins Marine Station
U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries
University of California, Scripps Institution of Oceanography

CalCOFI atlases are issued as individual units as they become available. They provide processed physical, chemical and biological measurements of the California Current region. Each number may contain one or more contributions. A general description of the CalCOFI program with its objectives appears in the preface of Atlas No. 2.

This atlas was prepared by the Data Collection and Processing Group of the Marine Life Research Program, Scripps Institution of Oceanography.

CalCOFI Atlas Editorial Staff:
Abraham Fleminger and Hans T. Klein, Editors
John G. Wyllie, Cartographer

Atlases in this series, through June 1969, are:

CalCOFI Atlas No. 1  Anonymous  CalCOFI atlas of 10-meter temperatures and salinities 1949 through 1959.
CalCOFI Atlas No. 2  Fleminger, A.  Distributional atlas of calanoid copepods in the California Current region. Part I.
CalCOFI Atlas No. 3  Alvariño, A.  Distributional atlas of Chaetognatha in the California Current region.
CalCOFI Atlas No. 4  Wyllie, J. G.  Geostrophic flow of the California Current at the surface and at 200 meters.
CalCOFI Atlas No. 5  Brinton, E.  Distributional atlas of Euphausiacea (Crustacea) in the California Current region. Part I.
CalCOFI Atlas No. 6  McGowan, J. A.  Distributional atlas of pelagic molluscs in the California Current region.
CalCOFI Atlas No. 7  Fleminger, A.  Distributional atlas of calanoid copepods in the California Current region. Part II.
CalCOFI Atlas No. 8  Brinton, E.  Distributional atlas of Thaliacea in the California Current region.
CalCOFI Atlas No. 12  Kramer, David  Distributional atlas of fish eggs and larvae in the California Current region: Pacific sardine, Sardinops caerulea (Girard), 1951 through 1966.

1 Usually abbreviated CalCOFI, sometimes CALCOFI or COOFI.
2 For citation this issue in the series should be referred to as CalCOFI Atlas No. 12.
DISTRIBUTIONAL ATLAS OF FISH EGGS AND LARVAE IN THE CALIFORNIA CURRENT REGION: PACIFIC SARDINE, SARDINOPS CAERULEA (GIRARD), 1951 THROUGH 1966

David Kramer

CALCOFI ATLAS NO. 12

Data Collection and Processing Group
Marine Life Research Program
Scripps Institution of Oceanography
La Jolla, California

June 1970
DISTRIBUTIONAL ATLAS OF FISH EGGS AND LARVAE IN THE CALIFORNIA CURRENT REGION: PACIFIC SARDINE, SARDINOPS CAERULEA (GIRARD), 1951 THROUGH 1966

David Kramer

This atlas illustrates the distribution and relative abundance of the eggs and larvae of the Pacific sardine, Sardinops caerulea (Girard), off the coasts of California and Baja California in the region of the California Current during the years 1951 through 1966. The data were collected by the California Cooperative Oceanic Fisheries Investigations on surveys covering selected portions of the pattern shown in Chart 1. The surveys were conducted monthly in 1951 through 1960 and again in 1966, and quarterly in 1961 through 1965. Sampling methods and collecting apparatus have been described in detail by Fleminger (1964) and Ahlstrom (1966). In brief, each sample was collected by lowering a plankton net of 0.55 mm silk mesh, and a mouth opening one meter in diameter, to a depth of about 140 meters (200 meters of wire out, depth permitting) and retrieving it at 20 meters per minute, while maintaining a wire angle of 45 degrees and a ship speed of about two knots. In shallow water, samples were taken to within 15 meters of the bottom. Data on vertical distribution (Ahlstrom, 1959a) indicate that this standard net tow samples the entire stratum occupied by sardine eggs and larvae.

Samples were sorted in the laboratory for all fish eggs and larvae. Very large samples were fractioned with the Folsom Plankton Sample Splitter (McEwen, Johnson and Folsom, 1954).

Estimates of abundance of fish eggs and larvae were made comparable between samples by standardizing the values to a unit of 10 square meters of sea surface. Details of this standardizing procedure were described by Kramer and Ahlstrom (1968). The abundance of other planktonic organisms dealt with in previous CalCOFI atlases has been standardized by estimating the number in 1000 cubic meters of water strained.


1Fishery-Oceanography Center, Bureau of Commercial Fisheries, La Jolla, California.
No charts are presented for those cruises in which both eggs and larvae were absent. These cruises are indicated in the pagination tables by the term "no occurrences." Tables 1 and 2 give the pagination of egg and larvae charts, respectively.

REFERENCES CITED


Table 1. Pagination of charts showing the distributions of sardine eggs.

(O) No occurrences. (−) No cruise. (*) Distribution for early and late March cruises are shown on the same chart.

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Table 2. Pagination of charts showing the distributions of sardine larvae.

(O) No occurrences. (−) No cruise. (*) Distribution for early and late March cruises are shown on the same chart.

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CALCOFI
BASIC STATION PLAN
SINCE 1950

CAPE MENDOCINO

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA
Sardinops caerulea eggs

CALCOFI CRUISE 5101
9-29 JANUARY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE □ DAY ● SUNSET

10
100
1,000
10,000

Sardinops caerulea eggs
5101
Sardinops caerulea larvae

CALCOFI CRUISE 5101
9-29 JANUARY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae
Sardinops caerulea larvae

CALCOFI CRUISE 5201
8 - 28 JANUARY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m$^2$ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

CAPE MENDOCINO
SAN FRANCISCO
POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA
*Sardinops caerulea* eggs

CALCOFI CRUISE 5301

8 - 22 JANUARY 1953

Estimated relative abundance under 10 m$^2$ of sea surface

Stations: • Night  ○ Sunrise  ○ Day  ○ Sunset

Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5301
8 - 22 JANUARY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE • SUNSET

100
1,000

Sardinops caerulea larvae

5301
Sardinops caerulea eggs

CALCOFI CRUISE 5401
5 JANUARY - 4 FEBRUARY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinops caerulea eggs
5401
ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea larvae

CALCOFI CRUISE 5401
5 JANUARY - 4 FEBRUARY 1954
CALCOFI CRUISE 5501
13-29 JANUARY 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea eggs

5501
Sardinops caerulea larvae

CALCOFI CRUISE 5501
13-29 JANUARY 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ◢ SUNRISE
○ DAY ◢ SUNSET

Punta Eugenia
Sardinops caerulea eggs

CALCOFI CRUISE 5601
5 - 18 JANUARY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE □ DAY □ SUNSET

100
1,000
Sardinops caerulea larvae

CALCOFI CRUISE 5601
5 - 18 JANUARY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m$^2$ OF SEA SURFACE

STATIONS:  ● NIGHT  ● SUNRISE
          ○ DAY  ○ SUNSET

Sardinops caerulea larvae

5601
Sardinops caerulea eggs

CALCOFI CRUISE 5701
3 - 19 JANUARY 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ● SUNSET

Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5701
3 - 19 JANUARY 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinoos caerulea larvae
5701
Sardinops caerulea eggs

CALCOFI CRUISE 5801
8 JANUARY - 2 FEBRUARY 1958

Estimated relative abundance under 10 m² of sea surface

Stations: • Night • Sunrise
• Day • Sunset

San Francisco
Point Conception
San Diego
Punta Eugenia
Cape Mendocino

5801
Sardinops caerulea larvae

CALCOFI CRUISE 5801

8 JANUARY - 2 FEBRUARY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS - NIGHT • SUNRISE
• DAY • SUNSET

Sardhops cuerue larvae

Sardhops cuerue larvae

5801
Sardinops caerulea eggs

CALCOFI CRUISE 5901
7 - 29 JANUARY 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinops caerulea eggs
5901
Sardinops caerulea larvae

CALCOFI CRUISE 5901
7 - 29 JANUARY 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae 5901
Sardinops caerulea eggs

CALCOFI CRUISE 6001
8 JANUARY - 13 FEBRUARY 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ◦ SUNRISE ◦ SUNSET

10
100
1,000
10,000

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

SAN FRANCISCO

CAPE MENDOCINO
Sardinops caerulea larvae

CALCOFI CRUISE 6001
8 JANUARY – 13 FEBRUARY 1960

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

10
100
1,000
10,000

Sardinops caerulea larvae

6001
Sardinops caerulea larvae

CALCOFI CRUISE 6101
5 JANUARY - 20 FEBRUARY 1961

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS - NIGHT - SUNRISE
○ DAY - SUNSET

Sardinops caerulea larvae
Sardinops caerulea larvae

CALCOFI CRUISE 6201
12 JANUARY - 19 FEBRUARY 1962

Sardinoops caerulea larvae

6201
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/fry were present at stations marked "0," abundances at these stations were interpolated. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at those stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea eggs

CALCOFI CRUISE 5102
6-25 FEBRUARY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
⊙ DAY • SUNSET

Sardinops caerulea eggs

5102
Sardinops caerulea larvae

CALCOFI CRUISE 5102
6-25 FEBRUARY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

Sardinops caerulea larvae
Sardinops caerulea larvae

CALCOFI CRUISE 5202
6 - 22 FEBRUARY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

Sardinops caerulea larvae
Sardinops caerulea larvae

CALCOFI CRUISE 5302
4 - 26 FEBRUARY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Punta Eugenia

San Diego

Point Conception

San Francisco

Cape Mendocino

Sardinops caerulea larvae

5302
Sardinops caerulea eggs

CALCOFI CRUISE 5402
2-16 FEBRUARY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT   • SUNRISE
          O DAY     • SUNSET

Surdhops caerulea eggs

5402
CALCOFI CRUISE 5402
2-16 FEBRUARY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT  ○ SUNRISE  ○ SUNSET

Sardinaops caerulea larvae

5402
Sardinops caerulea eggs

CALCOFI CRUISE 5502
9-23 FEBRUARY 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS  • NIGHT  • SUNRISE
          • DAY  • SUNSET

Sardinops caerulea eggs

5502
Sardinops caerulea larvae

CALCOFI CRUISE 5502
9-23 FEBRUARY 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

SAN FRANCISCO
CAPE MENDOCINO
POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA

Sardinops caerulea larvae

5502
Sardinops caerulea eggs

CALCOFI CRUISE 5602
3 - 21 FEBRUARY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

5602
Sardinops caerulea larvae

CALCOFI CRUISE 5602
3 - 21 FEBRUARY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
• DAY • SUNSET

10
100
1,000

Sardinops caerulea larvae

5602
Estimated relative abundance under 10 m$^2$ of sea surface.

Stations:
- **Night**
- **Sunrise**
- **Day**
- **Sunset**

**Sardinops caerulea eggs**

CALCOFI CRUISE 5702
6 - 26 FEBRUARY 1957
Sardinops caerulea larvae

CALCOFI CRUISE 5702
6 - 26 FEBRUARY 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
○ NIGHT
● SUNRISE
● DAY
● SUNSET

CAPE MENDOCINO
SAN FRANCISCO
POINT CONCEPTION
SAN DIEGO
PUNTA EUENIA

Sardinops caerulea larvae
5702
Sardinops caerulea larvae

CALCOFI CRUISE 5802
7 - 24 FEBRUARY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m$^2$ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

Sardinops caerulea larvae

5802
Sardinops caerulea eggs

CALCOFI CRUISE 5902
6 - 28 FEBRUARY 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET

10
1,000
10,000
100,000

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA
Sardinops caerulea larvae

CALCOFI CRUISE 5902
6 - 28 FEBRUARY 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae
5902
Sardinops caerulea eggs

CALCOFI CRUISE 6002
11 FEBRUARY - 3 MARCH 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

SAN FRANCISCO
CAPE MENDOCINO
POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA
Sardinops caerulea larvae

CALCOFI CRUISE 6002
11 FEBRUARY - 3 MARCH 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS
● NIGHT
○ SUNRISE
○ DAY
○ SUNSET

Sardinops caerulea larvae
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea larvae

CALCOFI CRUISE 6602
15 FEBRUARY - 6 MARCH 1966

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
          ○ DAY • SUNSET

SAN FRANCISCO

PUNTA EUGENIA

SAN DIEGO

CAPE MENDOCINO

Surdinops cueruleu larvae

6602
Sardinaops caerulea eggs

CALCOFI CRUISE 5103
8-23 MARCH 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ● SUNSET

Sardinaops caerulea eggs

5103
Sardinops caerulea larvae

CALCOFI CRUISE 5103
8-23 MARCH 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS

- NIGHT
- SUNRISE
- DAY
- SUNSET

SAN FRANCISCO

CAPE MENDOCINO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea larvae

5103
Sardinops caerulea eggs

CALCOFI CRUISE 5203
5 MARCH - 3 APRIL 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
• NIGHT
• SUNRISE
• DAY
• SUNSET

24 MARCH - 3 APRIL 1952
Sardinops caerulea larvae

CALCOFI CRUISE 5203
5 MARCH - 3 APRIL 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ● SUNSET

24 MARCH - 3 APRIL 1952

Sardinops caerulea larvae

5203
Sardinops caerulea larvae

CALCOFI CRUISE 5303

6 MARCH - 5 APRIL 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

SARDINOPS CAERULEA LARVAE

5303


Sardinops caerulea eggs

CALCOFI CRUISE 5503
8-22 MARCH 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs
5503
Sardinops caerulea larvae

CALCOFI CRUISE 5503
8-22 MARCH 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardinops caerulea larvae

5503
Sardines caerulea eggs

CALCOFI CRUISE 5603
4 - 19 MARCH 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT  ● SUNRISE
  ○ DAY  ● SUNSET

Sardines caerulea eggs

5603
Sardinops caerulea larvae

CALCOFI CRUISE 5703
6 - 30 MARCH 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
• NIGHT
• SUNRISE
• DAY
• SUNSET

Sardinops caerulea larvae
5703
Sardinops caerulea eggs
CALCOFI CRUISE 5803
27 FEBRUARY - 21 MARCH 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ● SUNSET

Sardinops caerulea eggs
5803
Sardinops caerulea larvae

CALCOFI CRUISE 5803
27 FEBRUARY - 21 MARCH 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
● NIGHT
○ DAY
● SUNRISE
● SUNSET

Sardinops caerulea larvae

5803
Sardinops caerulea eggs

CALCOFI CRUISE 5903
11 - 28 MARCH 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs
5903
Sardinops caerulea larvae

CALCOFI CRUISE 5903
11 - 28 MARCH 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea larvae

5903
Sardinops caerulea eggs

CALCOFI CRUISE 6003
10 - 29 MARCH 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
● NIGHT
○ SUNRISE
○ DAY
○ SUNSET

10
100
1,000
10,000
Sardinops caerulea larvae

CALCOFI CRUISE 6003
10 - 29 MARCH 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET

Sardinops caerulea larvae

6003
Sardinops caerulea eggs

CALCOFI CRUISE 5104
2-17 APRIL 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET

Sardinops caerulea eggs 5104
Sardinops caerulea larvae

CALCOFI CRUISE 5104
2-17 APRIL 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS:
- NIGHT
- SUNRISE
- SUNSET

Sordinops caeruea larvae

5104
Sardinops caerulea larvae

CALCOFI CRUISE 5204
2 - 15 APRIL 1952

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS
• NIGHT
○ DAY
○ SUNSET

PUNTA EUGENIA
SAN DIEGO
POINT CONCEPTION
SAN FRANCISCO
CAPE MENDOCINO
Sardinops caerulea eggs

CALCOFI CRUISE 5304
31 MARCH - 19 APRIL 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sordinops caerdeo

CONCEPTION
CALCOFI CRUISE 5304
31 MARCH - 19 APRIL 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

10
100
1,000

Sardinops caerulea larvae
Sardinops caerulea eggs

CALCOFI CRUISE 5404
7 APRIL - 13 MAY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

San Francisco
Cape Mendocino
Point Conception
San Diego
Punta Eugenia

Sardinops caerulea eggs
5404
Sardinops caerulea larvae

CALCOFI CRUISE 5404
7 APRIL-13 MAY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardinops caerulea larvae

5404
Sardinops caerulea eggs

CALCOFI CRUISE 5504
5-22 APRIL 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT  ○ SUNRISE
         ○ DAY    ● SUNSET

Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5504
5-22 APRIL 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ◼ DAY □ SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea larvae

5504
Estimated relative abundance under 10 m² of sea surface:

Stations: ● Night ○ Day ◆ Sunset

Sardinops caerulea eggs

CALCOFI CRUISE 5604
5 - 27 APRIL 1956
Sardinops caerulea larvae

CALCOFI CRUISE 5604
5 - 27 APRIL 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS - NIGHT - SUNRISE
○ DAY - SUNSET

1,000
100
10

SAN FRANCISCO
CAPE MENDOCINO
POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA

Sardinops caerulea larvae
5604
Sardinops caerulea larvae

CALCOFI CRUISE 5704
5 - 30 APRIL 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE ○ DAY ○ SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardino
Sardinops caerulea larvae

CALCOFI CRUISE 5904
7-26 APRIL 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE ● SUNSET

10
100
1,000

Sardinops caerulea larvae

5904
Sardinops caerulea eggs

CALCOFI CRUISE 6004
29 MARCH - 30 APRIL 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
● NIGHT
○ SUNRISE
○ SUNSET

Sardinops caerulea eggs
6004
Sardinops caerulea larvae

CALCOFI CRUISE 6004
29 MARCH - 30 APRIL 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardina caerulea larvae

6004
Sardinops caerulea eggs

CALCOFI CRUISE 6204
15 MARCH – 2 MAY 1962

Estimated relative abundance under 10 m² of sea surface

Stations:
- Night
- Sunrise
- Day
- Sunset

Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 6204
15 MARCH - 2 MAY 1962

Sardinops caerulea larvae

6204
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at those stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
CALCOFI CRUISE 6504
31 MARCH - 24 APRIL 1965

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m$^3$ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ● SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0". When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea eggs

6504
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance label. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea eggs

CALCOFI CRUISE 6604
26 MARCH - 3 MAY 1966

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
Sardinops caerulea eggs

CALCOFI CRUISE 5105
1-16 MAY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: NIGHT ■ SUNRISE ● DAY ○ SUNSET

Point Conception

San Francisco

San Diego

Punta Eugenia
Sardinops caerulea eggs

CALCOFI CRUISE 5205
9 - 26 MAY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS

- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardinops caerulea eggs
5205
Sardinops caerulea larvae

CALCOFI CRUISE 5205
9 - 26 MAY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae
Sardinops caerulea eggs

CALCOFI CRUISE 5305
28 APRIL - 30 MAY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea eggs

5305
Sardinops caerulea larvae

CALCOFI CRUISE 5305
28 APRIL - 30 MAY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ DAY • SUNRISE • SUNSET

Sardinops caerulea larvae

5305
**Sardinops caerulea** larvae

CALCOFI CRUISE 5405

5-24 MAY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE

○ DAY • SUNSET

- Sardinae larvae

- Cape Mendocino

- San Francisco

- Point Conception

- San Diego

- Punta Eugenia
The image contains a map of the West Coast of the United States, specifically the California Current region, with an emphasis on the distribution of Sardinops caerulea eggs during the CALCOFI Cruise 5505 from 12 May to 7 June 1955. The map highlights estimated relative abundance under 10 m² of sea surface with stations marked for night and sunrise, day, and sunset. The map uses color gradients to indicate different abundance levels, ranging from light to dark shades. Notable locations include San Francisco, Cape Mendocino, Point Conception, San Diego, and Punta Eugenia.
Estimation of Relative Abundance Under 10 m² of Sea Surface

*Sardinops caerulea* larvae

CALCOFI CRUISE 5505
12 MAY - 7 JUNE 1955

SARDINOPS CAERULEA LARVAE

5505
Sardinops caerulea eggs

CALCOFI CRUISE 5605
4 - 22 MAY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE • SUNSET

Sardinops caerulea eggs

5605
Sardinops caerulea larvae

CALCOFI CRUISE 5605
4 - 22 MAY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

10
100
1,000

POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA
SAN FRANCISCO
CAPE MENDOCINO

Sardinops caerulea larvae
5605
Sardinops caerulea larvae

CALCOFI CRUISE 5705
9 - 23 MAY 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinaops caerulea larvae
5705
Sardinops caerulea eggs

CALCOFI CRUISE 5805
3 - 22 MAY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

San Francisco

Point Conception

San Diego

Punta Eugenia
Sardinops caerulea larvae

CALCOFI CRUISE 5805
3 - 22 MAY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
          ○ DAY • SUNSET

Sardinops caerulea larvae

5805
Sardinops caerulea larvae

CALCOFI CRUISE 5905
6-27 MAY 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS  • NIGHT  • SUNRISE
○ DAY  • SUNSET

Sardinops caerulea larvae
5905
Sardinops caerulea eggs

CALCOFI CRUISE 6005
13 - 29 MAY 1960

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

6005
Sardinops caerulea larvae

CALCOFI CRUISE 6005
13 - 29 MAY 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE ○ DAY ○ SUNSET

Sardinops caerulea larvae

6005
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
Sardinops caerulea larvae

CALCOFI CRUISE 6605
5 - 29 MAY 1966

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m$^2$ OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ● SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea larvae
6605
**Sardinops caerulea eggs**

**CALCOFI CRUISE 5106**

30 MAY–20 JUNE 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

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**Sardinops caerulea eggs**

5106
Sardinops caerulea larvae

CALCOFI CRUISE 5106
30 MAY - 20 JUNE 1951

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m$^2$ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE • DAY ◯ SUNSET

SAN DIEGO

PUNTA EUGENIA

POINT CONCEPTION

SAN FRANCISCO

CAPE MENDOCINO

Sardinops caerulea larvae

5106
Sardinops caerulea eggs

CALCOFI CRUISE 5206
3 - 21 JUNE 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

5206
Sardinops caerulea larvae

CALCOFI CRUISE 5206
3 - 21 JUNE 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea larvae

5206
Sardinops caerulea eggs

CALCOFI CRUISE 5306
3 JUNE - 3 JULY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE  ○ SUNSET

Sardinops caerulea eggs
5306
Estimates of the relative abundance of Sardinops caerulea larvae during the CALCOFI CRUISE 5306, from 3 June to 3 July 1953. The diagram shows the distribution of larvae under 10 m² of sea surface, with stations marked for night, sunrise, day, and sunset. The map includes locations such as Cape Mendocino, San Francisco, Point Conception, and Punta Eugenia.
Sardinops caerulea eggs

CALCOFI CRUISE 5406
2-23 JUNE 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ● SUNRISE
           ○ DAY      ● SUNSET

1
10
100
1,000
10,000

Sardinops caerulea eggs
5406
Sardinops caerulea larvae

CALCOFI CRUISE 5406
2-23 JUNE 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ● SUNSET

Sardinops caerulea larvae

5406
Sardinops caerulea larvae

CALCOFI CRUISE 5506

11-28 JUNE 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m^2 OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae

5506
Sardinops caerulea eggs

CALCOFI CRUISE 5606
26 MAY - 25 JUNE 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

SARDINOPS CAERULEA EGGS
5606
Sardinops caerulea larvae

CALCOFI CRUISE 5706
5 - 23 JUNE 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS - NIGHT - SUNRISE
• DAY - SUNSET

Sardinops caerulea larvae

5706
Sardinops caerulea eggs

CALCOFI CRUISE 5806
4-26 JUNE 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● Night ○ Sunrise
○ Day ● Sunset

Sardinops caerulea eggs

5806
Sardinops caerulea larvae

CALCOFI CRUISE 5906
3 - 30 JUNE 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET

Sardinops caerulea larvae

5906
Sardinops caerulea eggs

CALCOFI CRUISE 6006
14 - 30 JUNE 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT  • SUNRISE
Ø DAY  • SUNSET

Sardinops caerulea eggs

6006
**Sardinops caerulea larvae**

**CALCOFI CRUISE 6006**

*14 - 30 JUNE 1960*

ESTIMATED RELATIVE ABUNDANCE UNDER 10m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

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*SAN FRANCISCO*

*CAPE MENDOCINO*

*POINT CONCEPTION*

*SAN DIEGO*

*PUNTA EUGENIA*
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea eggs

CALCOFI CRUISE 5107
29 JUNE-20 JULY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET
Sardinops caerulea larvae

CALCOFI CRUISE 5107
29 JUNE-20 JULY 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ● SUNRISE ○ DAY ● SUNSET

Sardinops caerulea larvae

5107
Sardinops caerulea eggs

CALCOFI CRUISE 5207
2 - 23 JULY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
           o DAY • SUNSET

Sardinops caerulea eggs
5207
Sardinops caerulea larvae

CALCOFI CRUISE 5207
2 - 23 JULY 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ● SUNSET

Point Conception

San Francisco

Cape Mendocino

San Diego

Punta Eugenia

Sardinops caerulea larvae

5207
Sardinops caerulea eggs

CALCOFI CRUISE 5307
8 - 27 JULY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE • SUNSET

SARDINOPS CAERULEA EGGS

5307
Sardinops caerulea larvae

CALCOFI CRUISE 5307
8 - 27 JULY 1953

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
O DAY • SUNSET

Sardinops caerulea larvae
5307
Sardine eggs

CALCOFI CRUISE 5407
7-23 JULY 1954

Estimated relative abundance under 10 m² of sea surface

Stations: • Night • Sunrise
○ Day • Sunset

10
100
1,000
10,000

Sardinops caerulea eggs
5407
"Sardinops caerulea" larvae

CALCOFI CRUISE 5407
7-23 JULY 1954

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ● SUNSET

Sardinops caerulea larvae
5407
Sardinops caerulea larvae

CALCOFI CRUISE 5507
8 - 23 JULY 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS:  ● NIGHT  ● SUNRISE
           ○ DAY  ● SUNSET

Sardinops caerulea larvae

5507
Sardinops caerulea eggs

CALCOFI CRUISE 5607
6 - 25 JULY 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET
Sardinops caerulea eggs

CALCOFI CRUISE 5707
8 JULY - 3 AUGUST 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS ________________________ SUNRISE
NIGHT ________________________ DAY

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUSENIA

Sardinops caerulea eggs

5707
Sardinops caerulea eggs

CALCOFI CRUISE 5807
30 JUNE - 22 JULY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

10
100
1,000

Sardinops caerulea eggs

5807
Sardinops caerulea larvae

CALCOFI CRUISE 5807
30 JUNE - 22 JULY 1958

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m³ OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
          O DAY • SUNSET

1,000
100
10

Sardinops caerulea larvae
5807
Sardinops caerulea eggs

CALCOFI CRUISE 5907
9 JULY - 3 AUGUST 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10m² OF SEA SURFACE

STATIONS: ■ NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinops caerulea eggs

5907
Sardinops caerulea larvae

CALCOFI CRUISE 5907
9 JULY - 3 AUGUST 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

10
100
1,000

Sardinops caerulea larvae

5907
Sardinops caerulea eggs

CALCOFI CRUISE 6007
12 JULY - 14 AUGUST 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 M2 OF SEA SURFACE

STATIONS

NIGHT

DAY

SUNRISE

SUNSET

SAN DIEGO

PORTLAND

6007
Sardinops caerulea larvae

CALCOFI CRUISE 6007
12 JULY - 14 AUGUST 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
         ○ DAY • SUNSET

Sardinops caerulea larvae

6007

90°W       90°W
35°N
30°N
25°N

115°W
120°W
125°W
130°W
135°W

SAN FRANCISCO
POINT CONCESSION
SAN DIEGO
PASCO EUGENIA
Sardinops caerulea larvae

CALCOFI CRUISE 6107
12 JULY - 1 AUGUST 1961

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

SUNRISE
SUNSET
STATIONS
NIGHT
DAY

POINT REYES
SAN FRANCISCO

Sardinops caerulea larvae
6107
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea eggs

6307
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea eggs

6607
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tow, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
Sardinops caerulea eggs

CALCOFI CRUISE 5108
31 JULY–16 AUGUST 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT □ SUNRISE
● DAY □ SUNSET

40°
40°
35°
35°
30°
30°
25°
25°
20°
20°
125°
125°
120°
120°
115°
115°
110°
110°

Sardinops caerulea eggs

5108
Sardinops caerulea larvae

CALCOFI CRUISE 5108
31 JULY-16 AUGUST 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m$^2$ OF SEA SURFACE

STATIONS: • NIGHT  ● SUNRISE  ○ DAY  ● SUNSET

Sardinops caerulea larvae

5108
Sardinops caerulea larvae

CALCOFI CRUISE 5208
8 - 19 AUGUST 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae
Sardinops caerulea eggs

CALCOFI CRUISE 5308
5 - 30 AUGUST 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
• DAY • SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea eggs

5308
Sardinops caerulea larvae

CALCOFI CRUISE 5308
5 - 30 AUGUST 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea larvae
5308
Sardinops caerulea eggs

CALCOFI CRUISE 5408
18 AUGUST-10 SEPTEMBER 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardinops caerulea eggs
5408
Sardinops caerulea eggs

CALCOFI CRUISE 5608
7 - 19 AUGUST 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

5608
Sardinops caerulea larvae

CALCOFI CRUISE 5608
7 - 19 AUGUST 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

Sardiniops caerulea larvae
5608
Sardinops caerulea eggs

CALCOFI CRUISE 5708
9-27 AUGUST 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinops caerulea eggs
5708
Sardinops caerulea larvae

CALCOFI CRUISE 5708
9 - 27 AUGUST 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE
           ○ DAY    ○ SUNSET

Sardinops caerulea larvae

5708
Sardinops caerulea eggs

CALCOFI CRUISE 5808
6-21 AUGUST 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

10
100

Sardinops caerulea eggs
5808
Sardinops caerulea larvae

CALCOFI CRUISE 5808
6-21 AUGUST 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae
5808
Sardinops caerulea eggs

CALCOFI CRUISE 5908
13 - 31 AUGUST 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
○ NIGHT
○ SUNRISE
○ DAY
○ SUNSET

Sardinops caerulea eggs

5908
Sardinops caerulea larvae

CALCOFI CRUISE 5908
13 - 31 AUGUST 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
          ○ DAY • SUNSET

SAN FRANCISCO
POINT CONCEPTION
SAN DIEGO
PUNTA EUGENIA

Sardinops caerulea larvae

5908
Sardinops caerulea eggs

CALCOFI CRUISE 6008
10 - 22 AUGUST 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ● SUNRISE
○ DAY ○ SUNSET

Sardinops caerulea eggs

6008
Sardinops caerulea larvae

CALCOFI CRUISE 6008
10 - 22 AUGUST 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae

6008
Sardinops caerulea eggs

CALCOFI CRUISE 6608
5 - 25 AUGUST 1966

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE  ○ DAY  ● SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea larvae

CALCOFI CRUISE 6608
5 - 25 AUGUST 1966

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at those stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea larvae

6608
Sardinops caerulea larvae

CALCOFI CRUISE 5109
30 AUGUST - 13 SEPTEMBER 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
• DAY • SUNSET

Sordinops coeruleo 5109
Sardinops caerulea eggs

CALCOFI CRUISE 5209
4 - 19 SEPTEMBER 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
○ DAY
○ SUNSET

Sardinops caerulea eggs
5209
Sardinops caerulea eggs

CALCOFI CRUISE 5309
9 - 19 SEPTEMBER 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

5309
Sardinops caerulea eggs

CALCOFI CRUISE 5609
5 - 17 SEPTEMBER 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs

5609
Sardinops caerulea larvae

CALCOFI CRUISE 5609
5 - 17 SEPTEMBER 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea larvae

5609
Sardinops caerulea eggs

CALCOFI CRUISE 5709
4 - 21 SEPTEMBER 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE
          ○ DAY   ● SUNSET

Sardinops caerulea eggs

5709
Sardinops caerulea larvae

CALCOFI CRUISE 5709
4 - 21 SEPTEMBER 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

10

100

1,000

SAN DIEGO

PUNTA EUGENIA

SARDINOPS CAERULEA LARVAE

5709
Sardinops caerulea eggs

CALCOFI CRUISE 5809
4-19 SEPTEMBER 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE
○ DAY ○ SUNSET

Sardinoops caerulea eggs
Sardinaops caerulea larvae

CALCOFI CRUISE 5809
4-19 SEPTEMBER 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

1 10 100 1,000 10,000

Sardinops caerulea larvae

5809
**Sardinops caerulea eggs**

**CALCOFI CRUISE 5909**

9 SEPTEMBER - 1 OCTOBER 1959

**ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE**

STATIONS:
- NIGHT
- SUNRISE
- DAY
- SUNSET

**Legend**:
- 1
- 10
- 100
- 1,000

**Map**
- SAN MENDOCINO
- SAN FRANCISCO
- POINT CONCEPTION
- SAN DIEGO
- PUNTA EUGENIA
Sardinaops caerulea larvae

CALCOFI CRUISE 5909
9 SEPTEMBER - 1 OCTOBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

1,000
100
10

SAN FRANCISCO
CAPE MENDOCINO
POINT CONCEPTION
PUNTA EUGENIA
SAN DIEGO
Sardinops caerulea eggs

CALCOFI CRUISE 6009
9 – 21 SEPTEMBER 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT  • SUNRISE
          ○ DAY    • SUNSET

Santopinae, S. cf. pelagica

Sportunops, S. pelagica
Sardinops caerulea larvae

CALCOFI CRUISE 6009
9 - 21 SEPTEMBER 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ○ NIGHT  ● SUNRISE
○ DAY  ● SUNSET

10
100
1,000

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardihops cuerdeu

CALCOFI CRUISE 6009
6009
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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Sardinops caerulea eggs

CAICO CRUISE 6609
7 - 24 SEPTEMBER 1966

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.

Sardinops caerulea eggs

6609
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
Sardinops caerulea eggs

CALCOFI CRUISE 5210
8 - 22 OCTOBER 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

Sardinops caerulea eggs
Sardinops caerulea eggs

CALCOFI CRUISE 5310
7 - 24 OCTOBER 1953

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE
○ DAY    ○ SUNSET

Sardinops caerulea eggs
Sardinops caerulea eggs

CALCOFI CRUISE 5410
6-24 OCTOBER 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT  ○ SUNRISE
            ○ DAY  • SUNSET

NO EGGS FOUND
Sardinops caerulea larvae

CALCOFI CRUISE 5410
6-24 October 1954

Estimated relative abundance under 10 m² of sea surface

Stations: ● NIGHT ○ SUNRISE
          ○ DAY ⬤ SUNSET

San Francisco
Cape Mendocino
Point Conception
San Diego
Punta Eugenia
Sardinops caerulea eggs

CALCOFI CRUISE 5510
16 - 30 OCTOBER 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ○ SUNSET

Sardinops caerulea eggs

5510
**Sardinops caerulea eggs**

CALCOFI CRUISE 5610

27 SEPTEMBER - 5 OCTOBER 1956

Estimated relative abundance under 10 m² of sea surface

Stations: • Night  ● Sunrise  ○ Day  ● Sunset

Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5610
27 SEPTEMBER - 5 OCTOBER 1956

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT • SUNRISE
- DAY • SUNSET

Punta Eugenia
Point Conception
San Diego
San Francisco
Cape Mendocino
Sardinops caerulea eggs

CALCOFI CRUISE 5710
4 OCTOBER - 8 NOVEMBER 1957

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m$^2$ OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE
○ DAY ○ SUNSET

SAN DIEGO
PUNTA EUGENIA
POINT CONCEPTION
SAN FRANCISCO
CAPE MENDOCINO
Sardinops caerulea larvae

CALCOFI CRUISE 5710
4 OCTOBER - 8 NOVEMBER 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
○ NIGHT
○ SUNRISE
○ DAY
○ SUNSET

Sardinops caerulea larvae

5710
Sardinops caerulea eggs

CALCOFI CRUISE 5810
8 OCTOBER - 6 NOVEMBER 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m³ OF SEA SURFACE

STATIONS: • NIGHT ○ DAY • SUNRISE • SUNSET

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea eggs

5810
Sardinops caerulea larvae

CALCOFI CRUISE 5810
8 OCTOBER - 6 NOVEMBER 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardinops caerulea larvae

5810
Sardinops caerulea eggs

CALCOFI CRUISE 5910
8 - 30 OCTOBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ● SUNSET

Sardinops cuerulea eggs

5910
Sardinops caerulea larvae

CALCOFI CRUISE 5910
8 - 30 OCTOBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ SUNSET

10
100
1,000
Sardinops caerulea eggs

CALCOFI CRUISE 6010
22 SEPTEMBER - 22 OCTOBER 1960

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: NIGHT • SUNRISE
         DAY • SUNSET

SARDINOPS CAERULEA EGGS
Sardinops caerulea eggs

CALCOFI CRUISE 6110
10 OCTOBER - 12 NOVEMBER 1961

POINT CONCEPTION ESTIMATED RELATIVE ABUNDANCE UNDER 10 M OF SEA SURFACE

SUNRISE SUNSET
NIGHT DAY

SAN FRANCISCO PUNTA EUROPA

Sardinops caerulea eggs
6110
The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
Sardinops caerulea larvae

CALCOFI CRUISE 6310
2 - 29 OCTOBER 1963

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT • SUNRISE
○ DAY • SUNSET

The numbers to the right of the shoreline represent abundance at special inshore stations. When no eggs/larvae appear in tows, stations are marked "0." When present, abundance at these stations is indicated by the number to the right of the estimated-abundance key. The special inshore stations are too closely spaced to be shown by station circles and their values were not used in formulating the contours of abundance shown on this chart.
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**Sardinops caerulea** eggs

**CALCOFI CRUISE 5111**

30 OCTOBER - 12 NOVEMBER 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE • SUNSET

- 10
- 100
- 1,000

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*Sardinops caerulea* eggs

5111
Sardinops caerulea larvae

CALCOFI CRUISE 5111
30 OCTOBER - 12 NOVEMBER 1951

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: ● NIGHT  ○ SUNRISE
          ○ DAY    ○ SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea larvae
Sardinopec caerulea eggs

CALCOFI CRUISE 5211
6 - 21 NOVEMBER 1952

ESTIMATED RELATIVE ABUNDANCE UNDER
10 m² OF SEA SURFACE

STATIONS: • NIGHT  ● SUNRISE
          ○ DAY  ● SUNSET

Sardinopec caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5211
6 - 21 NOVEMBER 1952

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS
○ NIGHT
○ SUNRISE
○ SUNSET

Sardinops caerulea larvae

5211
**Sardinops caerulea** eggs

**CALCOFI CRUISE 5711**

16 - 25 NOVEMBER 1957

Estimated relative abundance under 10 m$^2$ of sea surface

Stations: • Night • Sunrise
○ Day • Sunset

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Sardinops caerulea eggs
Sardinops caerulea larvae

CALCOFI CRUISE 5711
16 - 25 NOVEMBER 1957

ESTIMATED RELATIVE ABUNDANCE UNDER 100 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

San Francisco
Cape Mendocino
Point Conception
San Diego
Punta Eugenia
Sardinops caerulea eggs

CALCOFI CRUISE 5911
16 - 25 NOVEMBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: • NIGHT ○ SUNRISE ○ SUNSET

Sardinops caerulea eggs
NO LARVAE FOUND

Sardinoops caerulea larvae

CALCOFI CRUISE 5911
16 - 25 NOVEMBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m$^2$ OF SEA SURFACE

STATIONS: ◦ NIGHT ◦ SUNRISE
○ DAY ◦ SUNSET

SARDINOPS CAERULEA LARVAE
Sardinops caerulea eggs

CRUISE 6611*

2 - 23 NOVEMBER 1966

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

* Scripps Tuna Oceanography Research
Cruise TO - 66 - 1

Sardinops caerulea eggs
Sardinops caerulea eggs

CALCOFI CRUISE 5112
25 NOVEMBER - 9 DECEMBER 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ● SUNSET

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

SAN FRANCISCO

CAPE MENDOCINO
Sardinops caerulea larvae

CALCOFI CRUISE 5112
25 NOVEMBER - 9 DECEMBER 1951

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
              • DAY • SUNSET

Sardinops caerulea larvae
Sardinops caerulea eggs

CALCOFI CRUISE 5312
1-13 DECEMBER 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10m² OF SEA SURFACE

STATIONS
○ NIGHT
● SUNRISE
□ DAY
□ SUNSET

Sardinops caerulea eggs

5312
Sardinops caerulea larvae

CALCOFI CRUISE 5312
1 - 13 DECEMBER 1953

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

25° 30° 35° 40° 20°

110° 115° 120° 125°
Sardinops caerulea eggs

CALCOFI CRUISE 5412
30 NOVEMBER–16 DECEMBER 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
• DAY • SUNSET

Sardinops caerulea eggs
5412
Sardinops caerulea larvae

CALCOFI CRUISE 5412
30 NOVEMBER-16 DECEMBER 1954

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ▲ NIGHT ◀ SUNRISE
○ DAY ◈ SUNSET

Sardinops caerulea larvae
5412
Sardinops caerulea larvae

CALCOFI CRUISE 5512
29 NOVEMBER - 16 DECEMBER 1955

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS: ● NIGHT ○ SUNRISE ○ DAY ● SUNSET

Sordinops caeruea larvae
Sardina caerulea eggs

CALCOFI CRUISE 5812
1 - 11 DECEMBER 1958

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS:
- NIGHT
- SUNRISE
- DAY
- SUNSET

Sardina caerulea eggs

5812
NO LARVAE FOUND
Sardinops caerulea eggs

CALCOFI CRUISE 5912
9 - 19 DECEMBER 1959

ESTIMATED RELATIVE ABUNDANCE UNDER 10 m² OF SEA SURFACE

STATIONS • NIGHT • SUNRISE
○ DAY • SUNSET

SAN FRANCISCO

POINT CONCEPTION

SAN DIEGO

PUNTA EUGENIA

Sardinops caerulea eggs

5912
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These maps are designed to show essential details of the area most intensively studied by the California Cooperative Oceanic Fisheries Investigations. This is approximately the same area as is shown in color on the front cover. Geographical place names are those most commonly used in the various publications emerging from the research. The cardinal station lines extending southwestward from the coast are shown. They are 120 miles apart. Additional lines are utilized as needed and can be as closely spaced as 12 miles apart and still have individual numbers. The stations along the lines are numbered with respect to the station 60 line, the numbers increasing to the west and decreasing to the east. Most of them are 40 miles apart, and are numbered in groups of 10. This permits adding stations as close as 4 miles apart as needed. An example of the usual identification is 120.65. This station is on line 120, 20 nautical miles southwest of station 60.

The projection of the front cover is Lambert's Azimuthal Equal Area Projection. The detail maps are a Mercator projection.
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David Kramer

Distributional atlas of fish eggs and larvae in the California Current region: Pacific sardine, Sardinops caerulea (Girard), 1951 through 1966

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