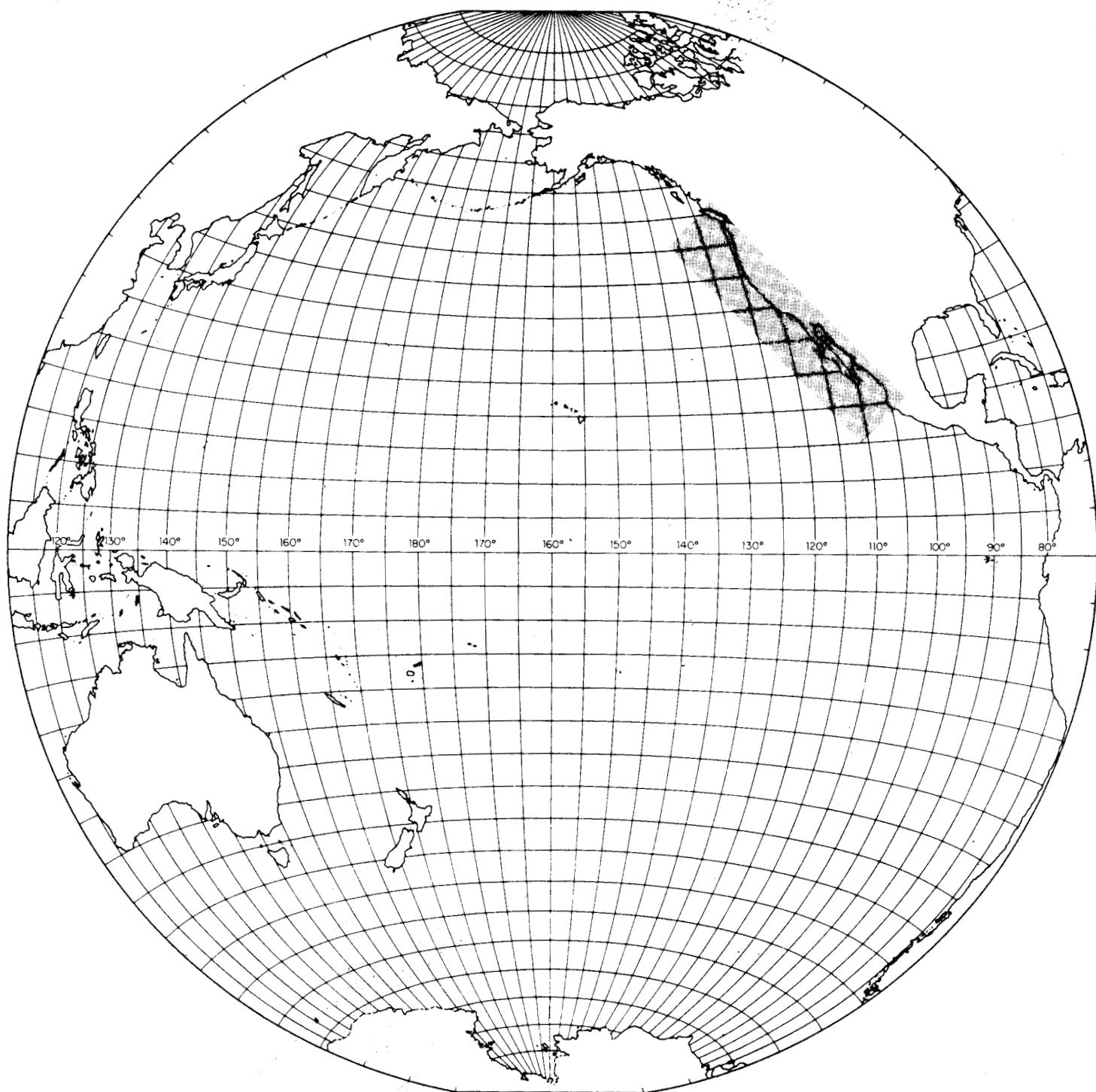


STATE OF CALIFORNIA
MARINE RESEARCH COMMITTEE



CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS

ATLAS No. 1

STATE OF CALIFORNIA
MARINE RESEARCH COMMITTEE

CALIFORNIA
COOPERATIVE
OCEANIC
FISHERIES
INVESTIGATIONS

Atlas No. 1

CALCOFI Atlas of 10-Meter
Temperatures and Salinities

1949 through 1959

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

July 1963

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The numbers for the rows (years) combined with those for the columns (months) form the cruise numbers.

● - Temperature and Salinity presented

TL - The same, but Temperature Chart enlarged

G - Gulf of California included

	01	02	03	04	05	06	07	08	09	10	11	12	
49			●	●	●	●	●	●	●	●	●	●	49
50	●	●	●	●	●	●	●	●	●			●	50
51	●	●	●	●	●	●	●	●	●	●	●	●	51
52	●	●	●	●	●	●	●	●	●	●	●	●	52
53	●	●	●	●	●	●	●	●	●	●	●	●	53
54	●	●	●	●	●	●	●	●	●	●	●	TL	54
55	●	●	●	●	●	●	●	●	●	●	●	●	55
56	●	G	●	G	●	●	●	●	●	●	●	●	56
57	●	G	●	G	●	G	●	G	●	●	●	●	57
58	●	●	●	●	●	●	●	●	●	●	●	●	58
59	●	●	●	●	●	●	●	●	●	●	●	●	59
	01	02	03	04	05	06	07	08	09	10	11	12	

INTRODUCTION

This Atlas of temperature and salinity charts for a depth of 10 meters is an attempt to provide oceanic data in as simple and usable a form as possible.

The Atlas consists of the following charts and graphs:

- 1) Basic station plans of the CALCOFI program. Additional unbound charts are available upon request.
- 2) CALCOFI Area Index Charts, showing, on a greatly reduced scale, the approximate over-all area covered by each monthly cruise. Additional unbound charts are available upon request.
- 3) Time-series graphs of temperature from twenty-two selected stations. None of these stations has been occupied less than 75 times. Included with each time-series graph is a plot of the 1950-1959 mean for that station, and an anomaly plot from this mean.
- 4, 5) Monthly mean 10-meter temperature and salinity charts for each month of the year, based on data collected from 1950 through 1959. No less than 5 years of data were used to derive each value. This 10-year period, 1950-1959, was adopted by the Eastern Pacific Oceanic Conference (EPOC, Lake Arrowhead, California, 1959) as the reference period for the surface water temperatures of the Pacific Ocean.
- 6, 7) One hundred twenty-five monthly 10-meter charts each of temperature and salinity, covering a 130-month period from March 1949, through December, 1959.
- 8) For optional use, one-degree grid charts, covering somewhat different areas, and identified by the number of dots (one through four) appearing in the lower right-hand corner of the page. Additional unbound charts are available upon request.
- 9) The same as (8), but the charts are without the one-degree grid. Additional unbound charts are available upon request.

The cruise numbers consists of four digits, the first two representing the year, and the last two the month in which all or the major portion of the cruise falls.

The analyses of the horizontal charts were made essentially by one man so as to eliminate, as much as possible, variations from chart to chart owing to different interpretations of the same data. We believe the true conditions to be close to our interpretation, but we realize there is an element of subjectivity involved in contouring any set of data.

The temperature data were collected by bathythermograph and reversing thermometer. For each established hydrographic station, data were available from both types of instrument to provide a check on the value. In case of disagreement, the reversing thermometer was considered correct, unless an obvious malfunction occurred. The water samples were collected with Nansen bottles, and the salinities were determined by the Knudsen titration method.

Since these data have been collected by trained personnel on oceanographic research ships using carefully calibrated instruments, we feel that they are the most accurate data presently available for the coastal waters of California and Baja California. Because of the relatively small-scale grid of stations, it was possible to obtain temperature and salinity conditions in greater detail than could have been obtained, for example, from averages of one-degree squares. For the charts of the individual months the values used are not averages, of course, but the actual values at the time of observations.

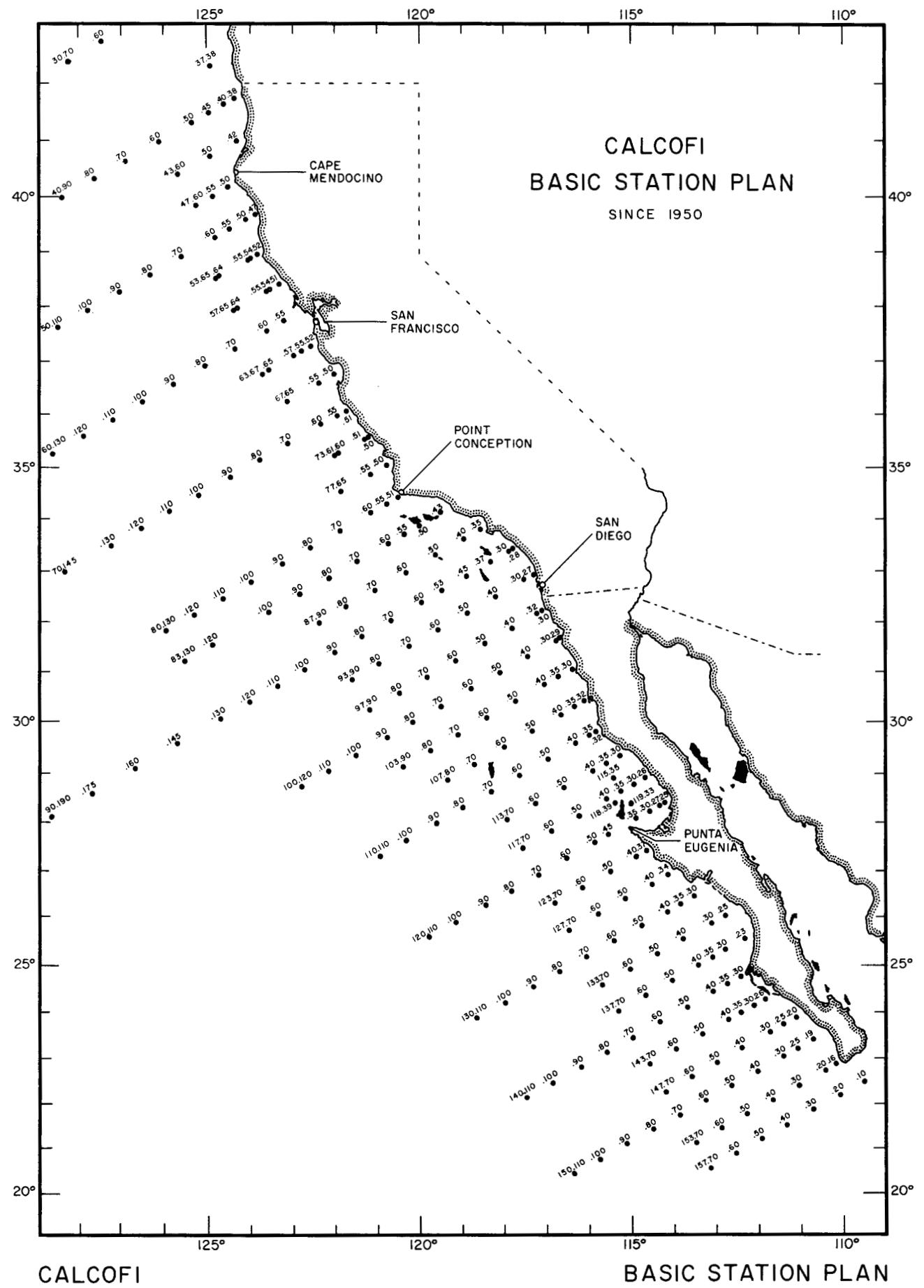
More CALCOFI* atlases will follow. The present atlas has been prepared with the convenience of the reader in mind. To facilitate the overlaying of charts the pages have been printed on one side only, and the charts are all of the same size and scale except where conditions made this impractical. Holes have been punched to simplify use and rearrangement in loose-leaf binders. The abbreviated identification in the lower right-hand corner of the page will help to sort the charts quickly or to select those of particular interest. Future atlases will be prepared in the same manner to facilitate rearrangement of charts, e.g., from several CALCOFI atlases according to desired point of view, or any additional dimensions to that of time.

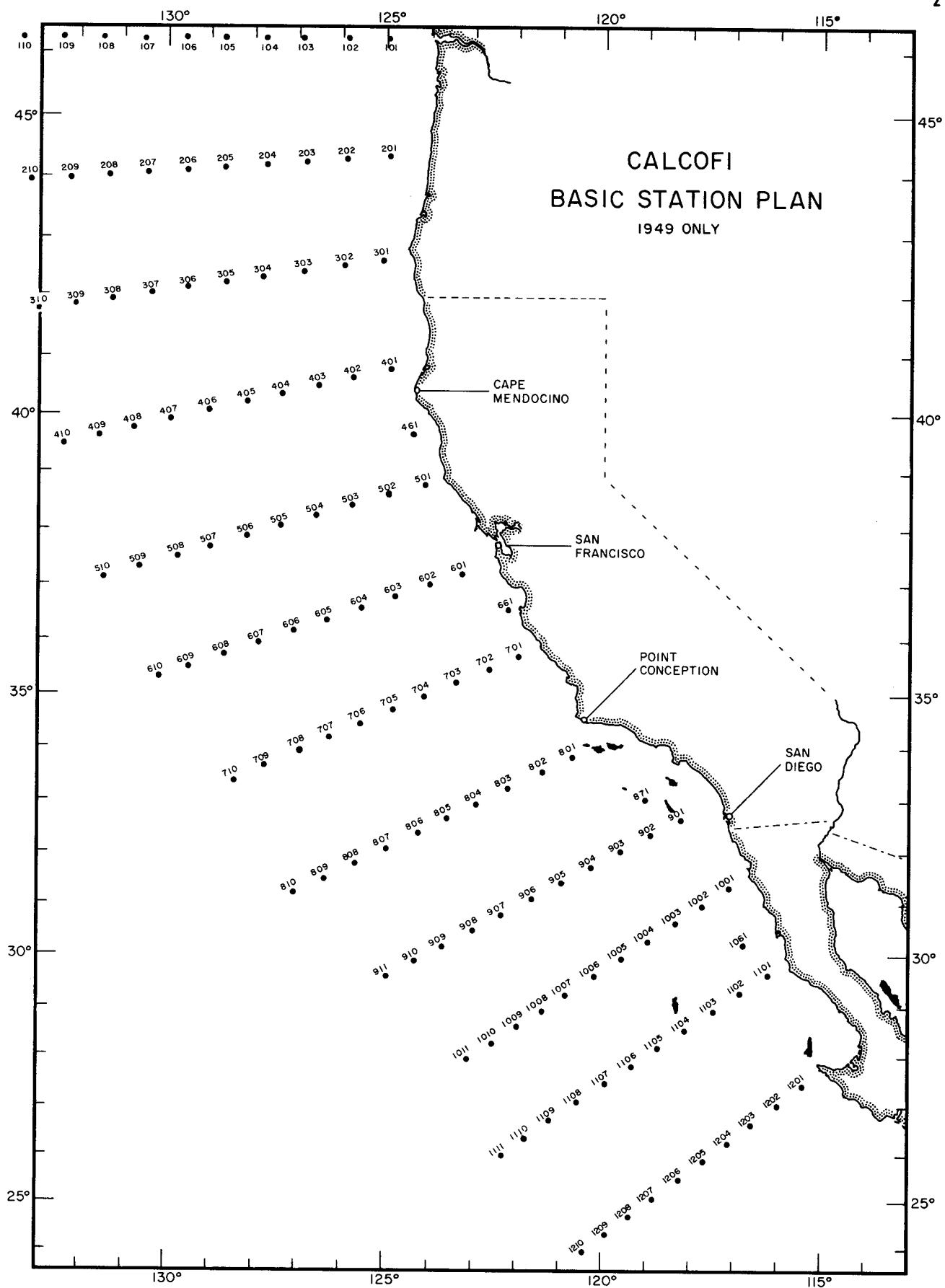
The CALCOFI data upon which this atlas is based are published in the "Oceanic Observations of the Pacific" volumes, University of California Press.

The data have been collected**, processed and presented by the Data Collection and Processing Group (DCPG) of the Marine Life Research program at the University of California's Scripps Institution of Oceanography, as a contribution to the California Cooperative Oceanic Fisheries Investigations (CALCOFI) program.

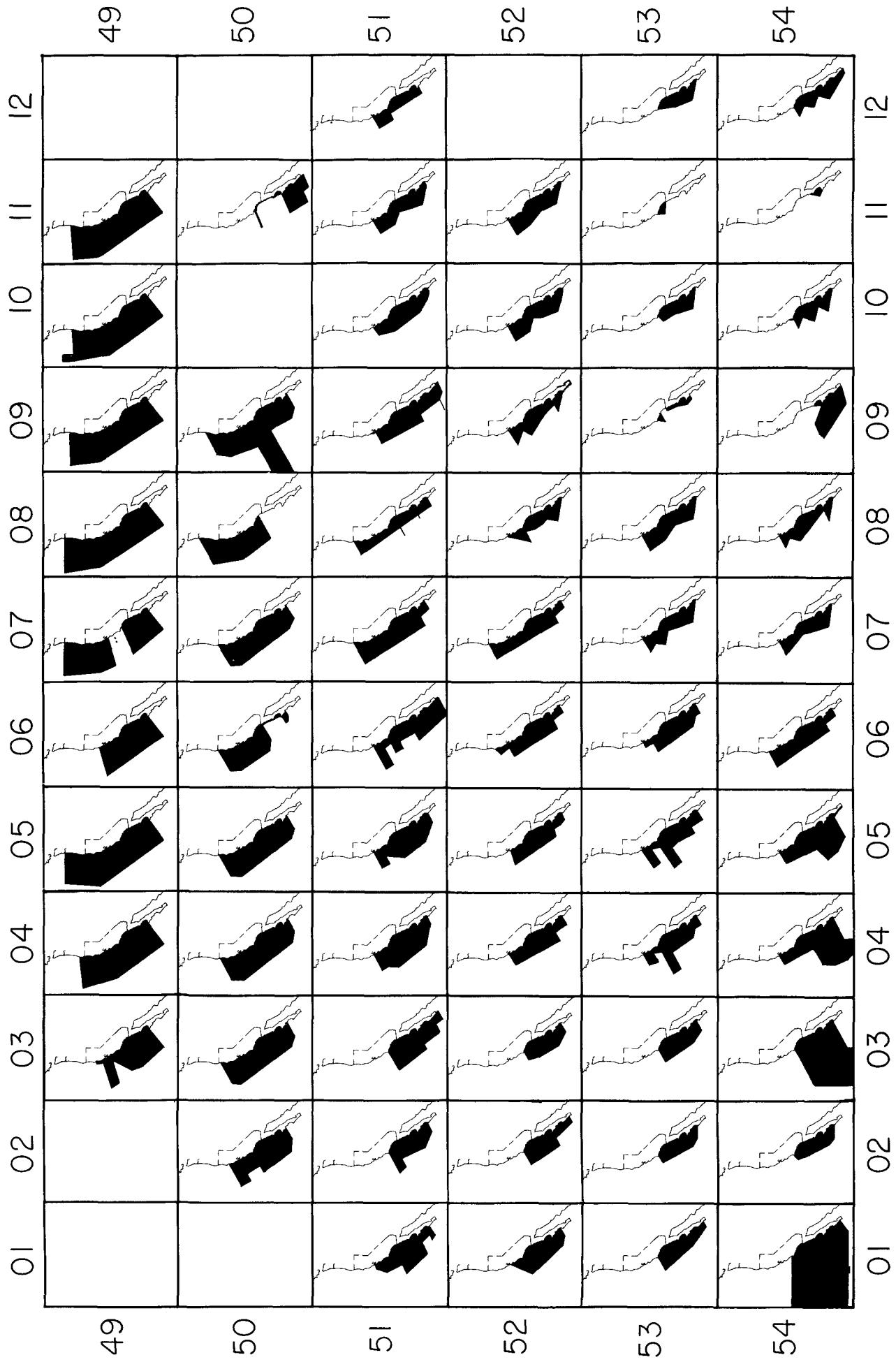
* Sometimes written CCOFI or CalCOFI.

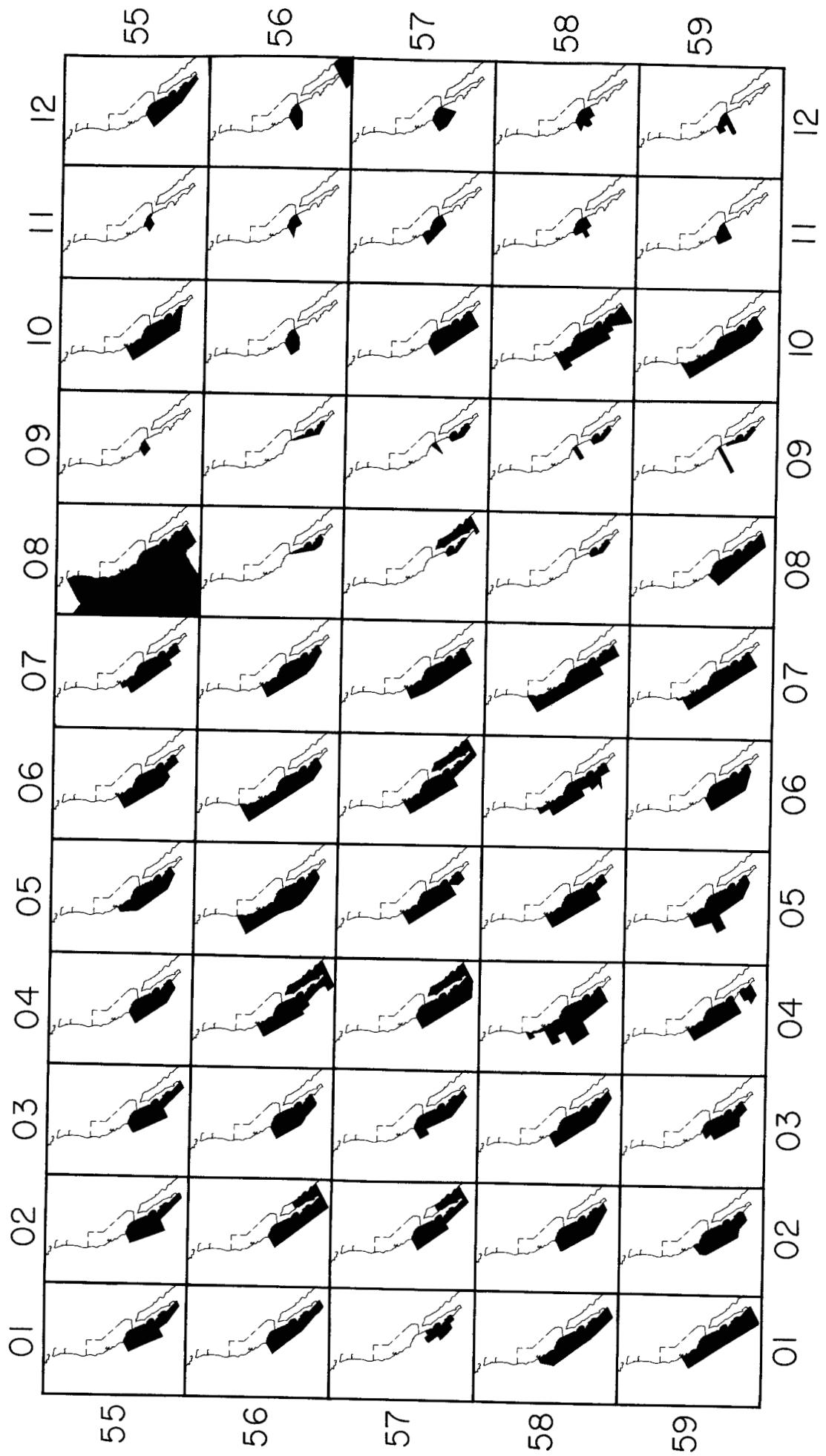
** The U. S. Bureau of Commercial Fisheries also participated in the collection and, to a lesser extent, the California Department of Fish and Game.



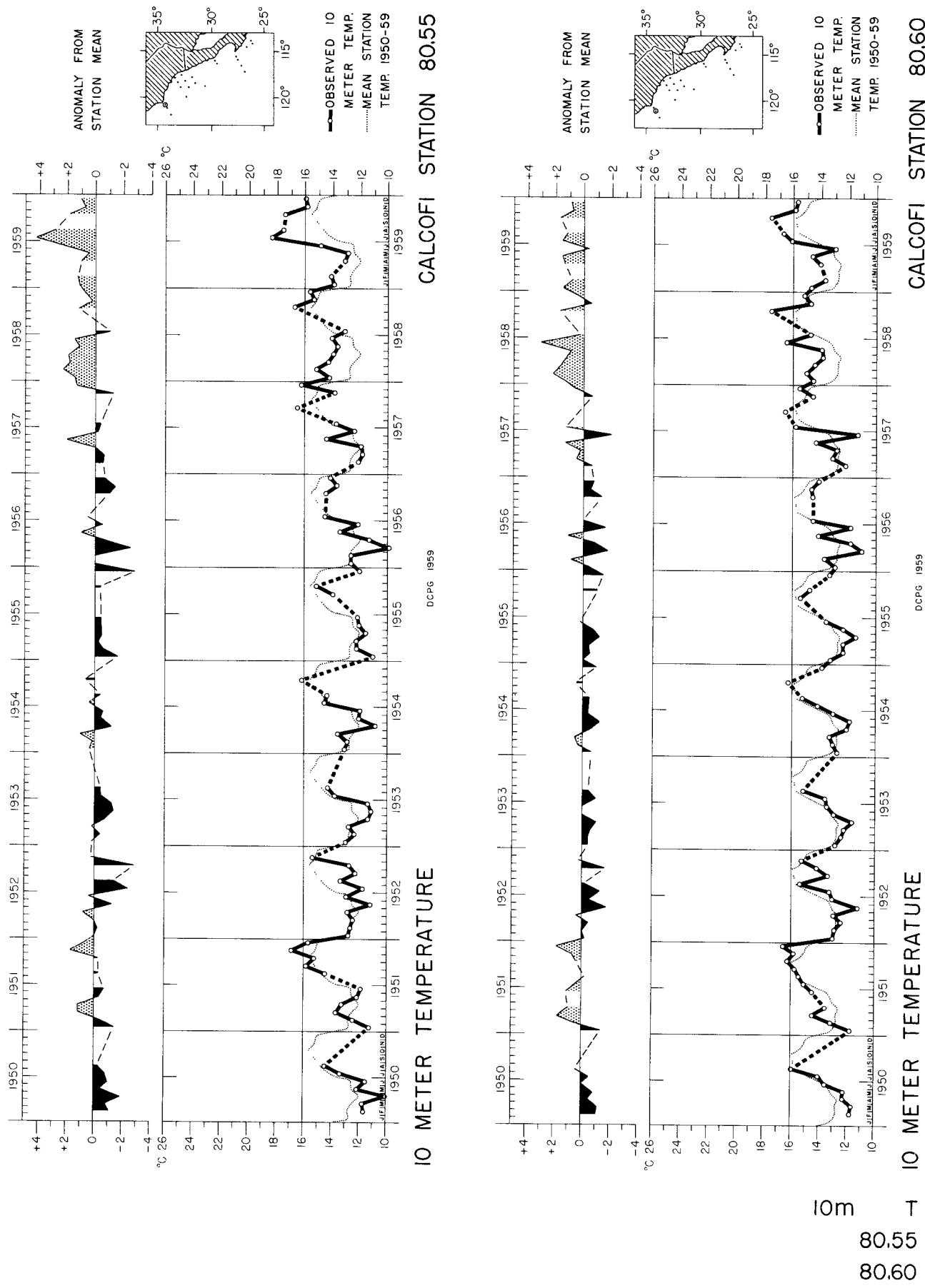


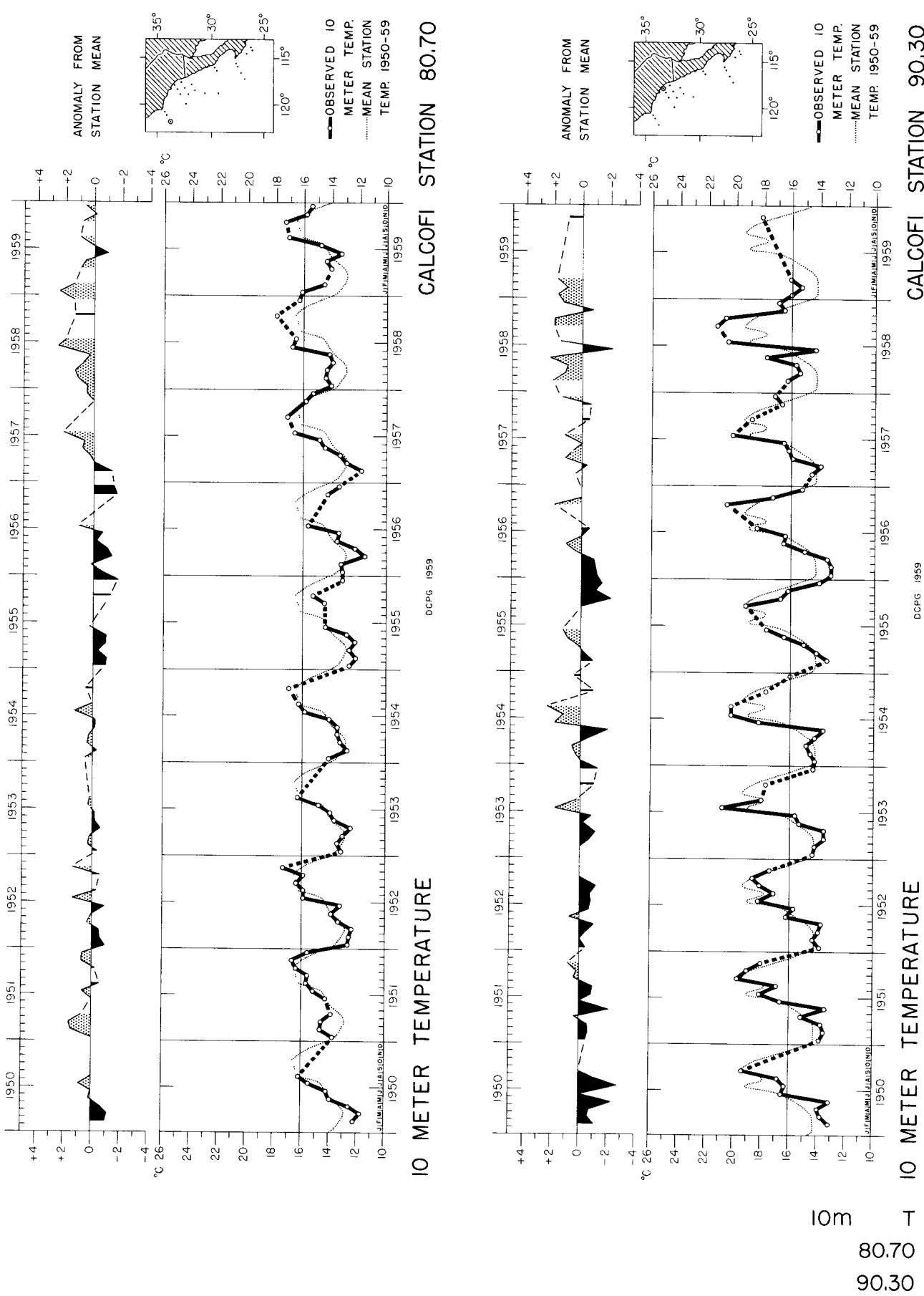
CALCOFI AREA INDEX — 1949 through 1959

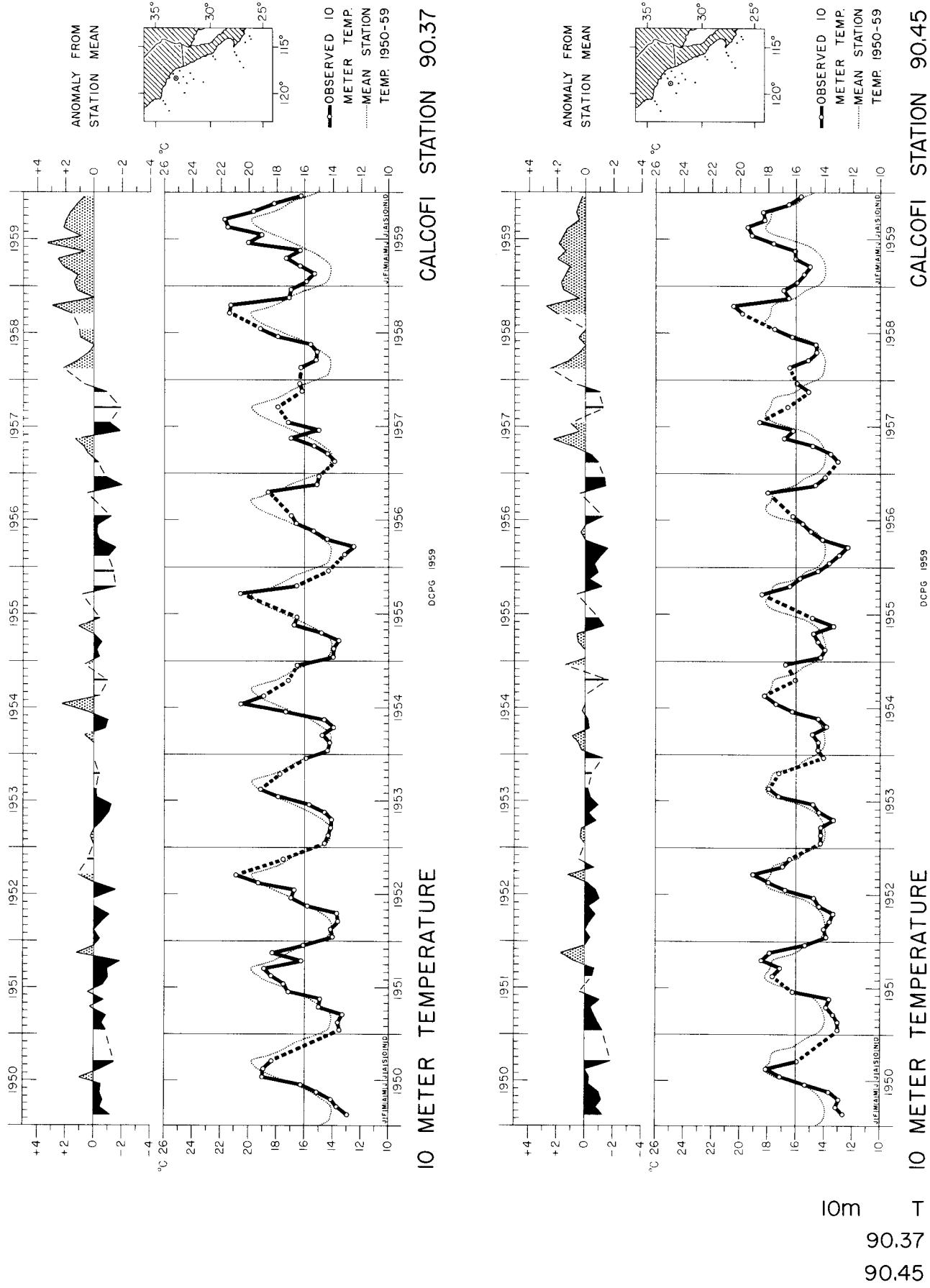


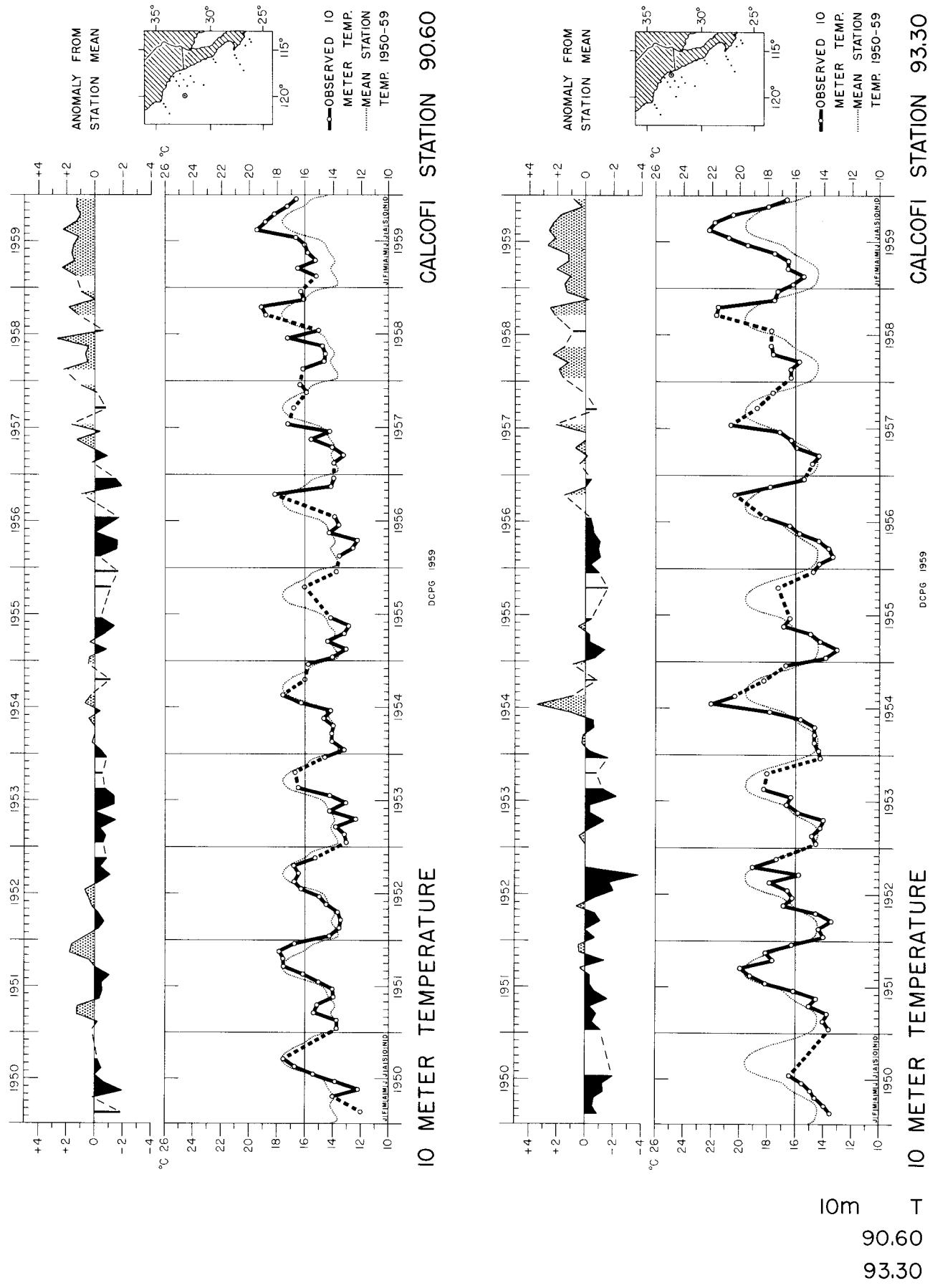


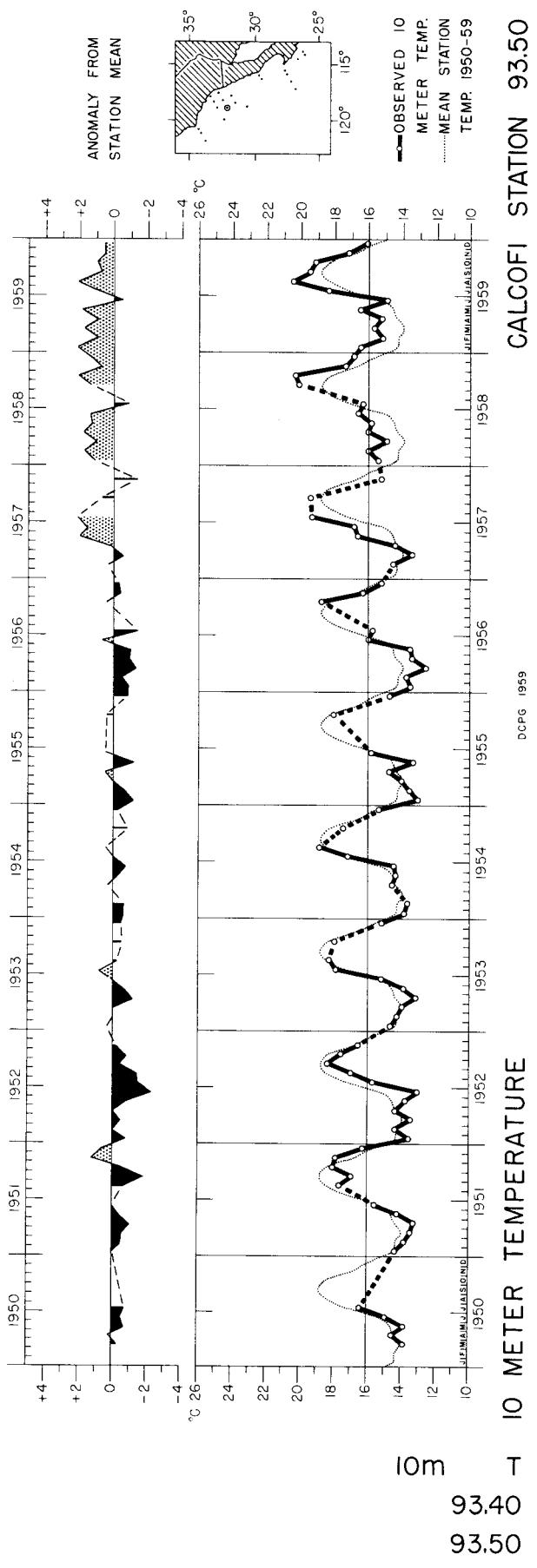
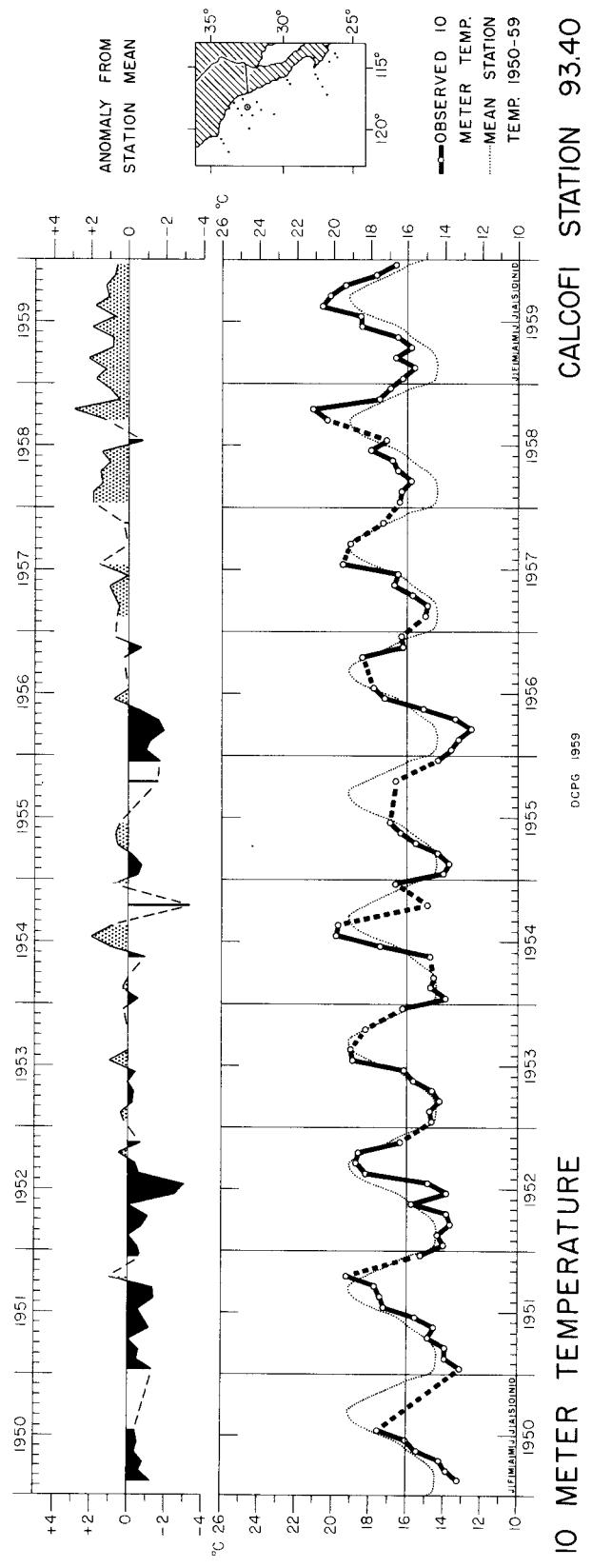
CALCOFI AREA INDEX — 1949 through 1959
MONTHLY THERMOMETER TEMPERATURE AND SALINITY COVERAGE

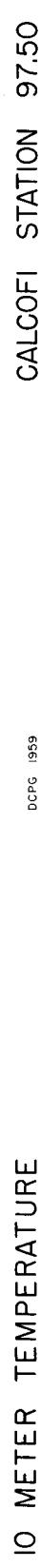
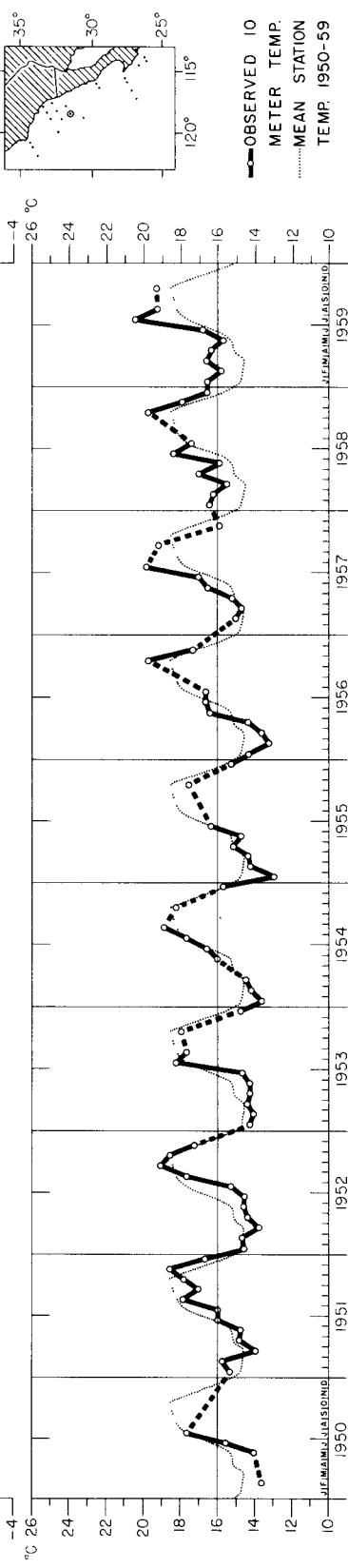
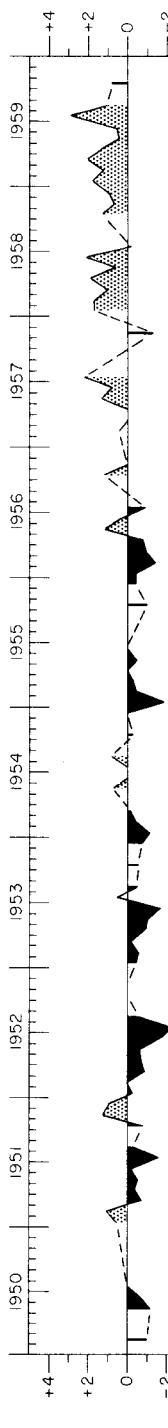
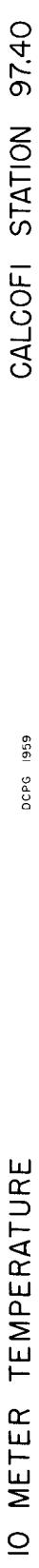
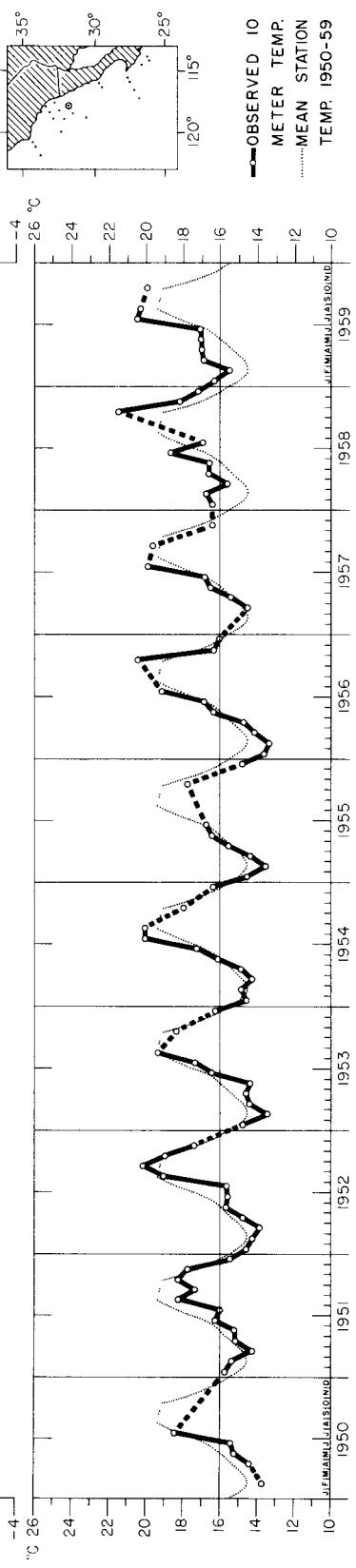
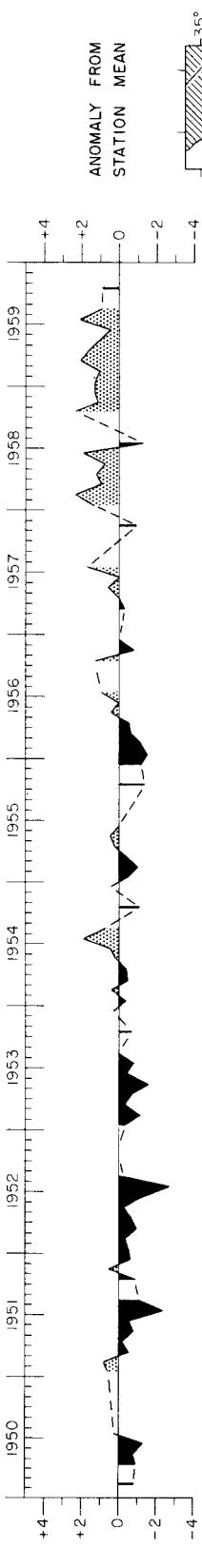


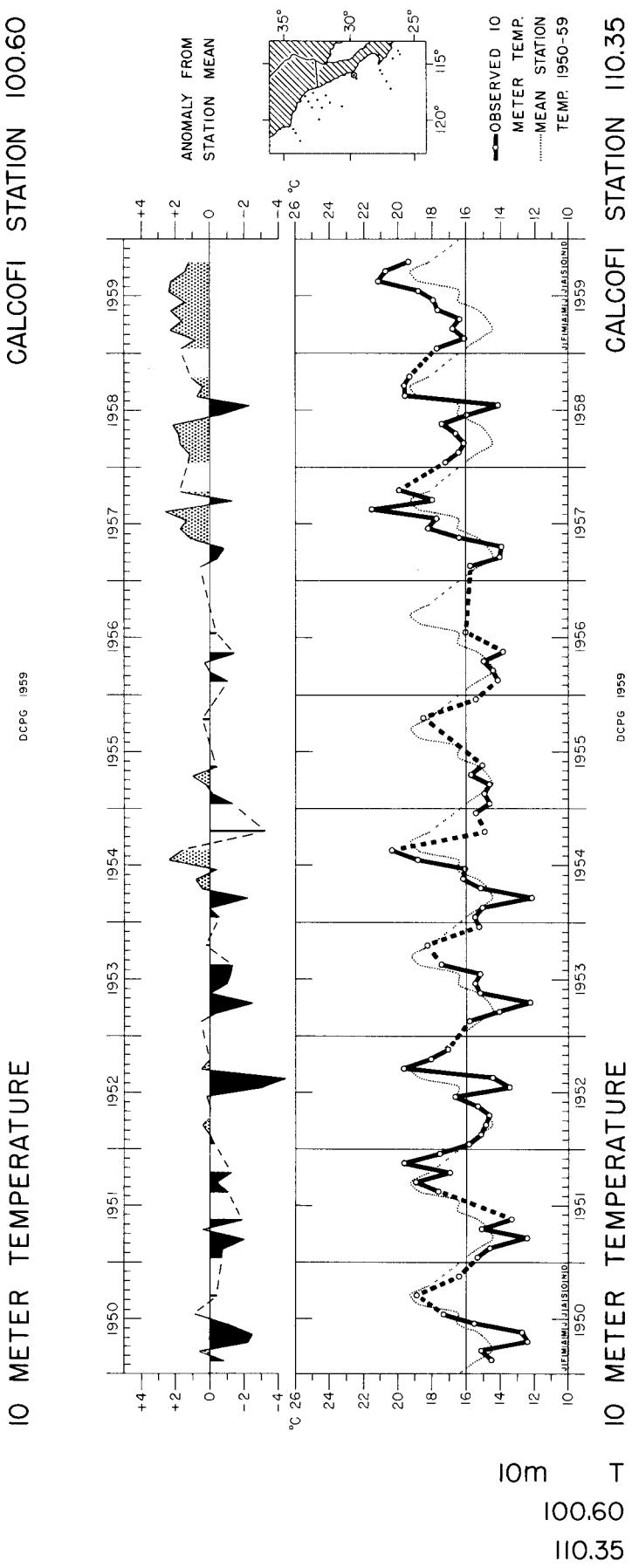
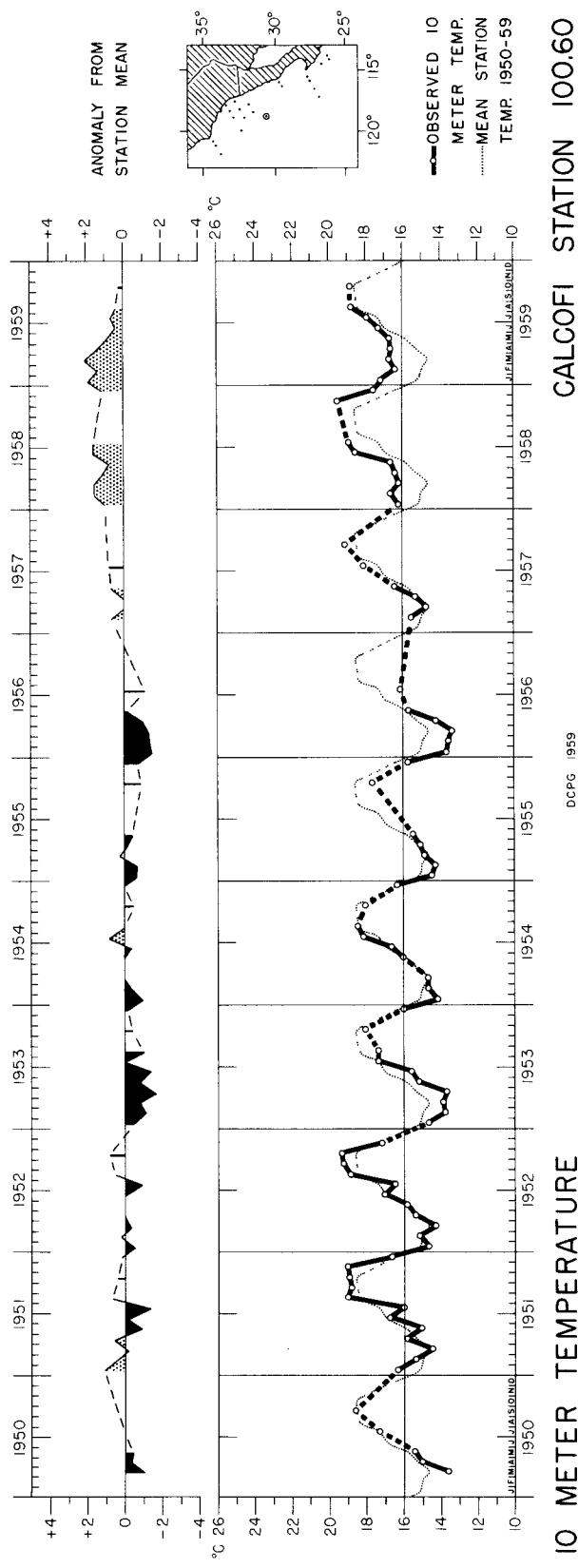


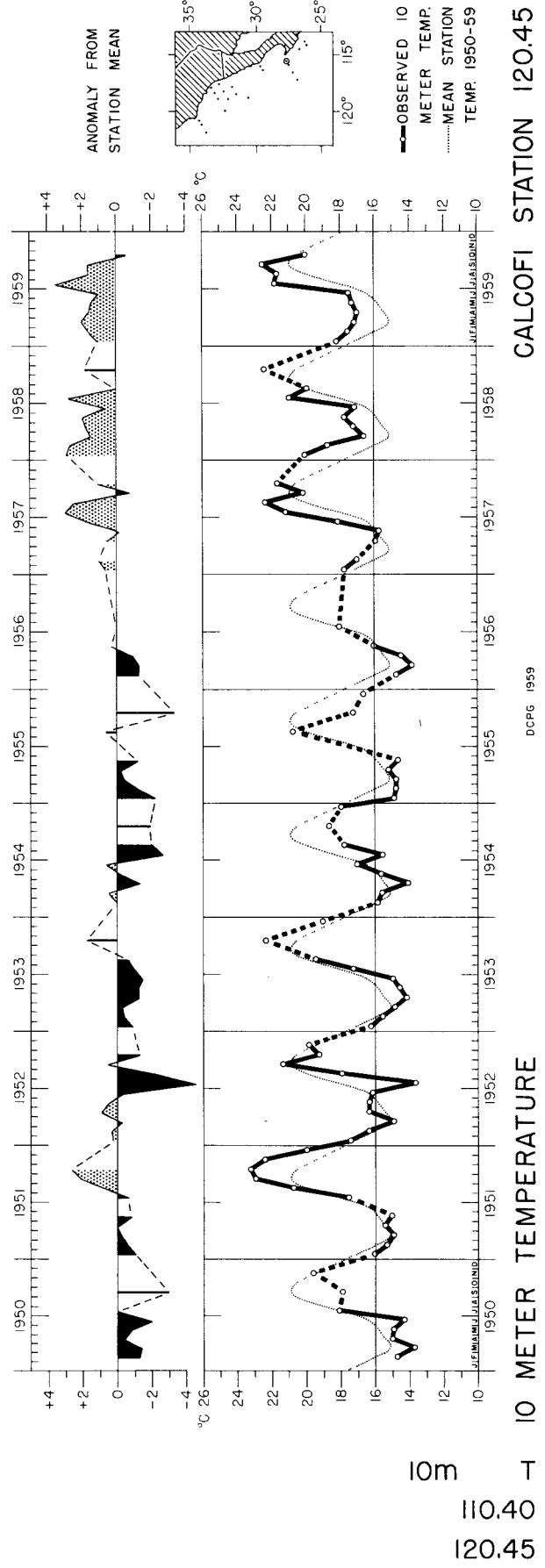
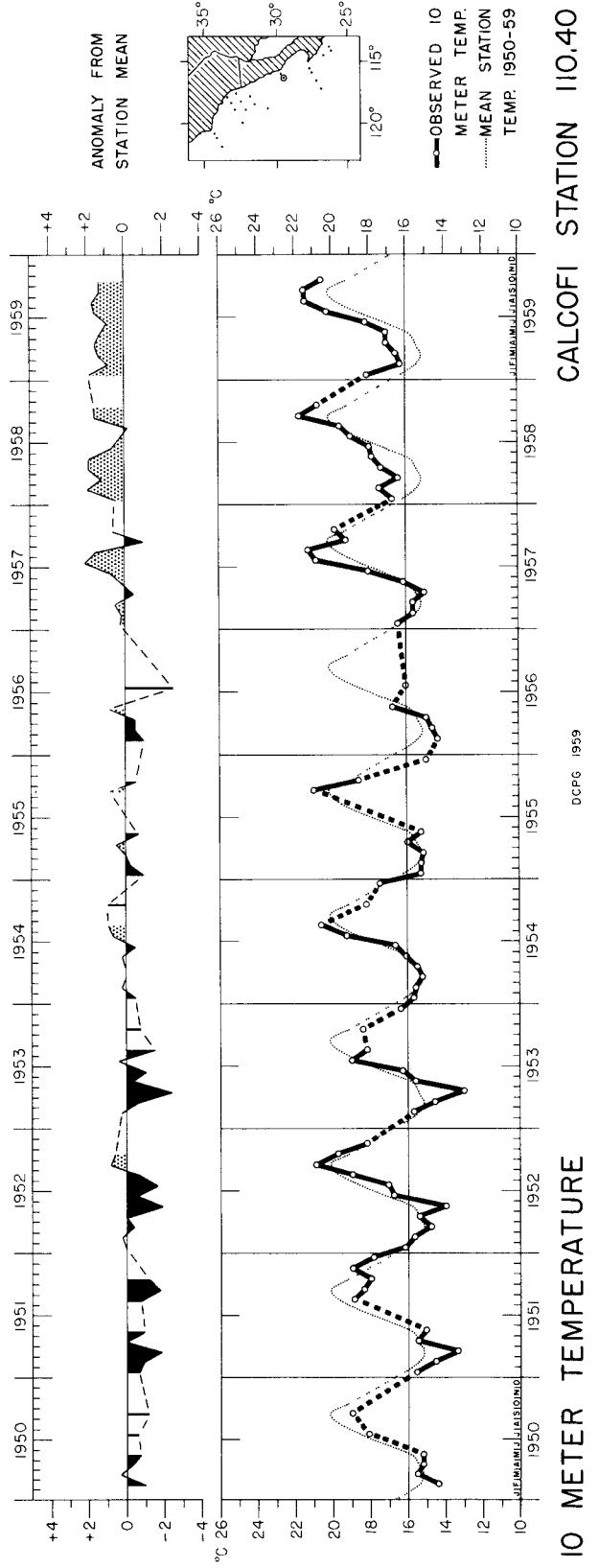


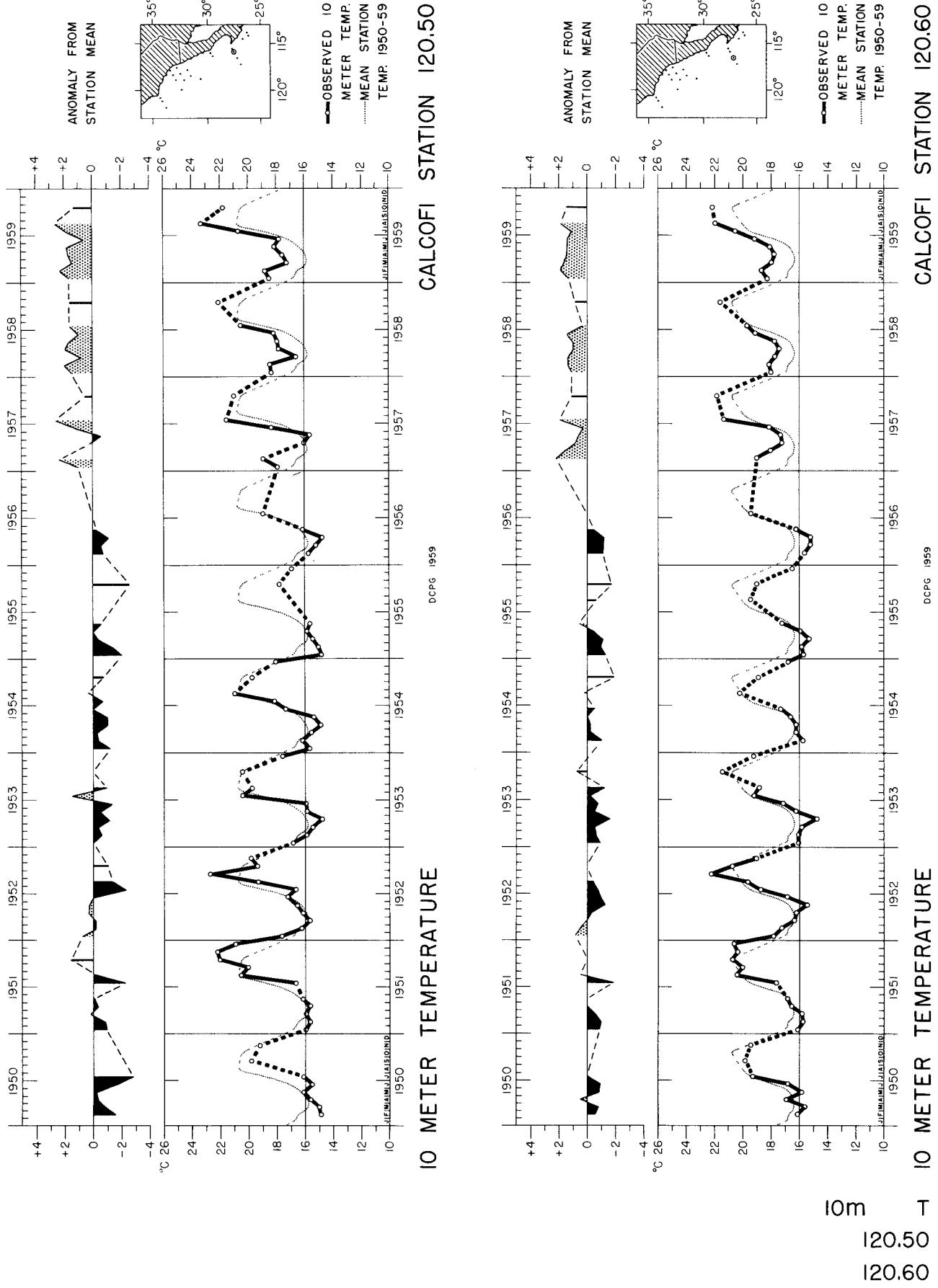


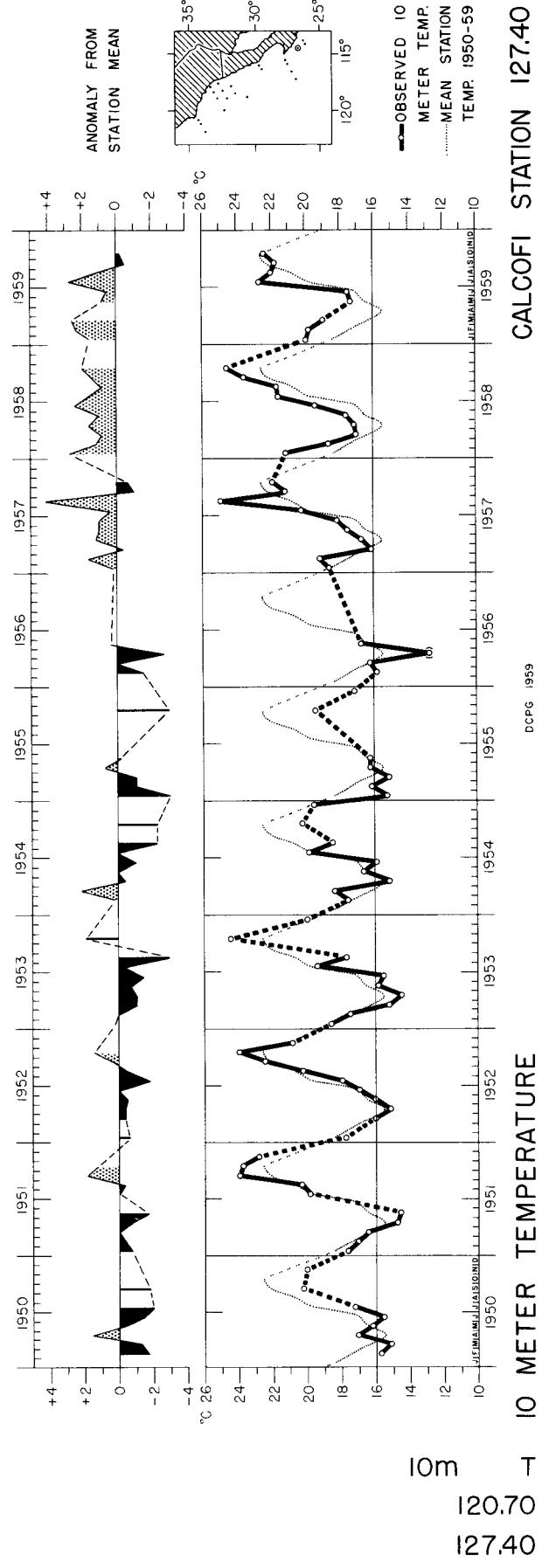
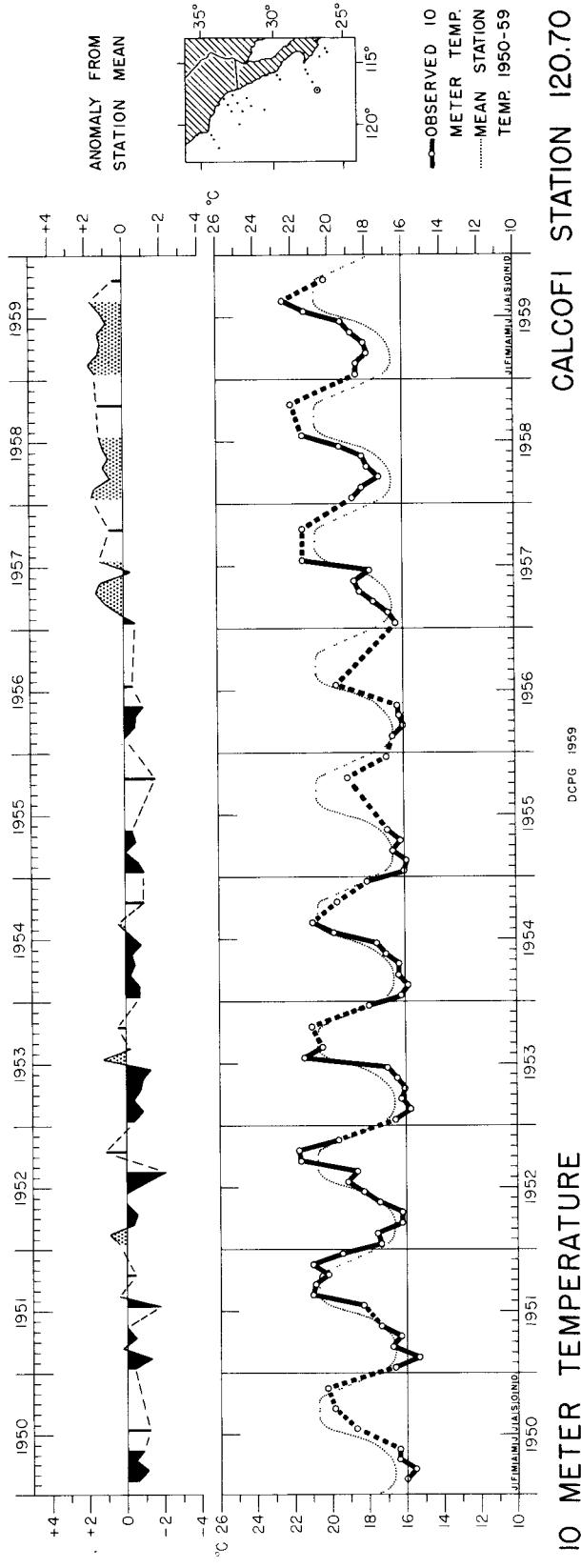


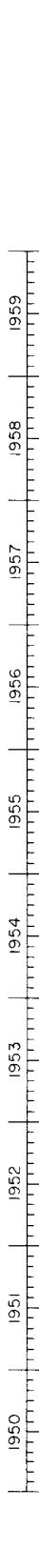
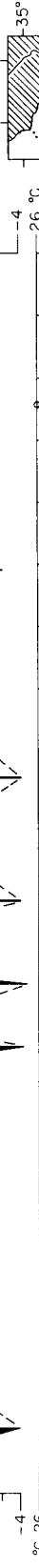
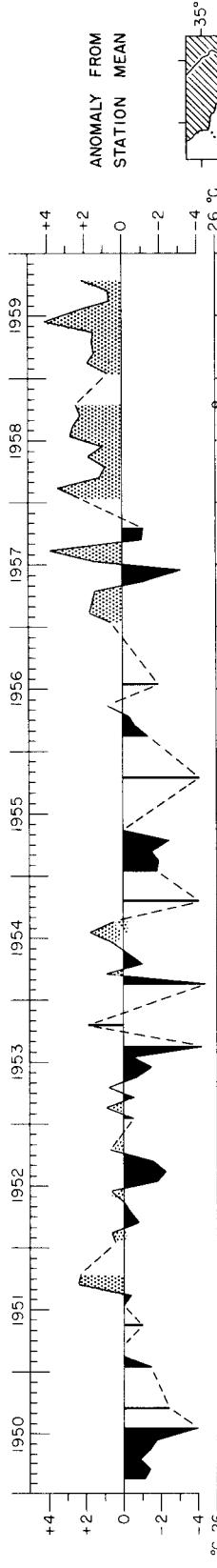


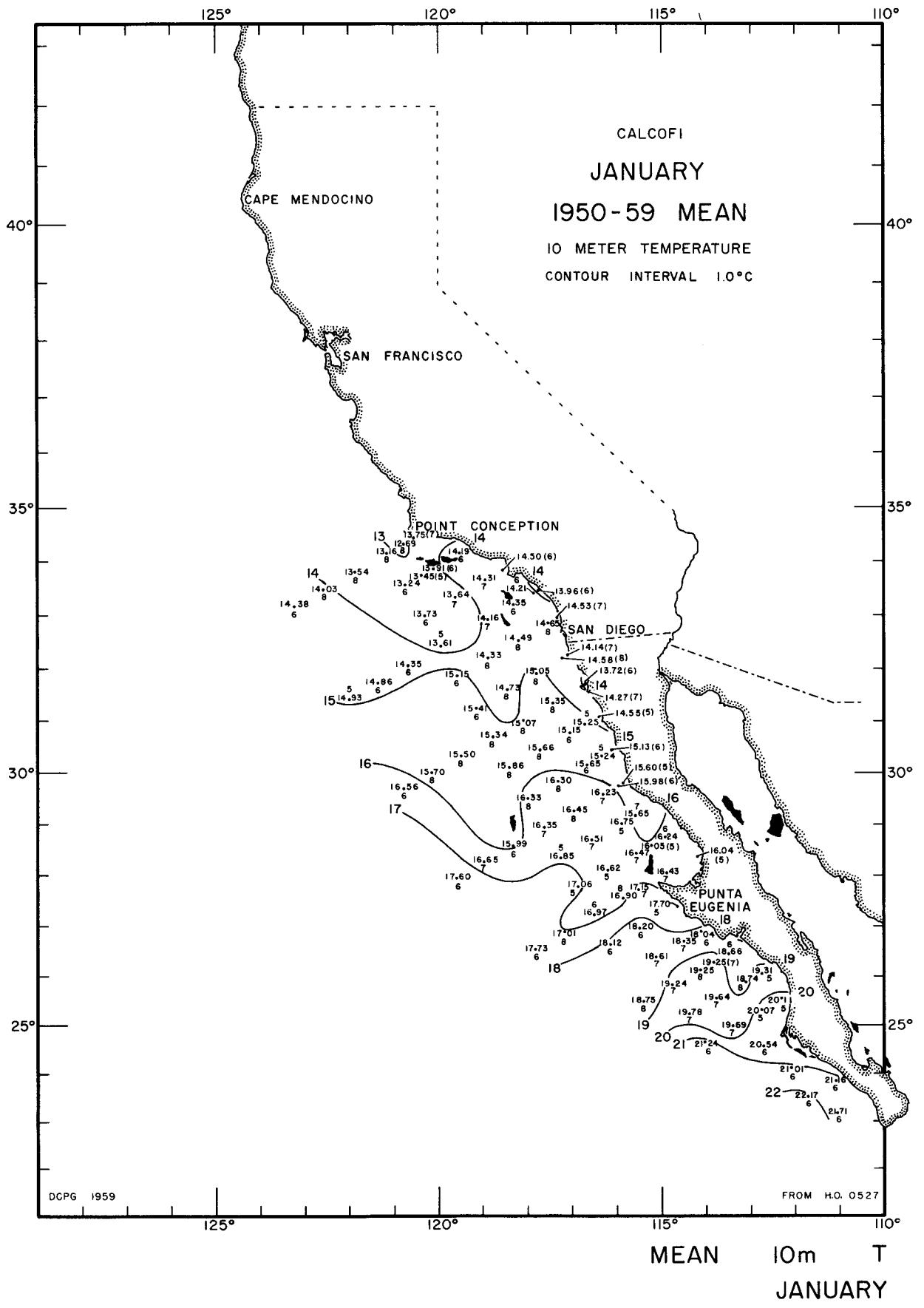


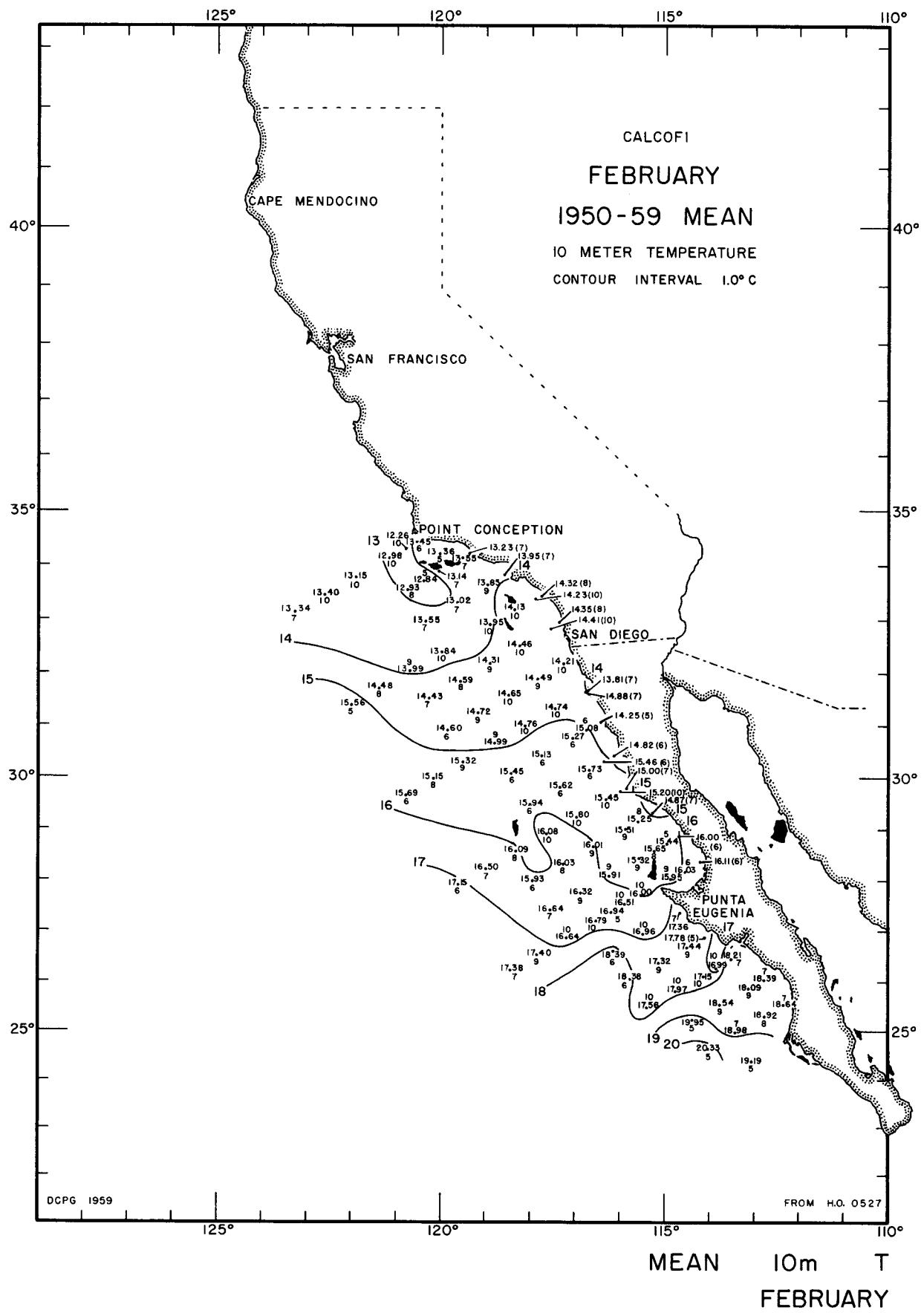


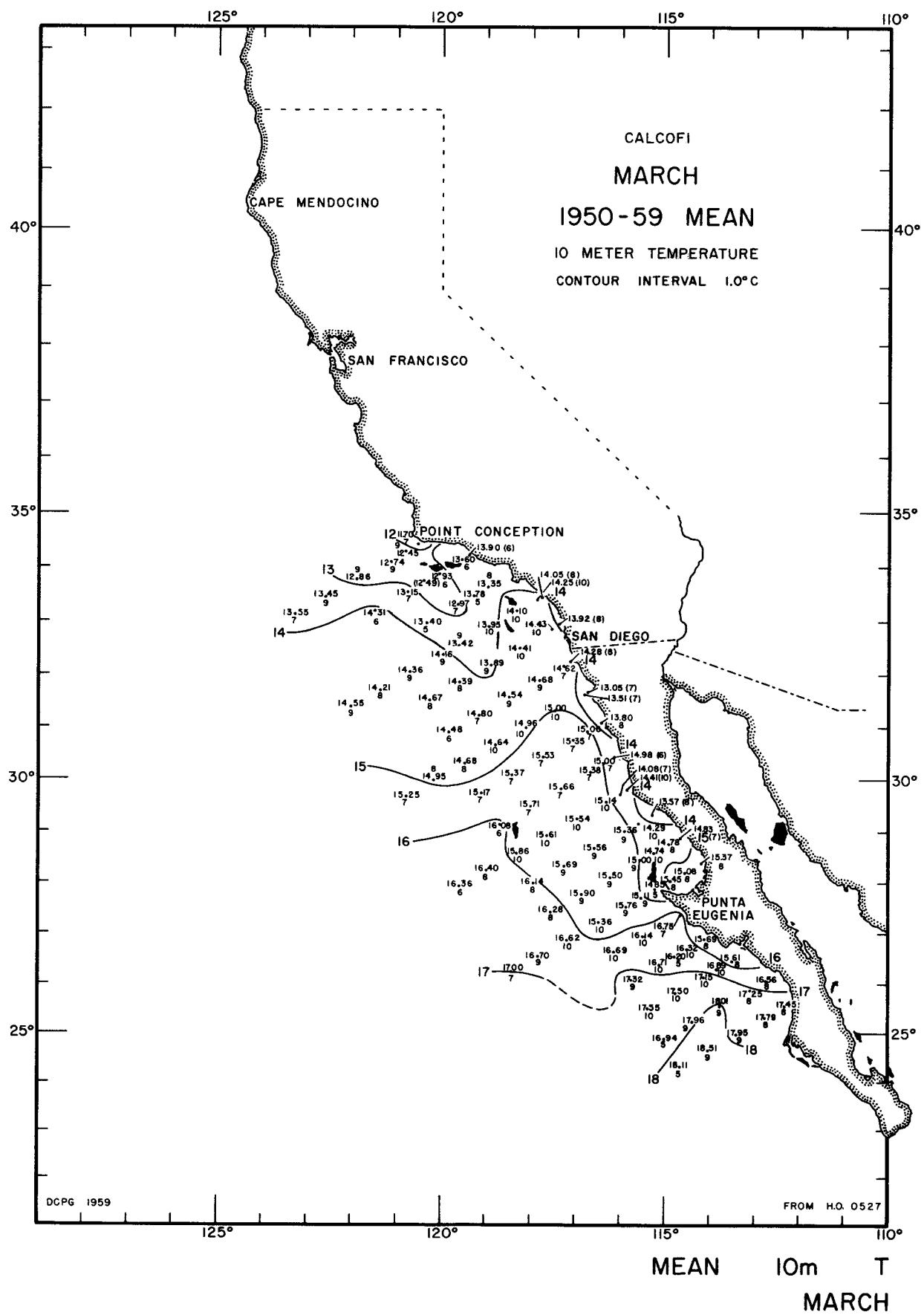


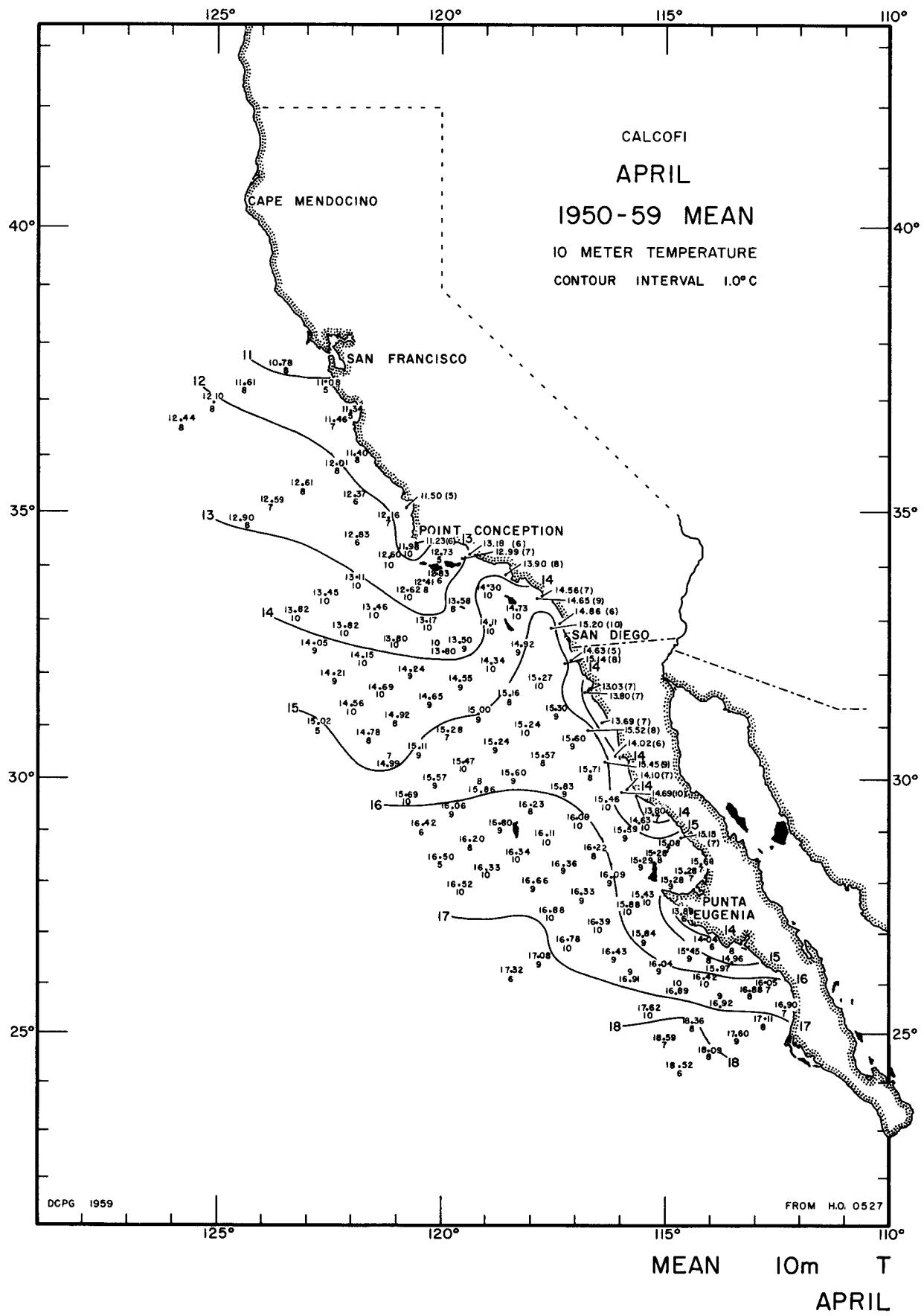


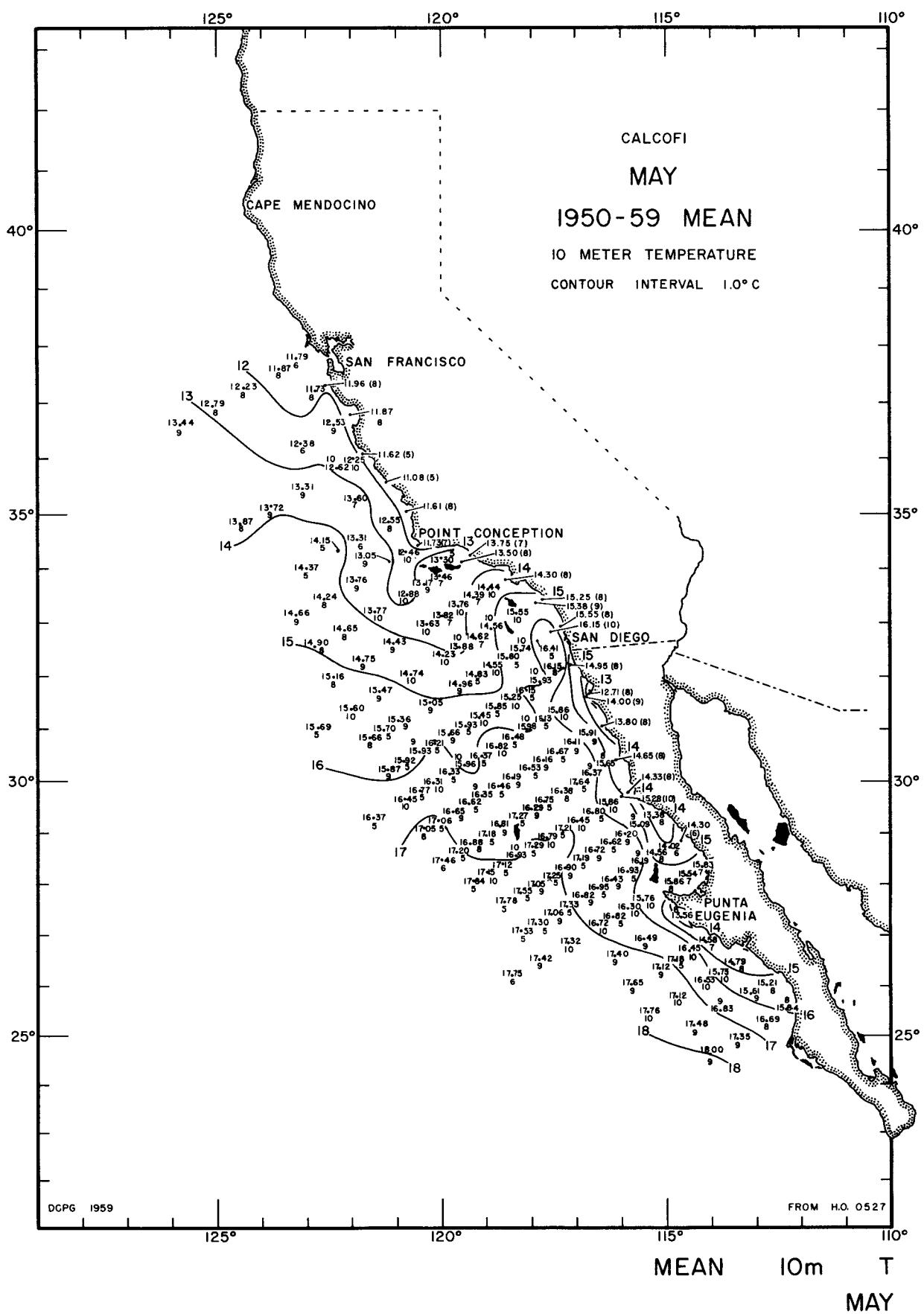


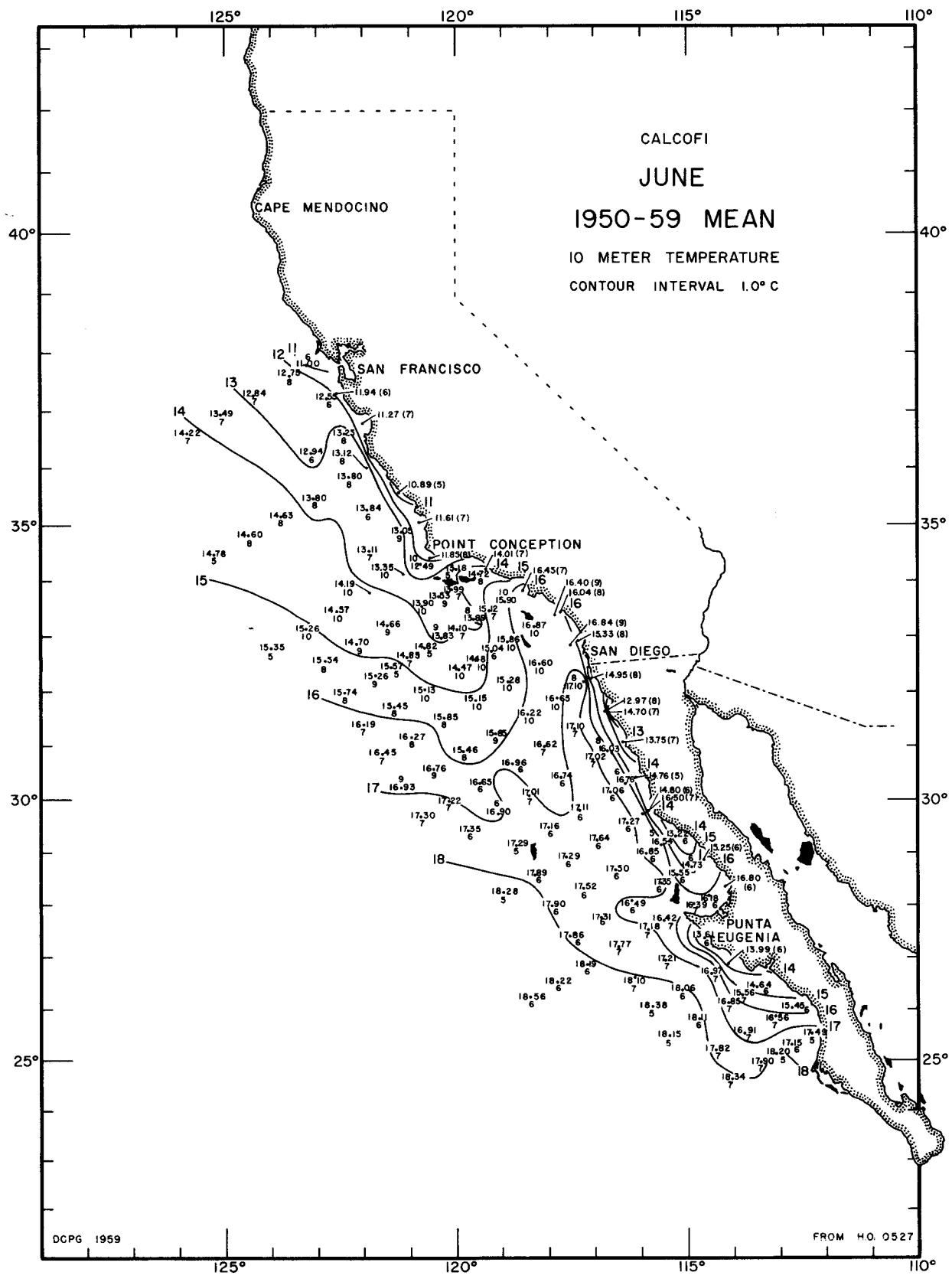


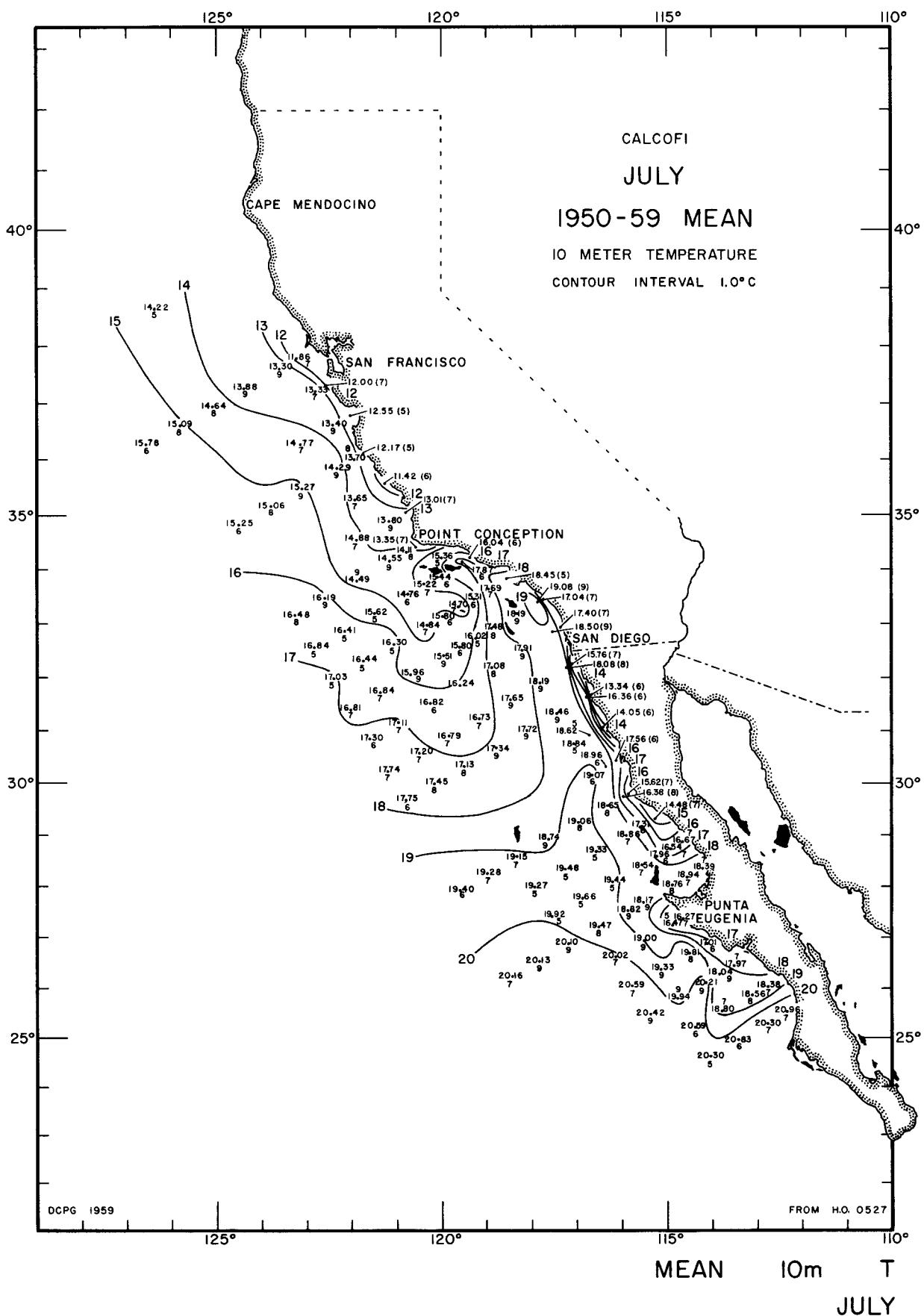


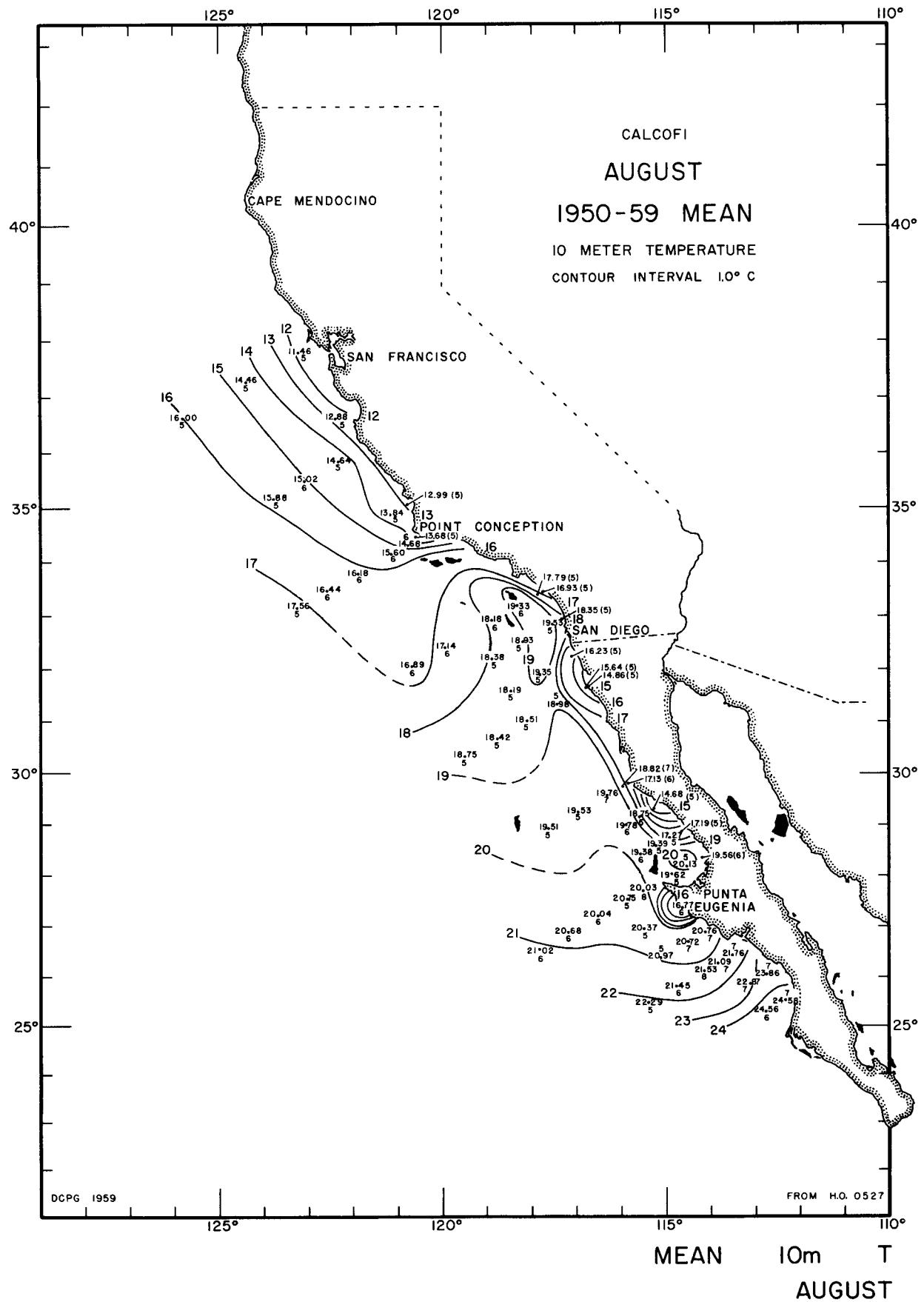


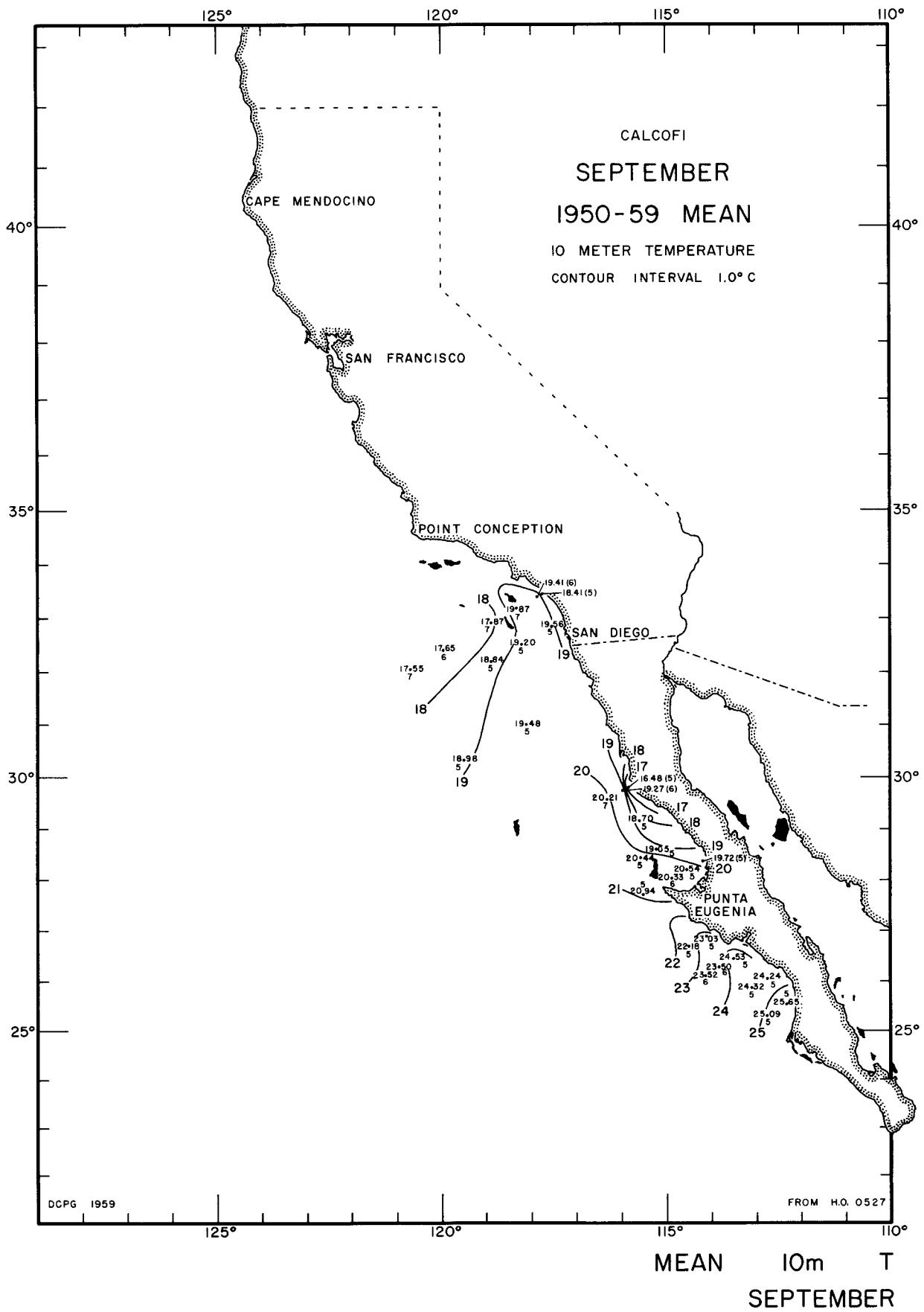


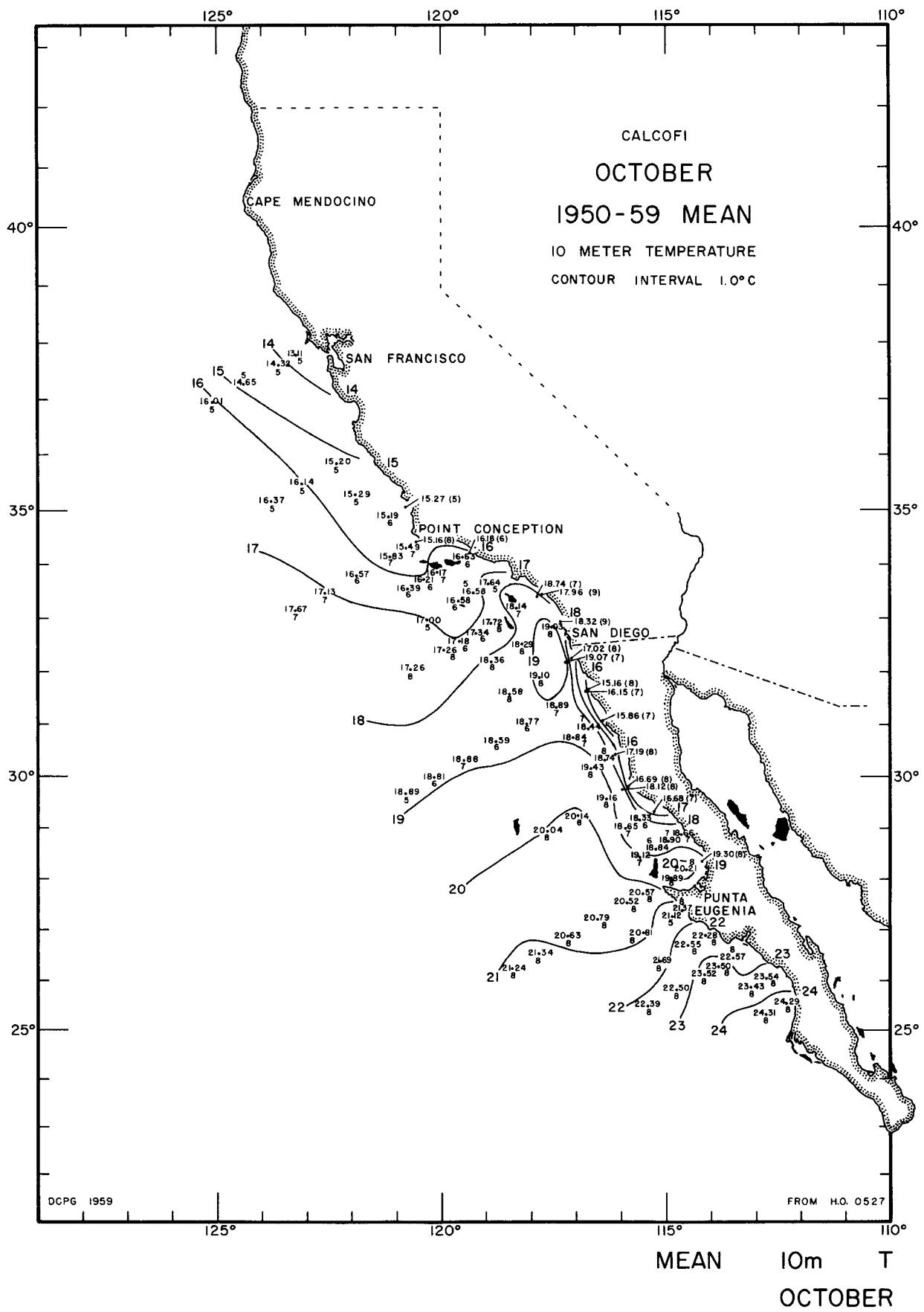


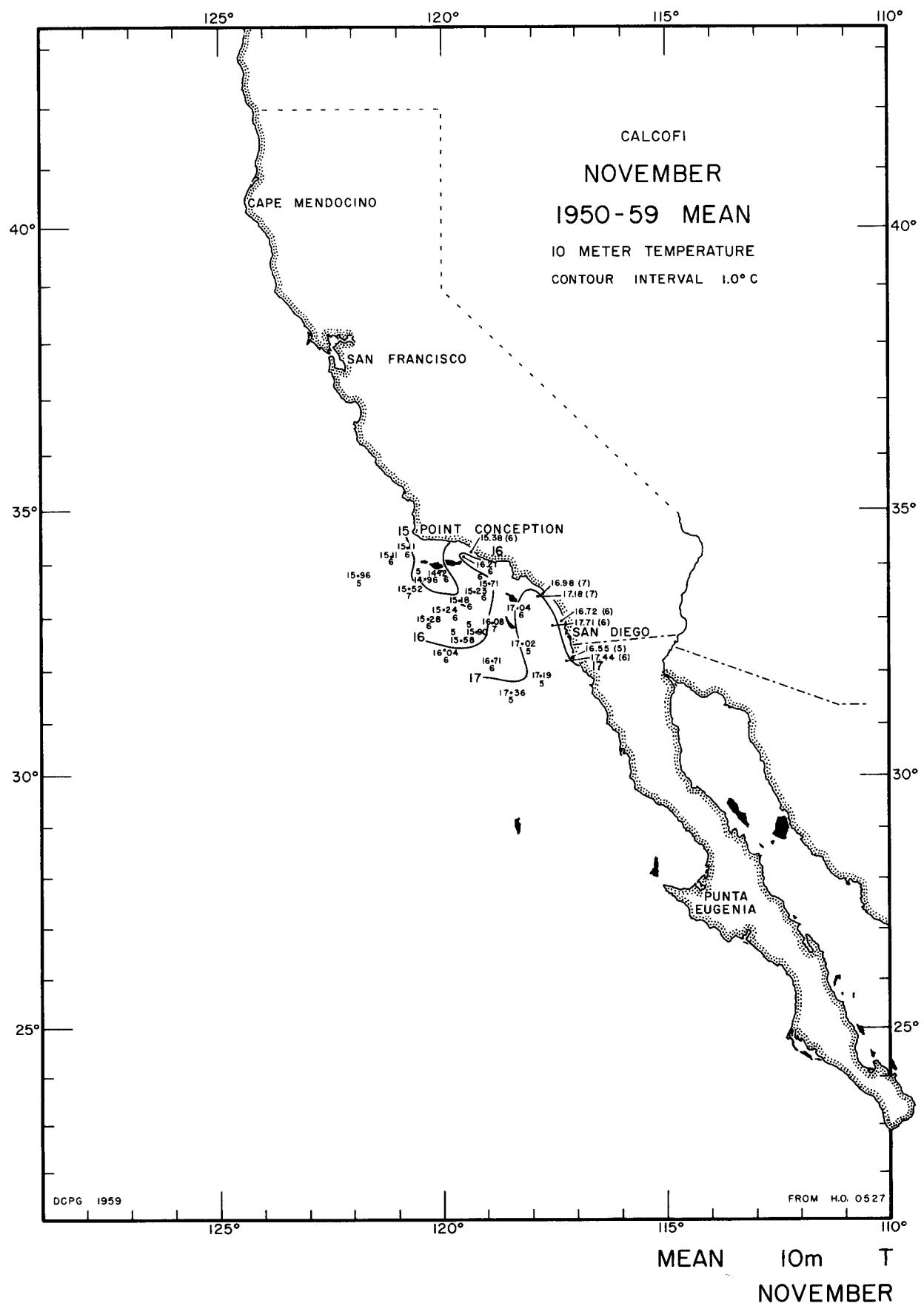


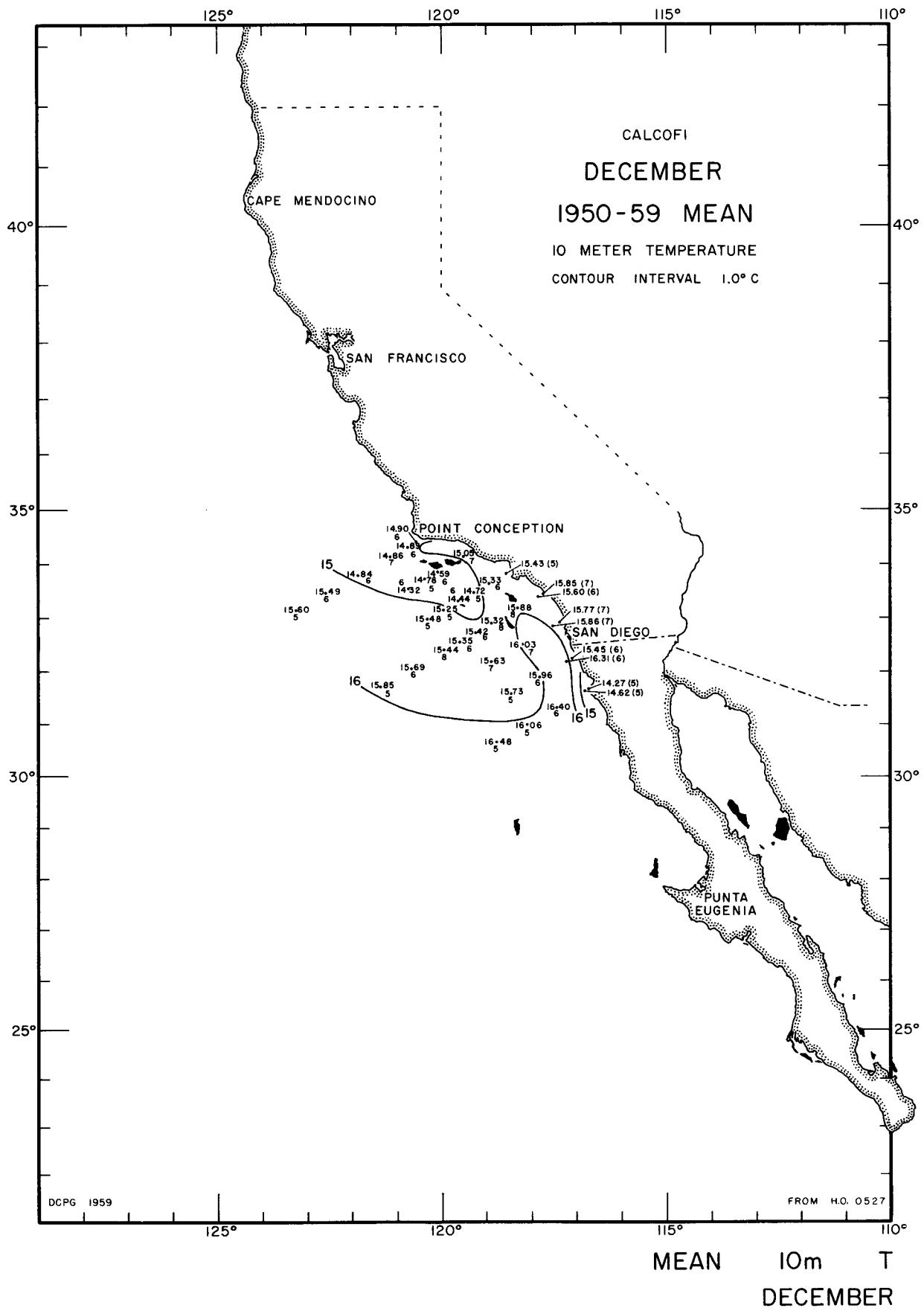


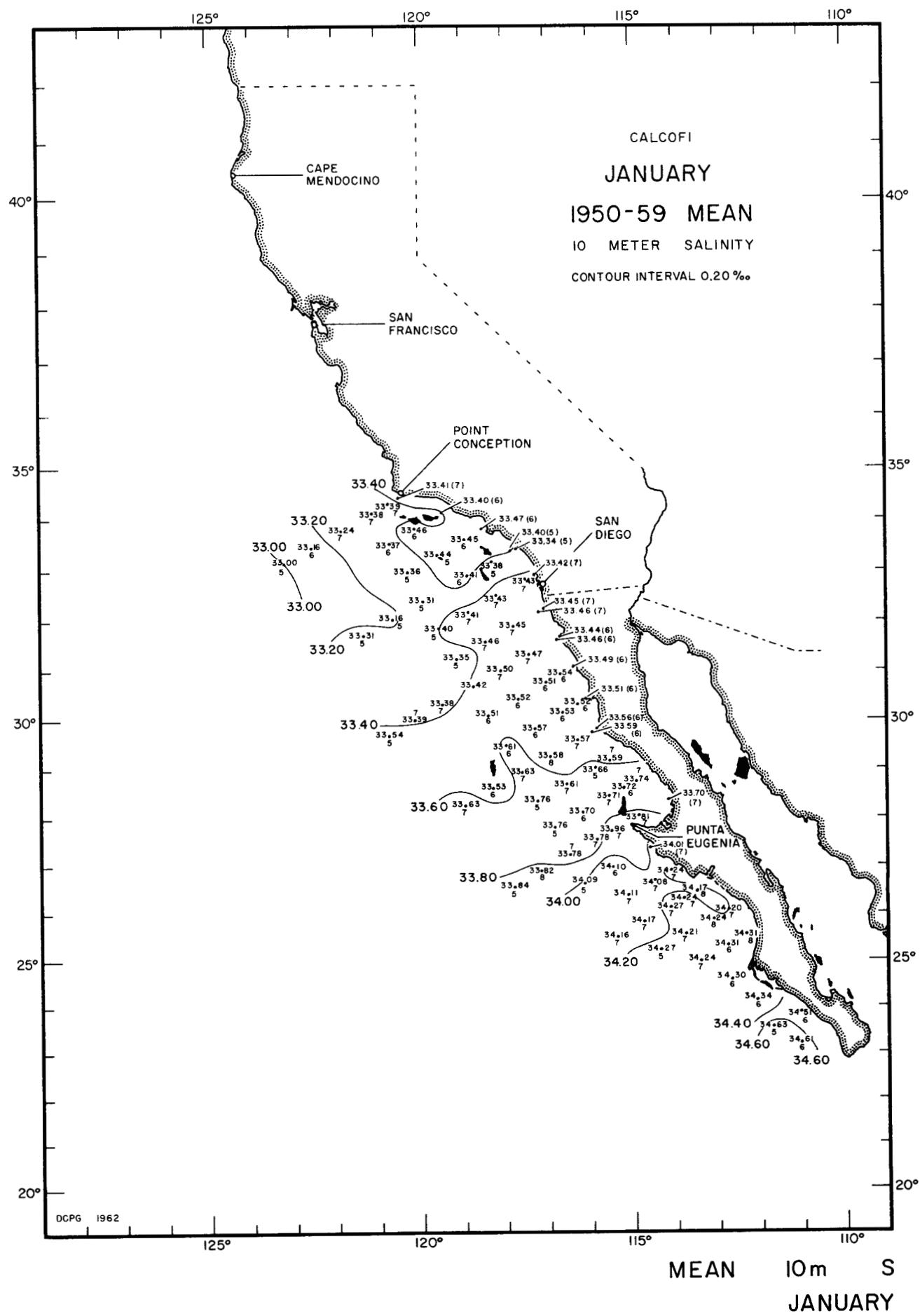


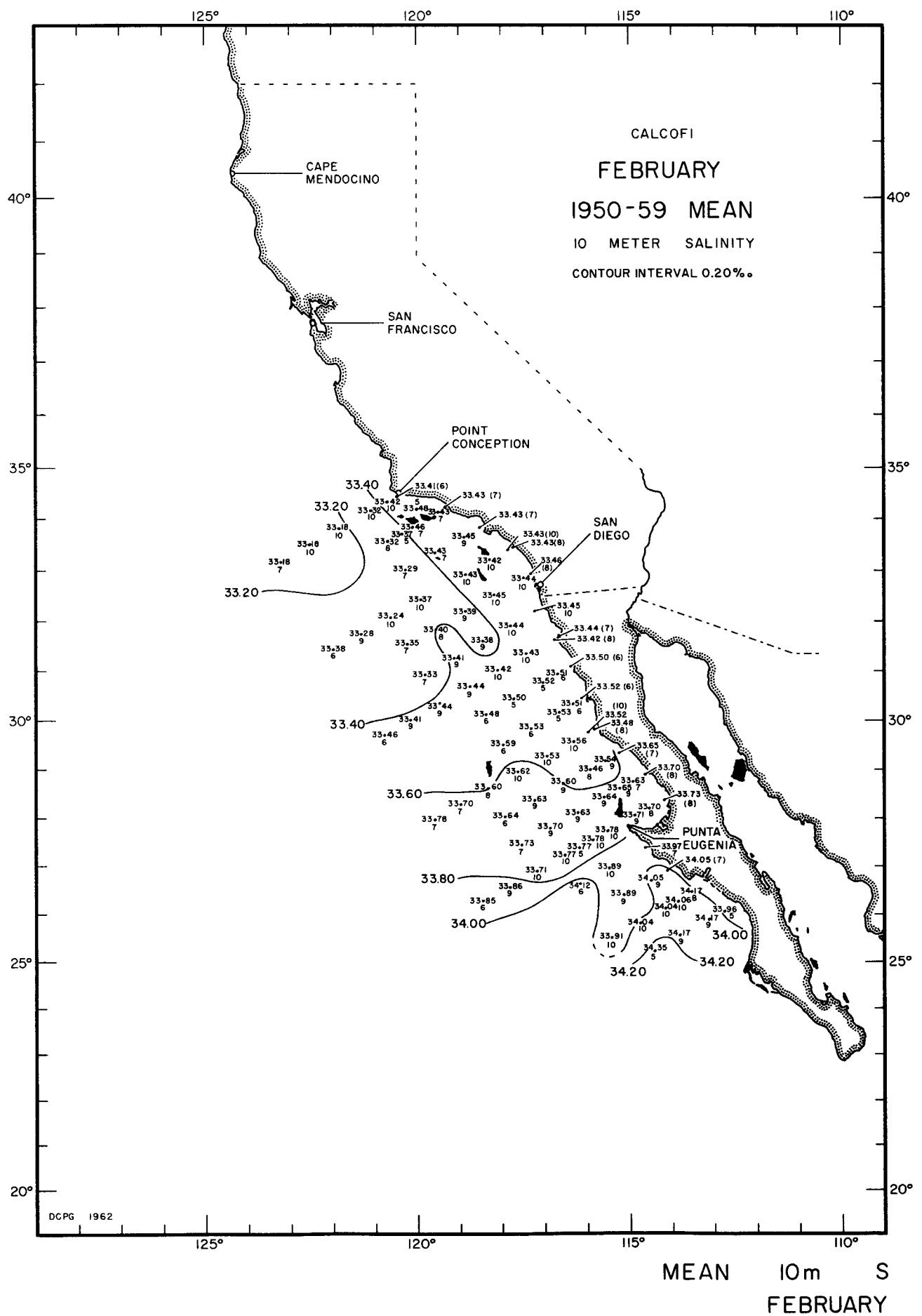


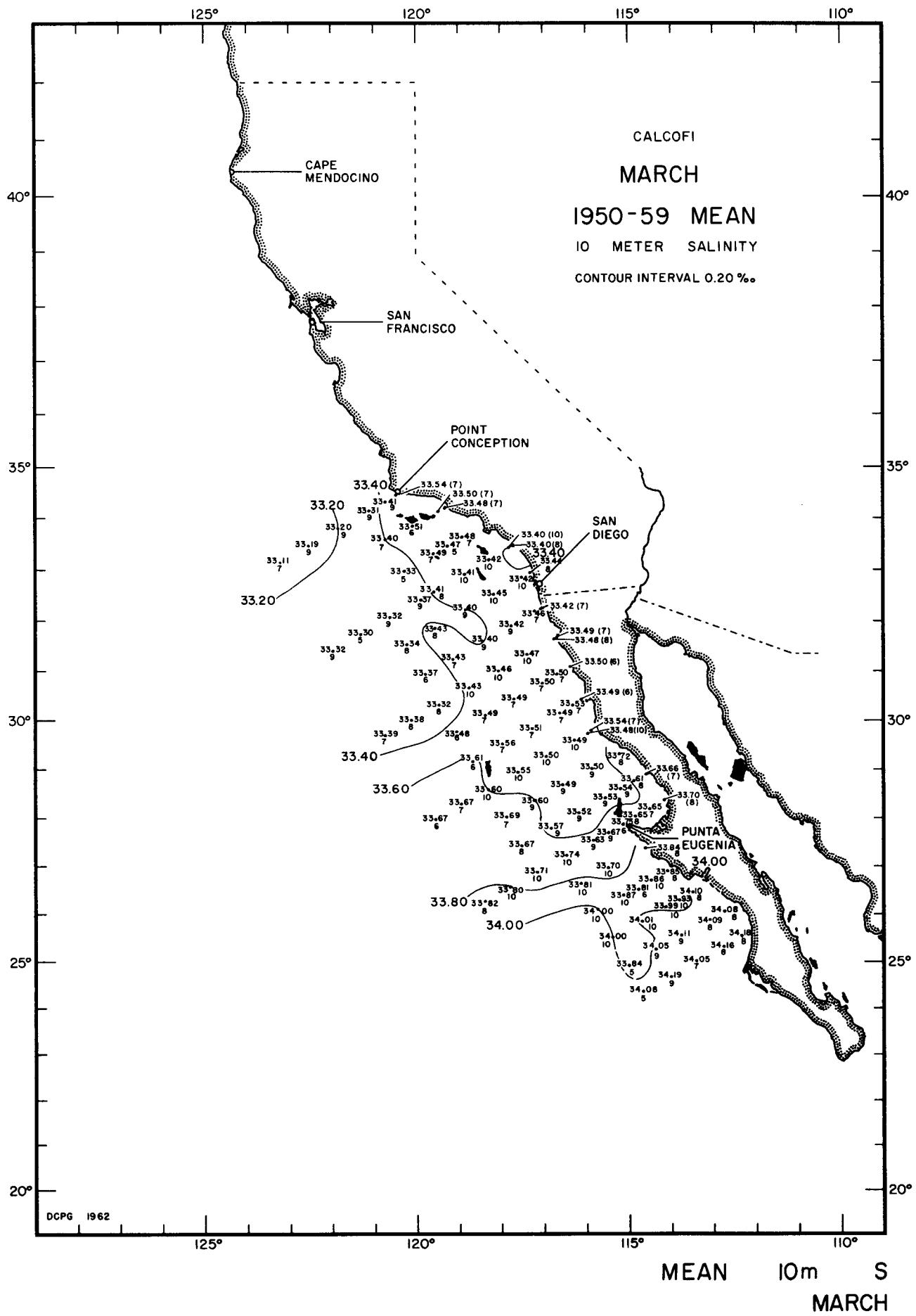


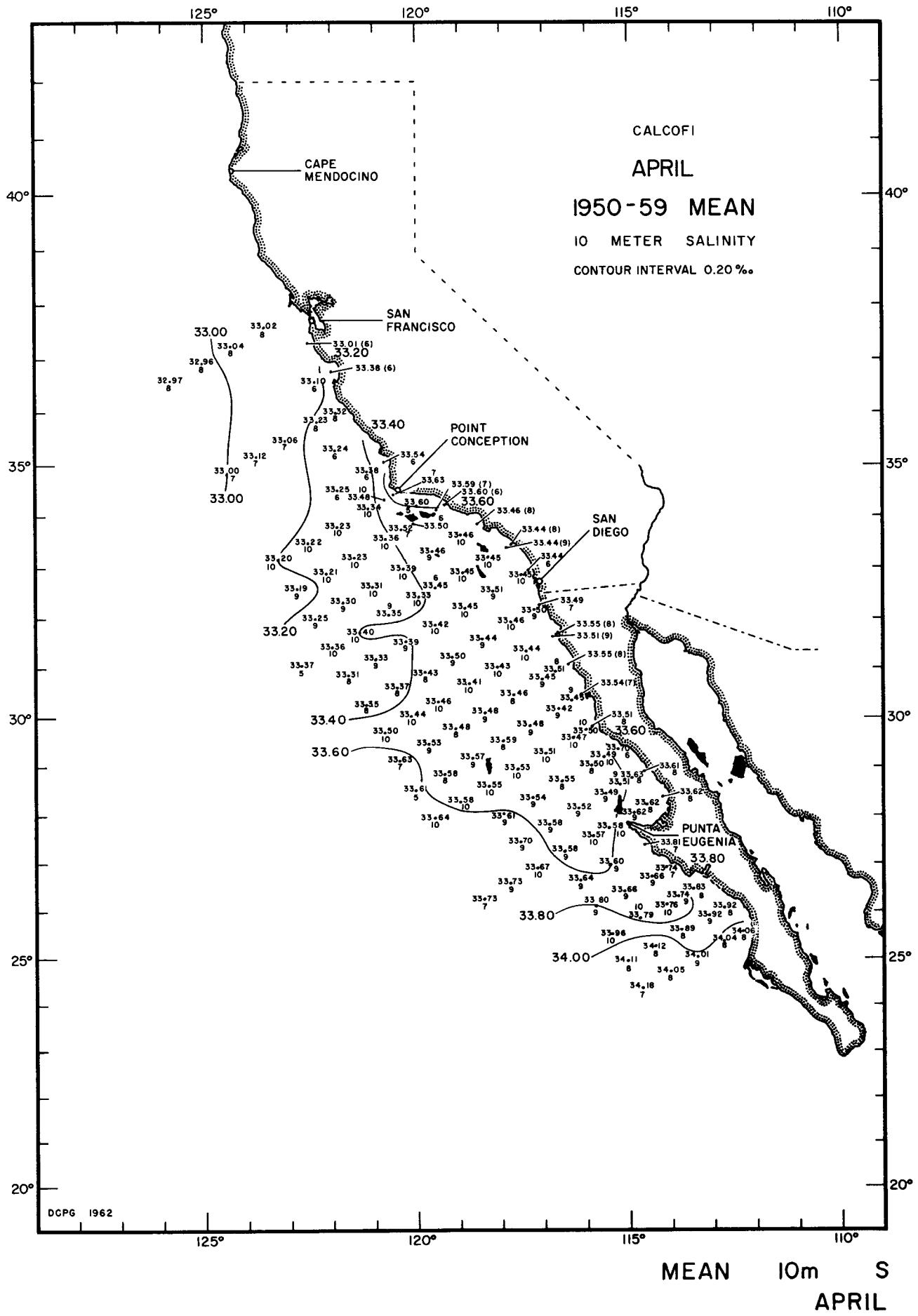


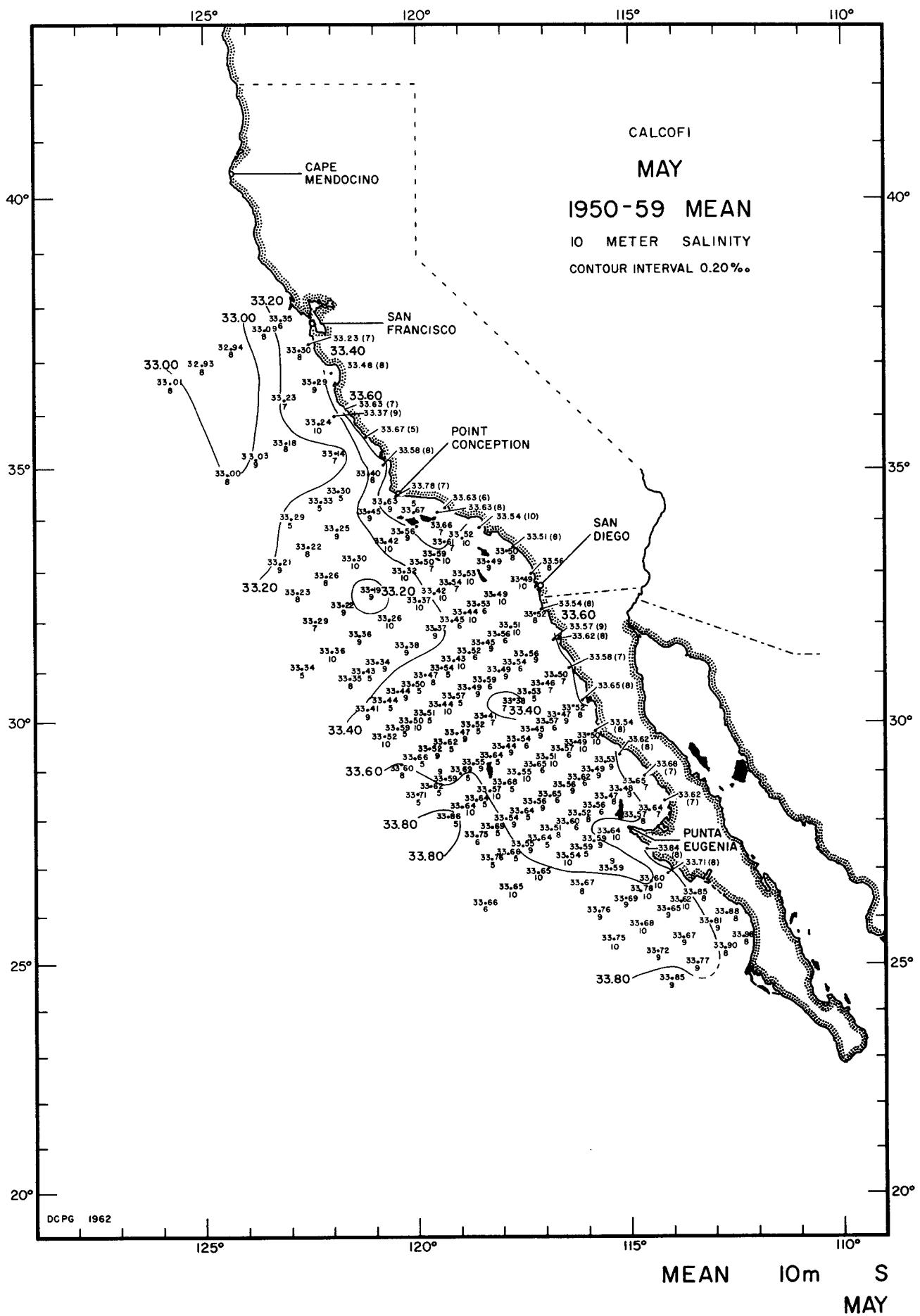


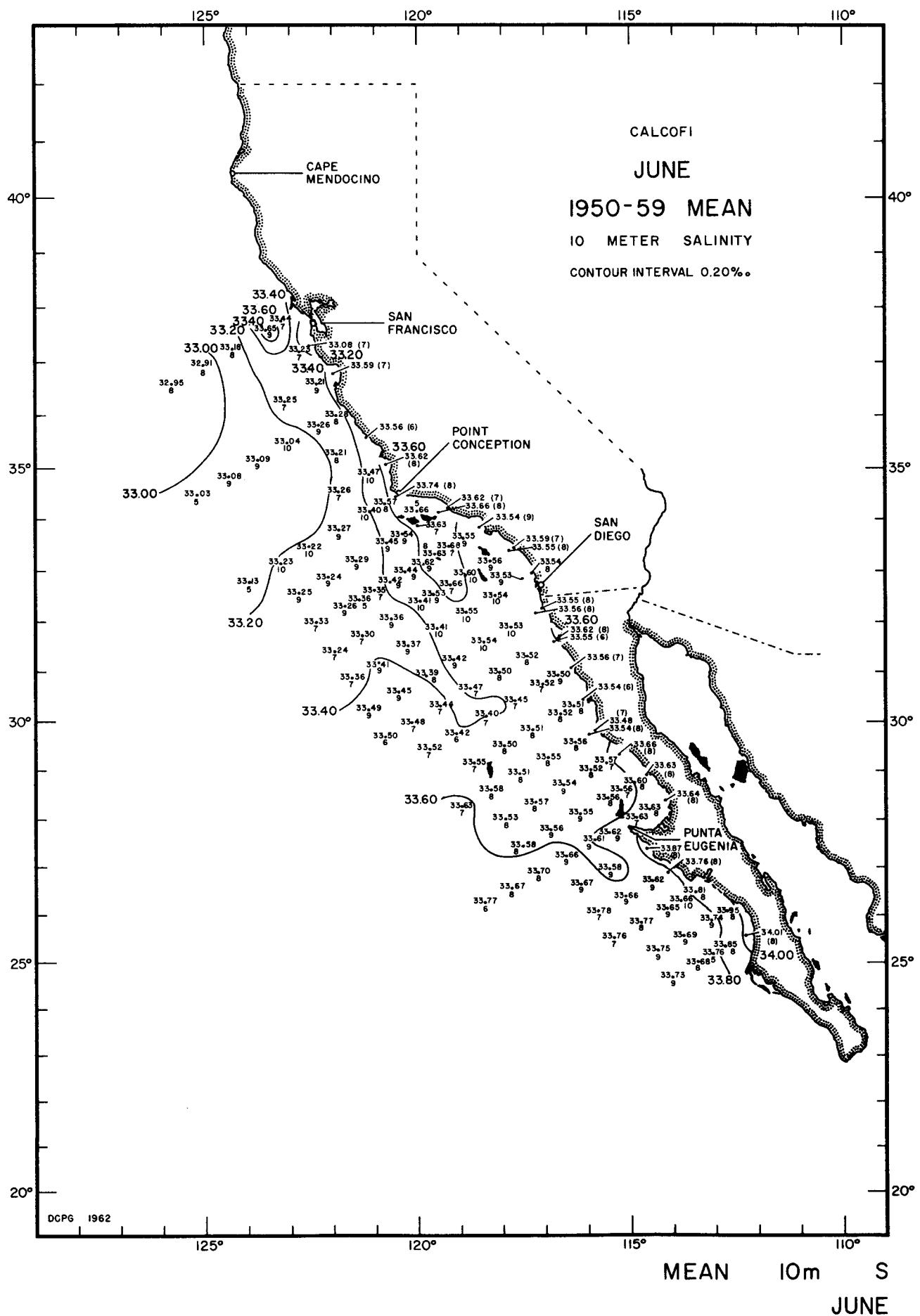


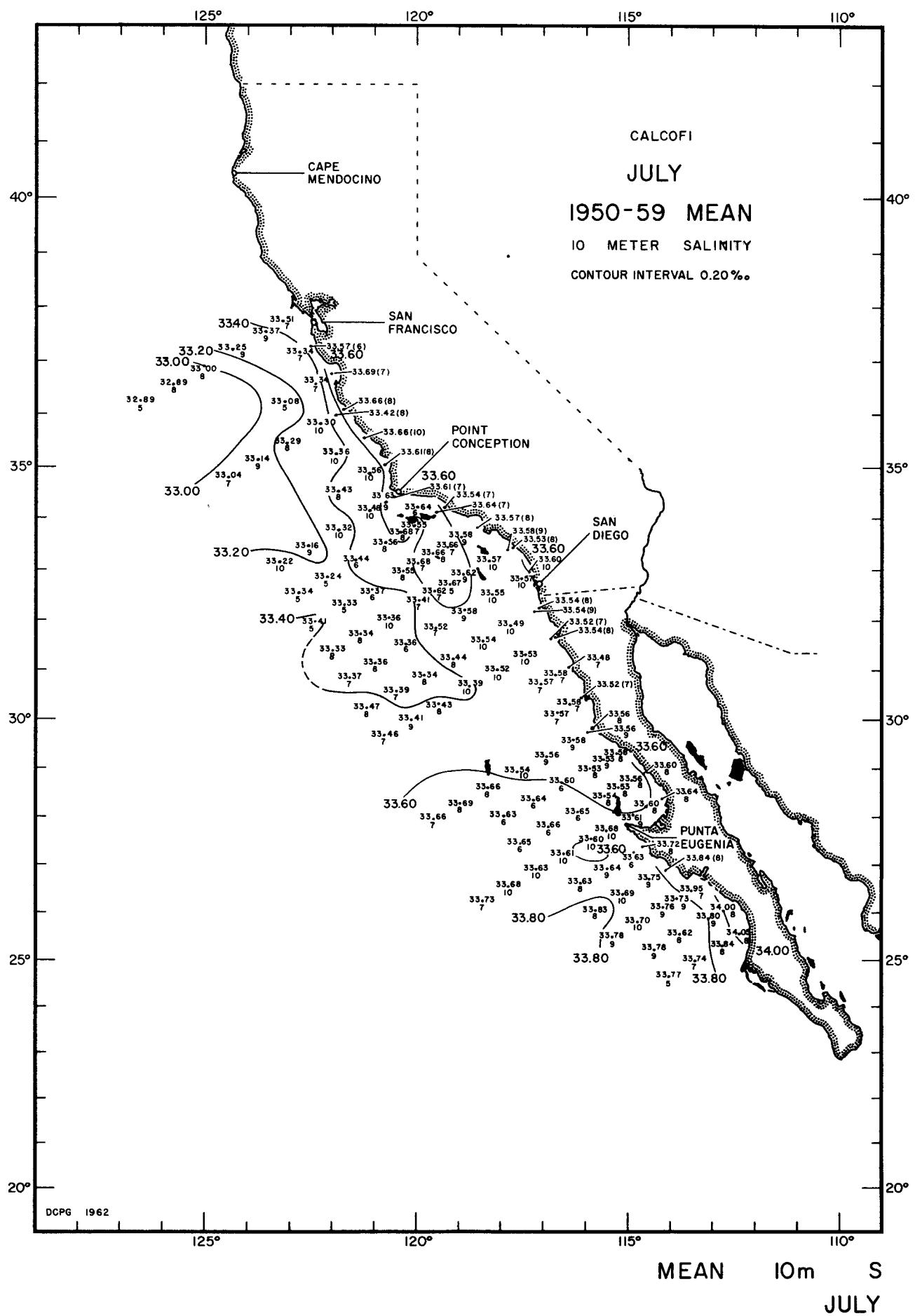


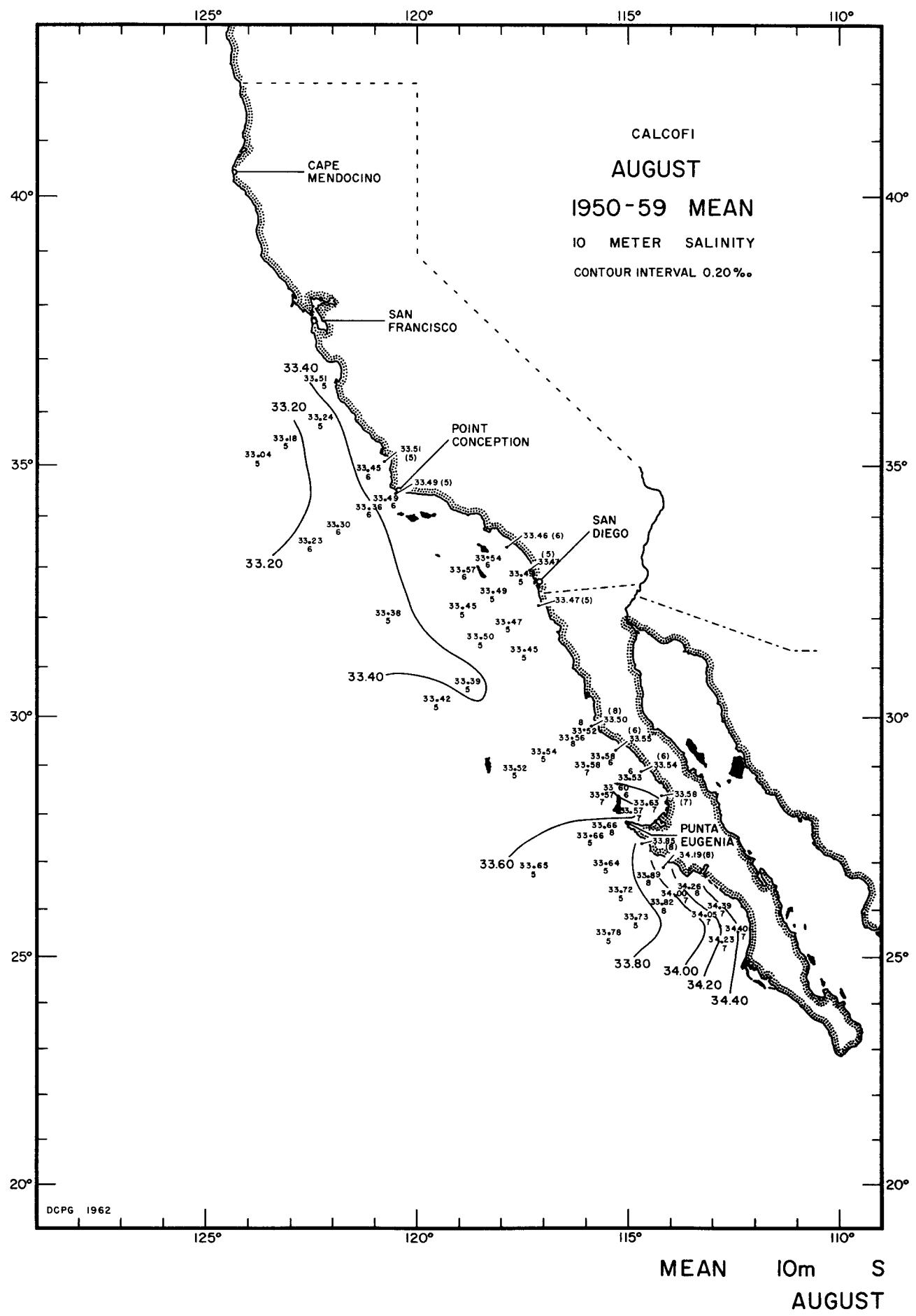


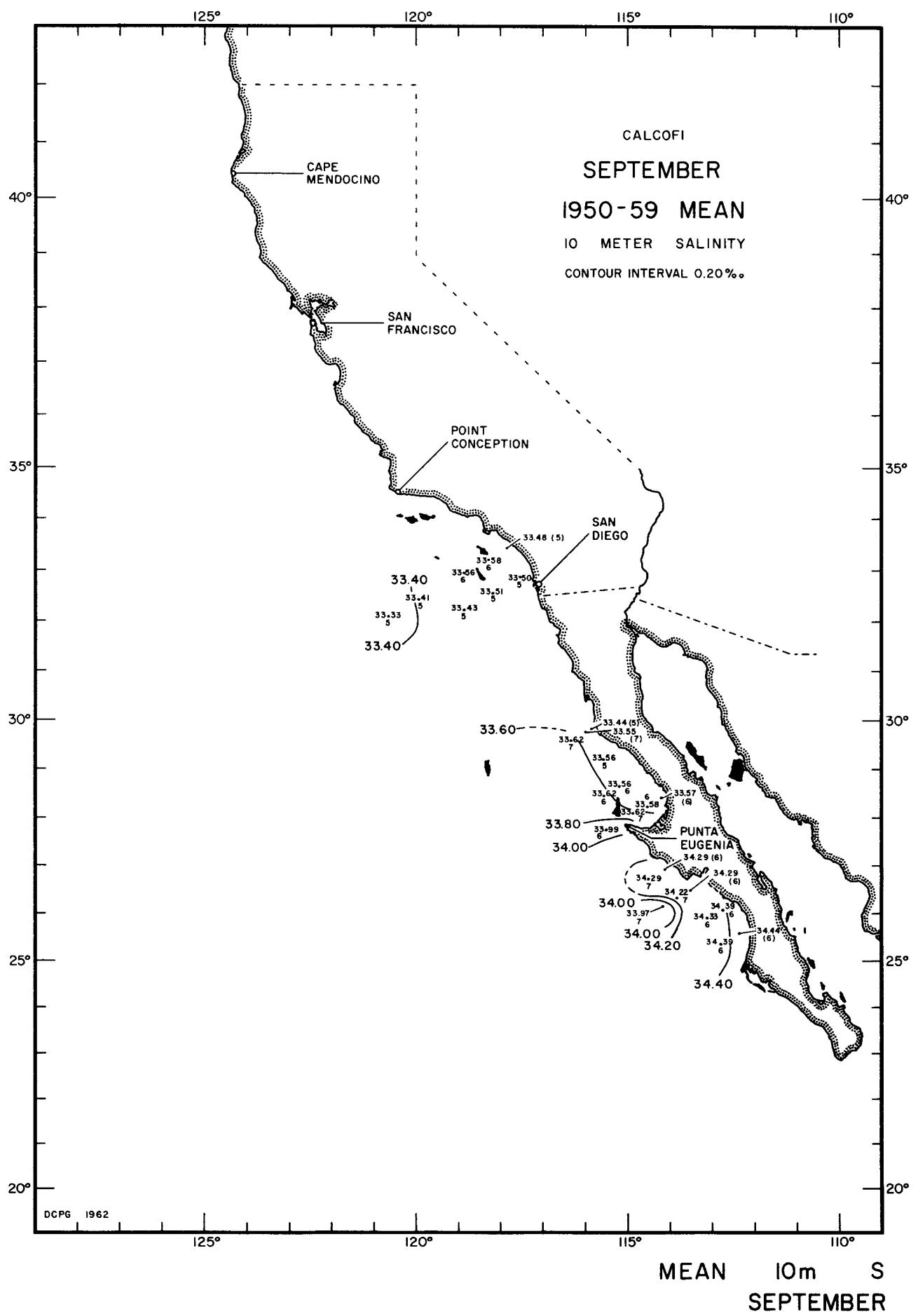


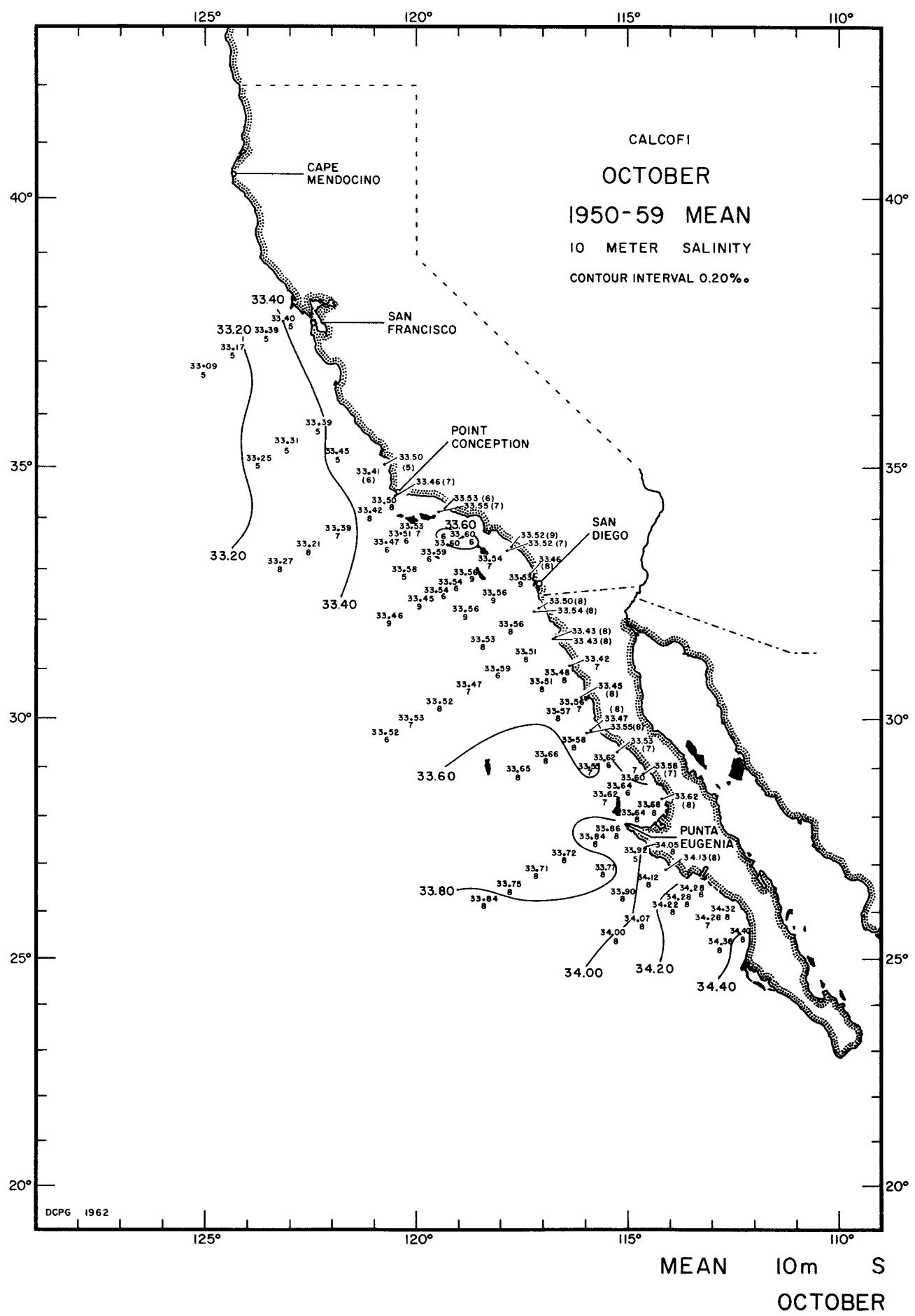


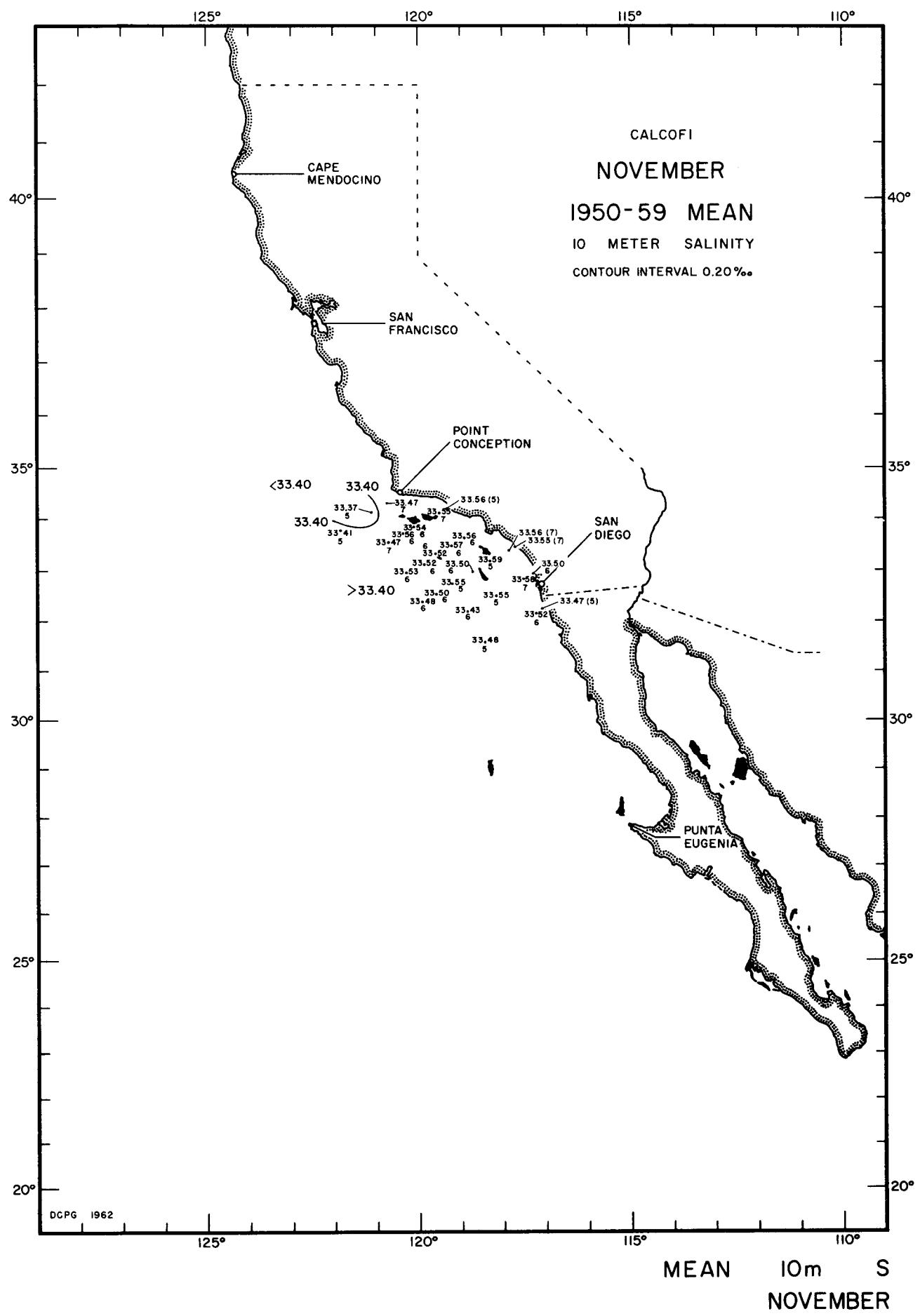


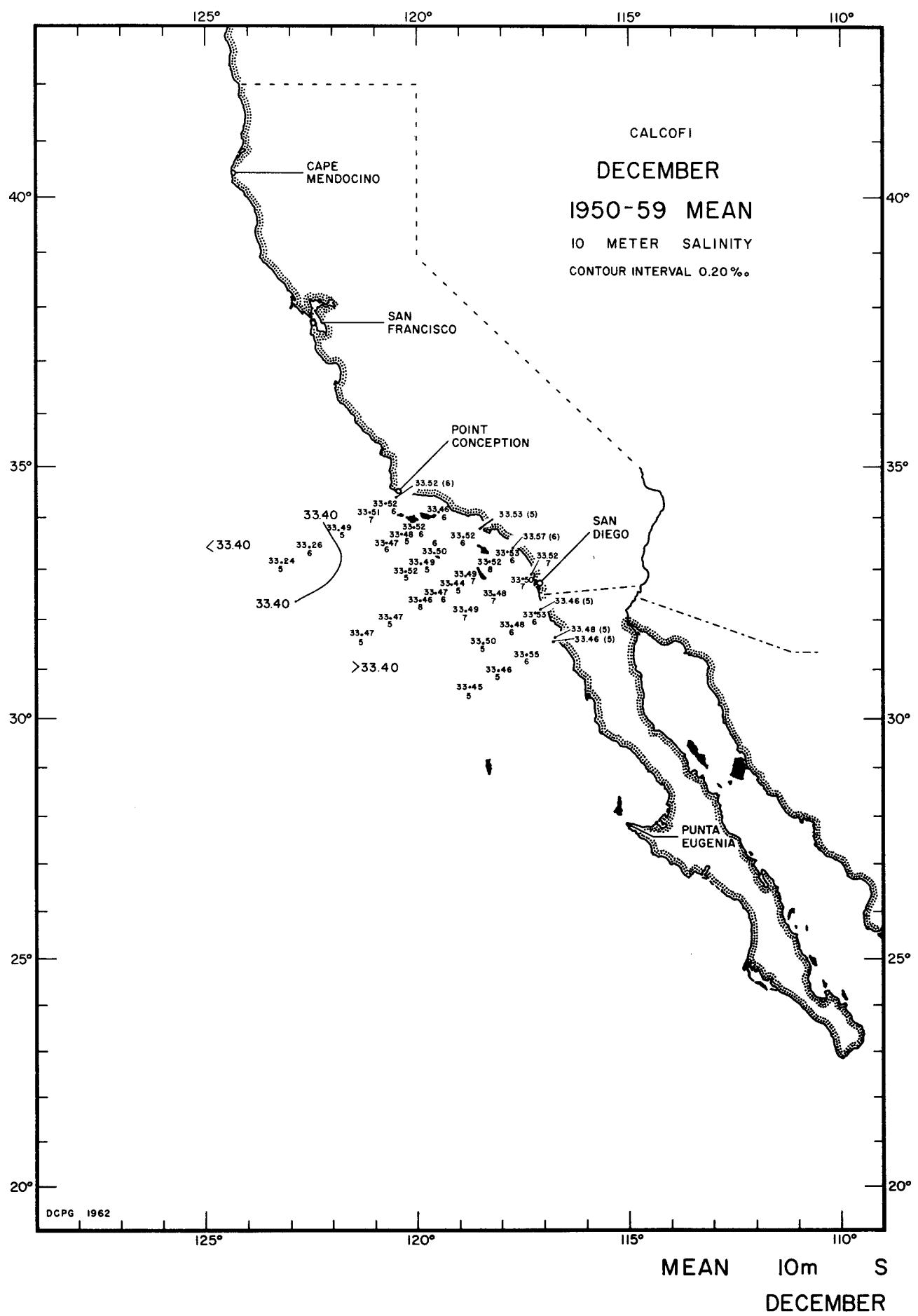


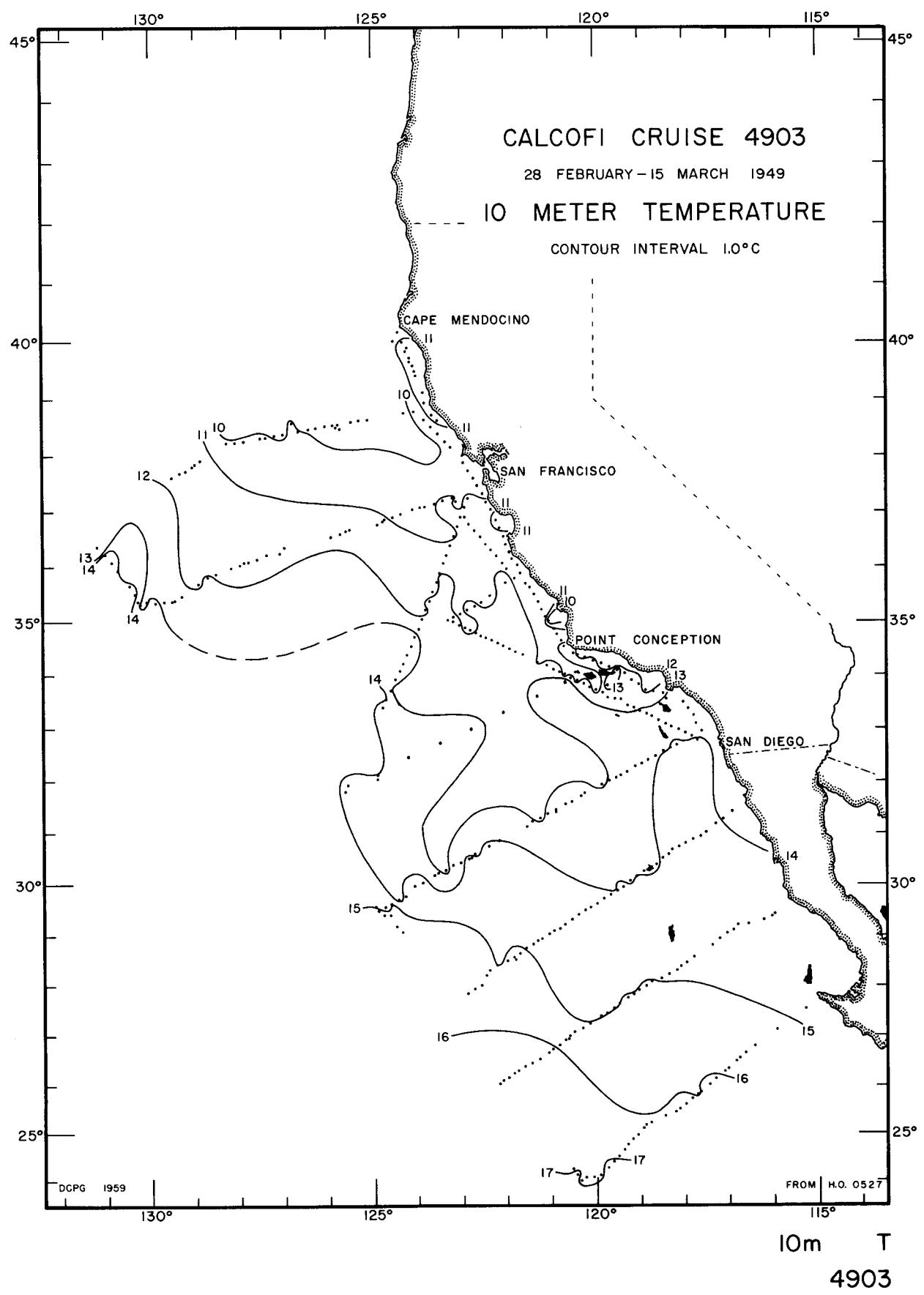


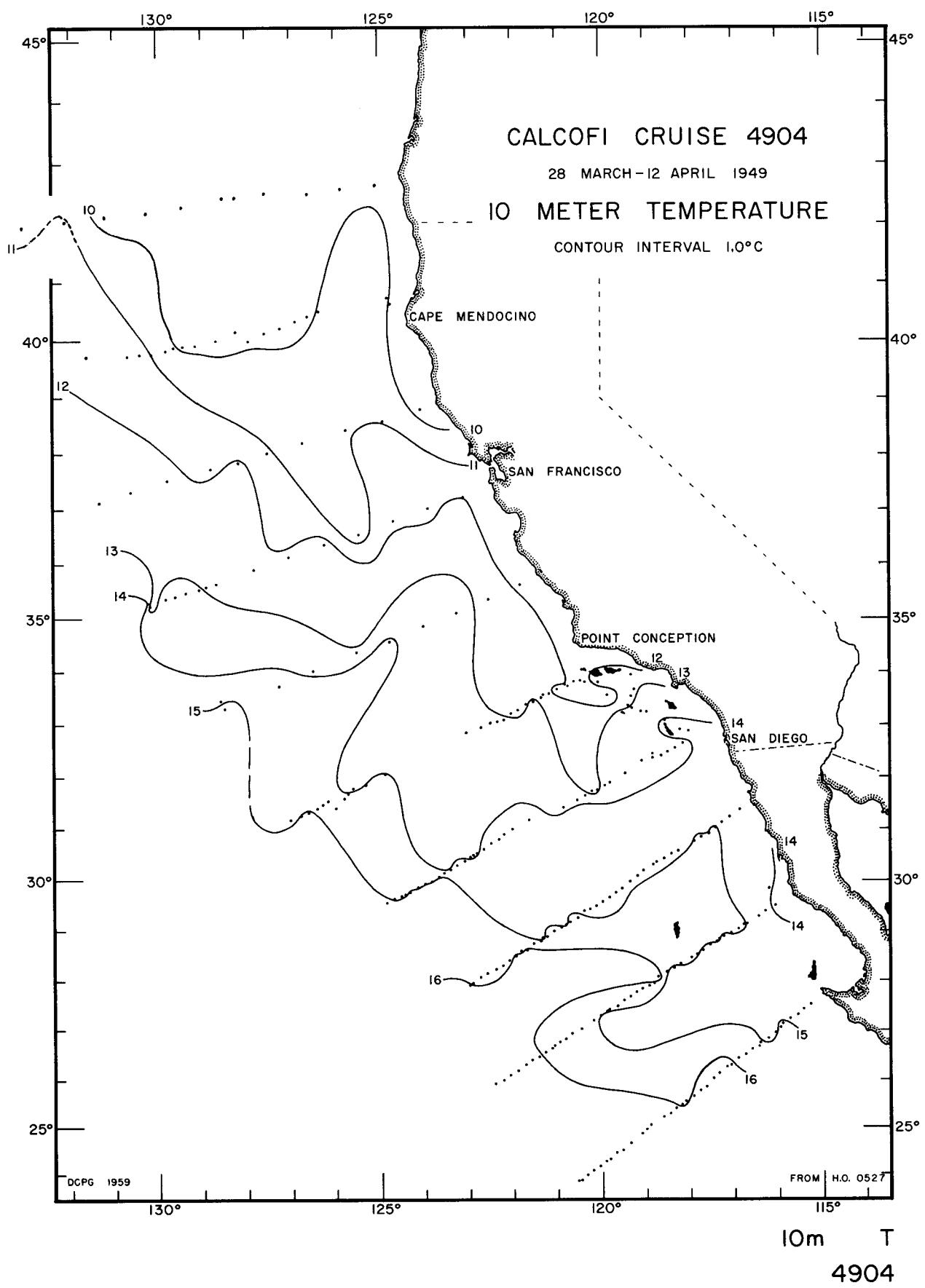


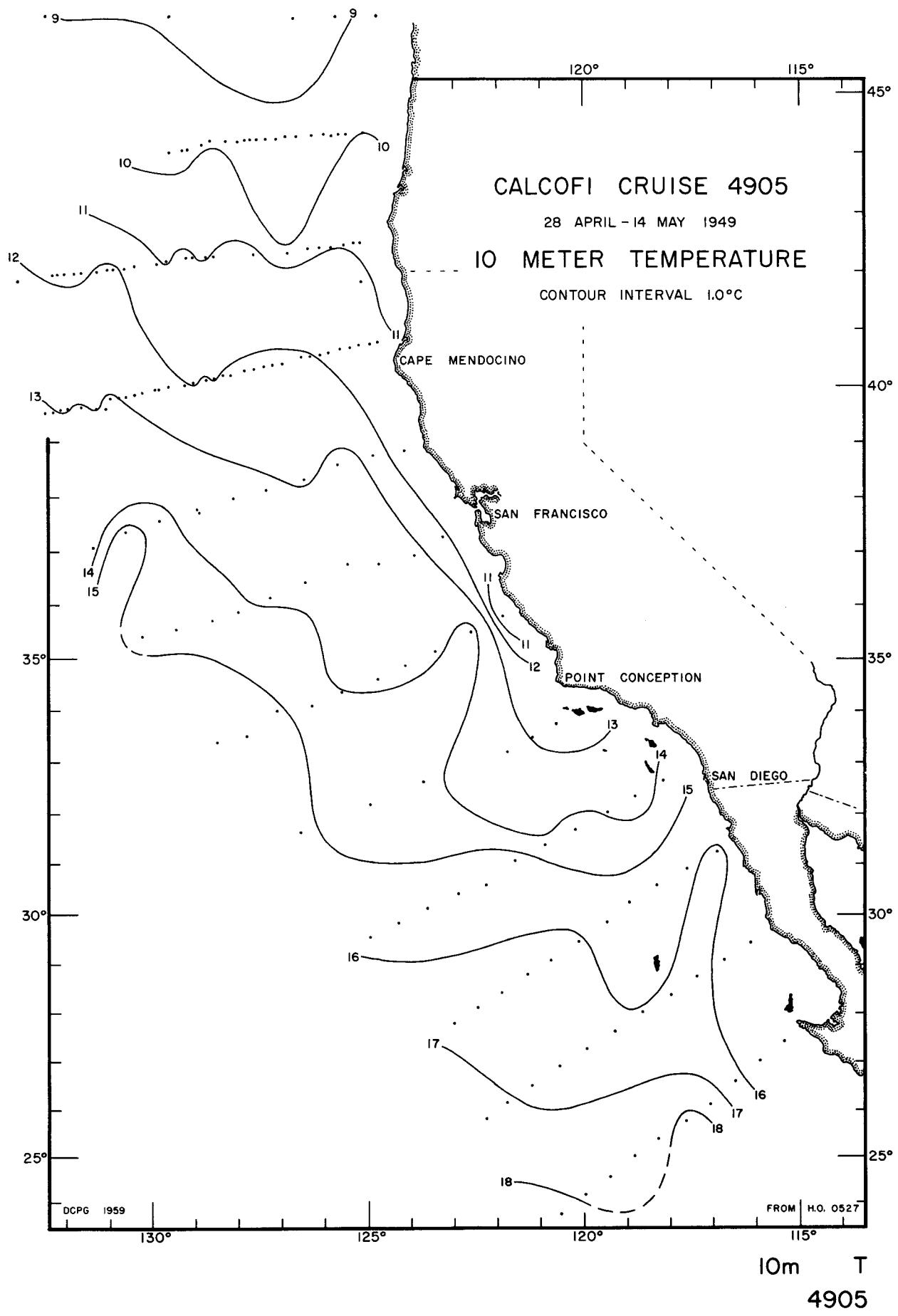


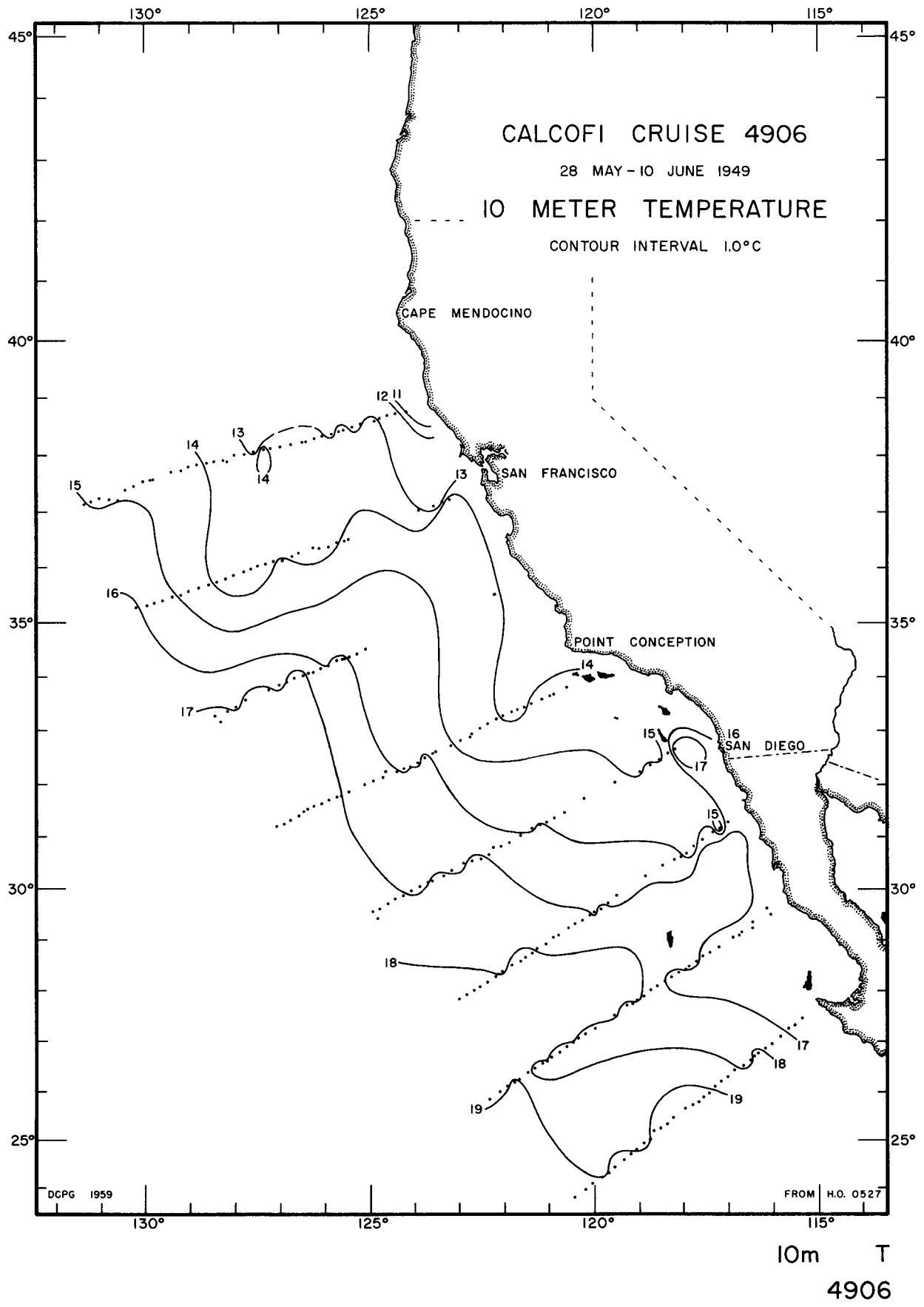


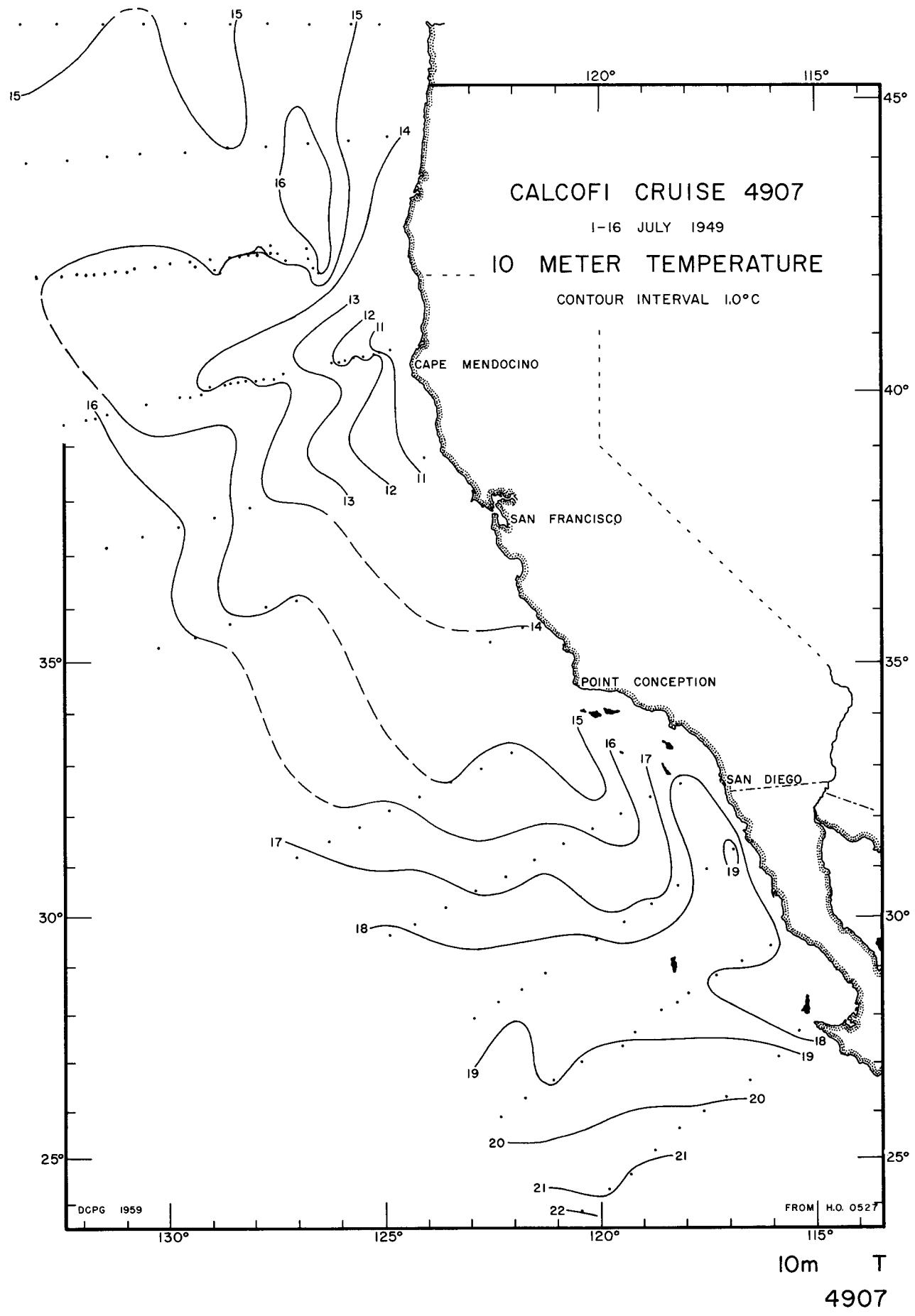


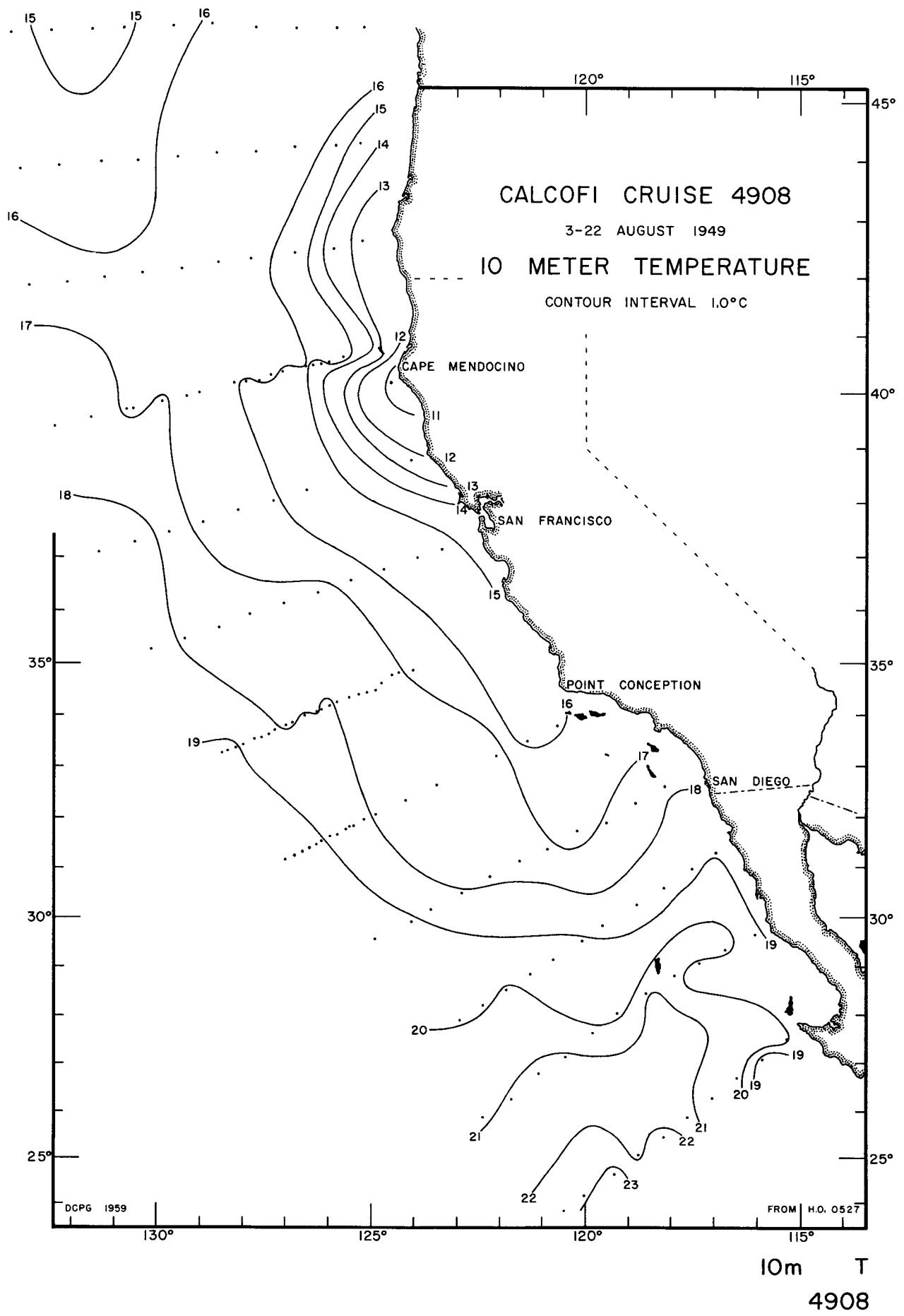


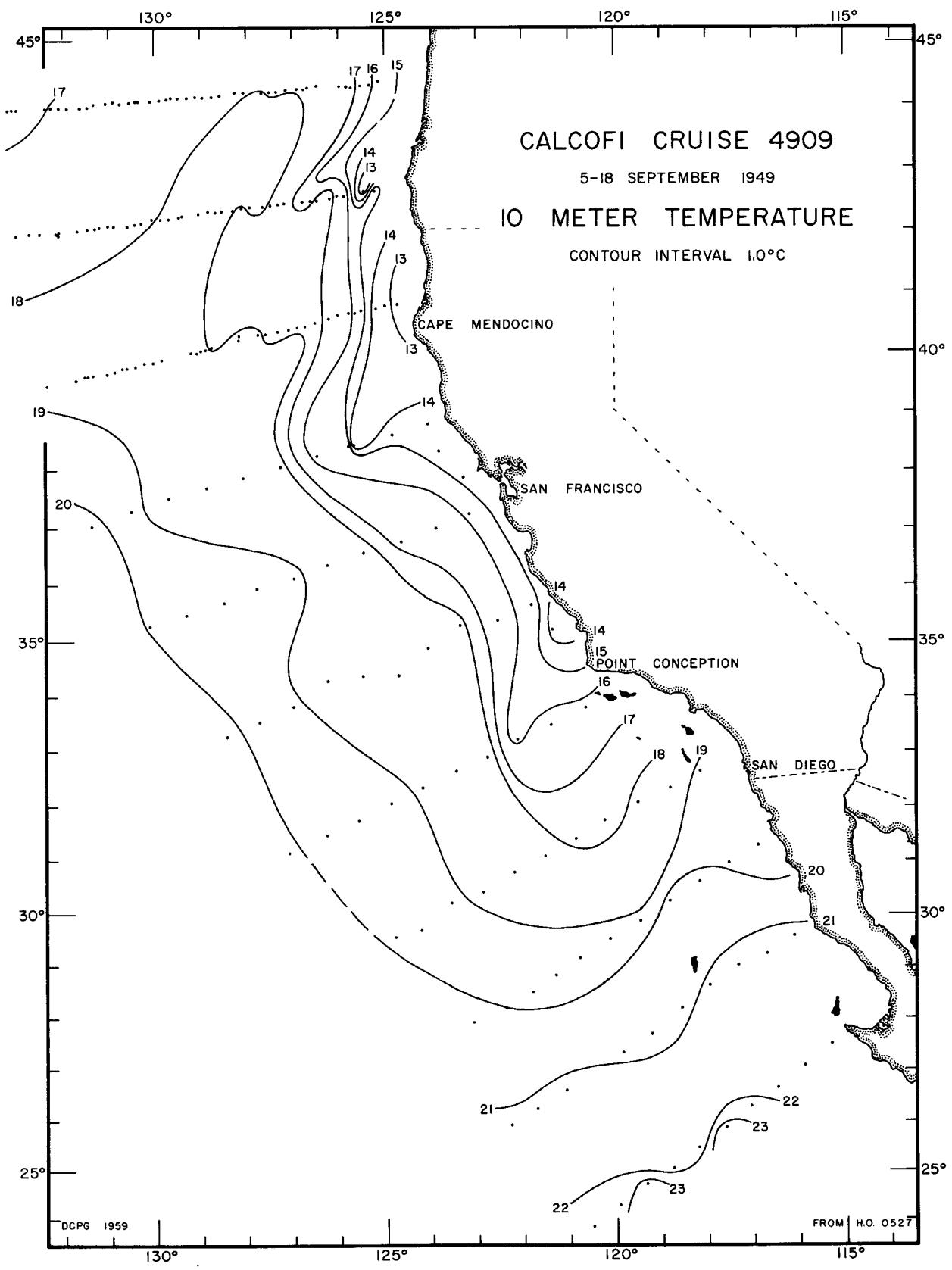


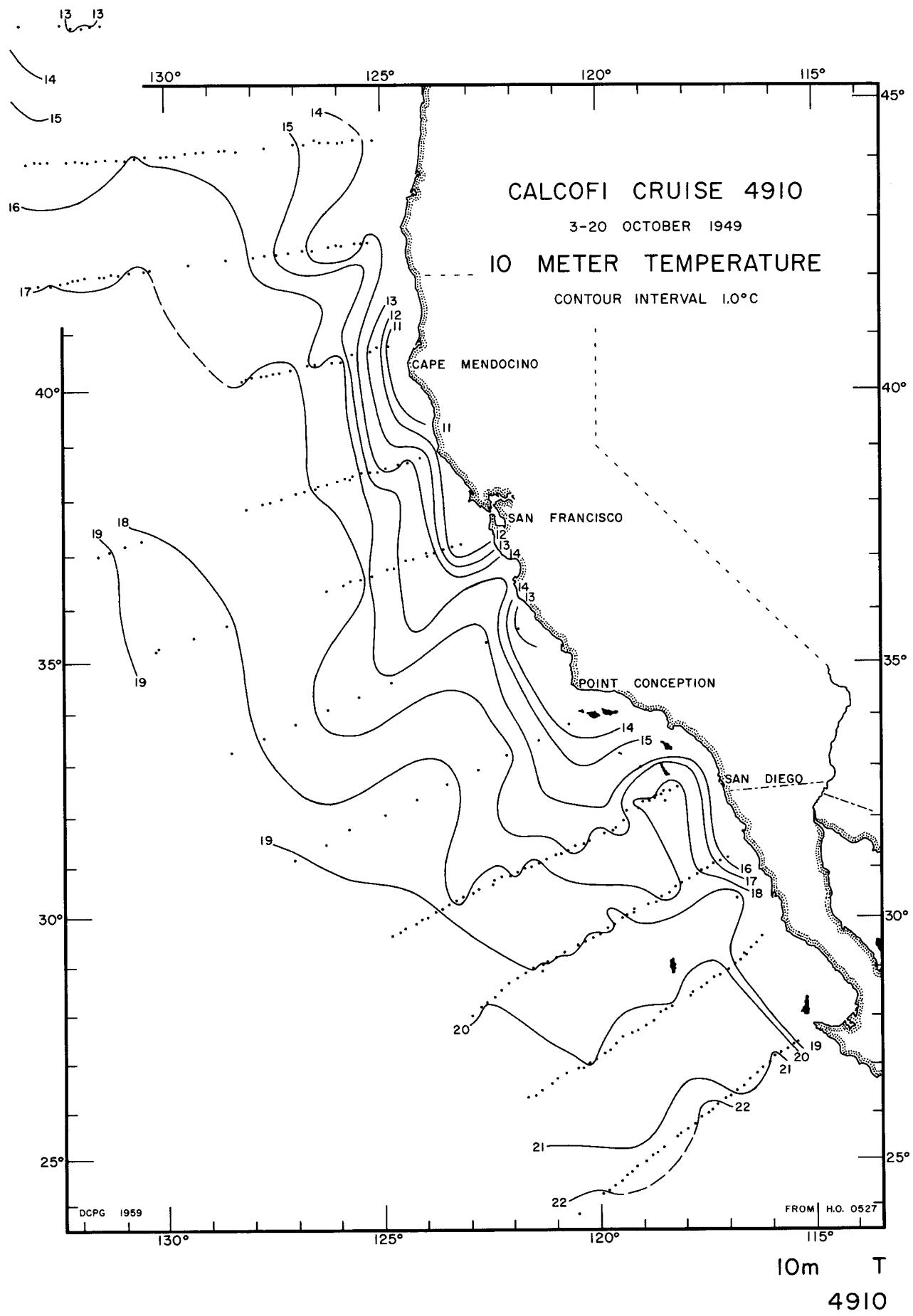


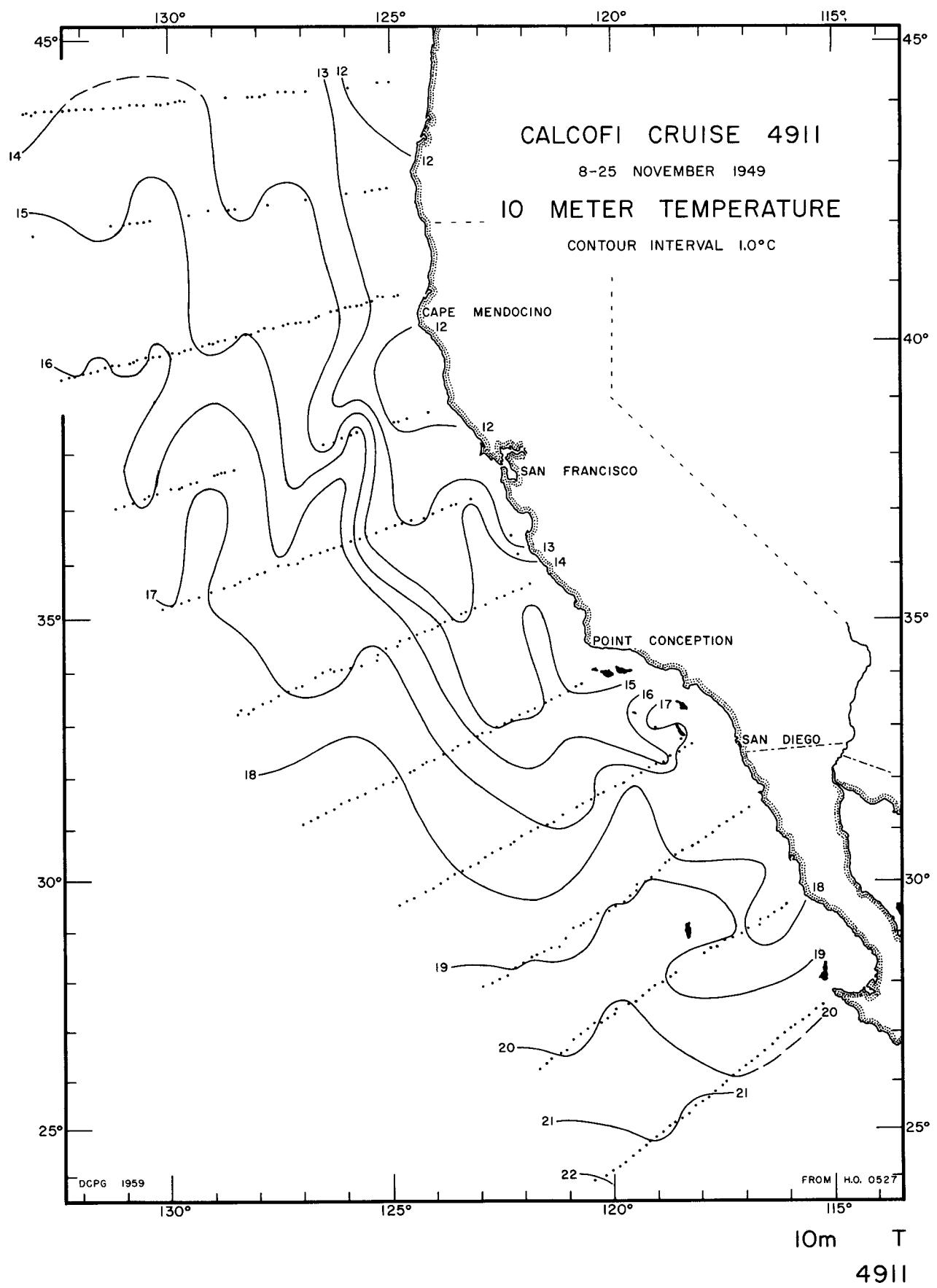


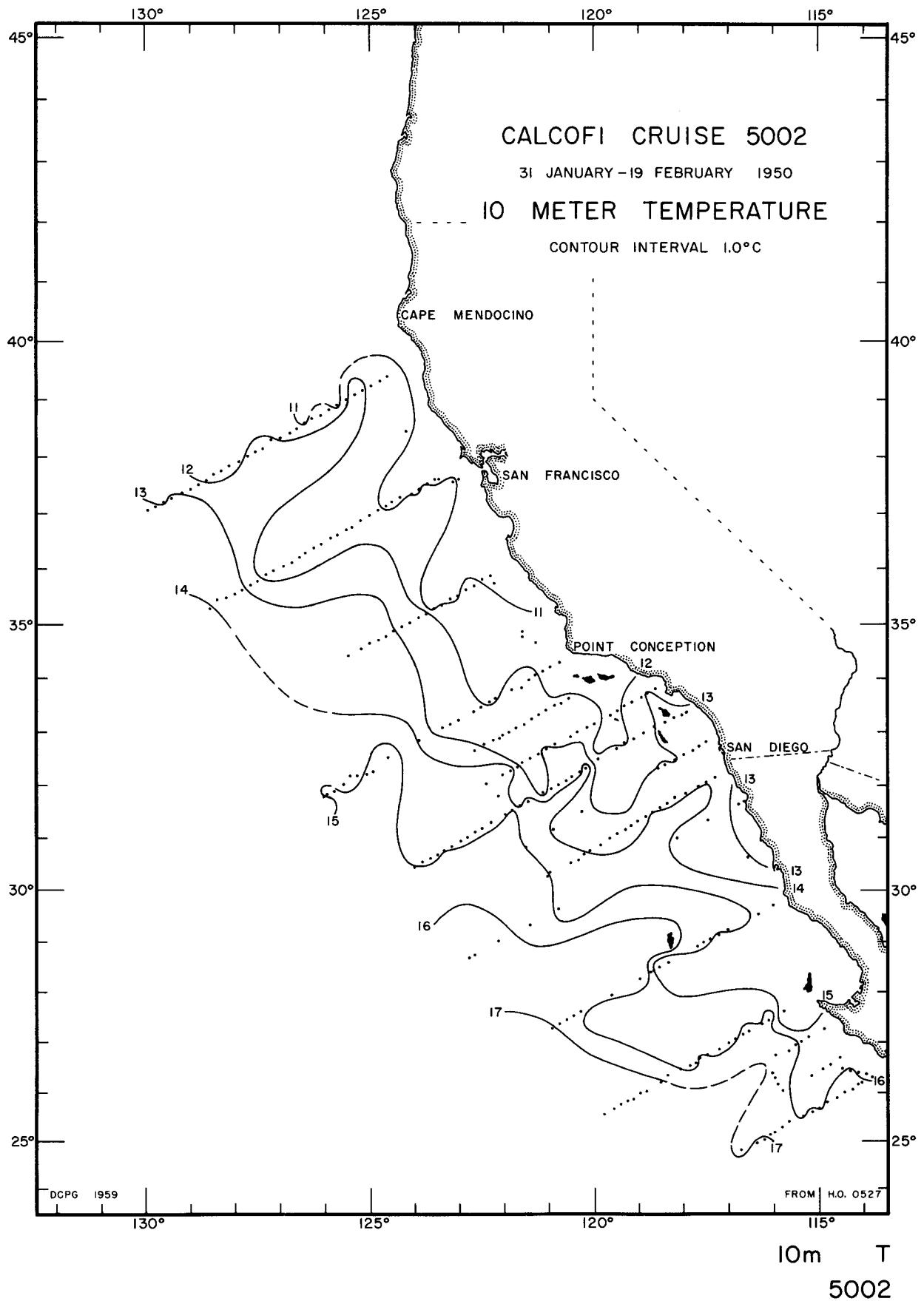


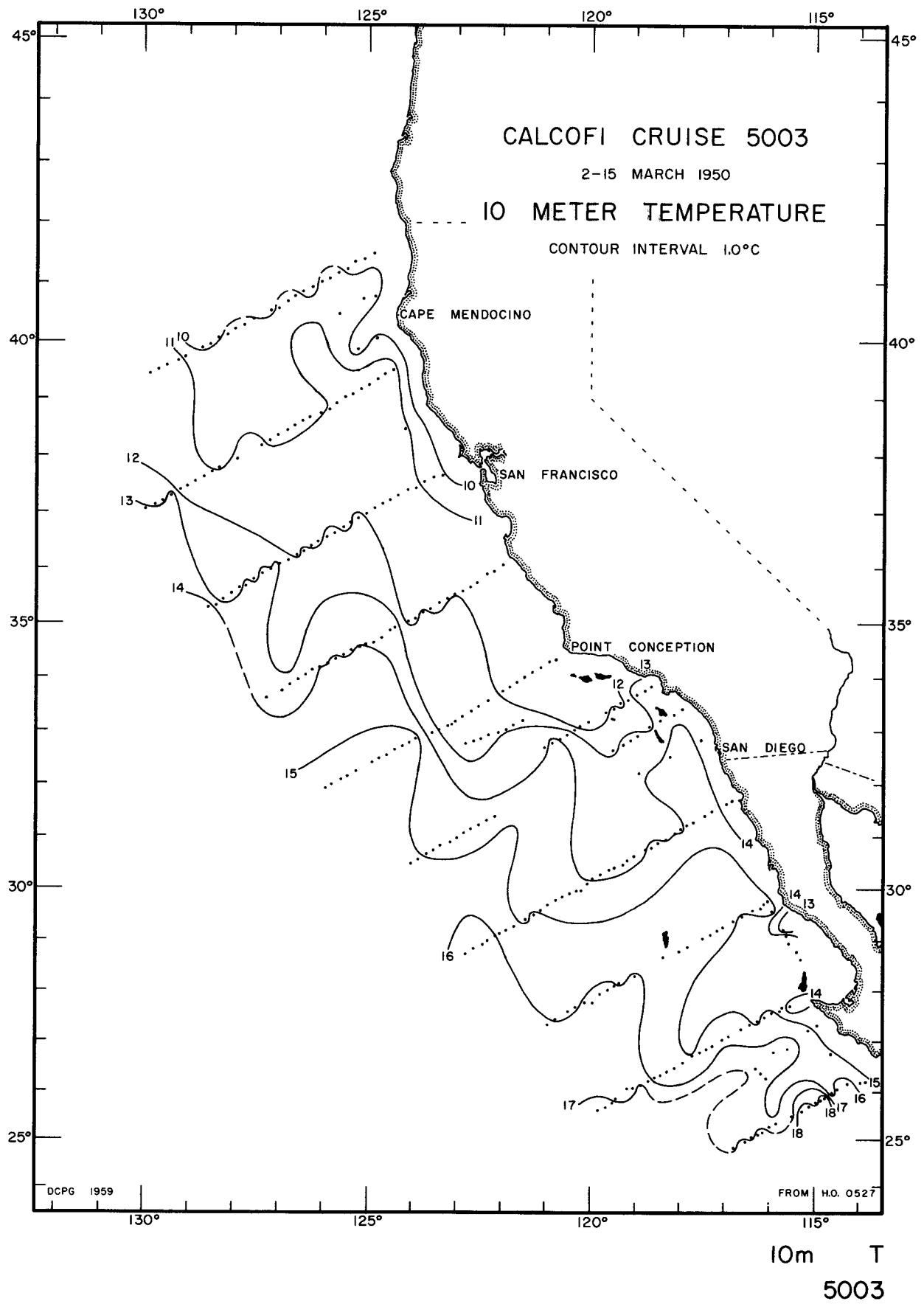


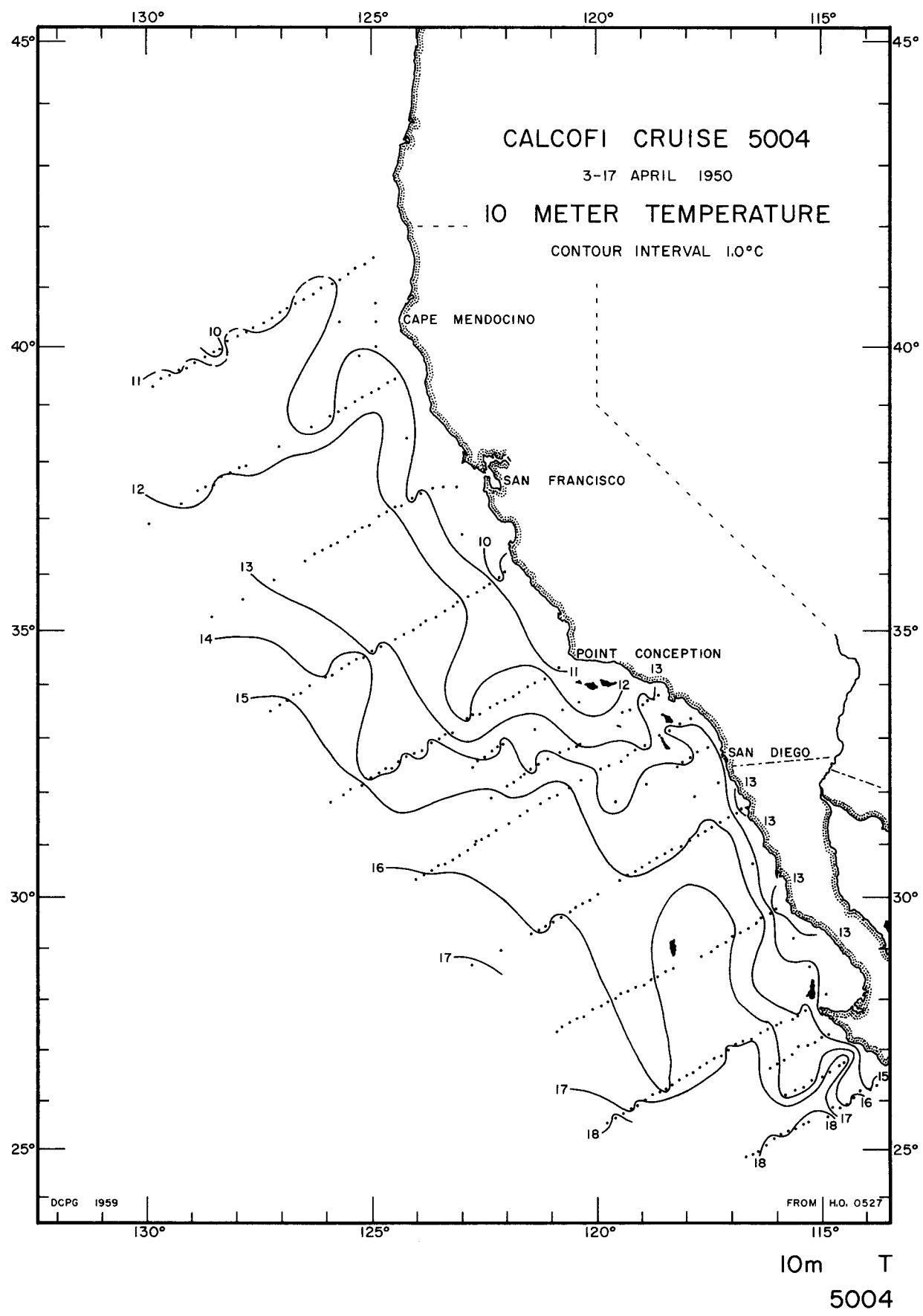


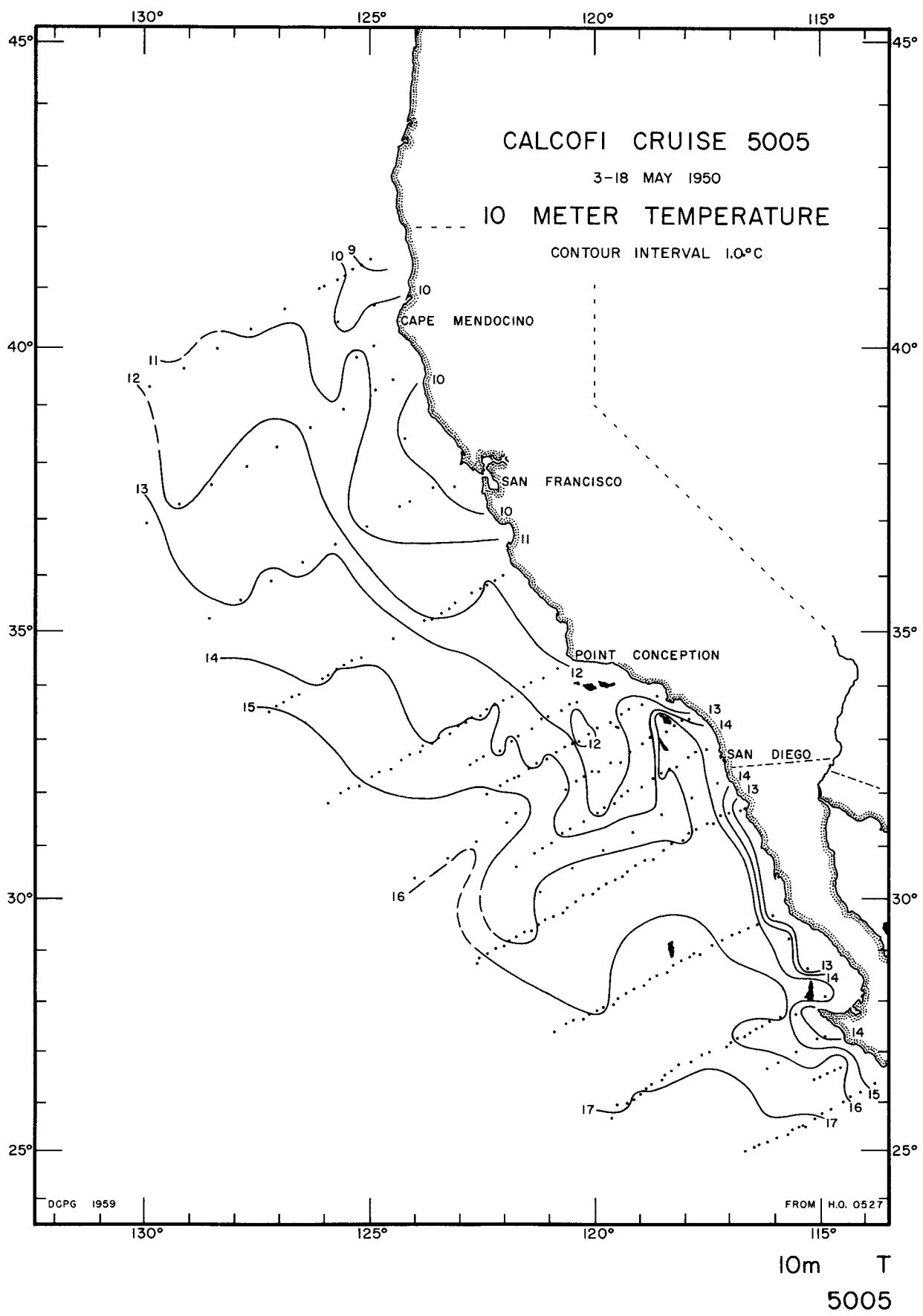


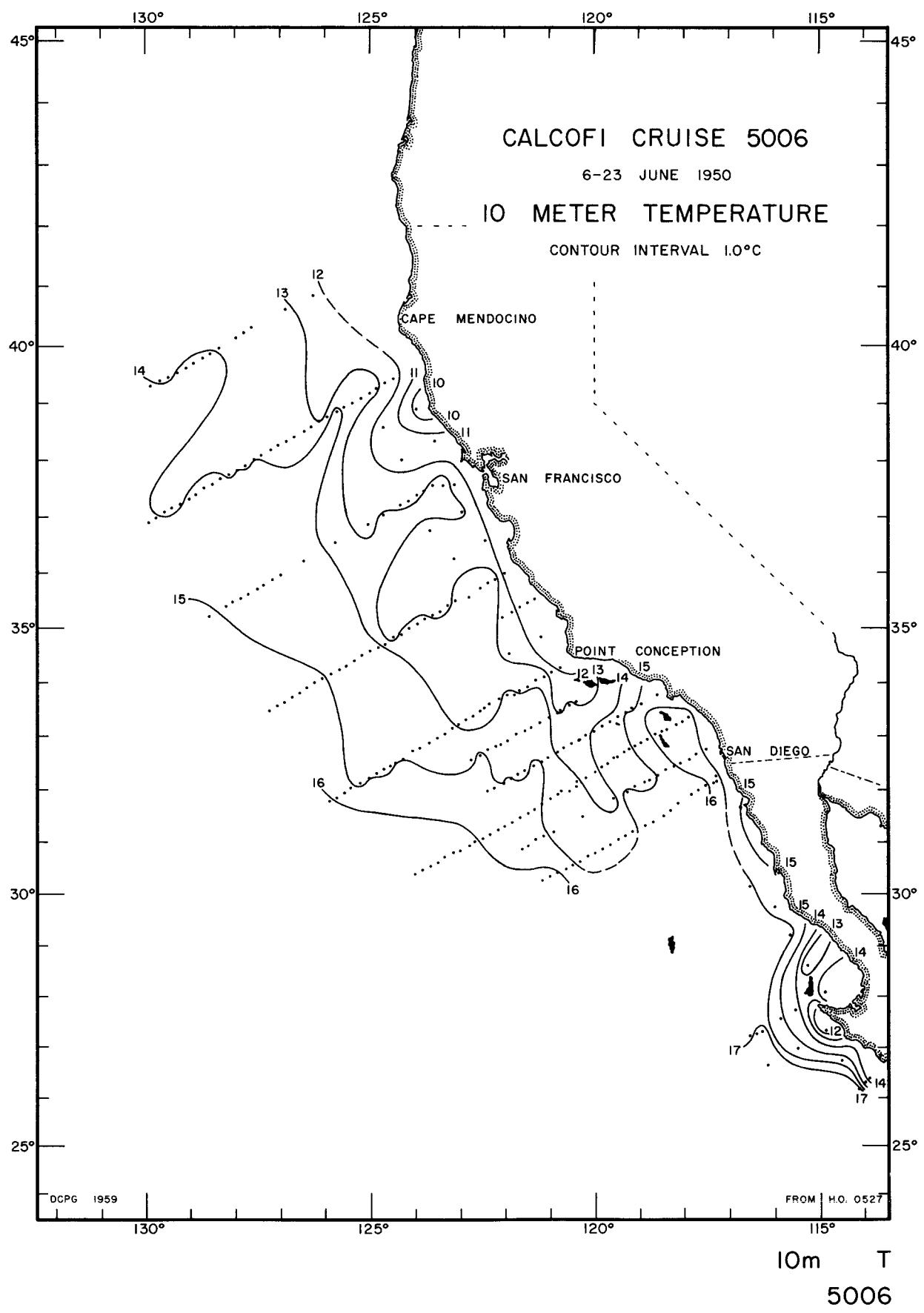


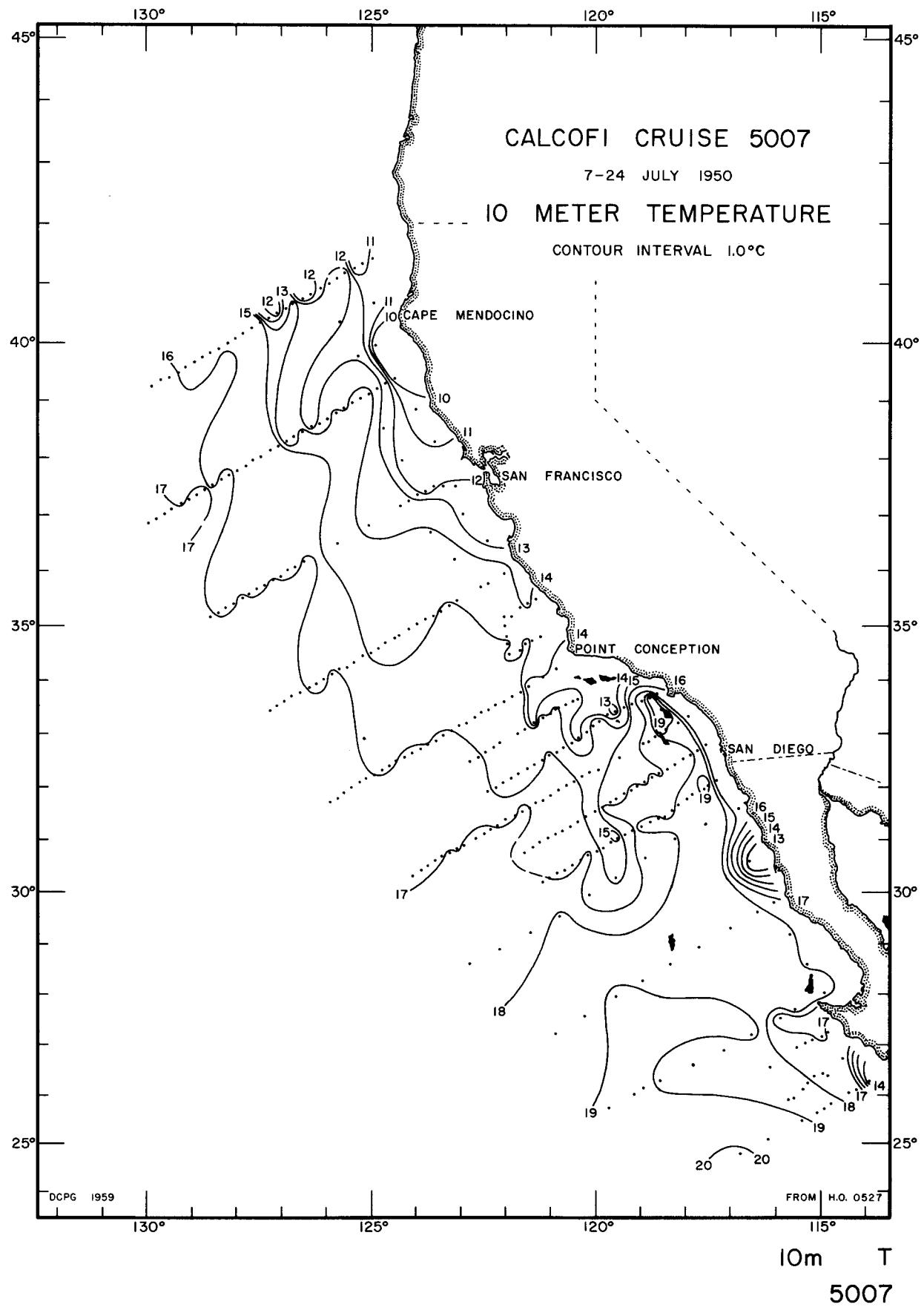


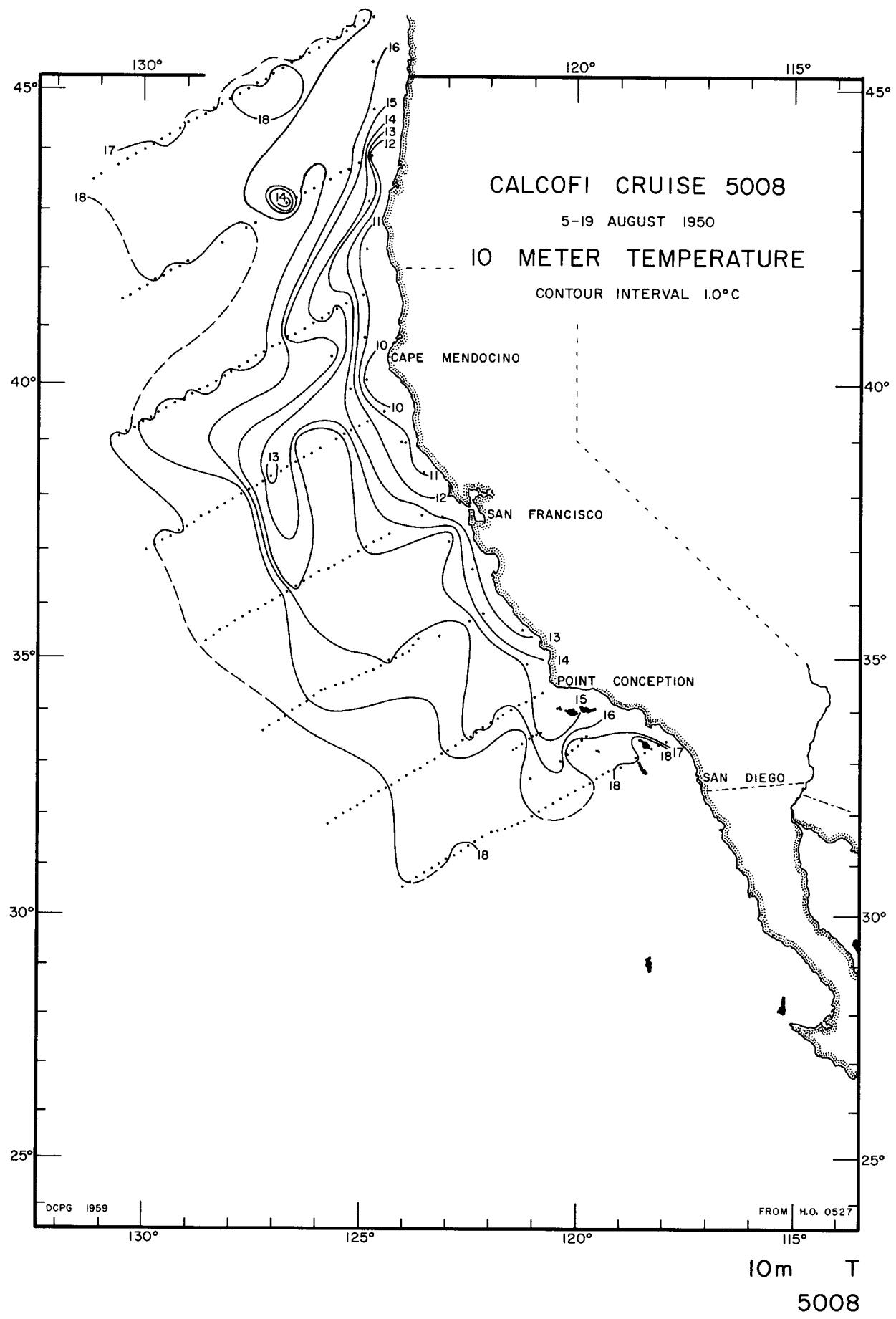


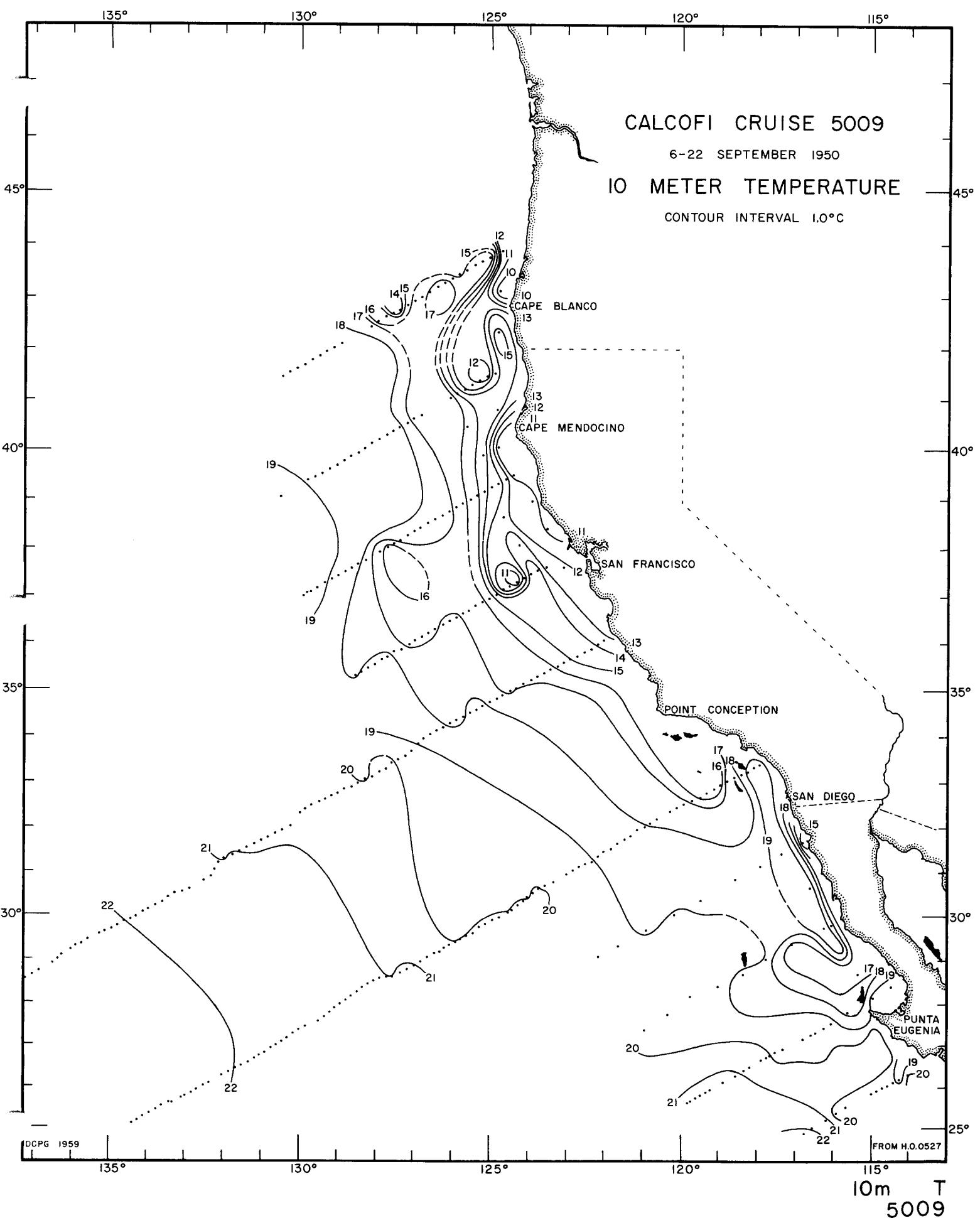


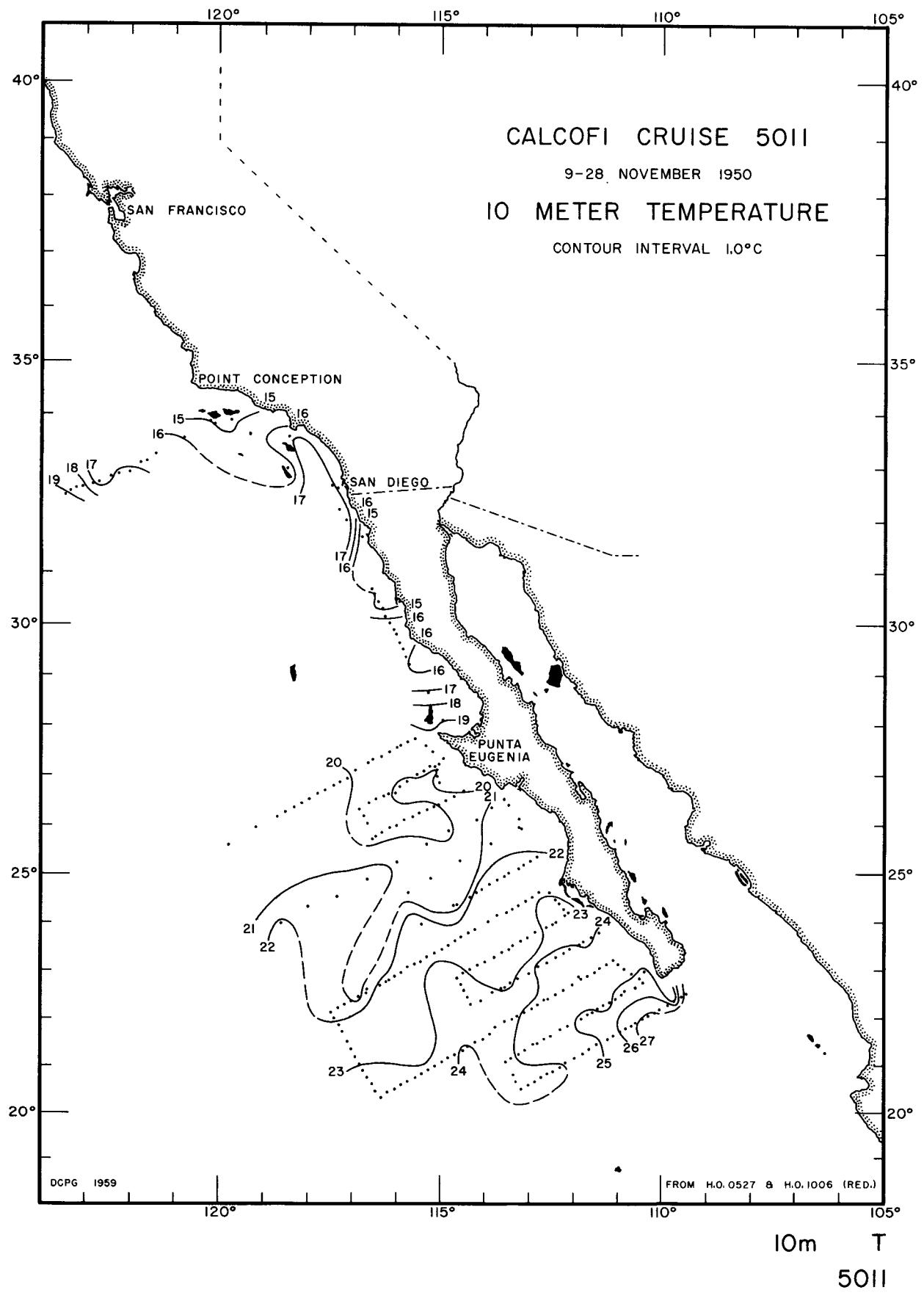


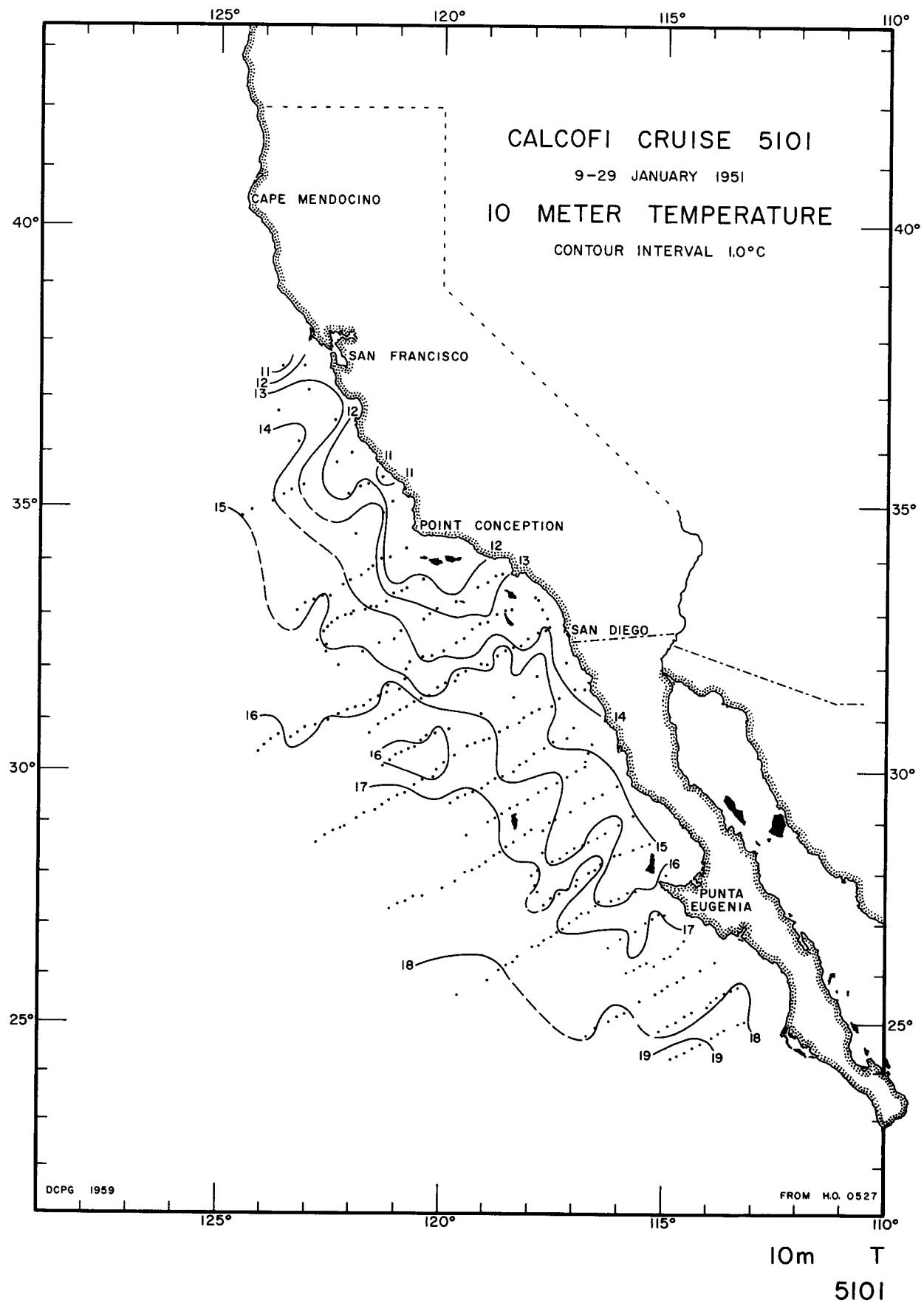


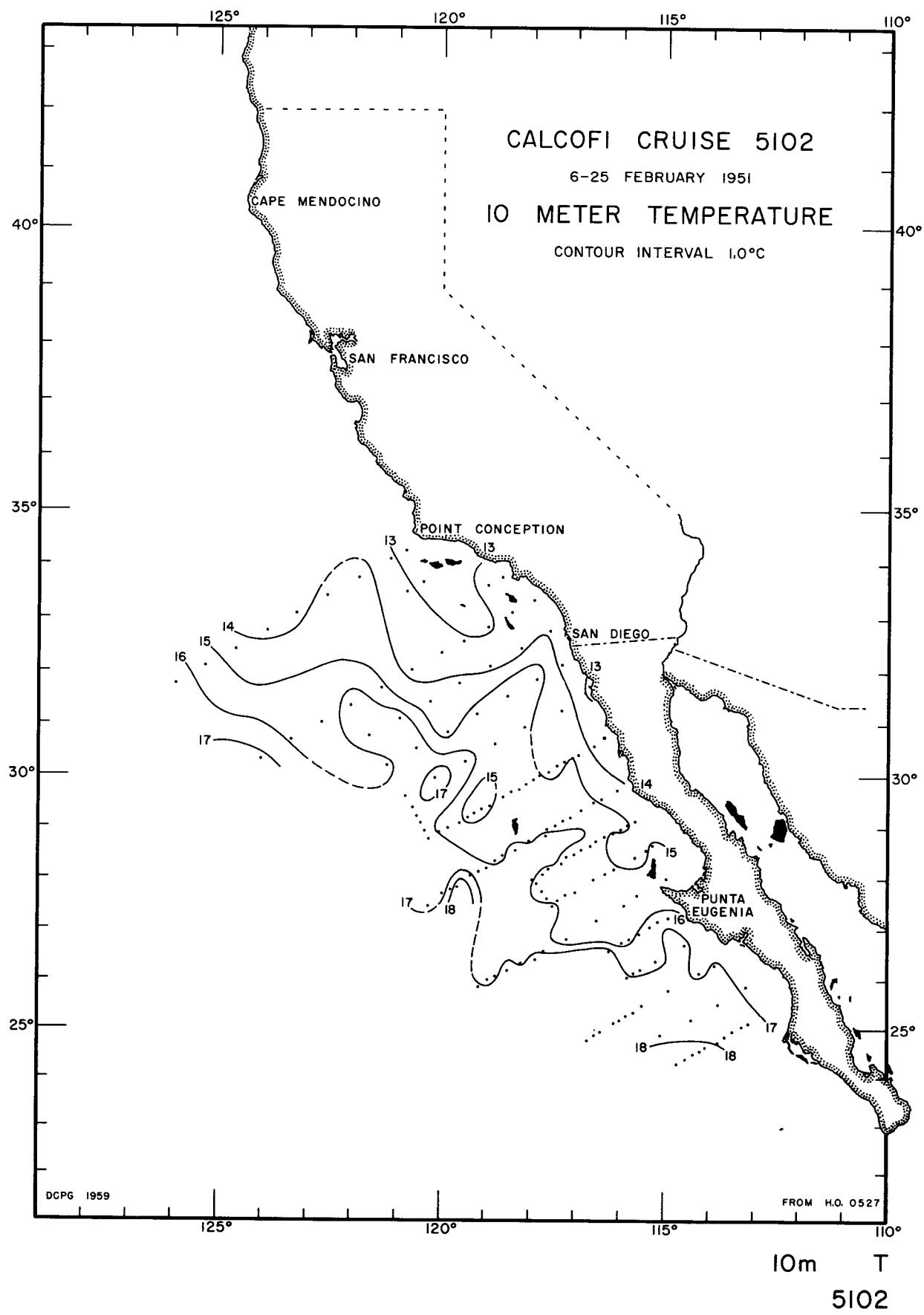


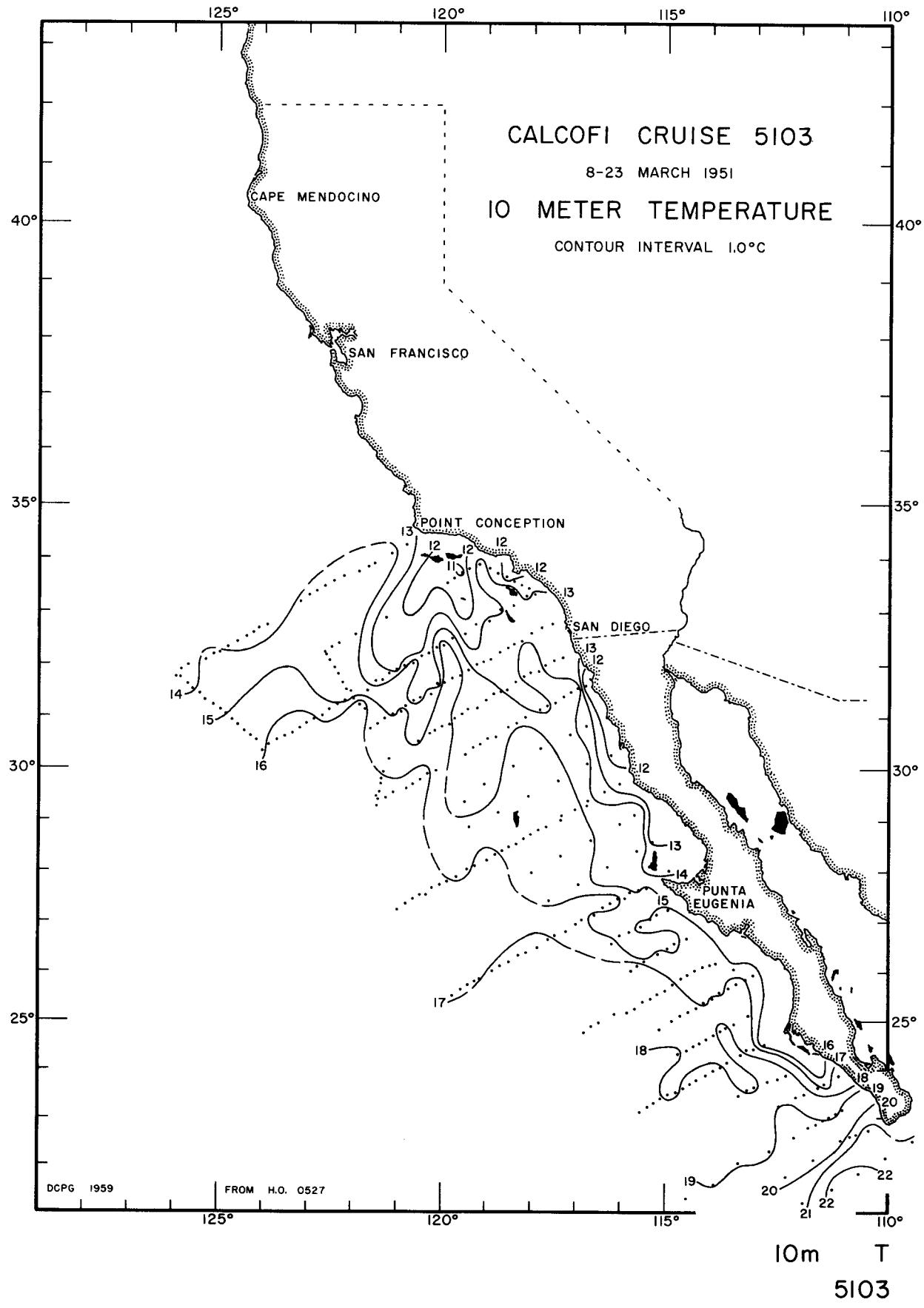


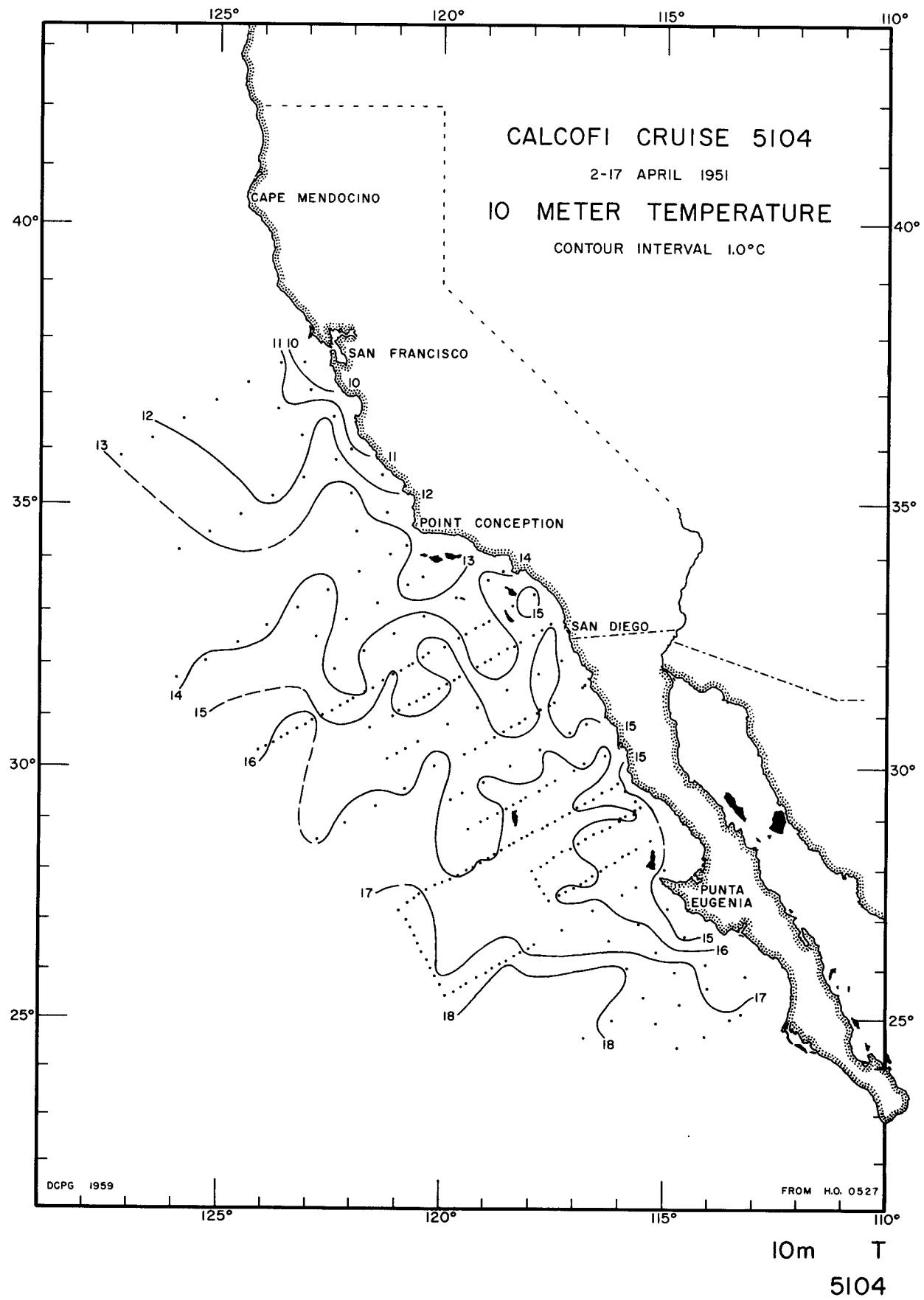


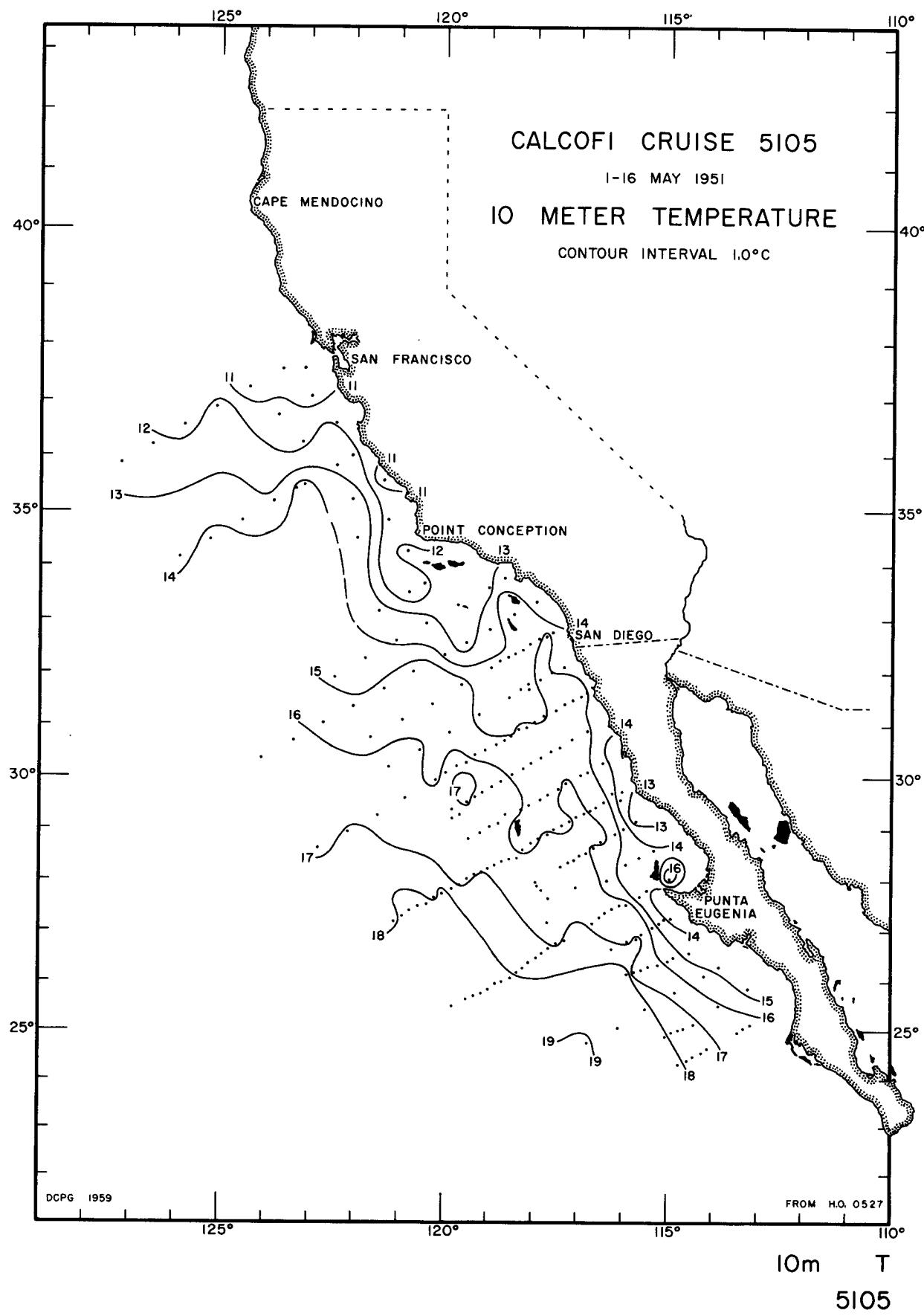


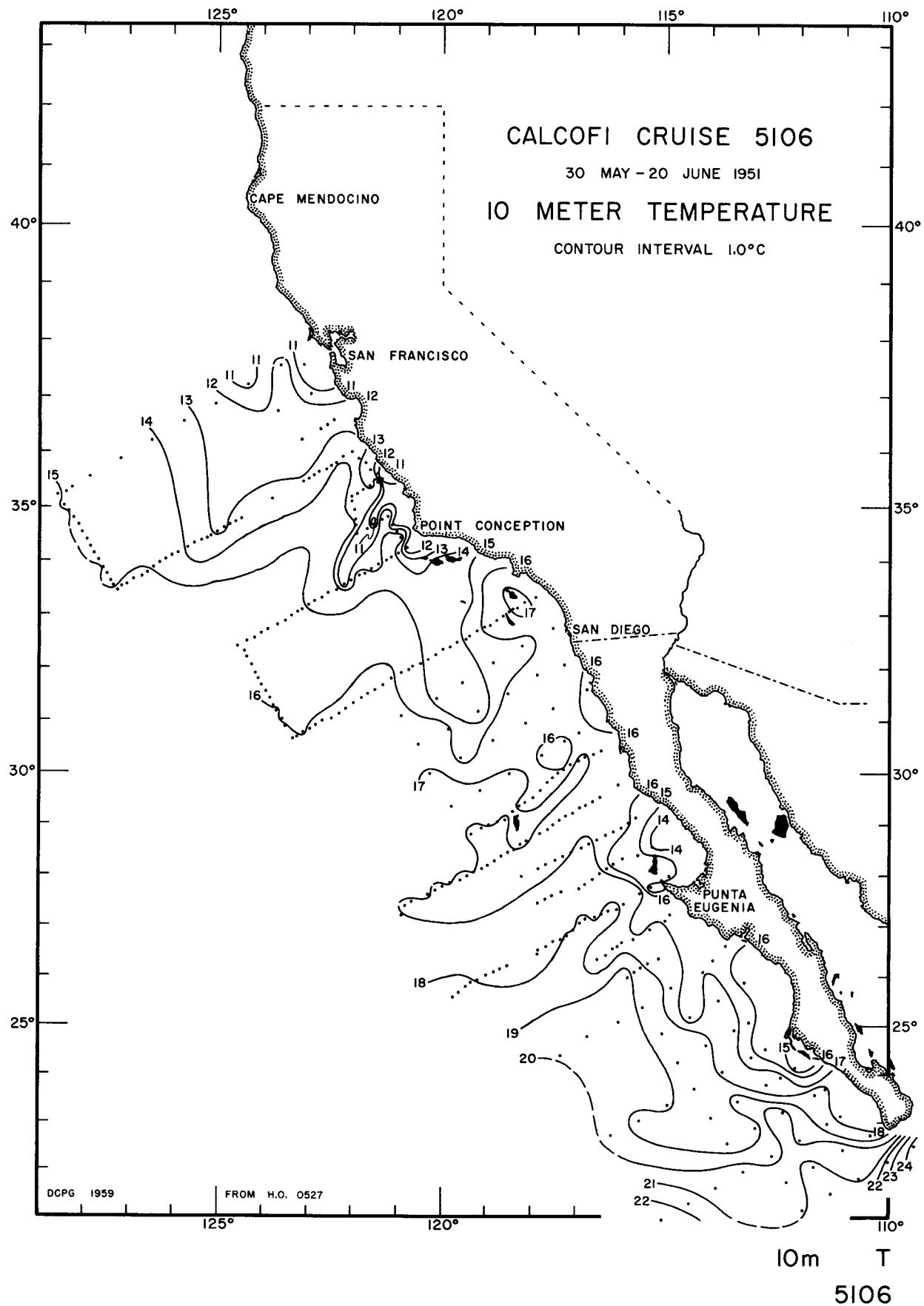


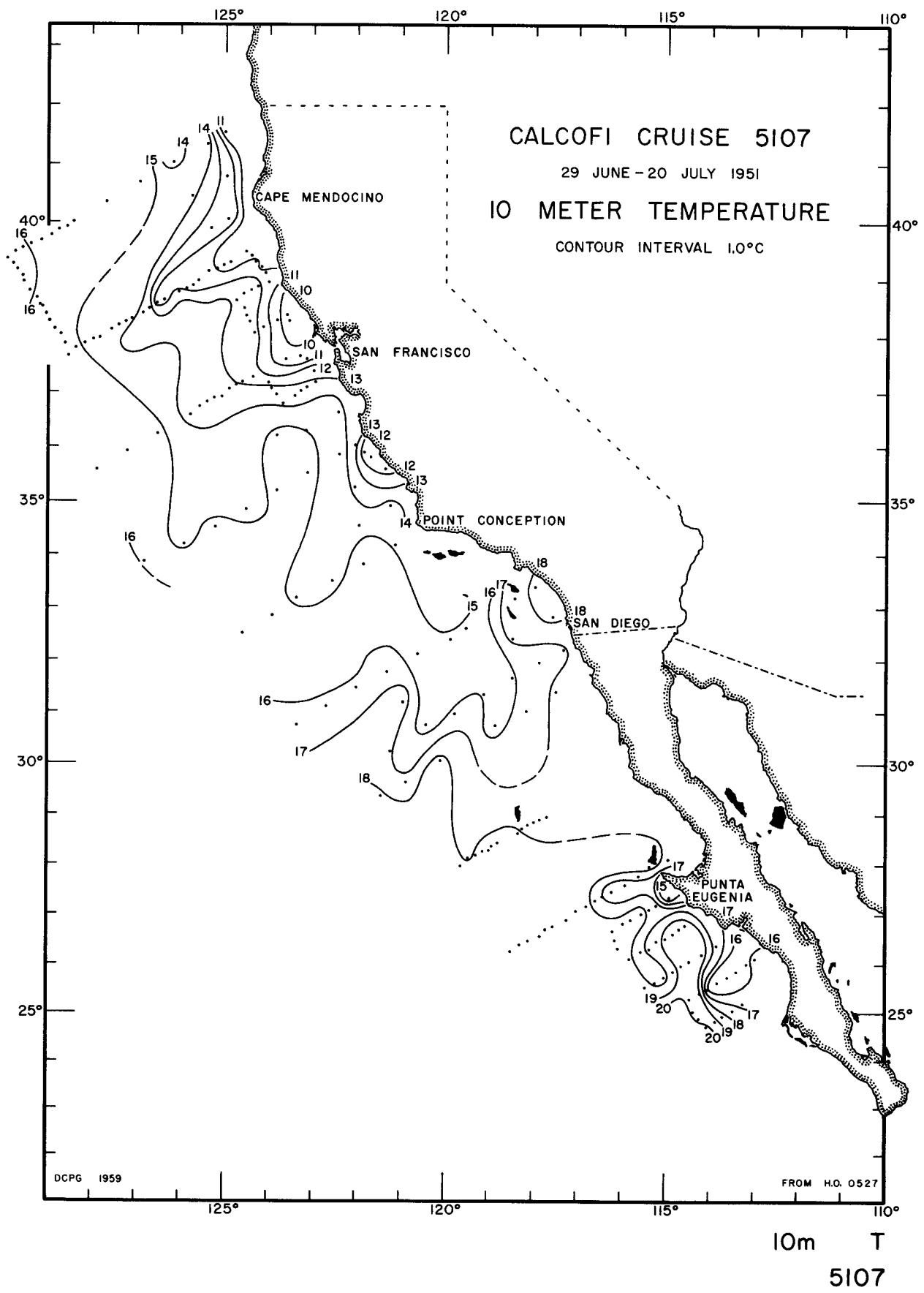


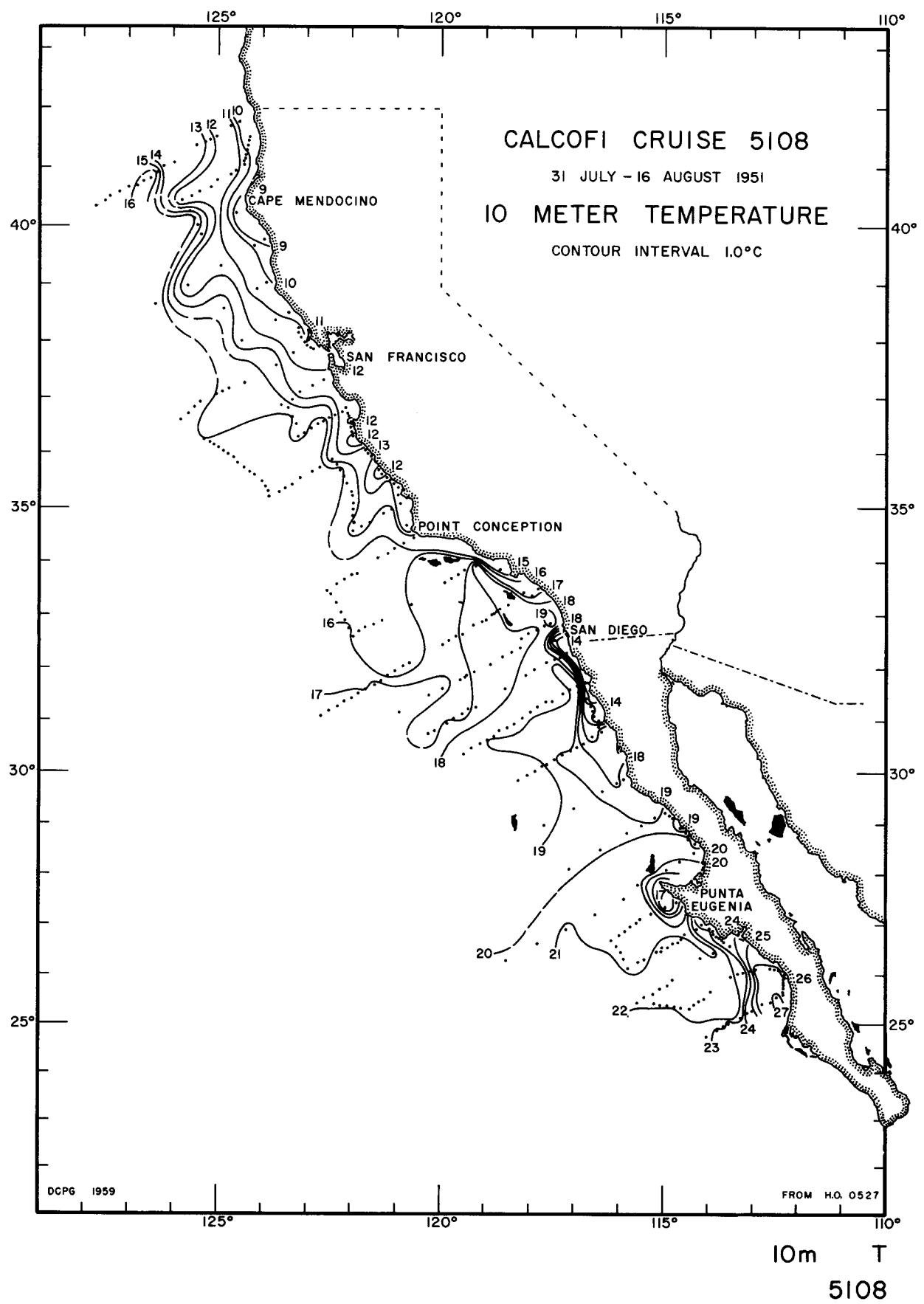


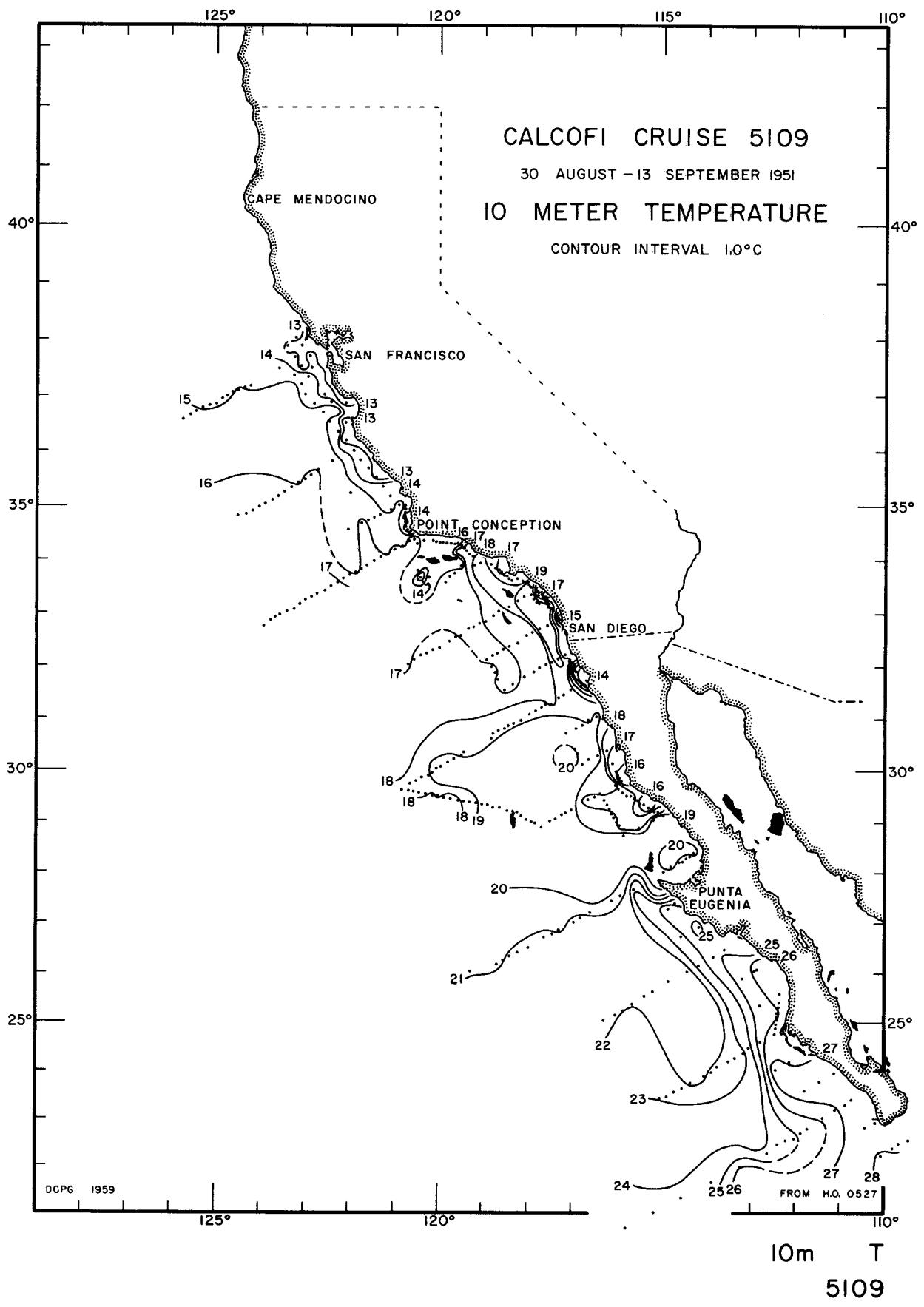


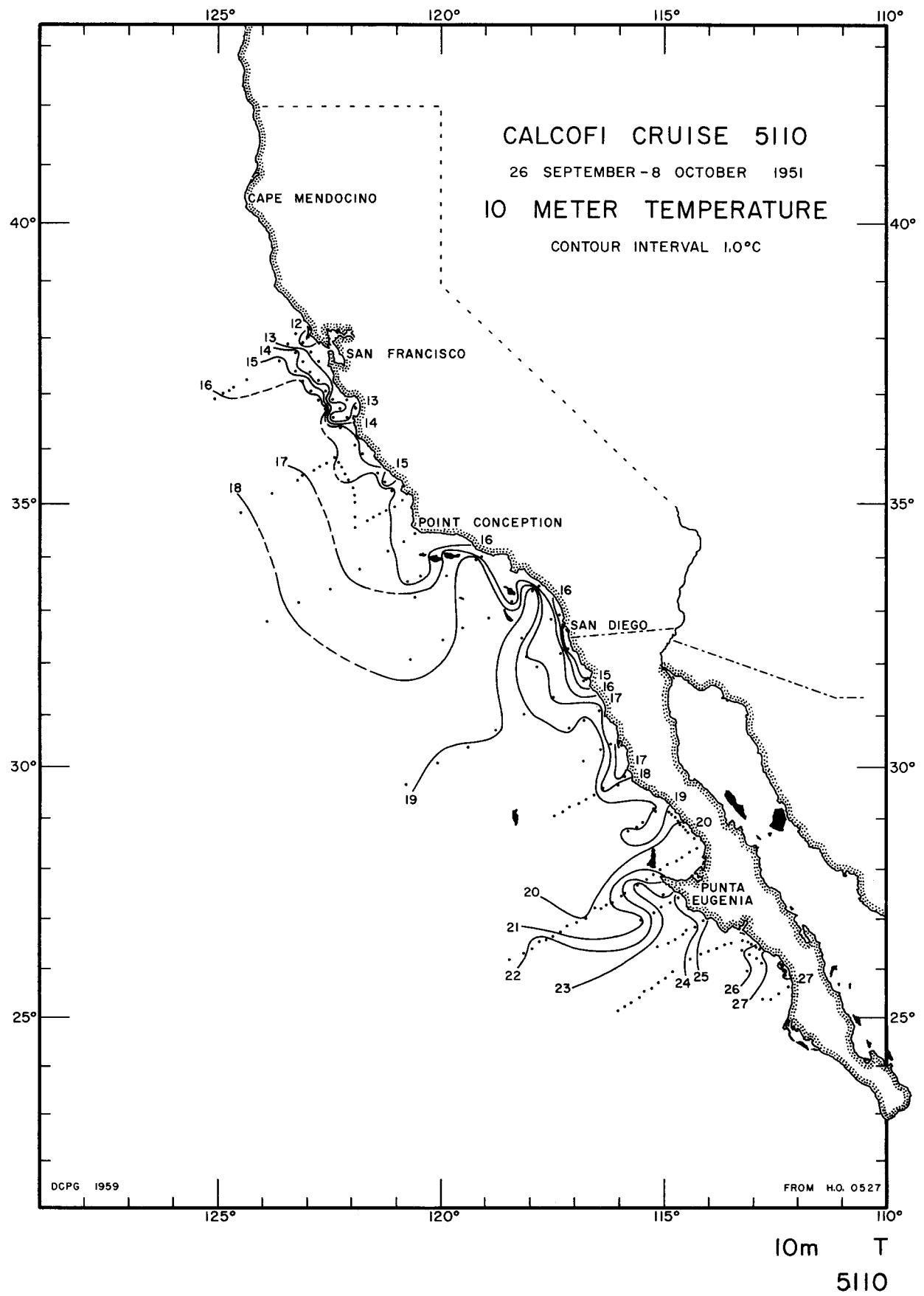


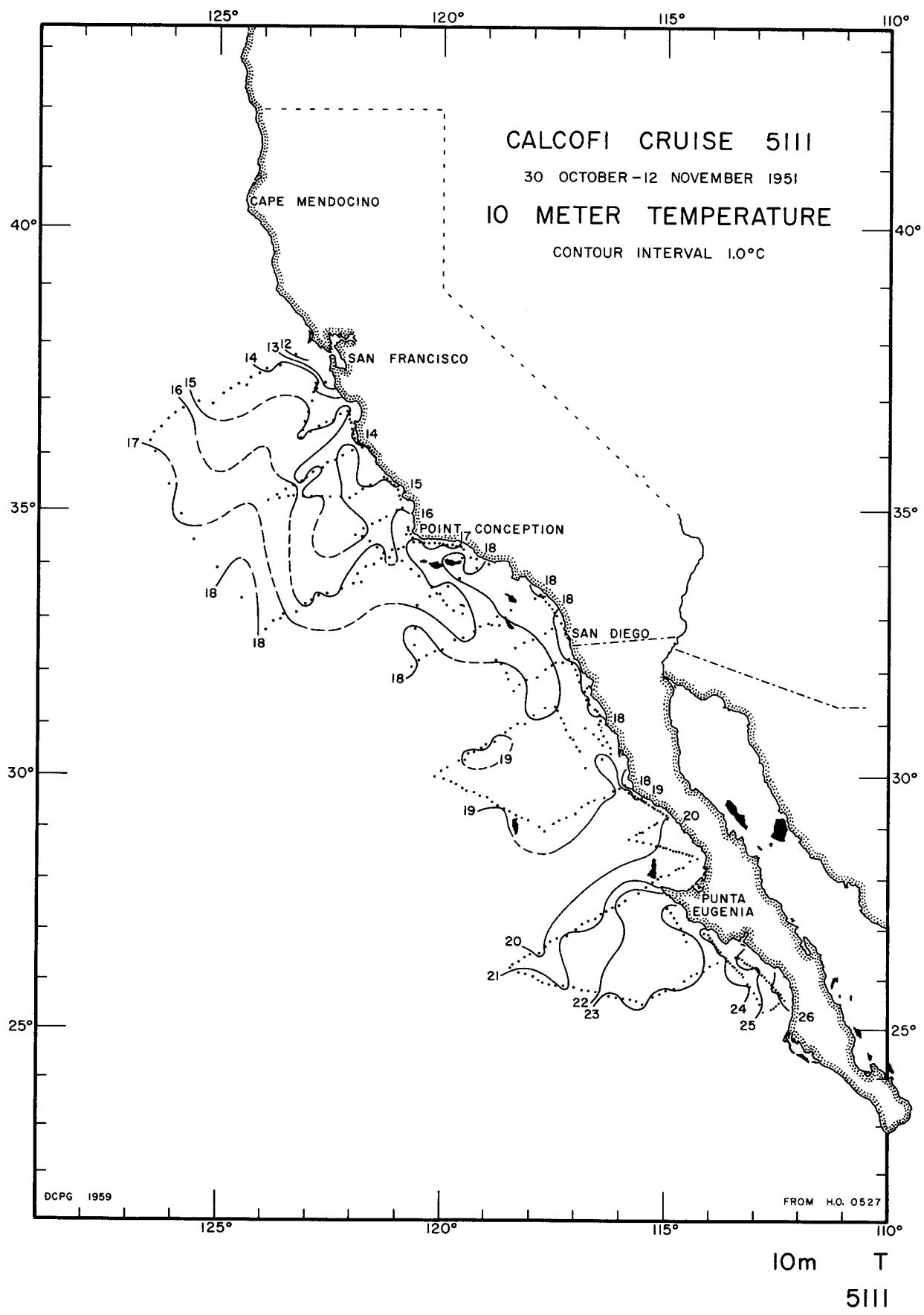


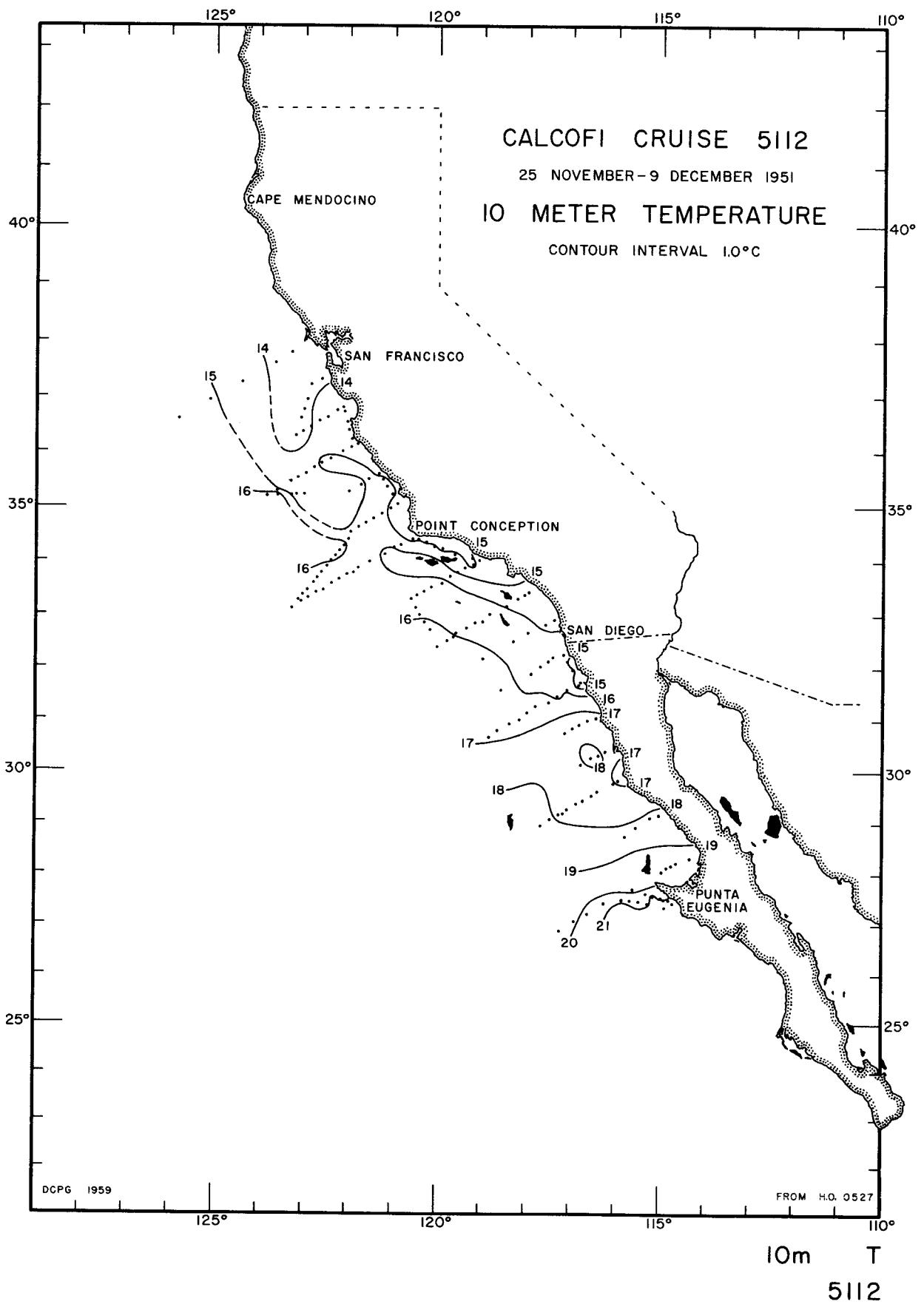


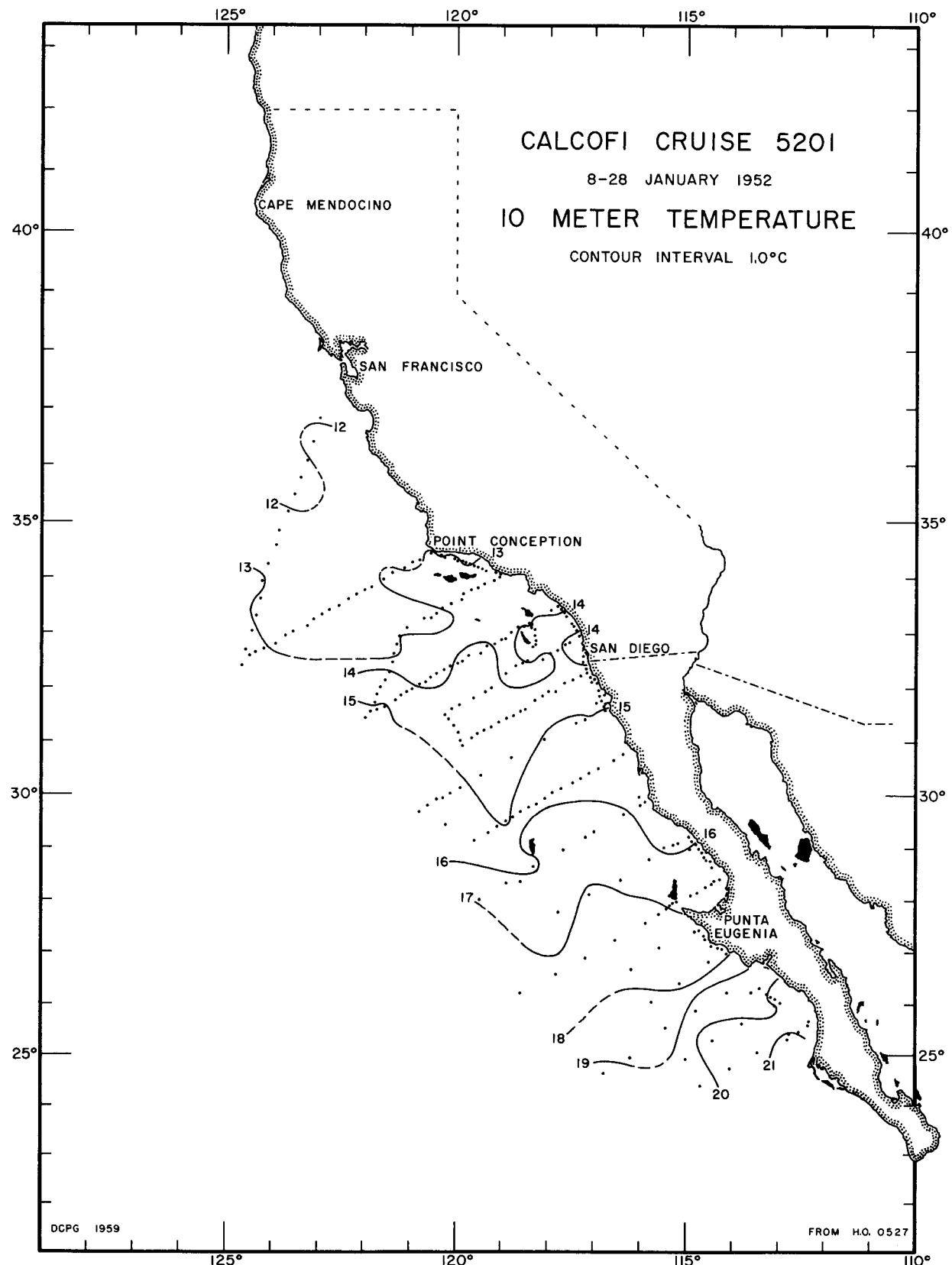




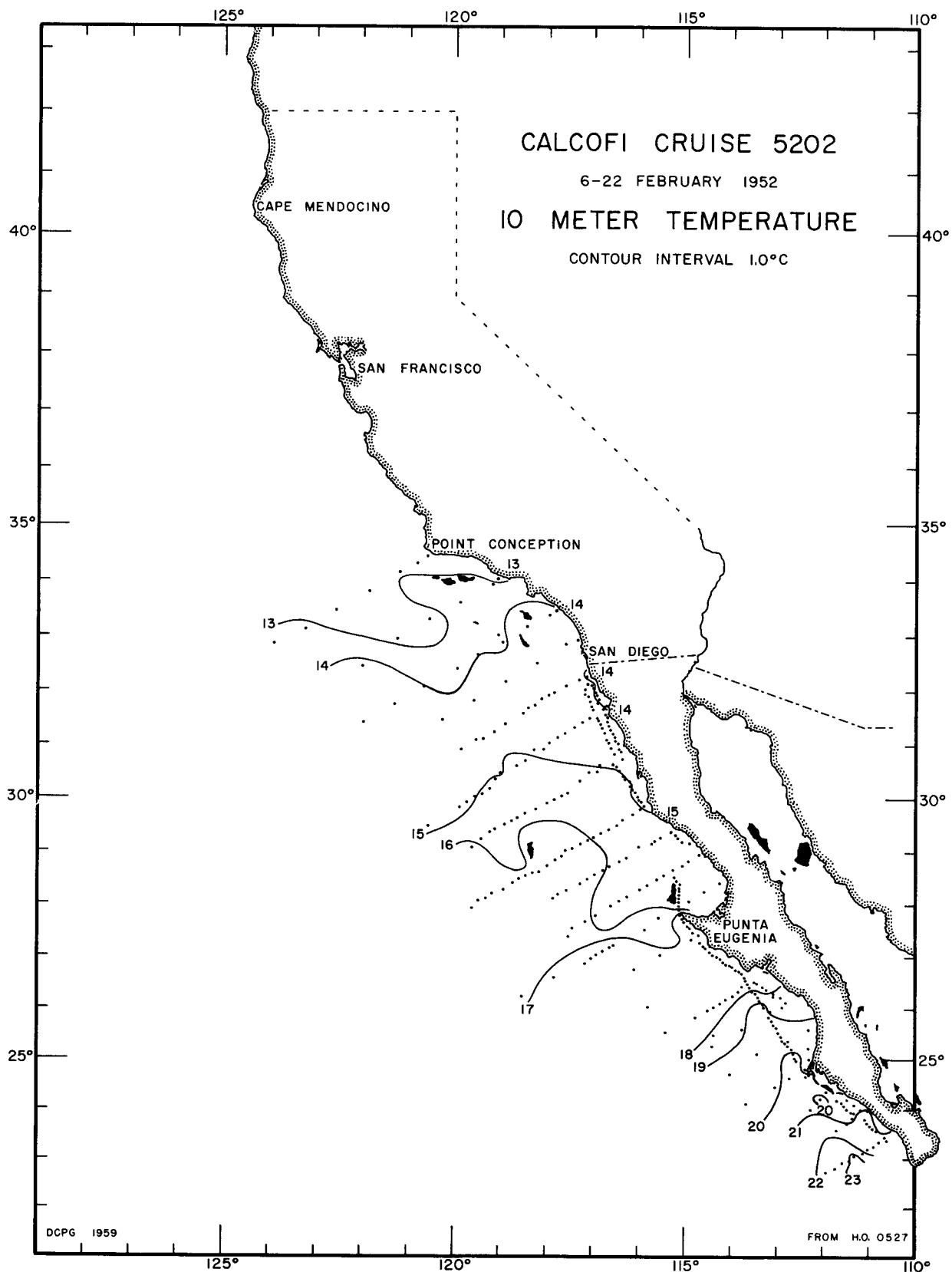




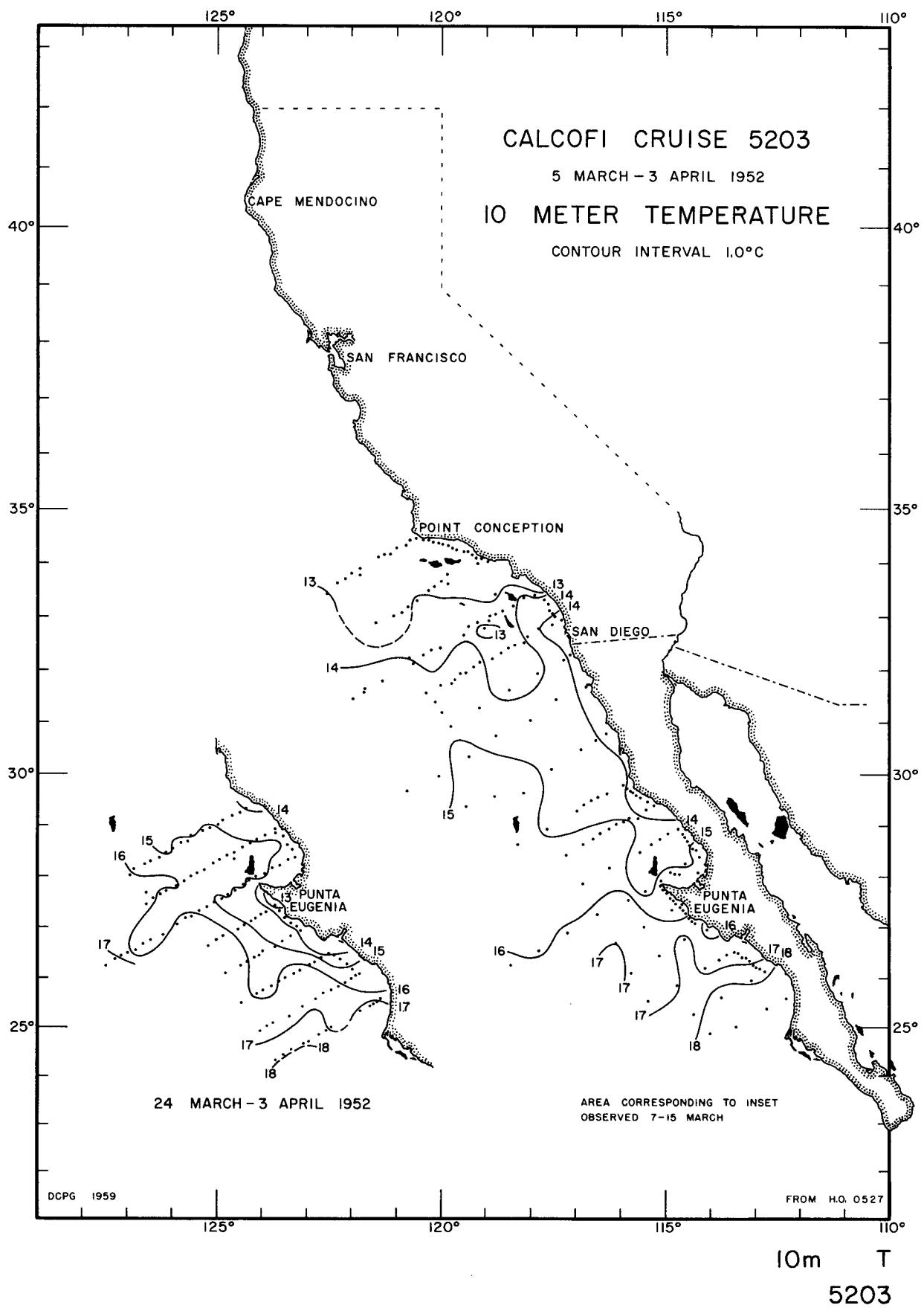


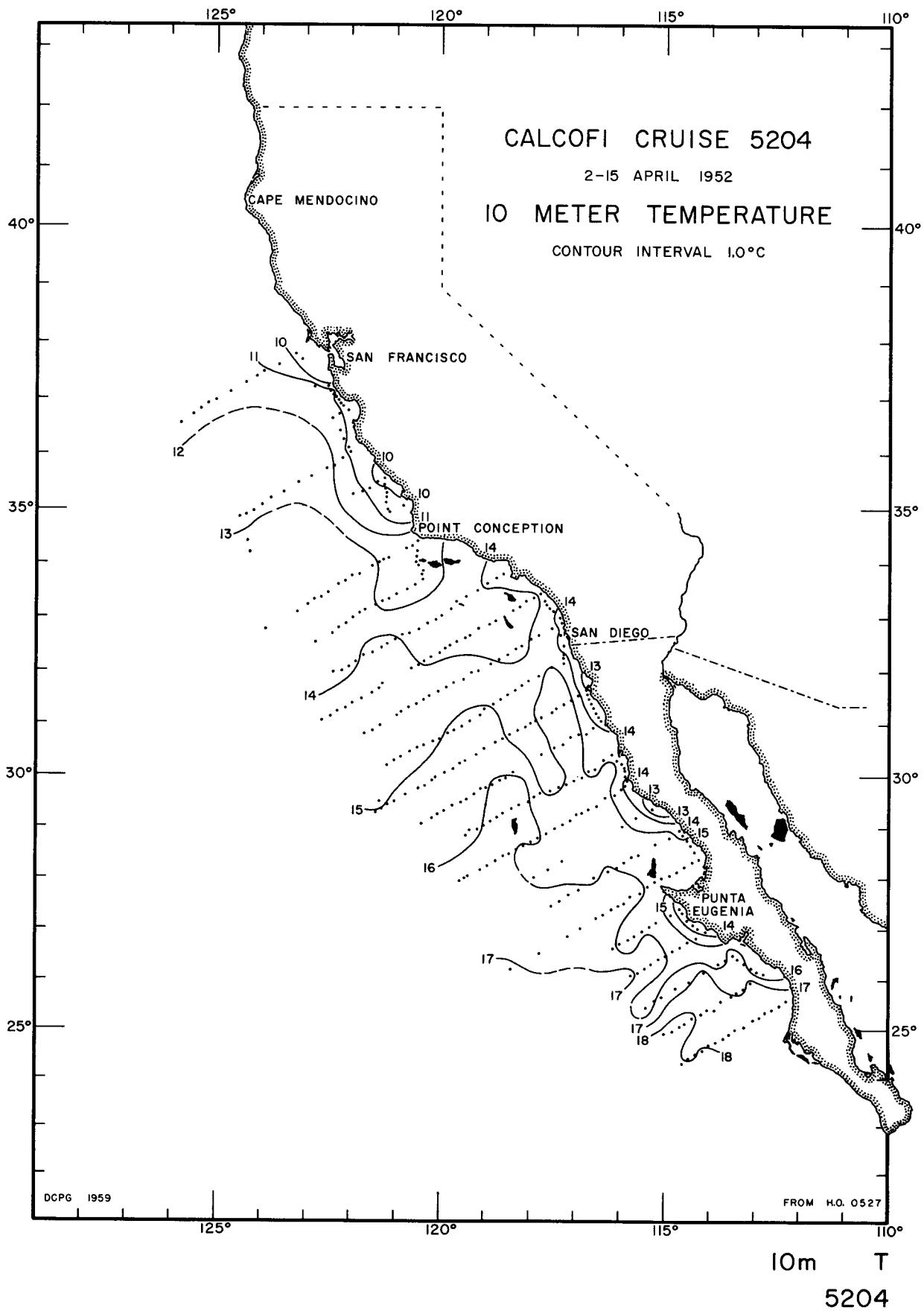


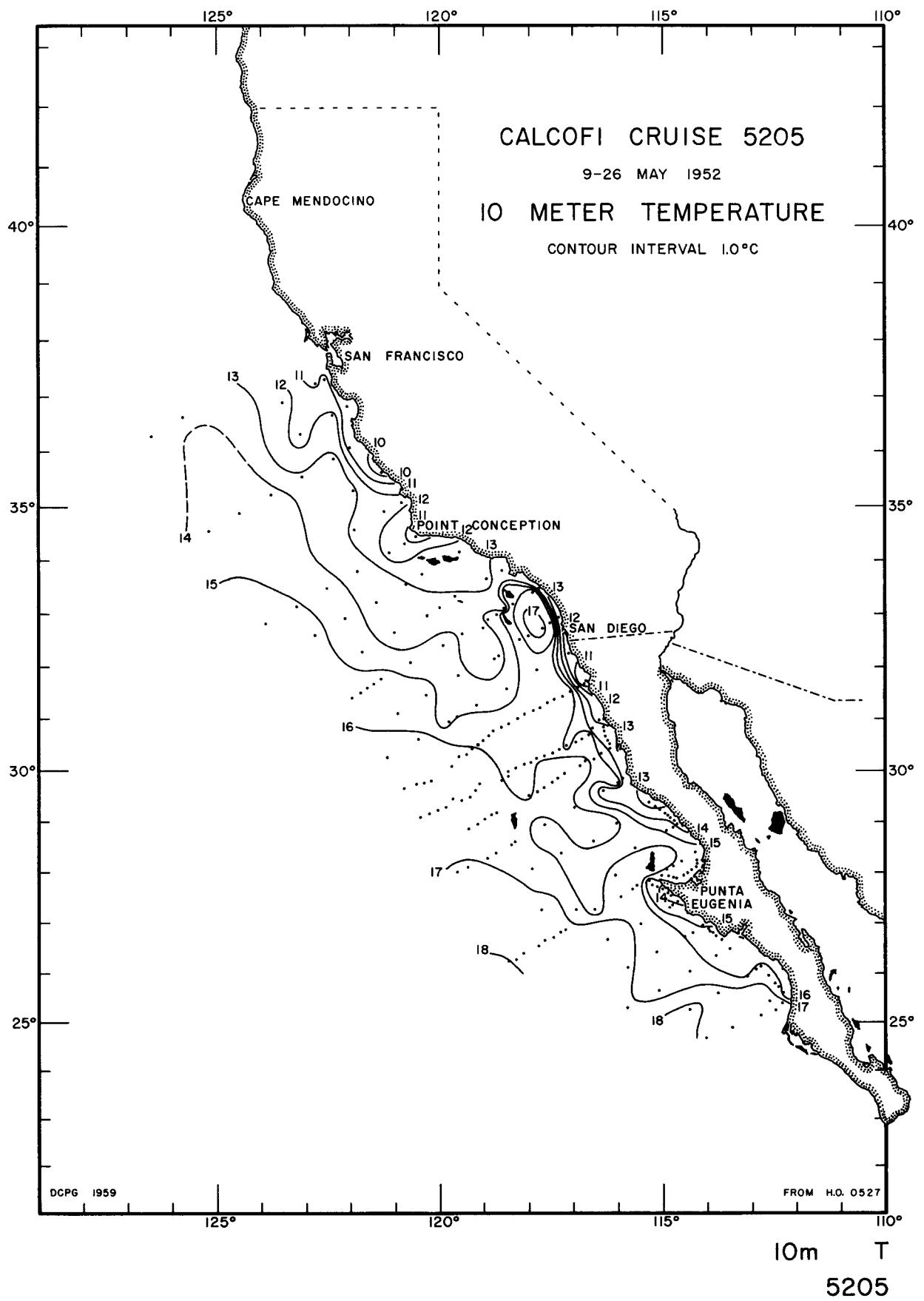
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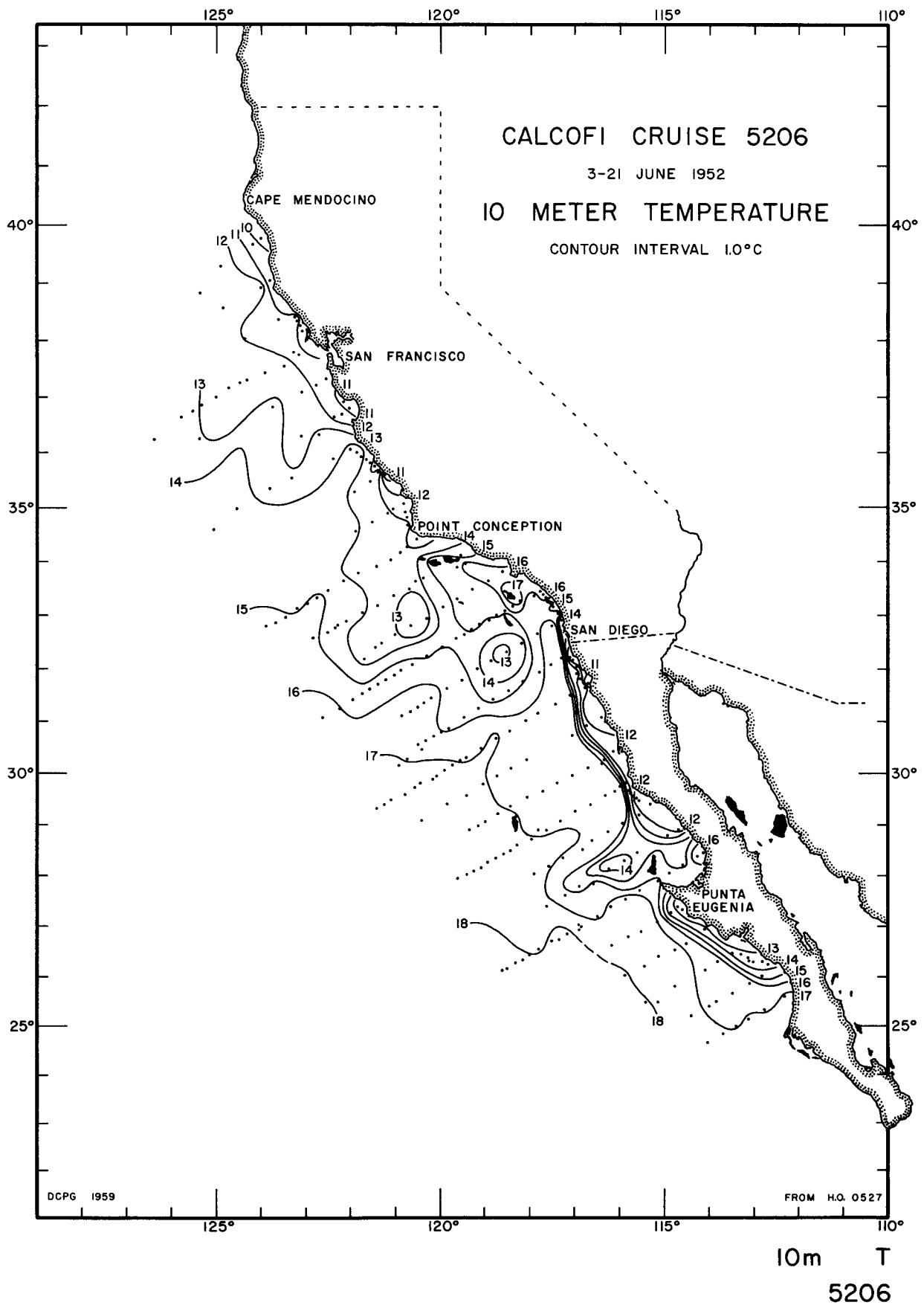


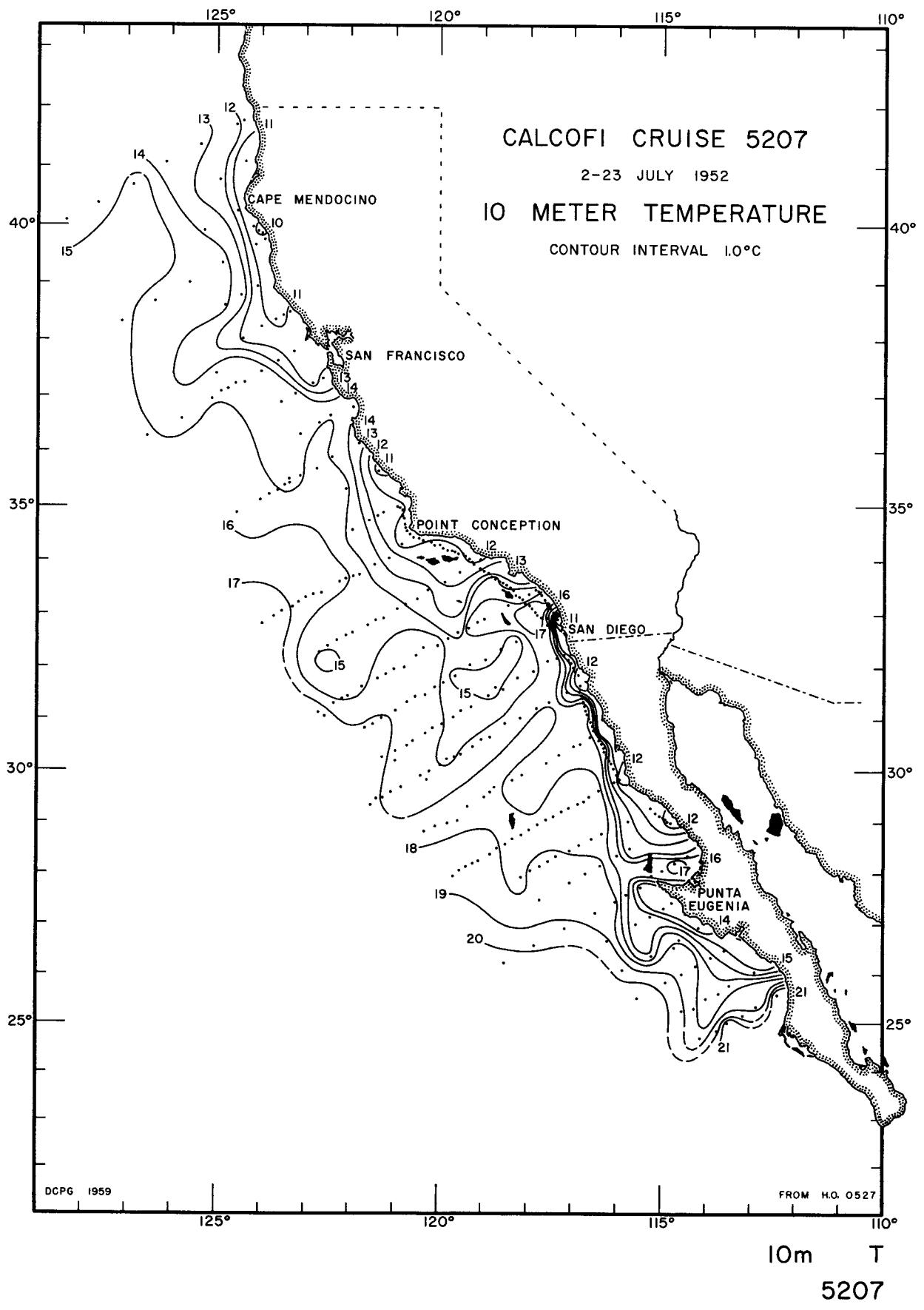
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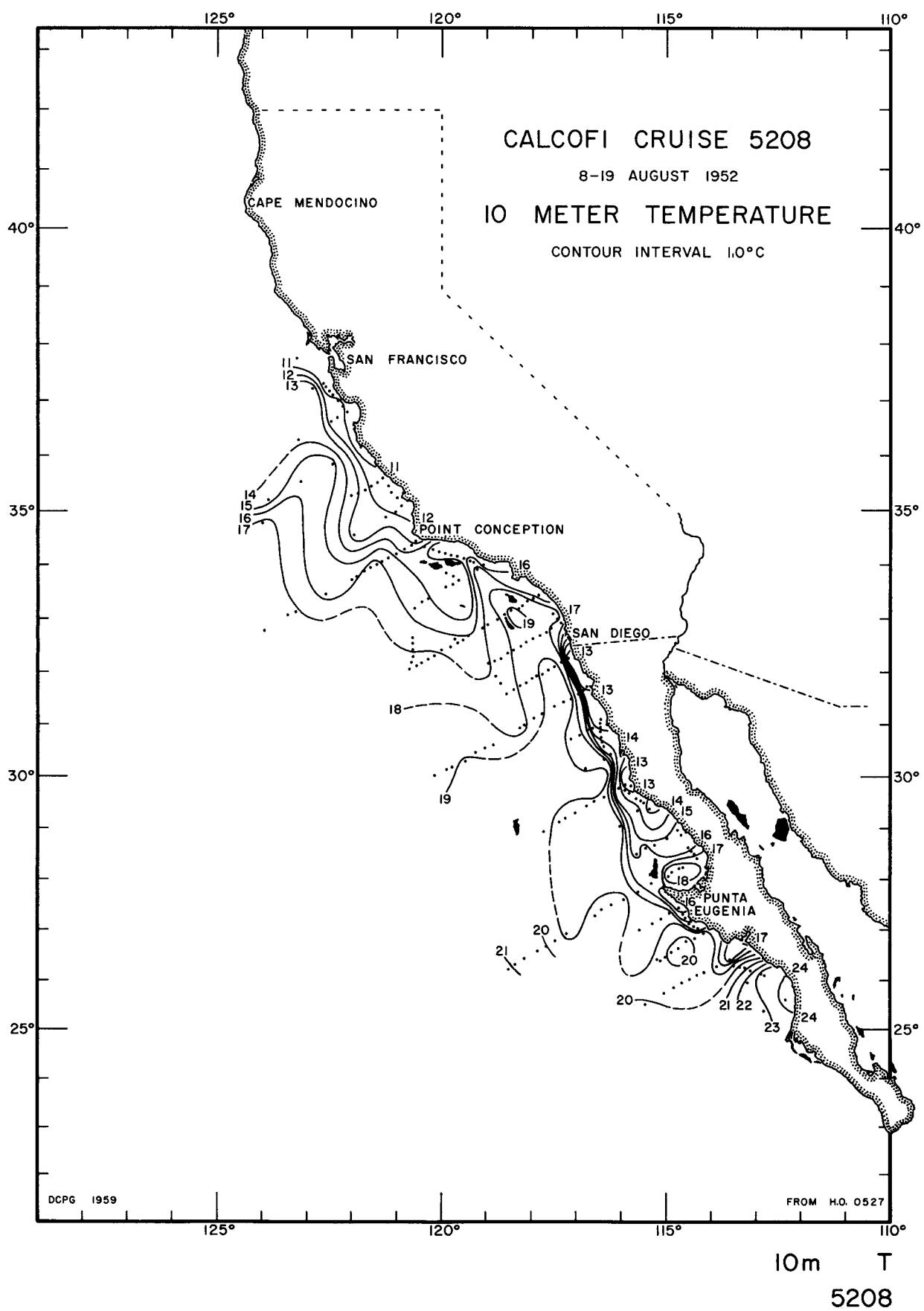


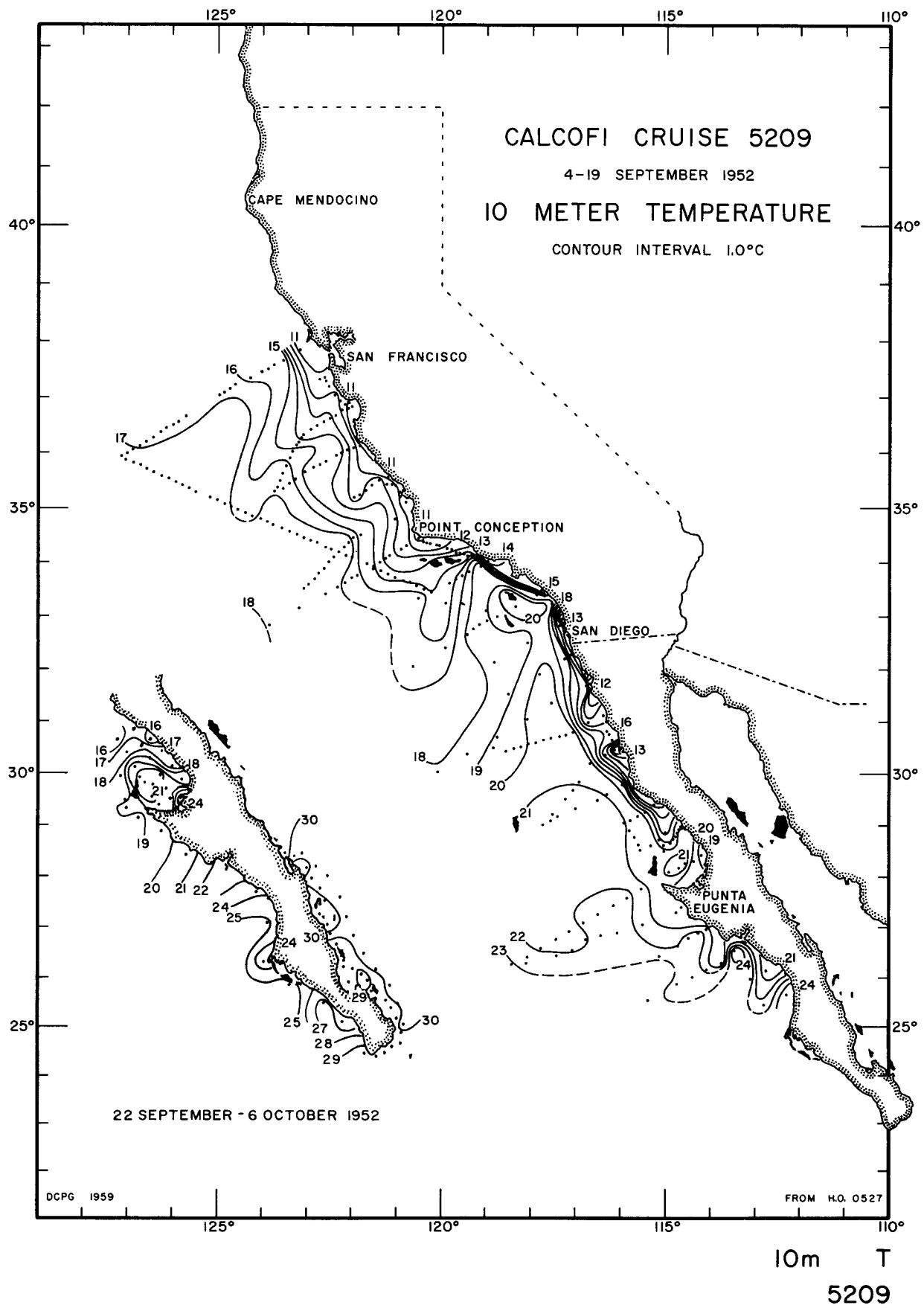


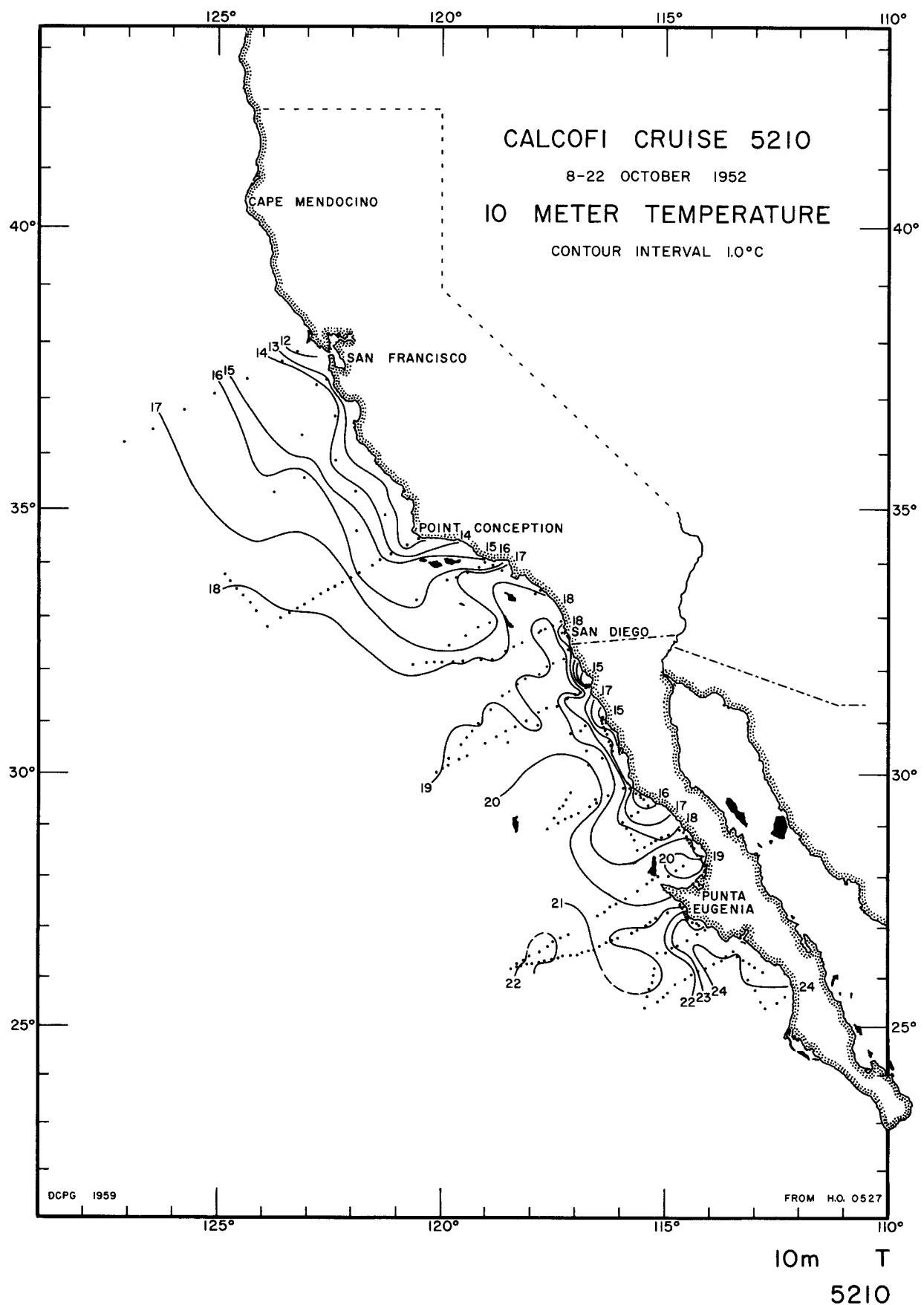


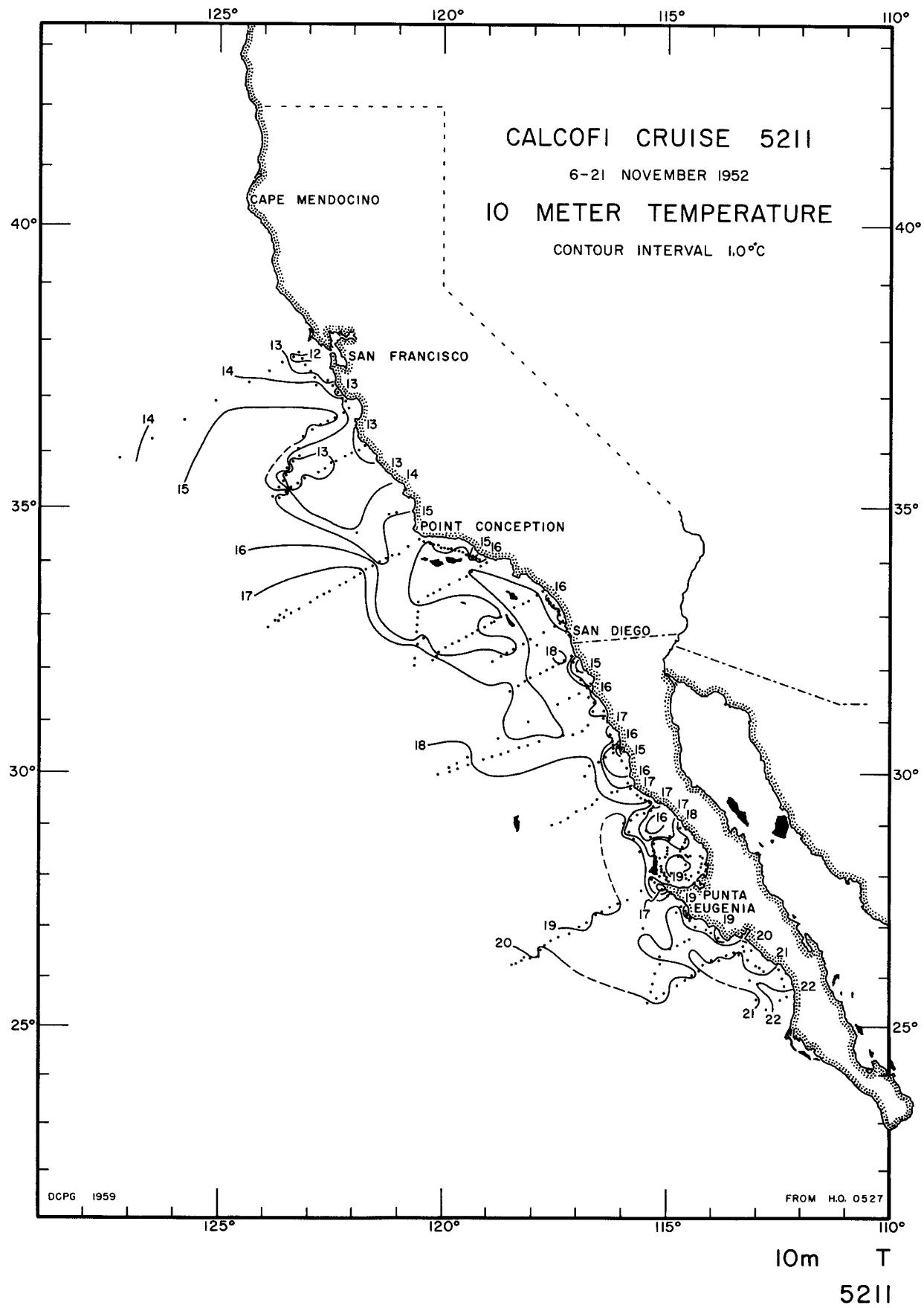


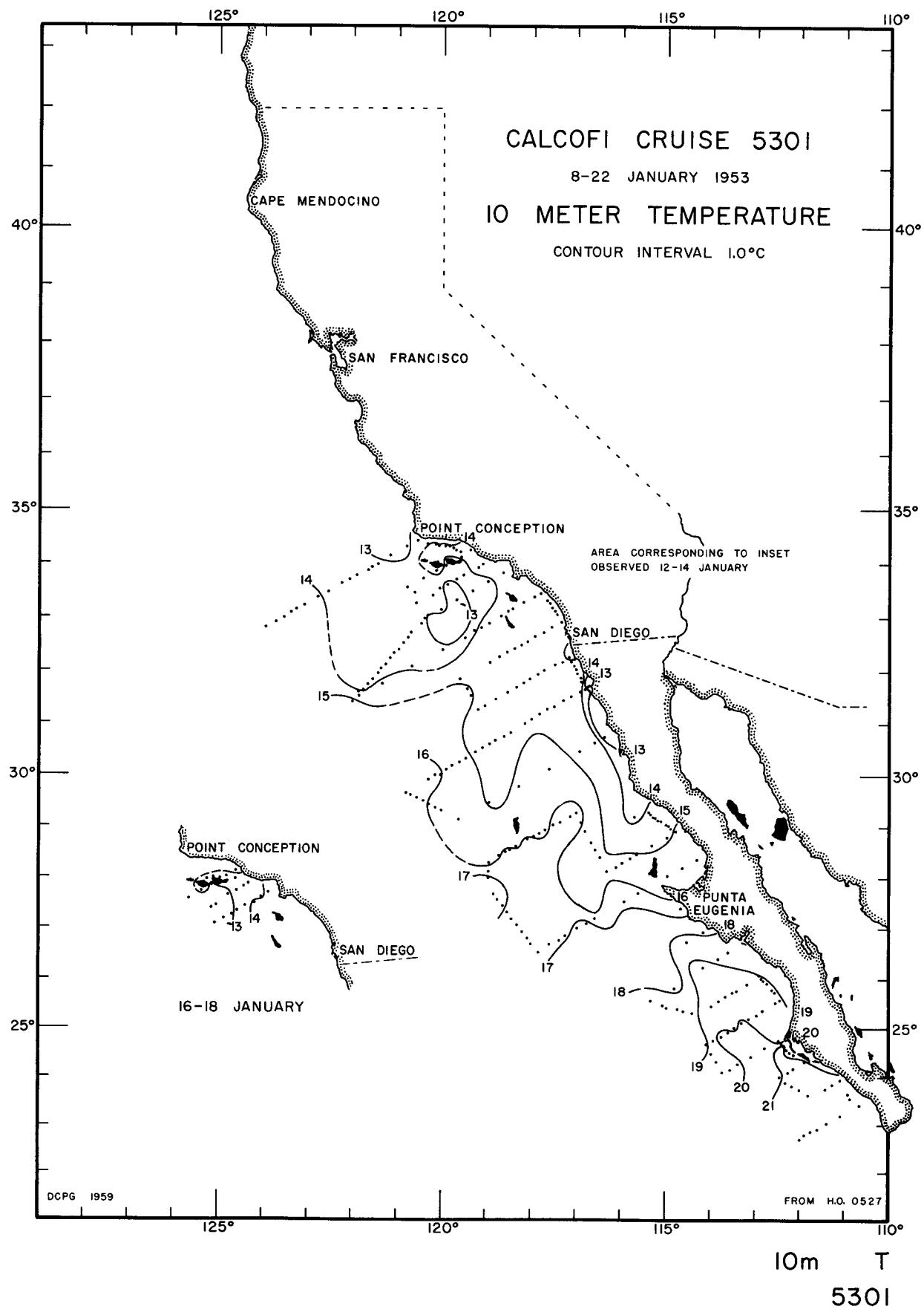


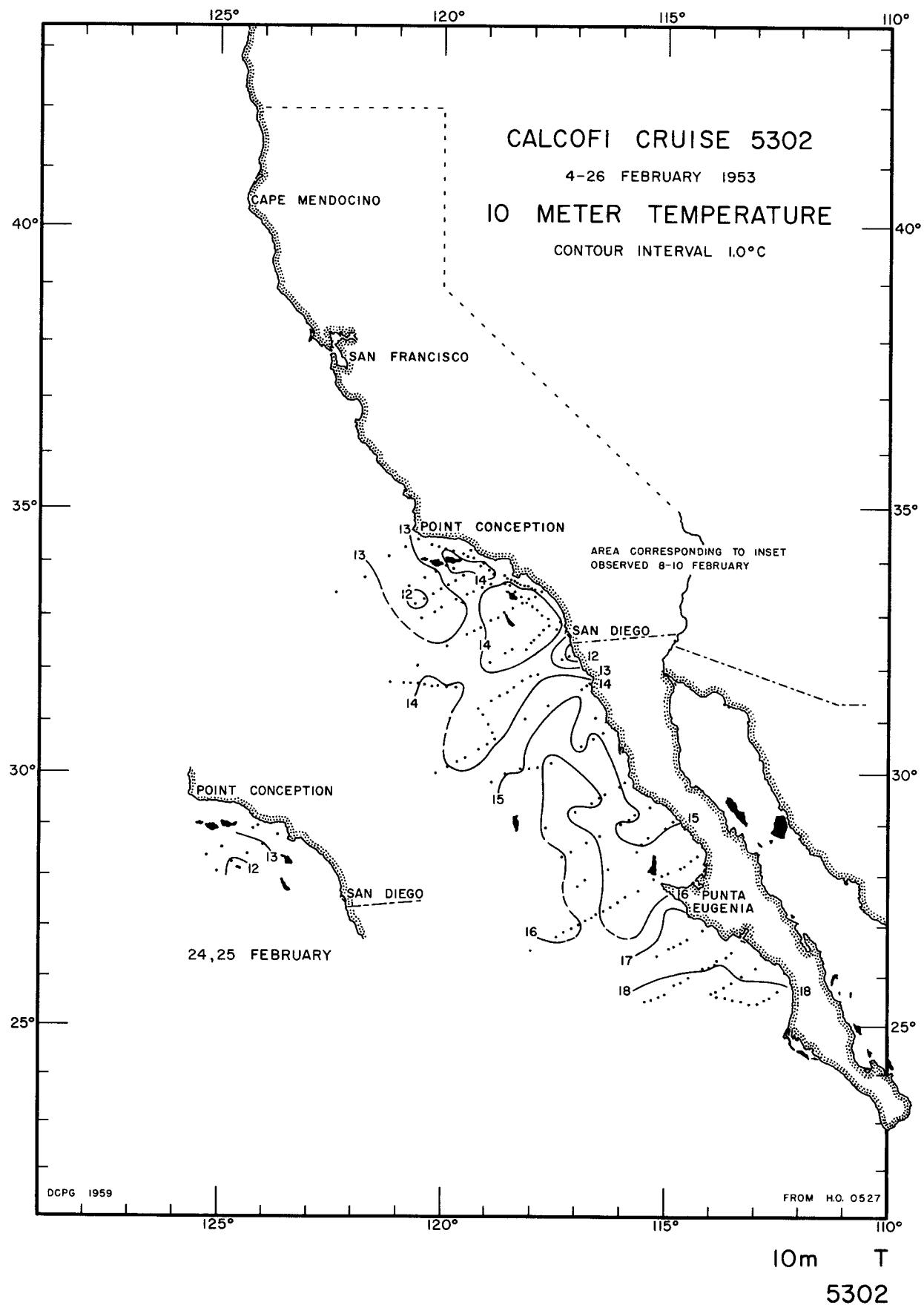


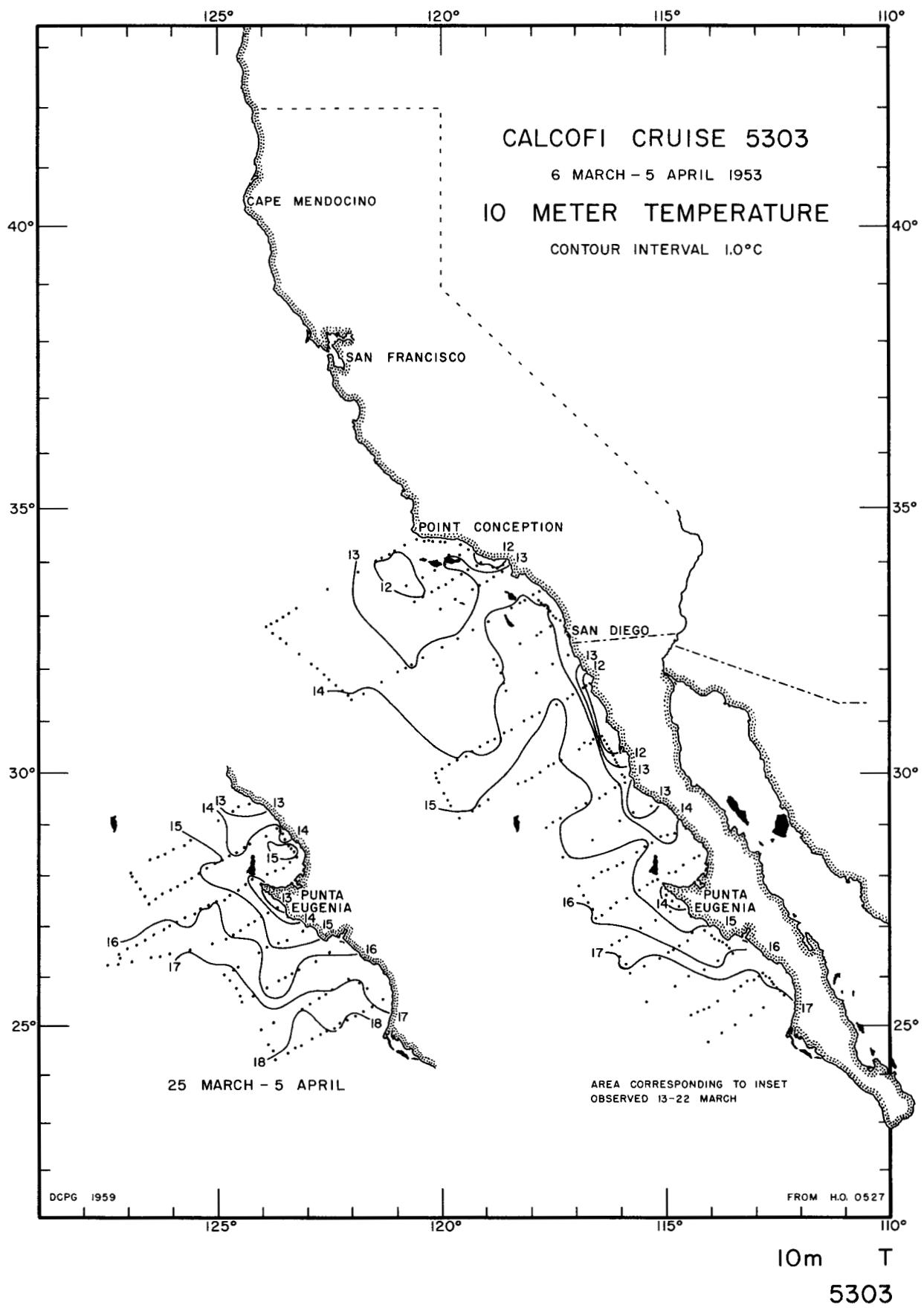


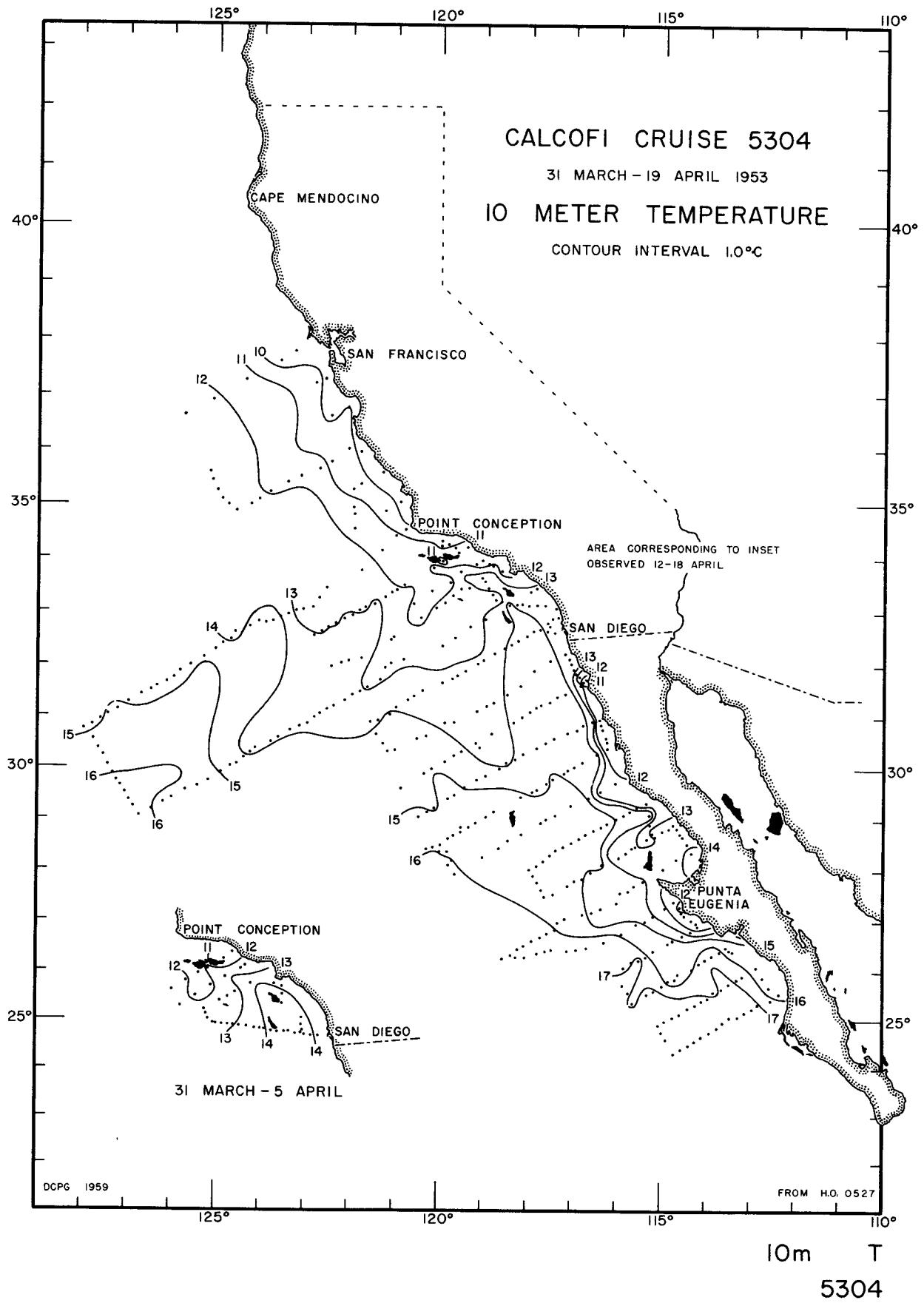


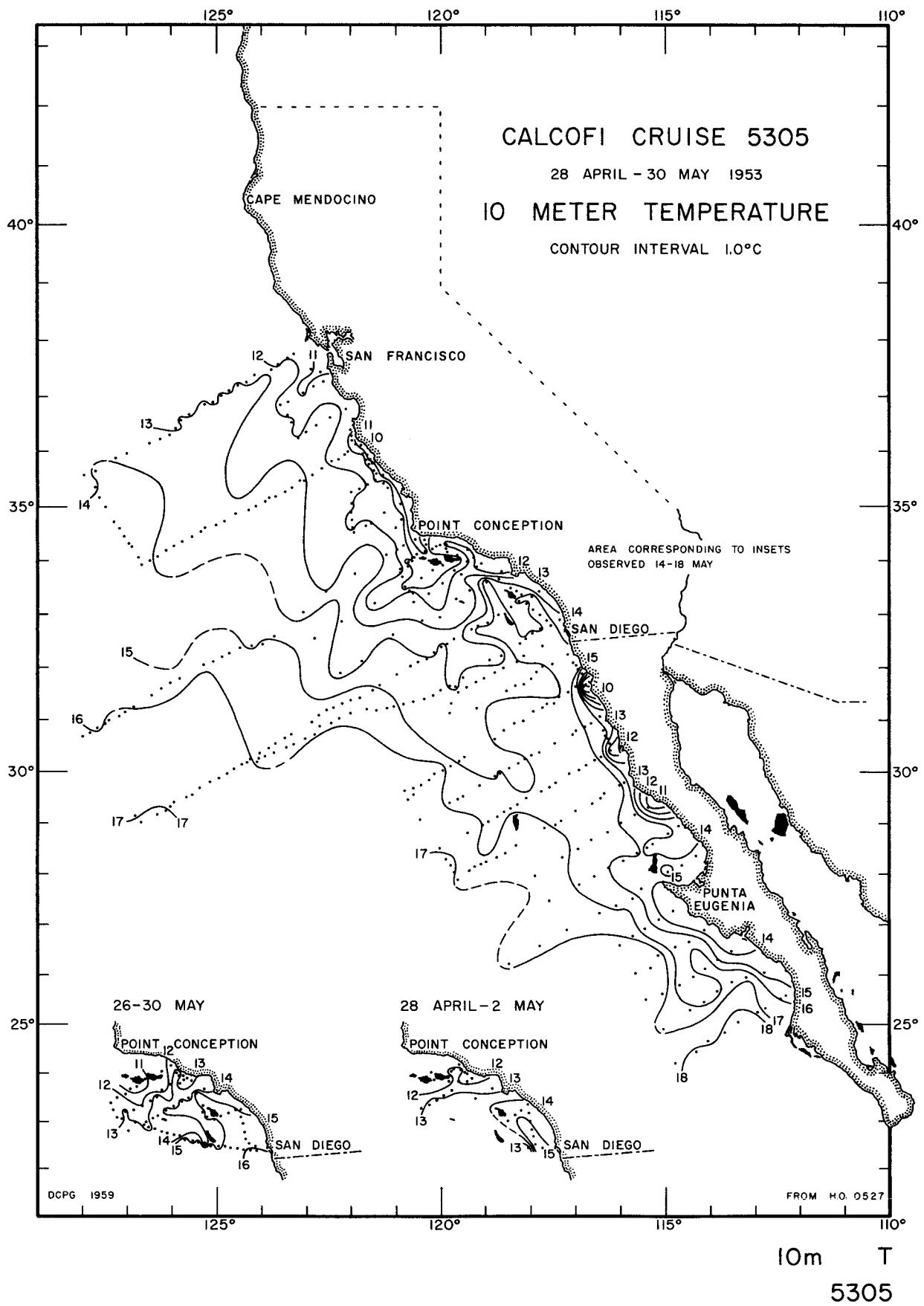


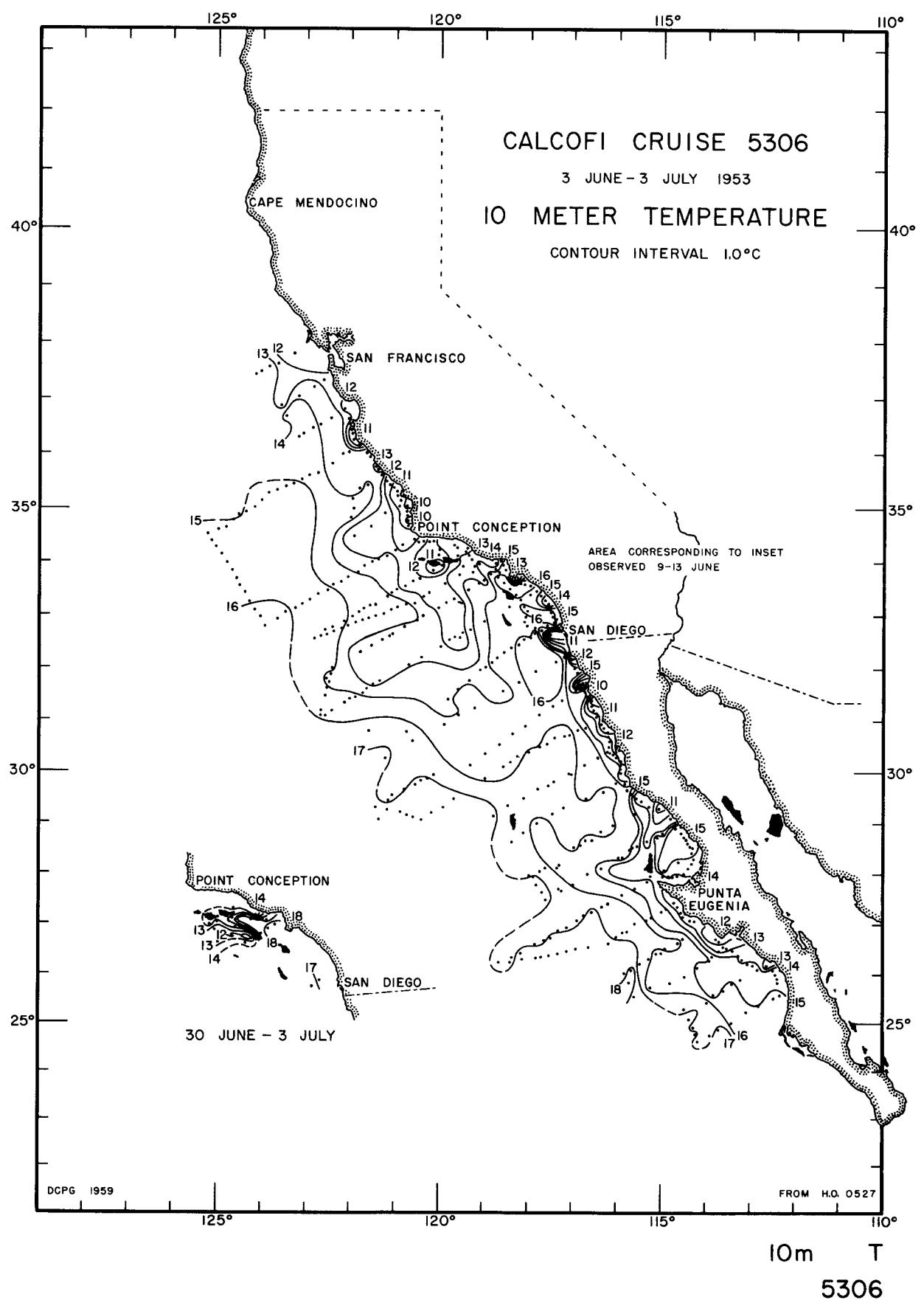


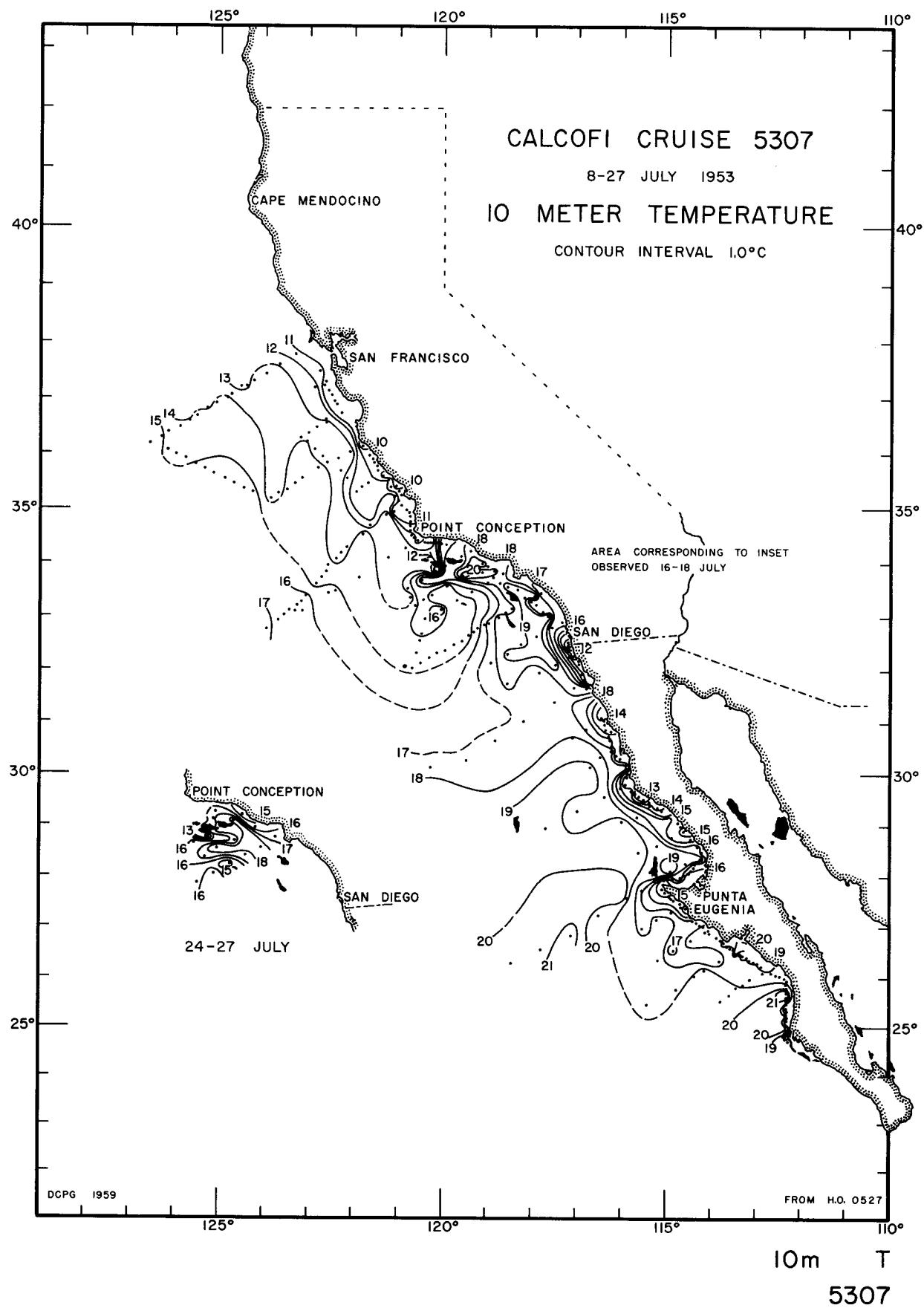


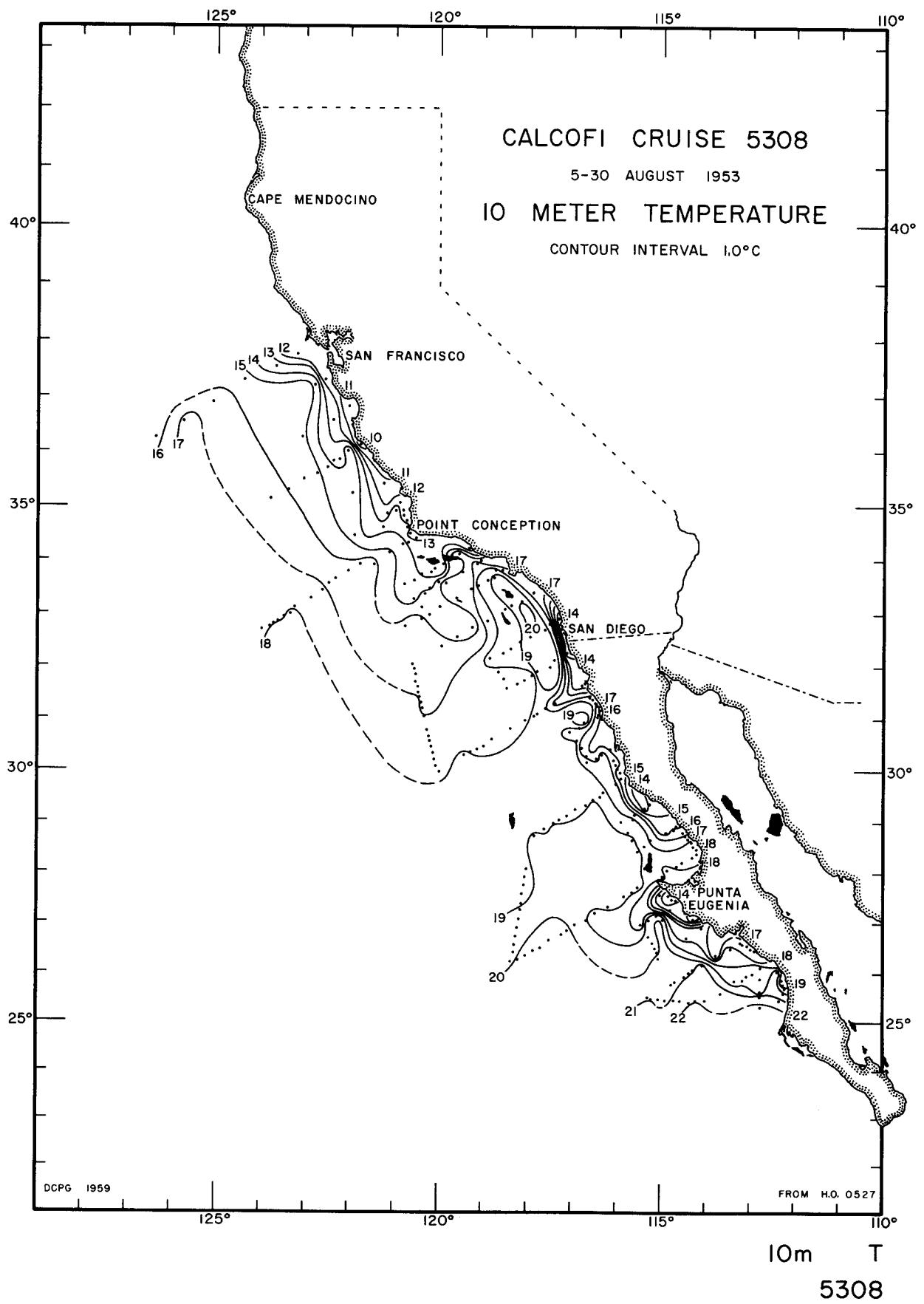


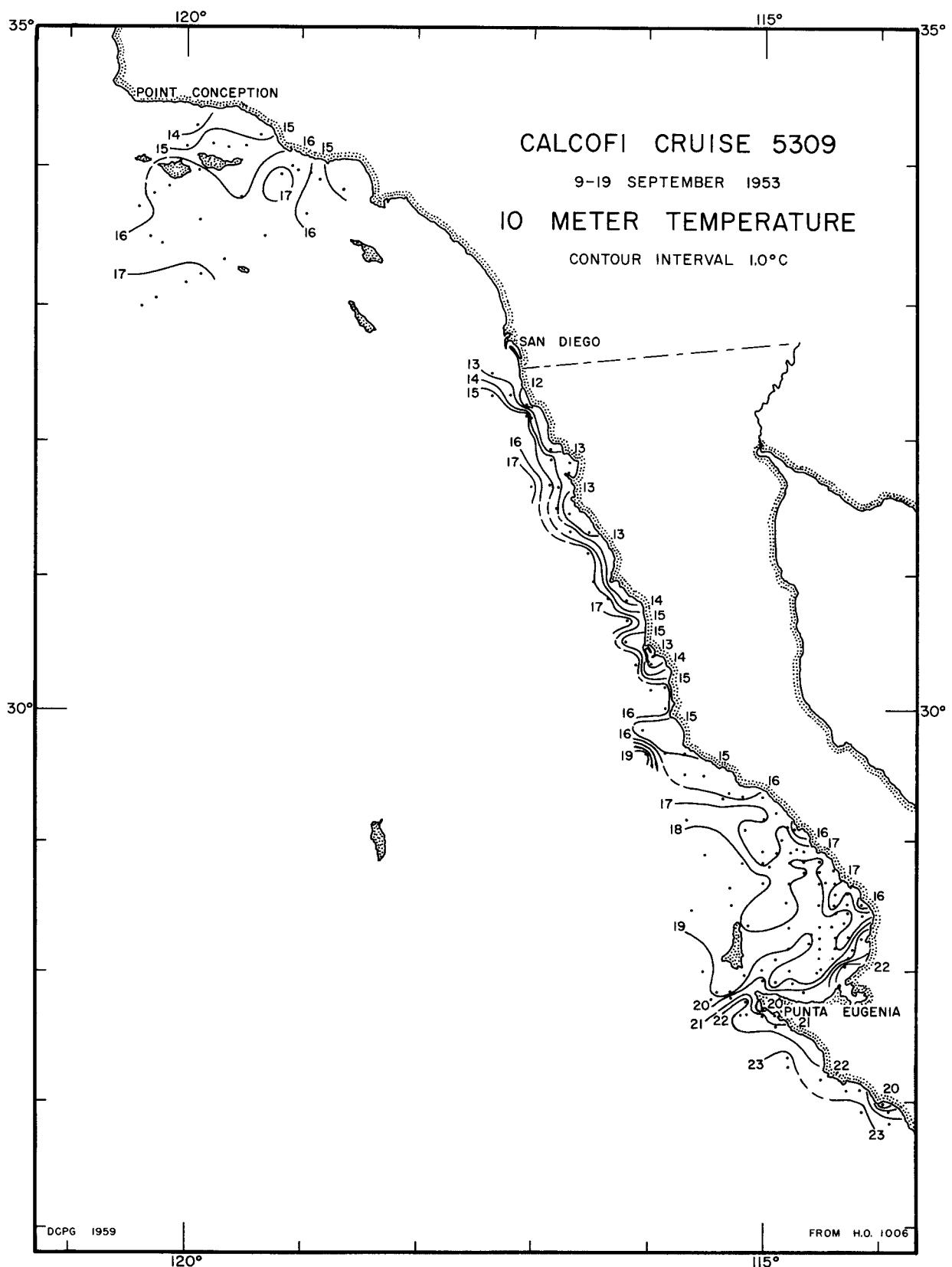




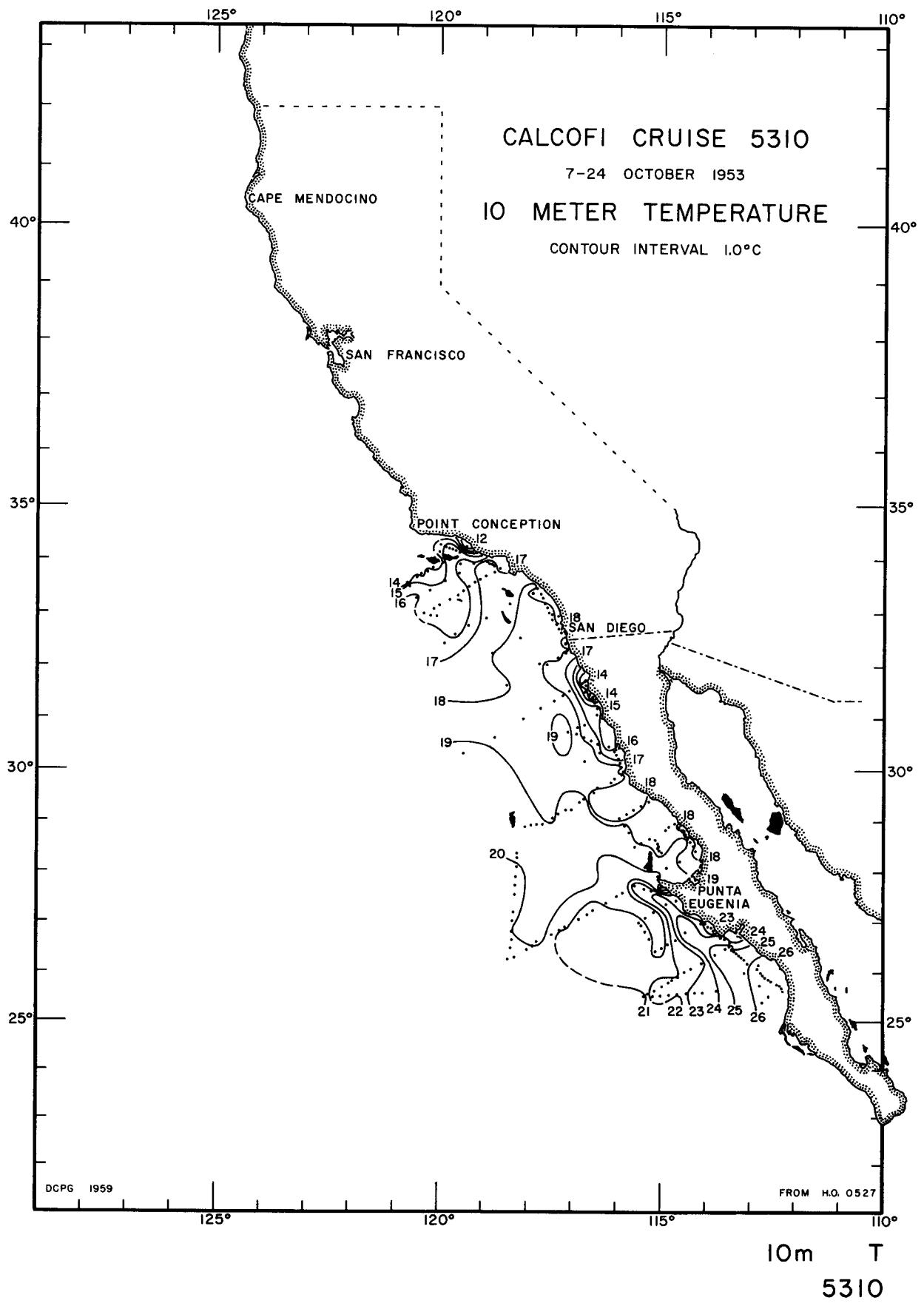


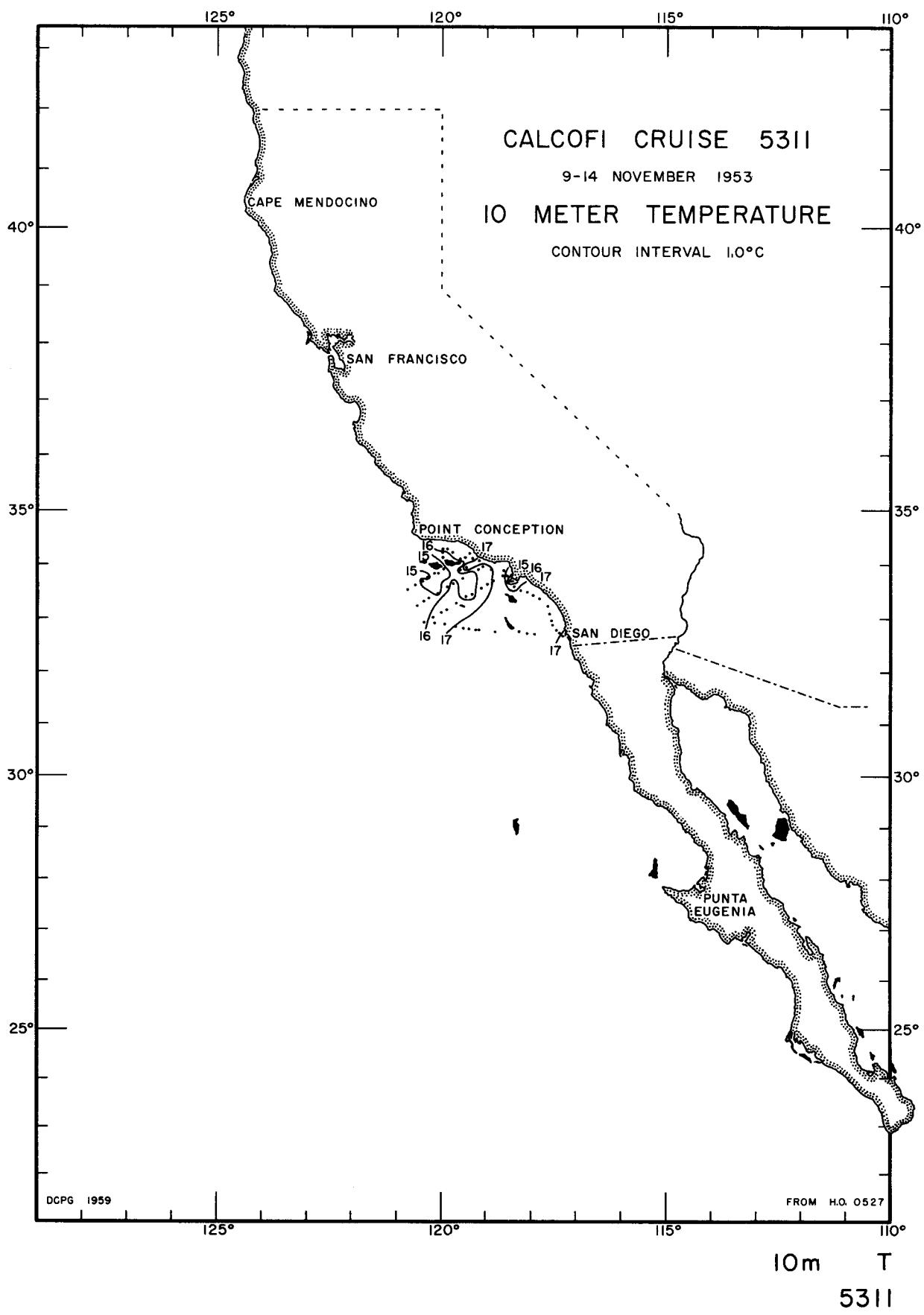


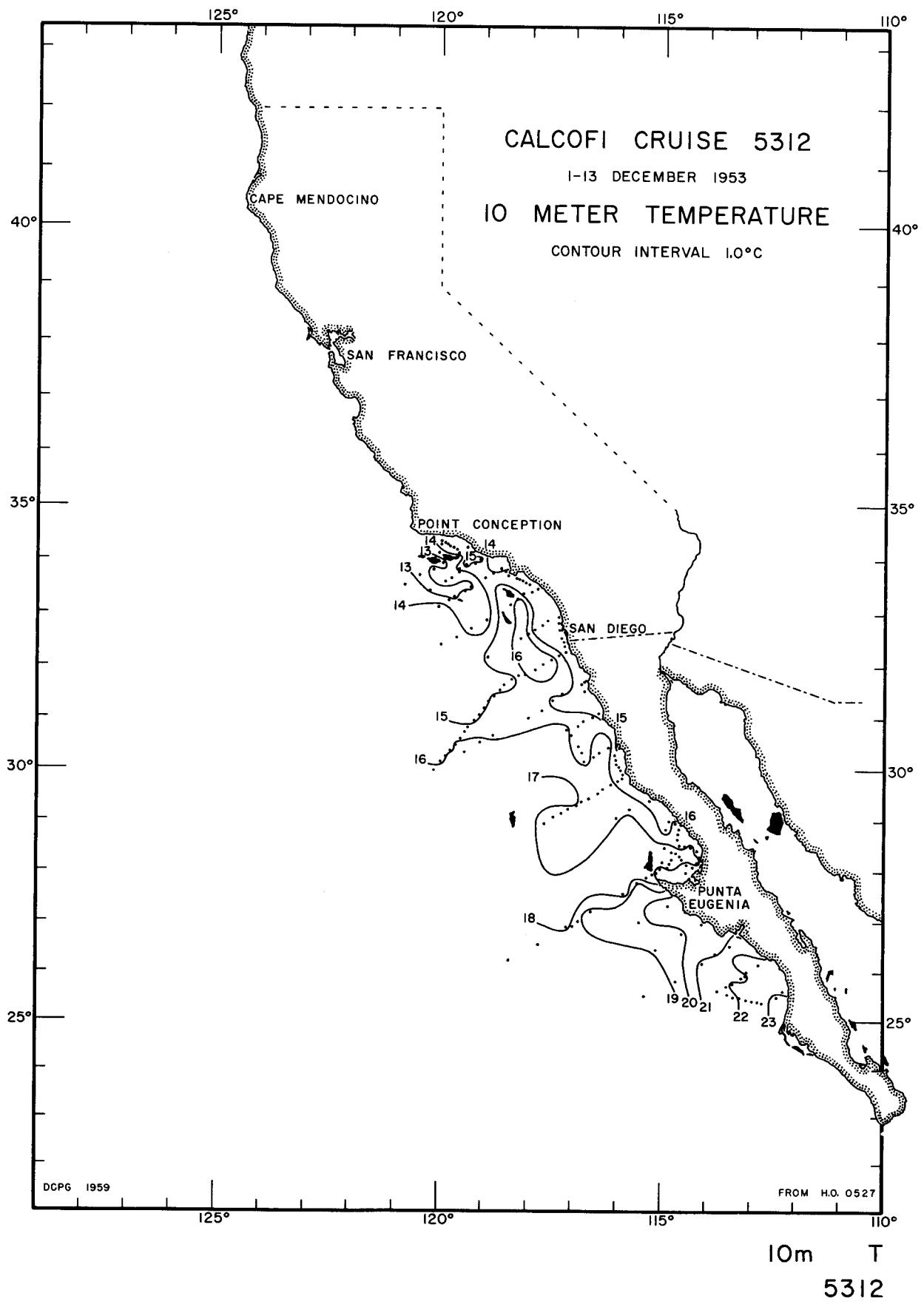


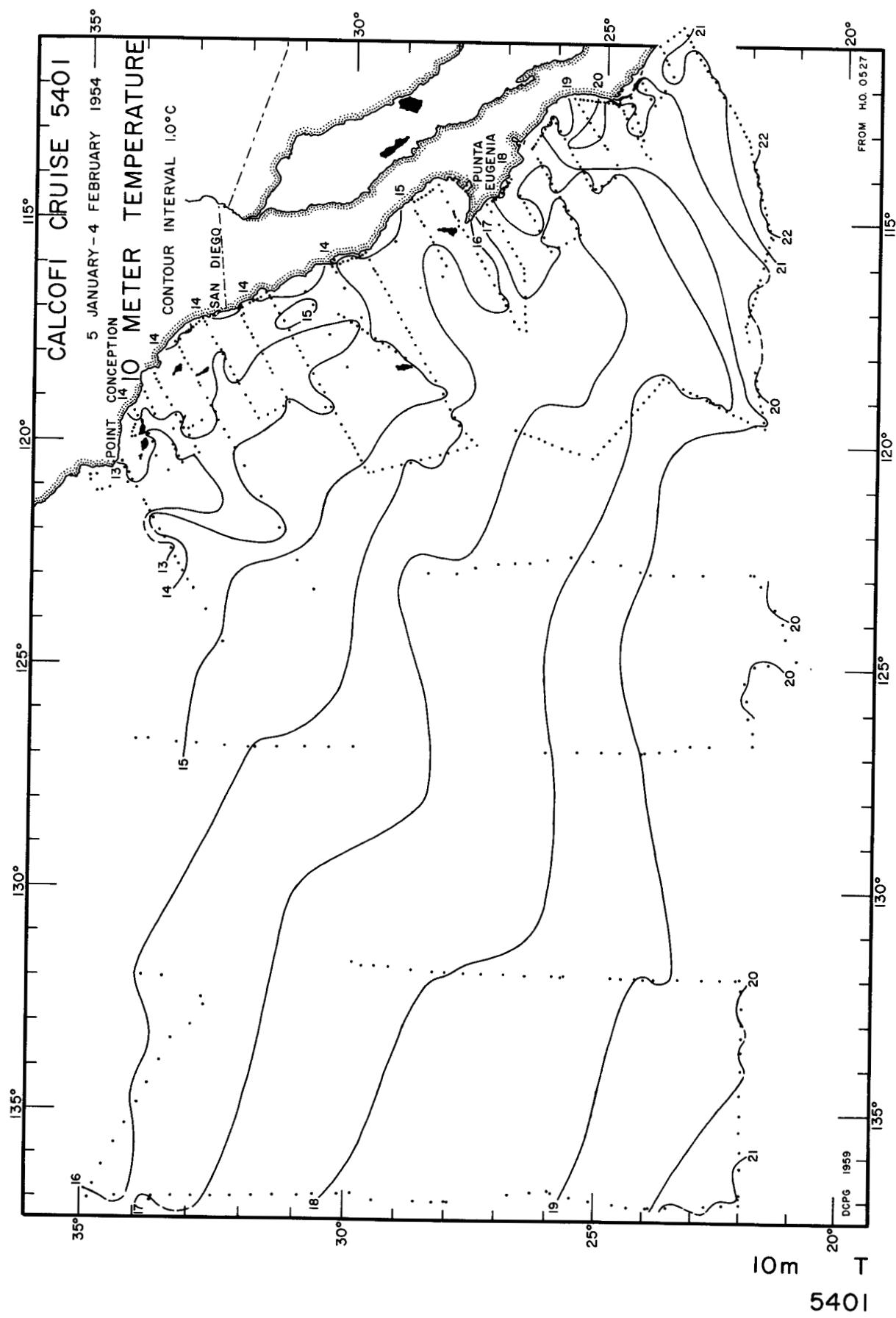


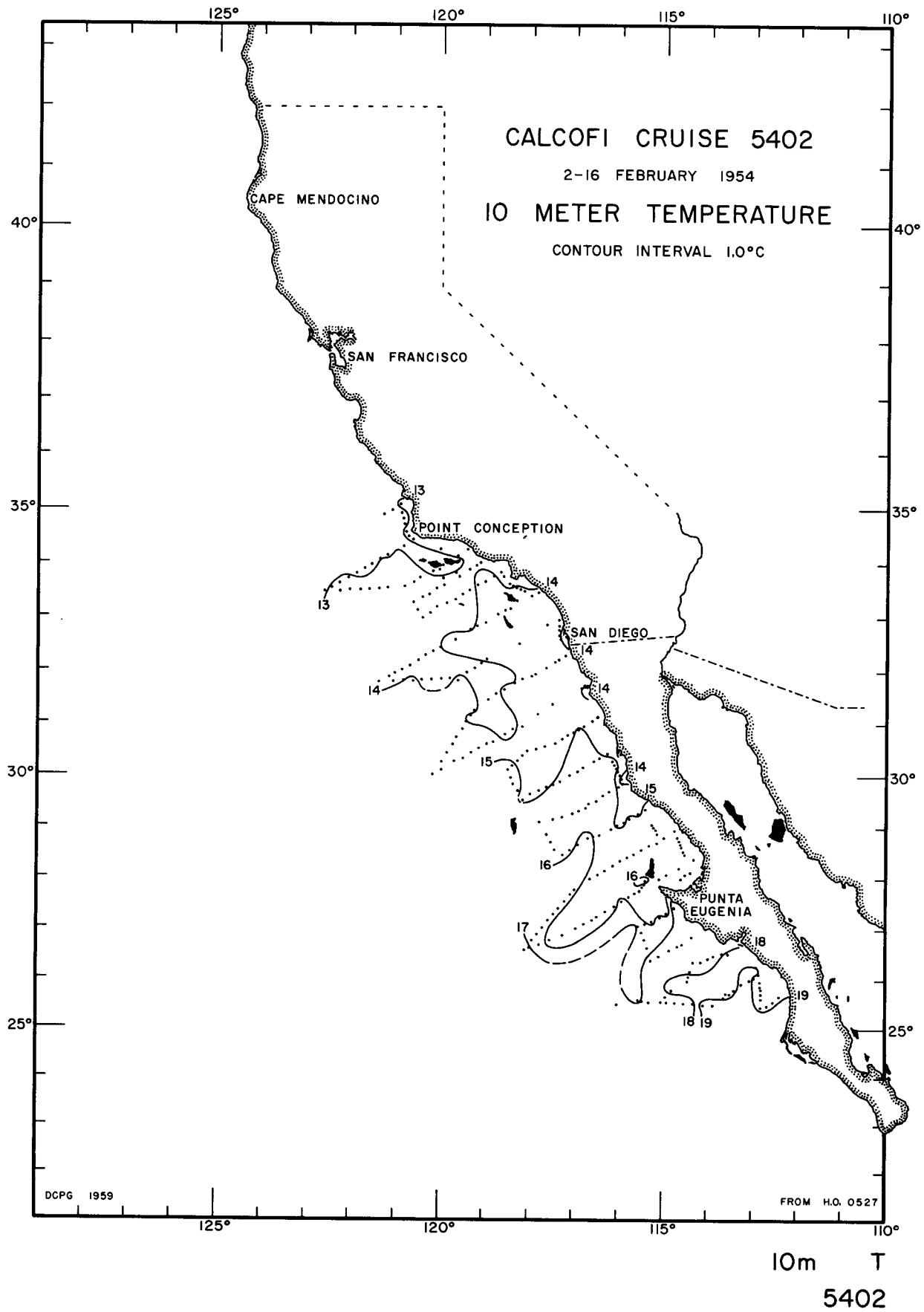
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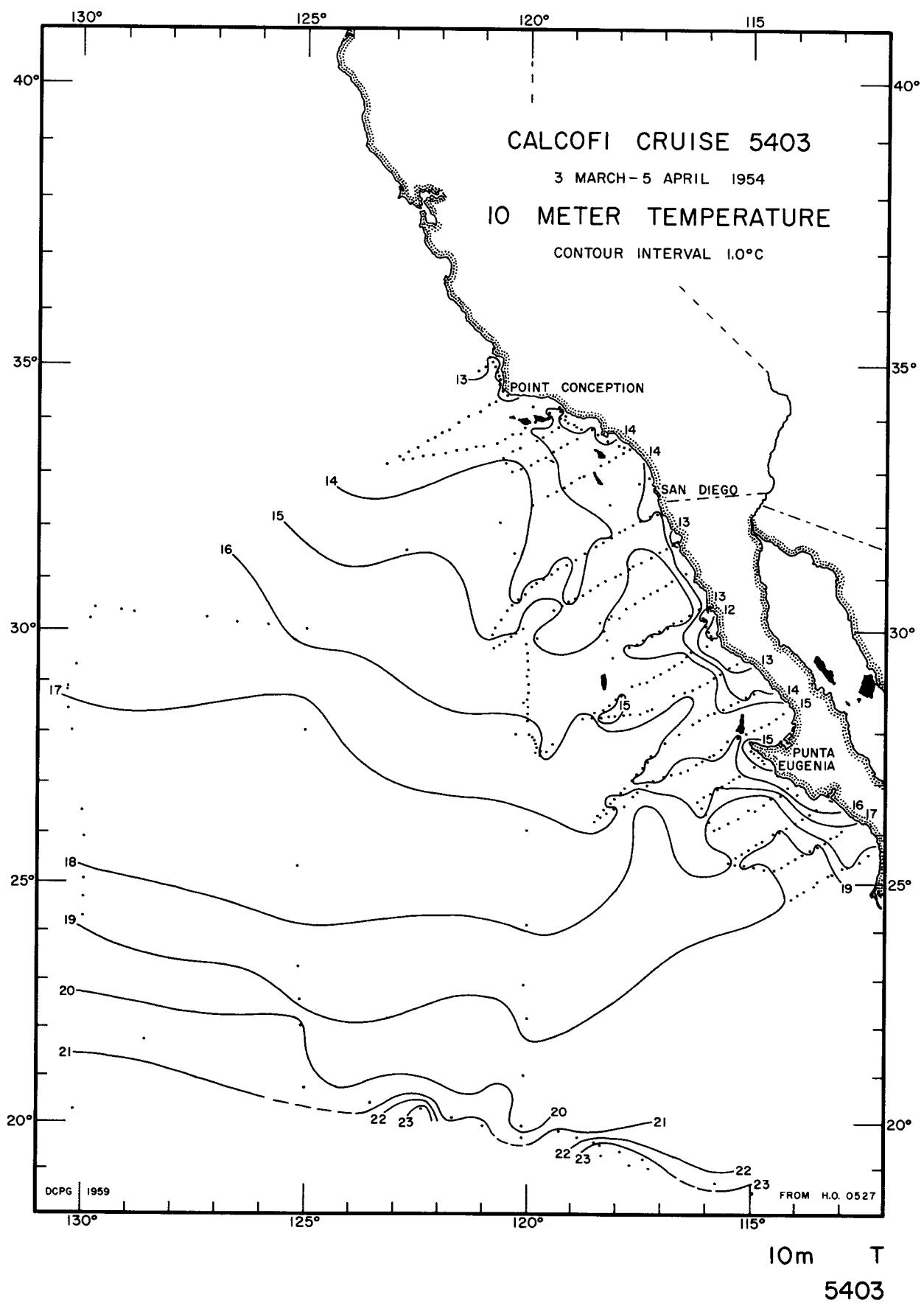


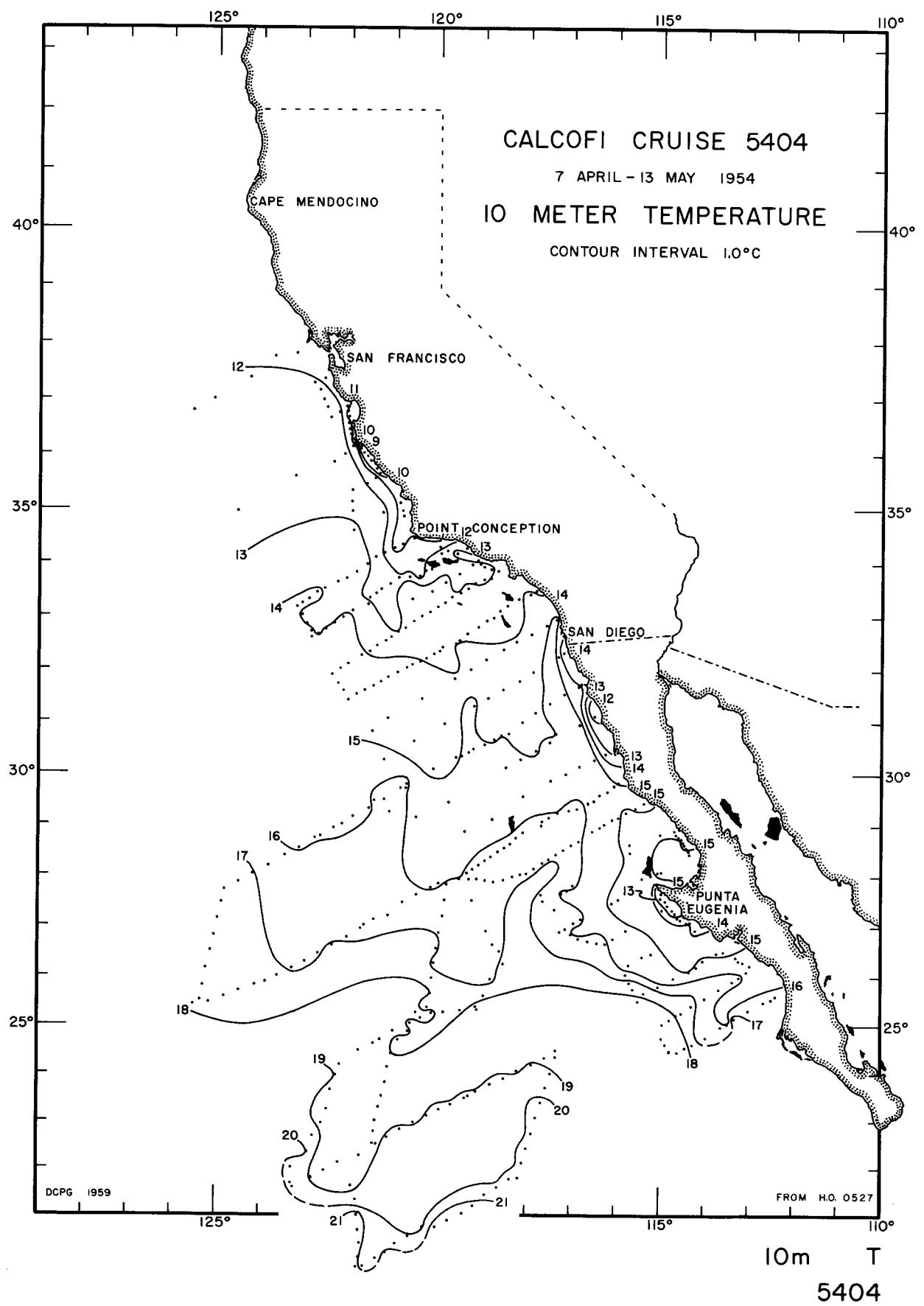


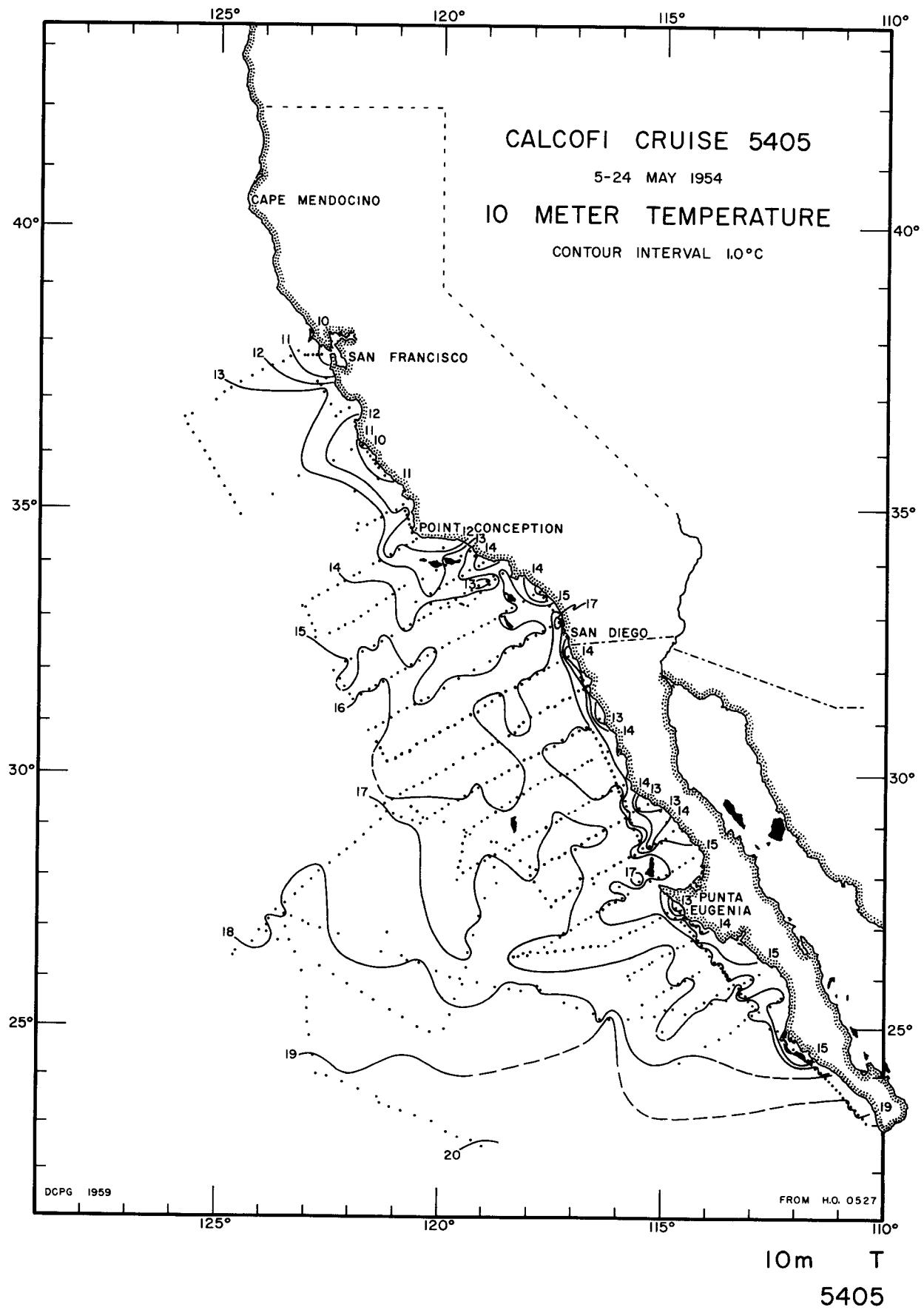


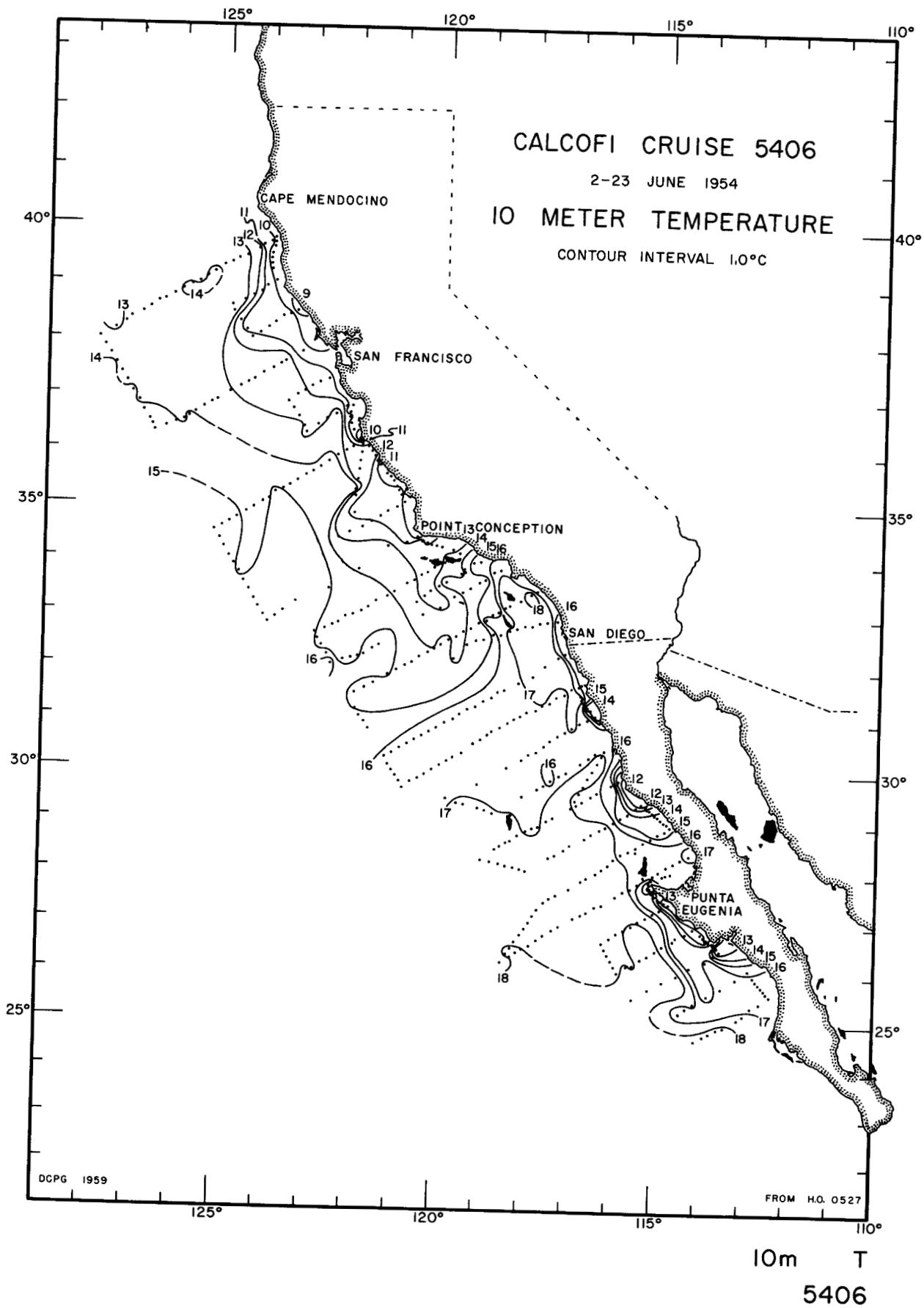


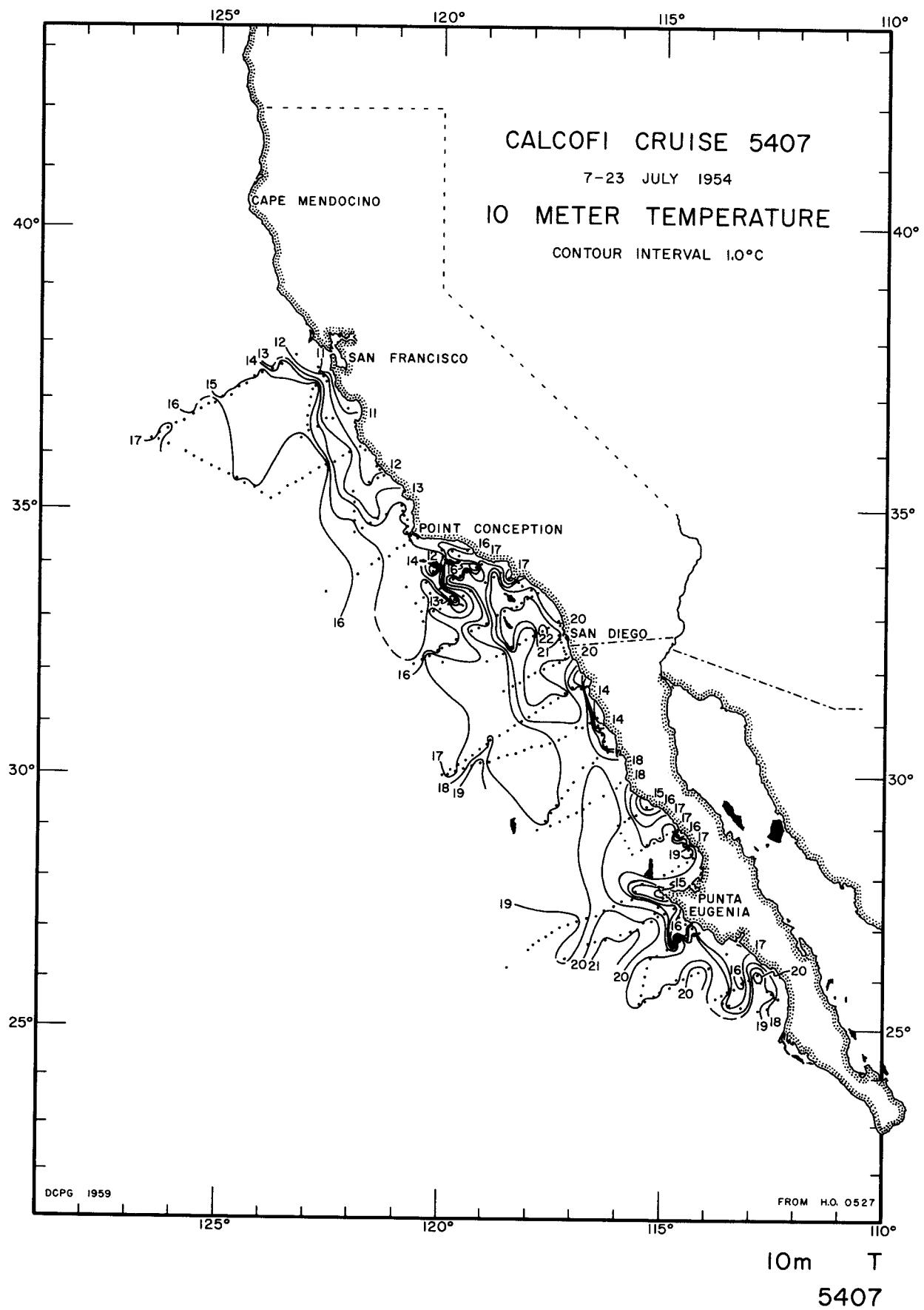


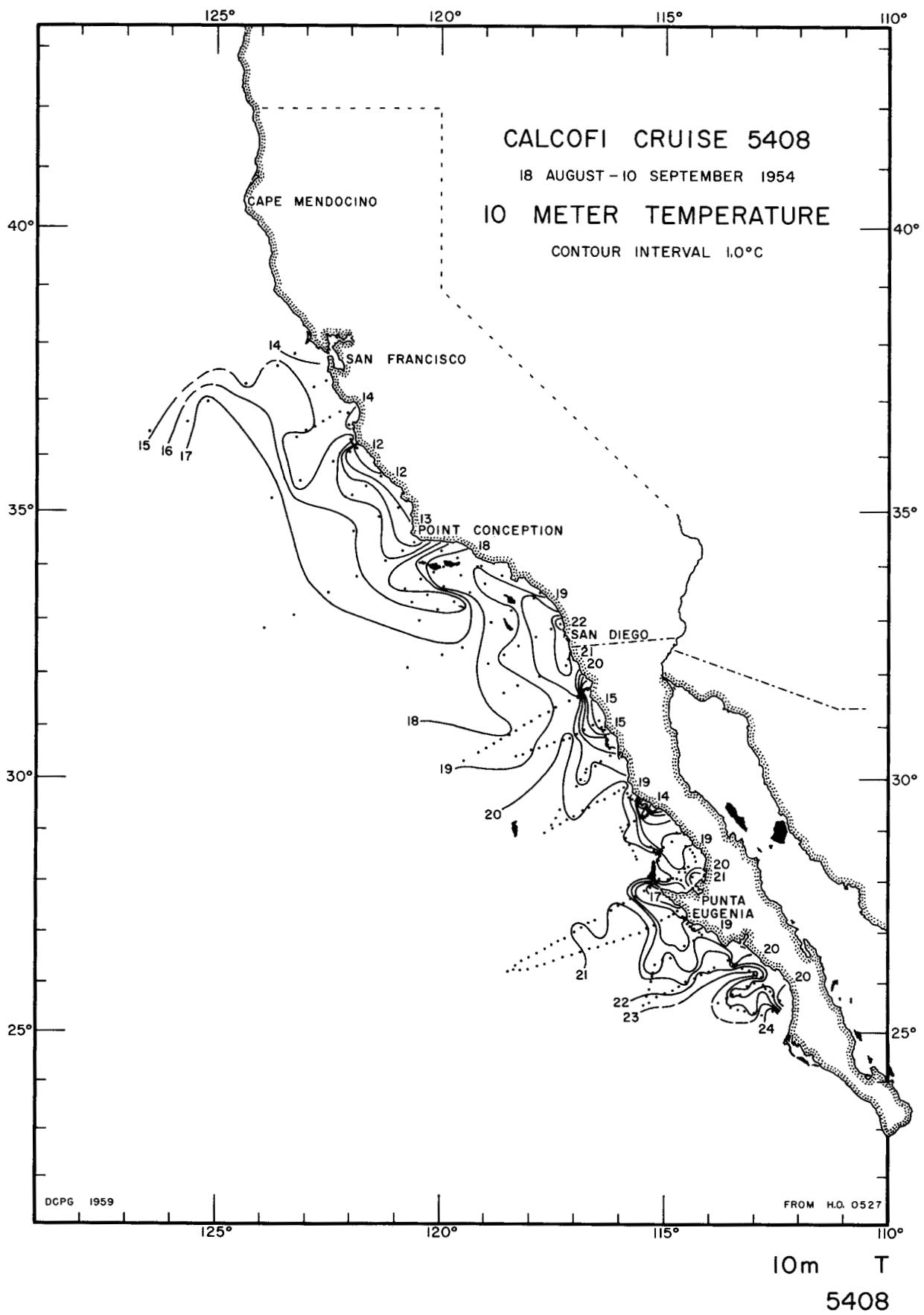


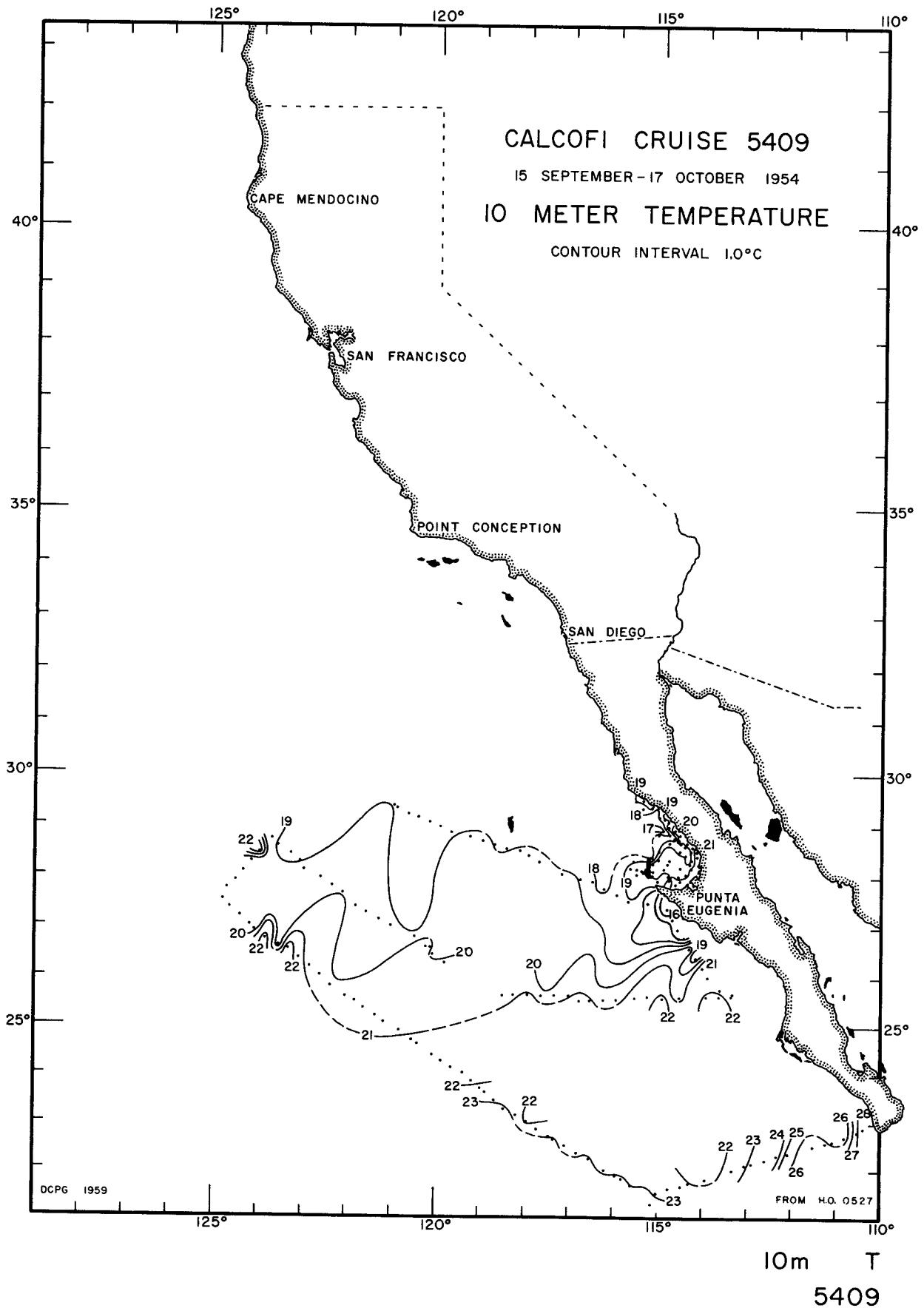


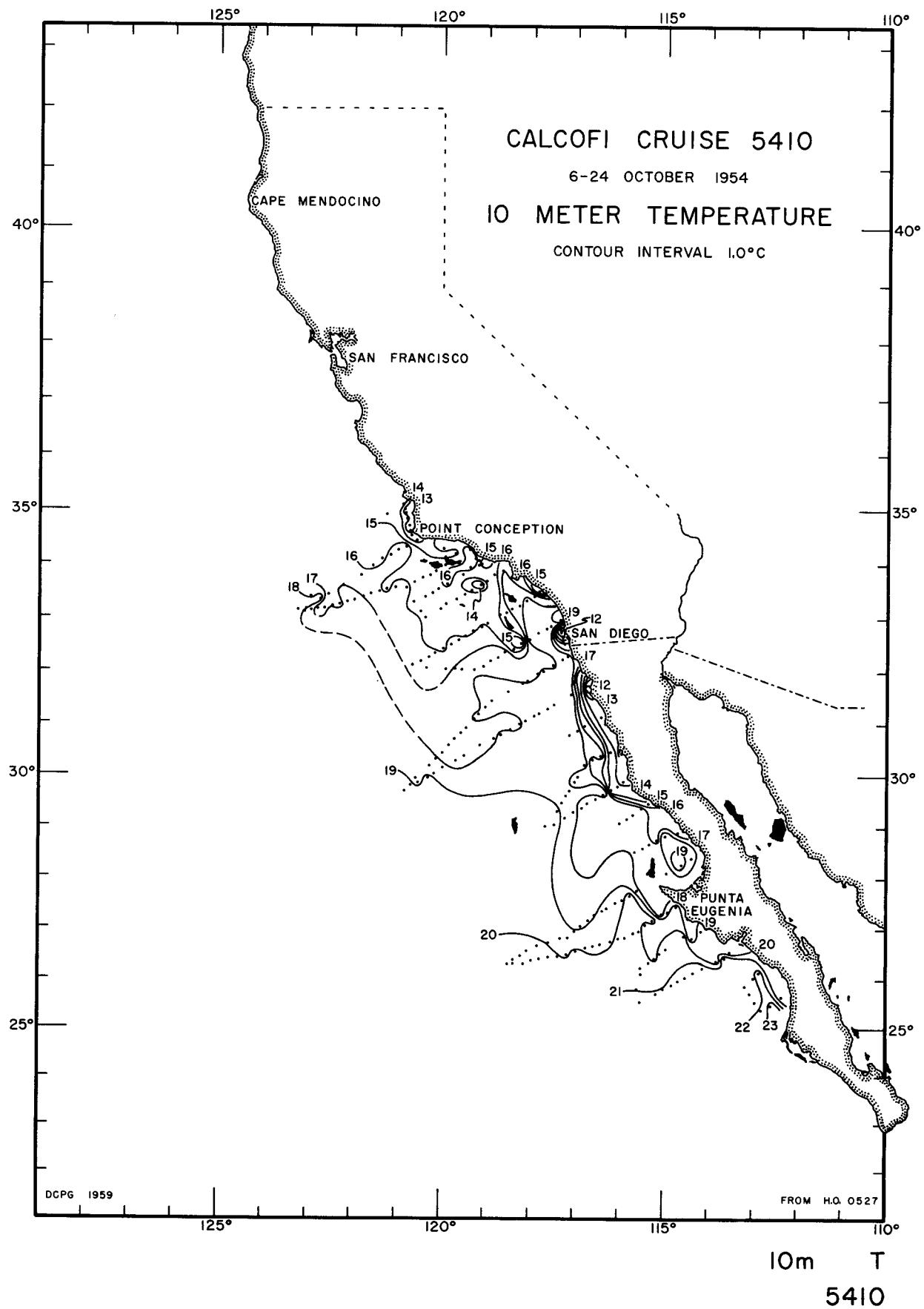


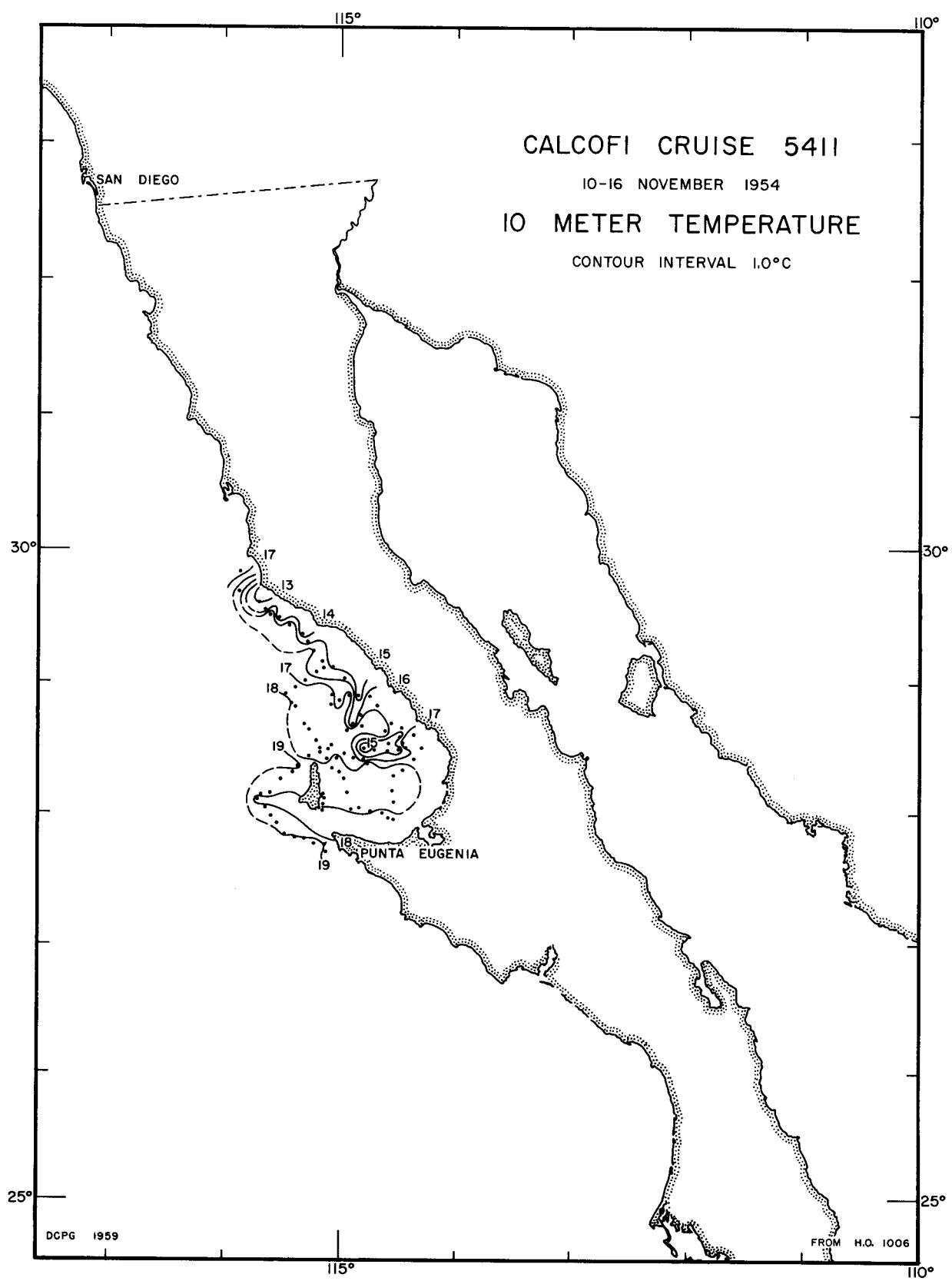




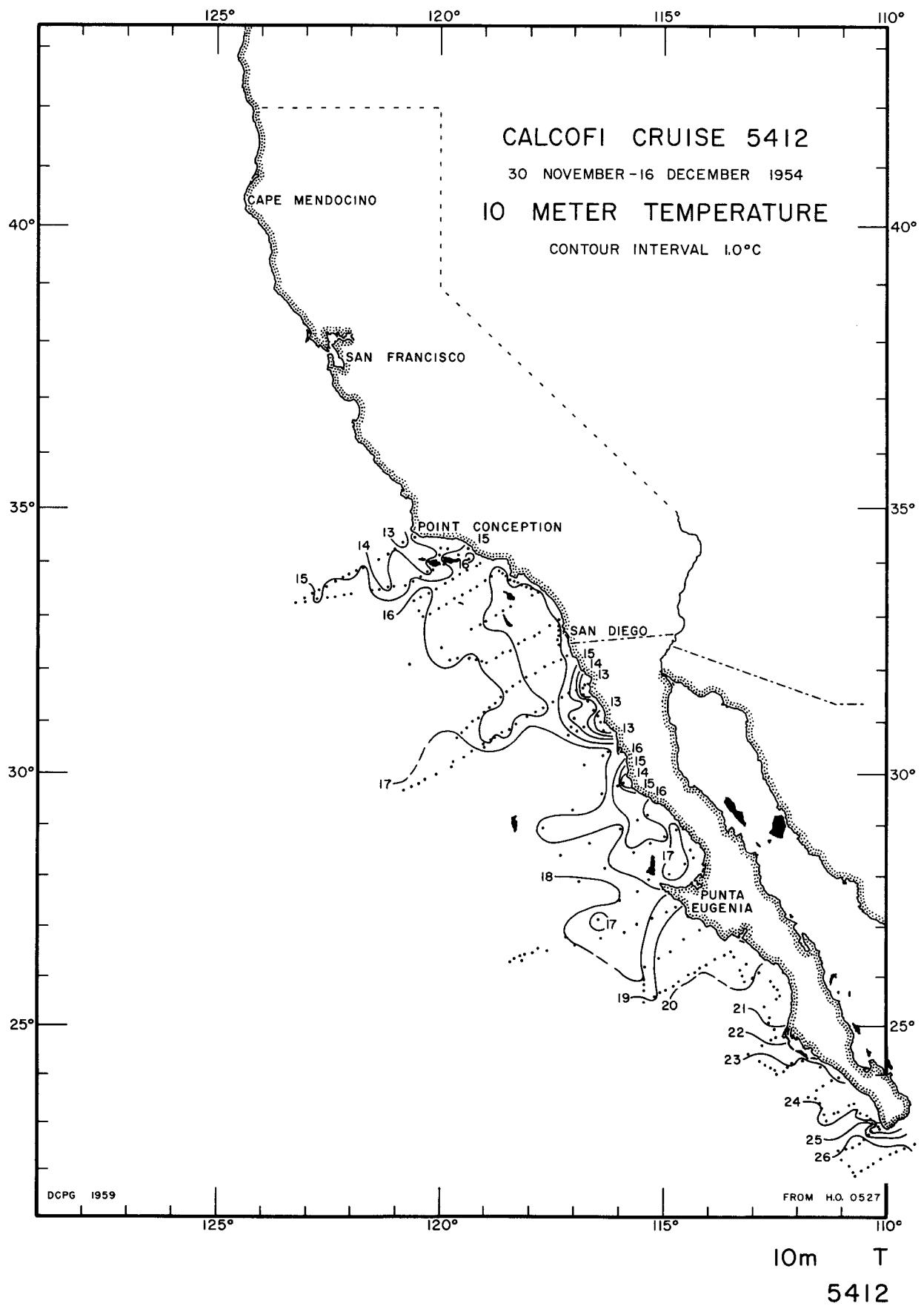


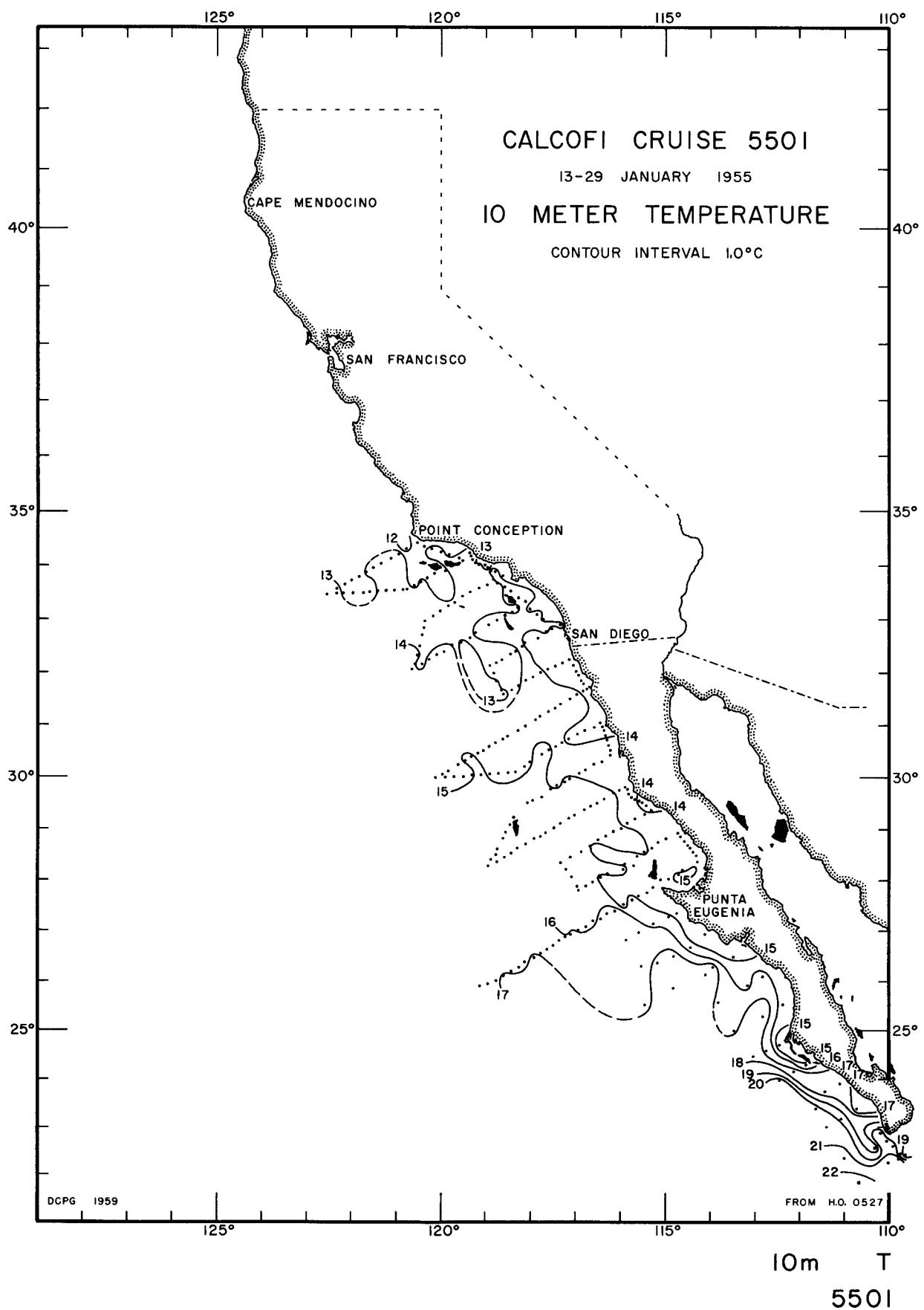




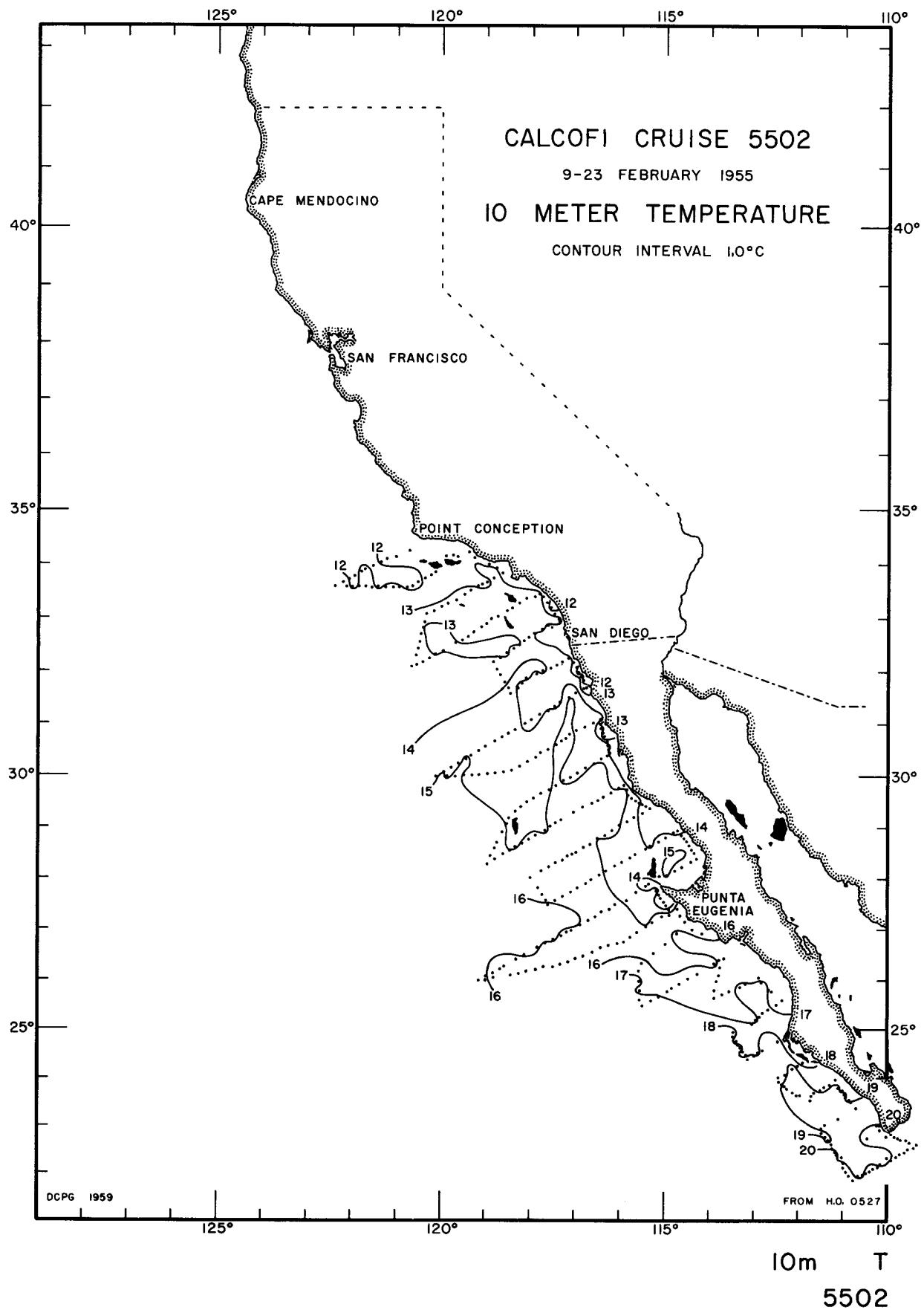


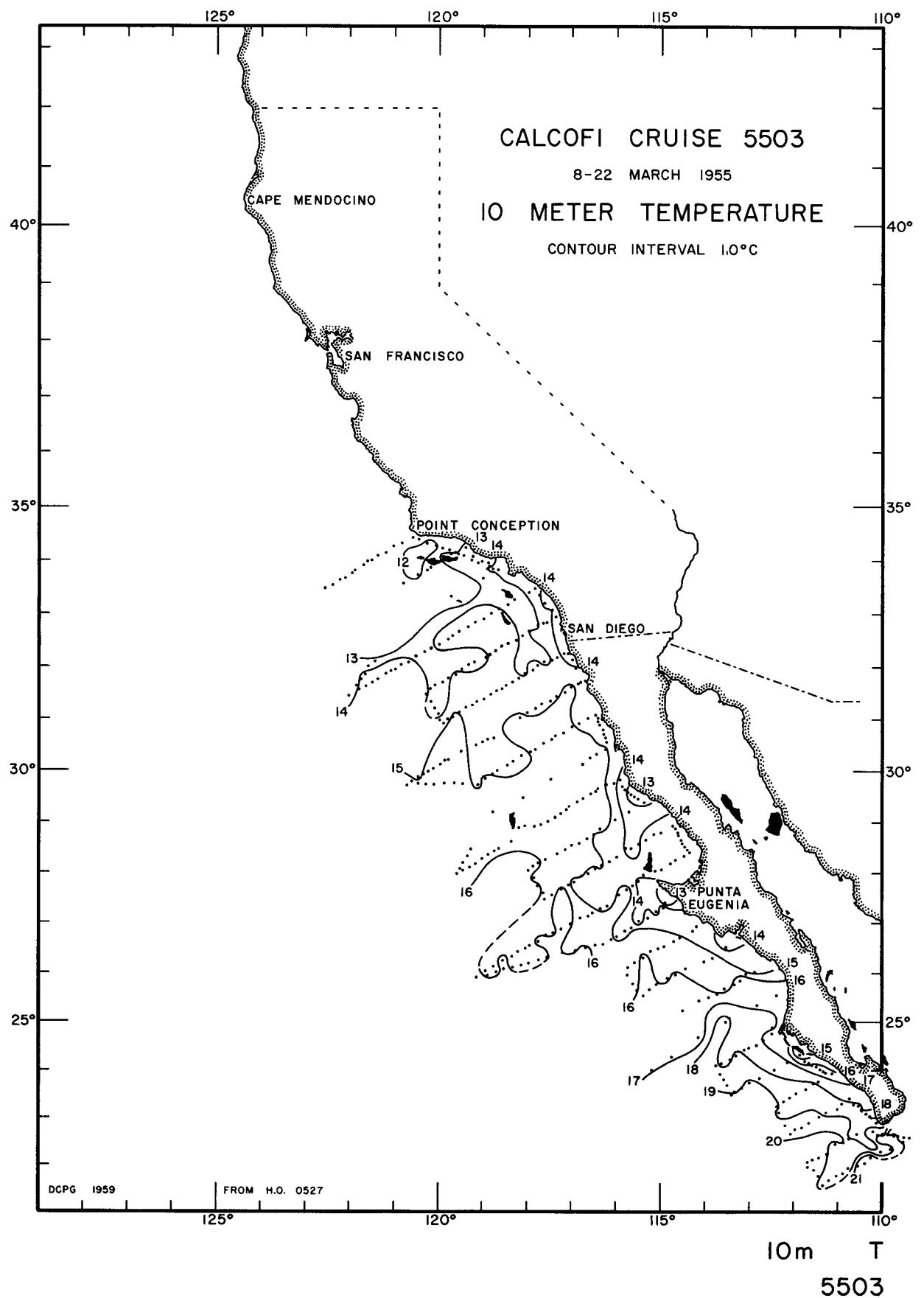
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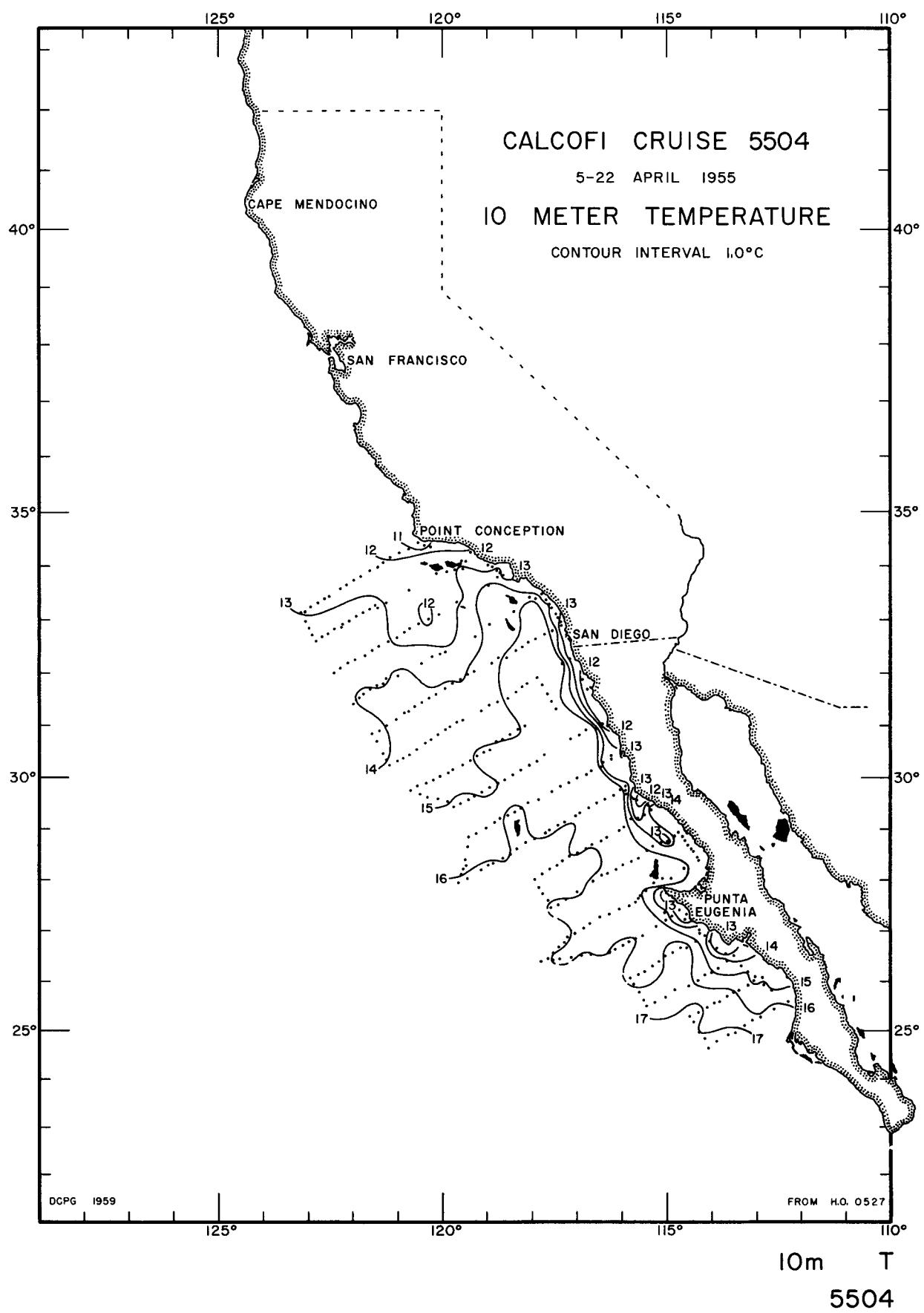


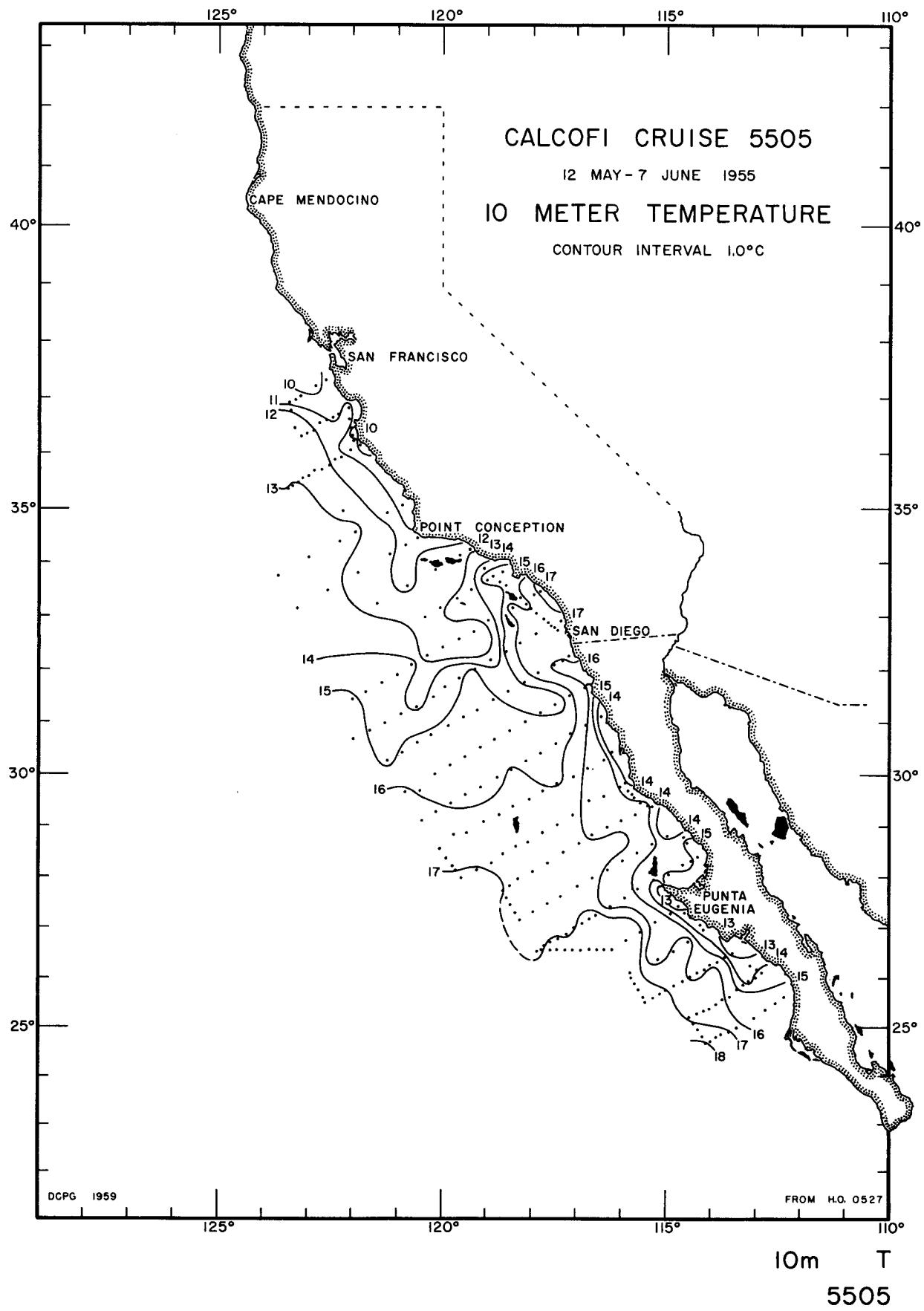


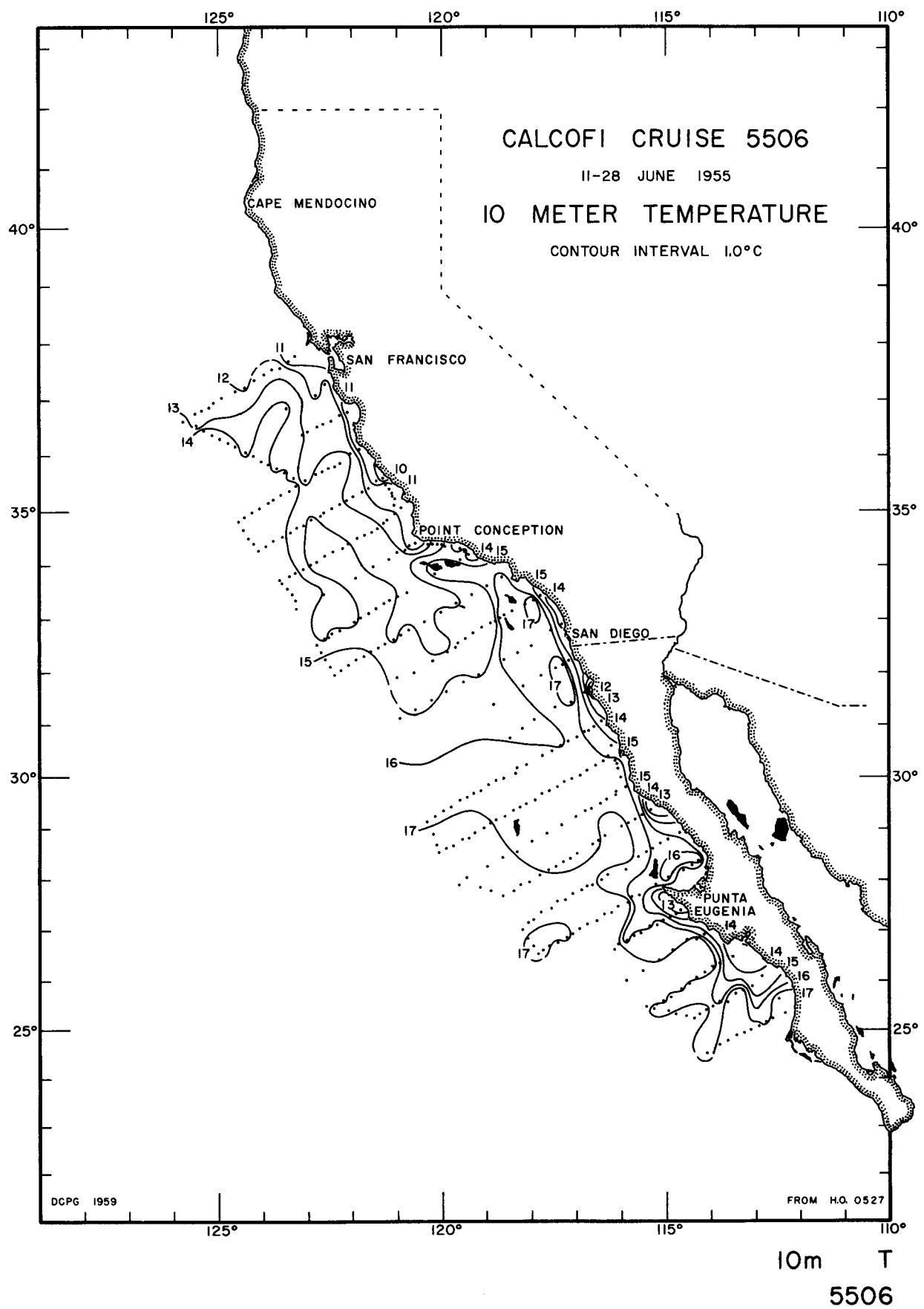
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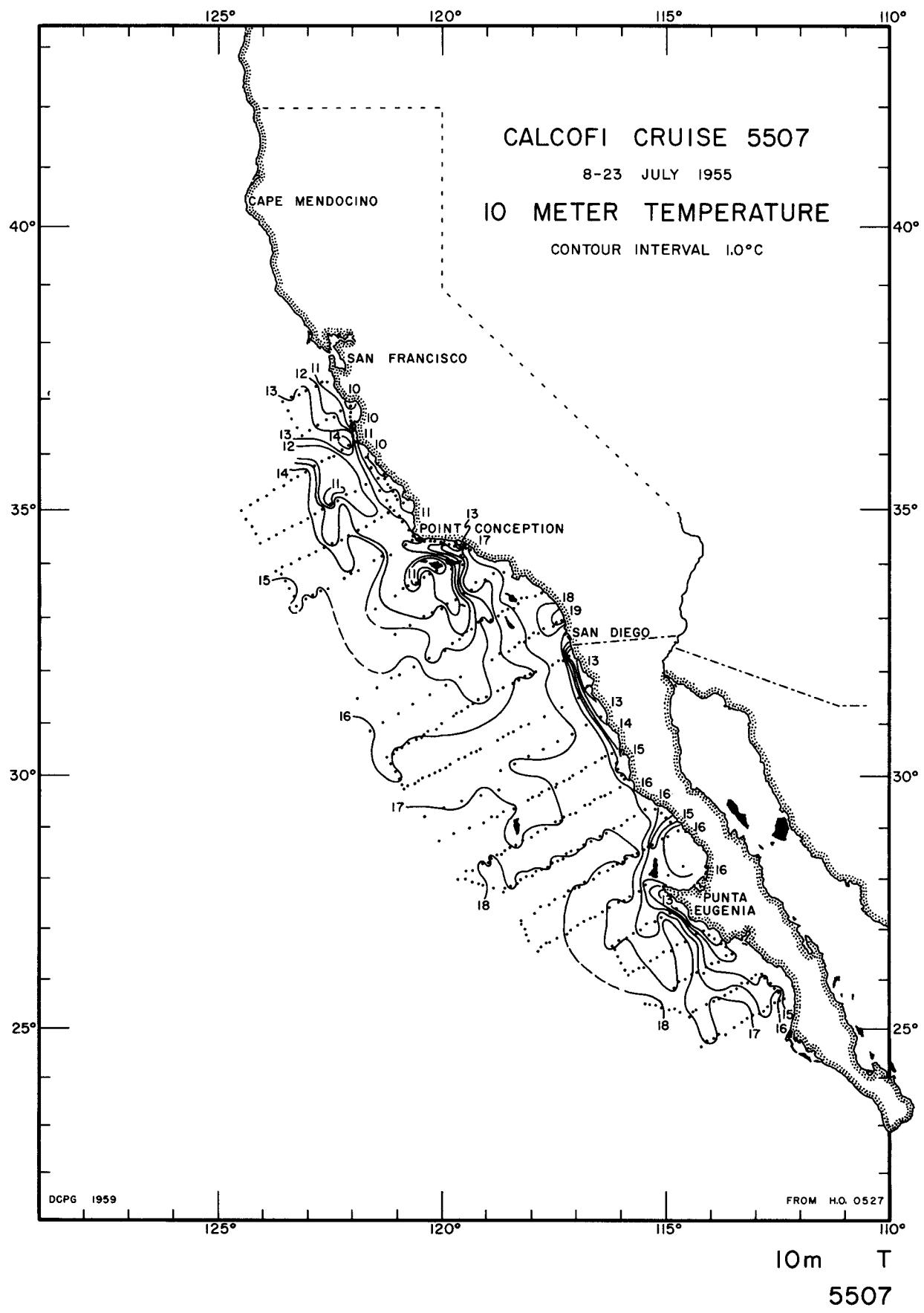


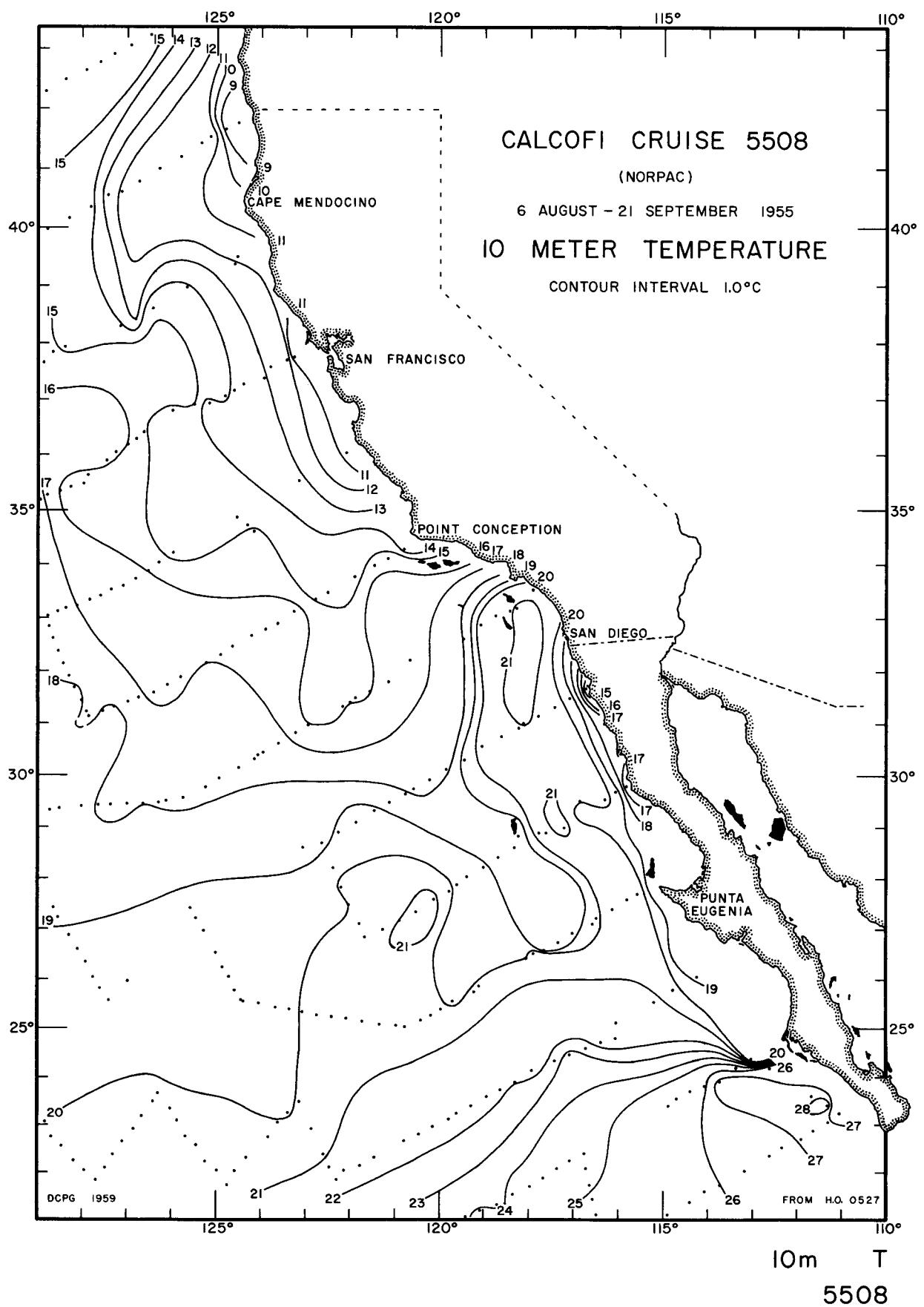












120°

CALCOFI CRUISE 5509

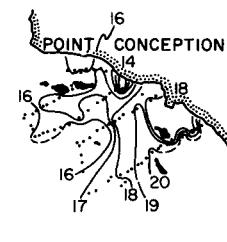
II-24 SEPTEMBER 1955

10 METER TEMPERATURE

CONTOUR INTERVAL 1.0°C

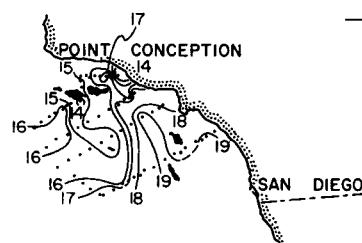
35°

II-17 SEPTEMBER



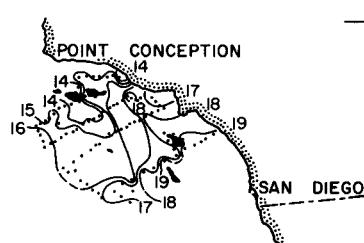
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14-20 SEPTEMBER



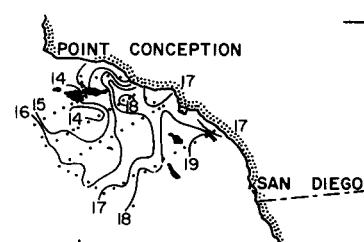
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18-23 SEPTEMBER



35°

21-24 SEPTEMBER



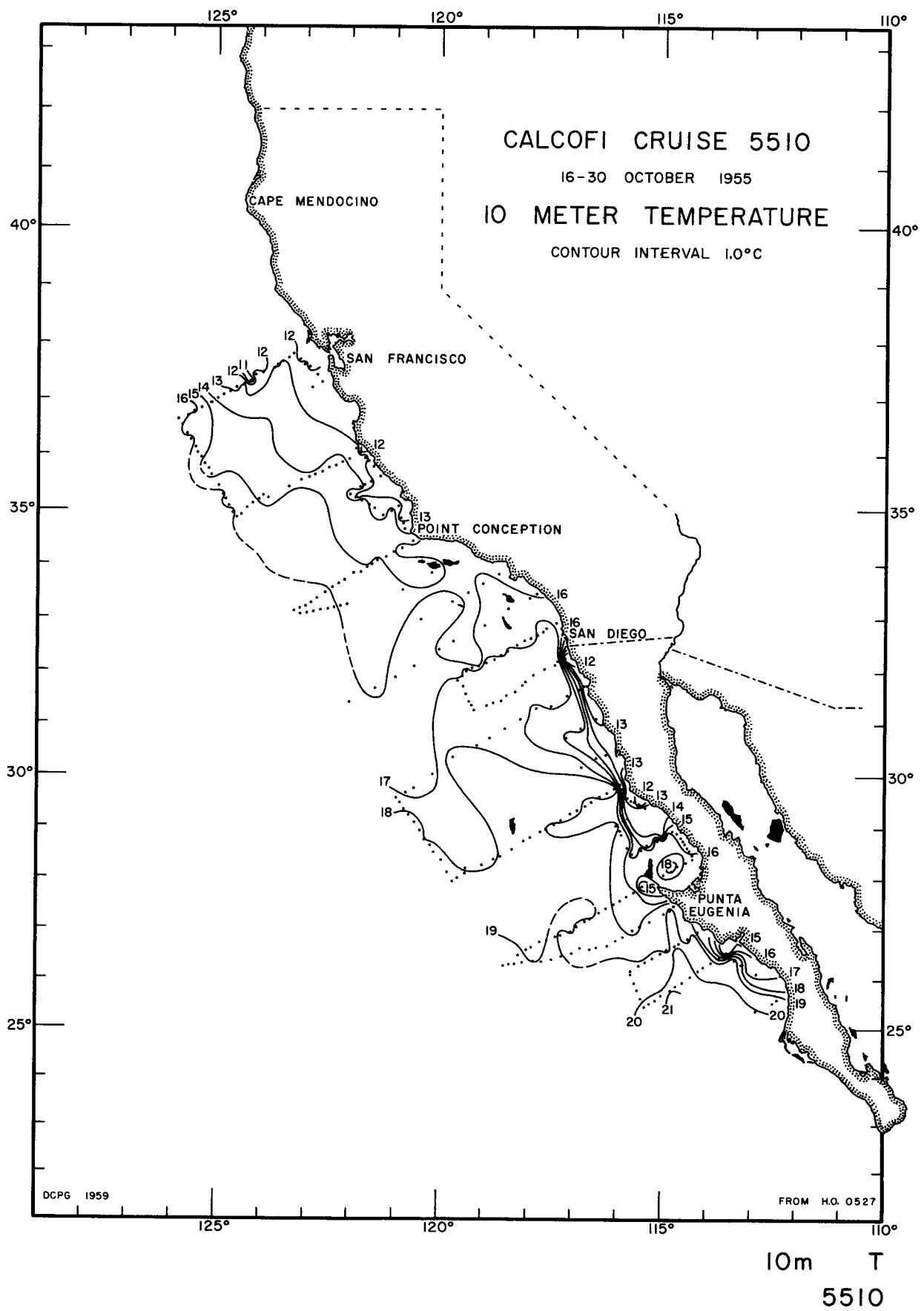
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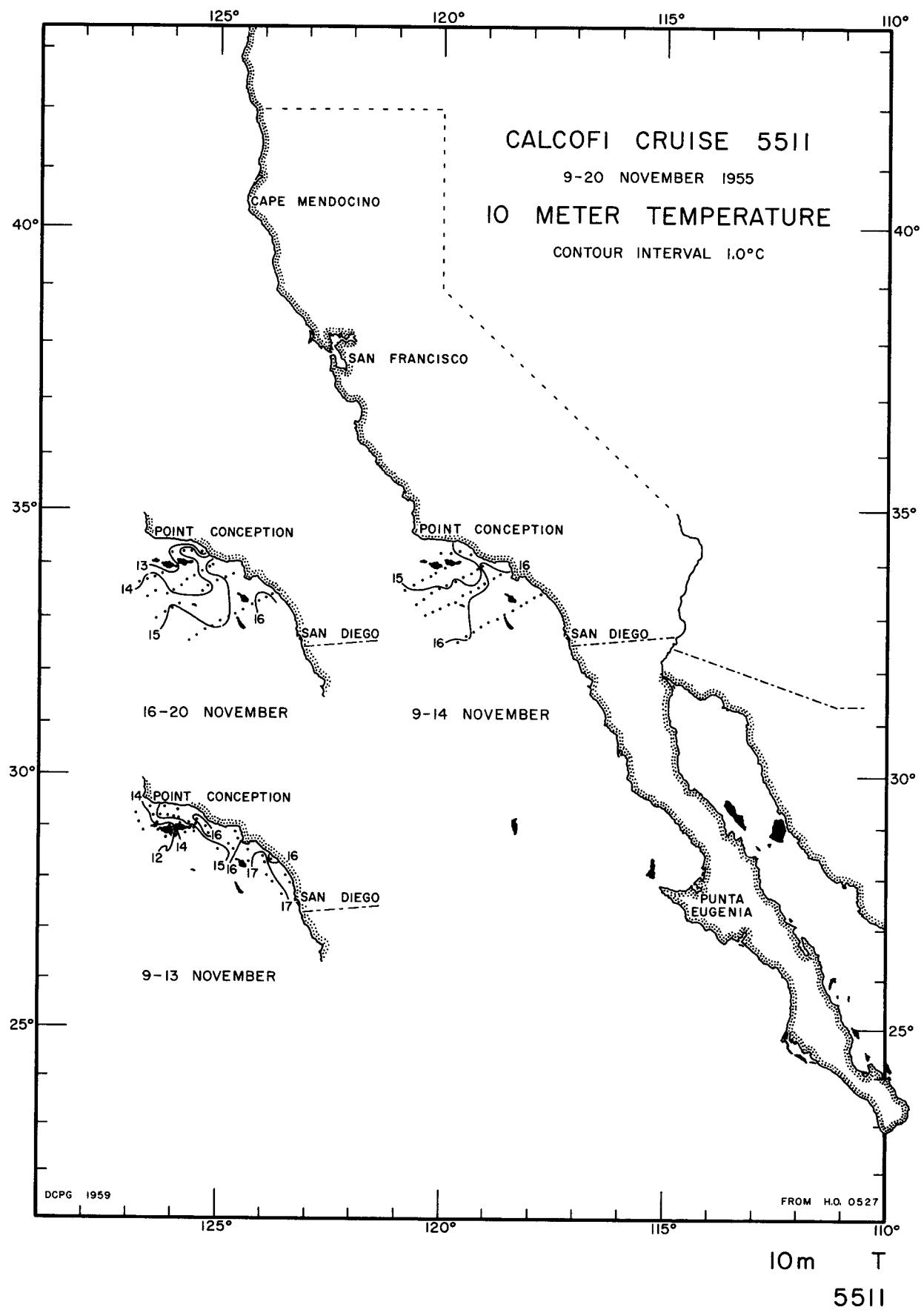
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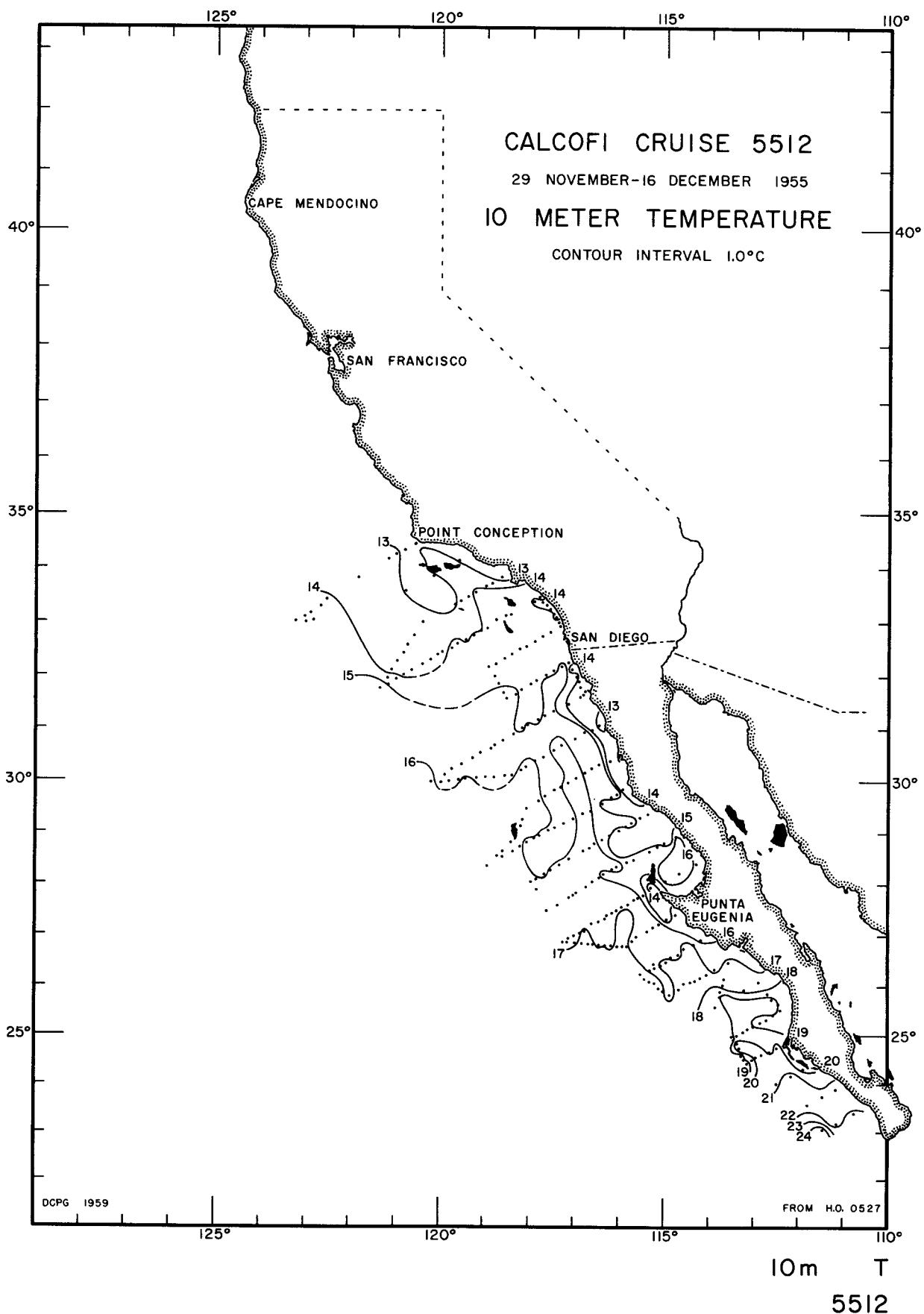
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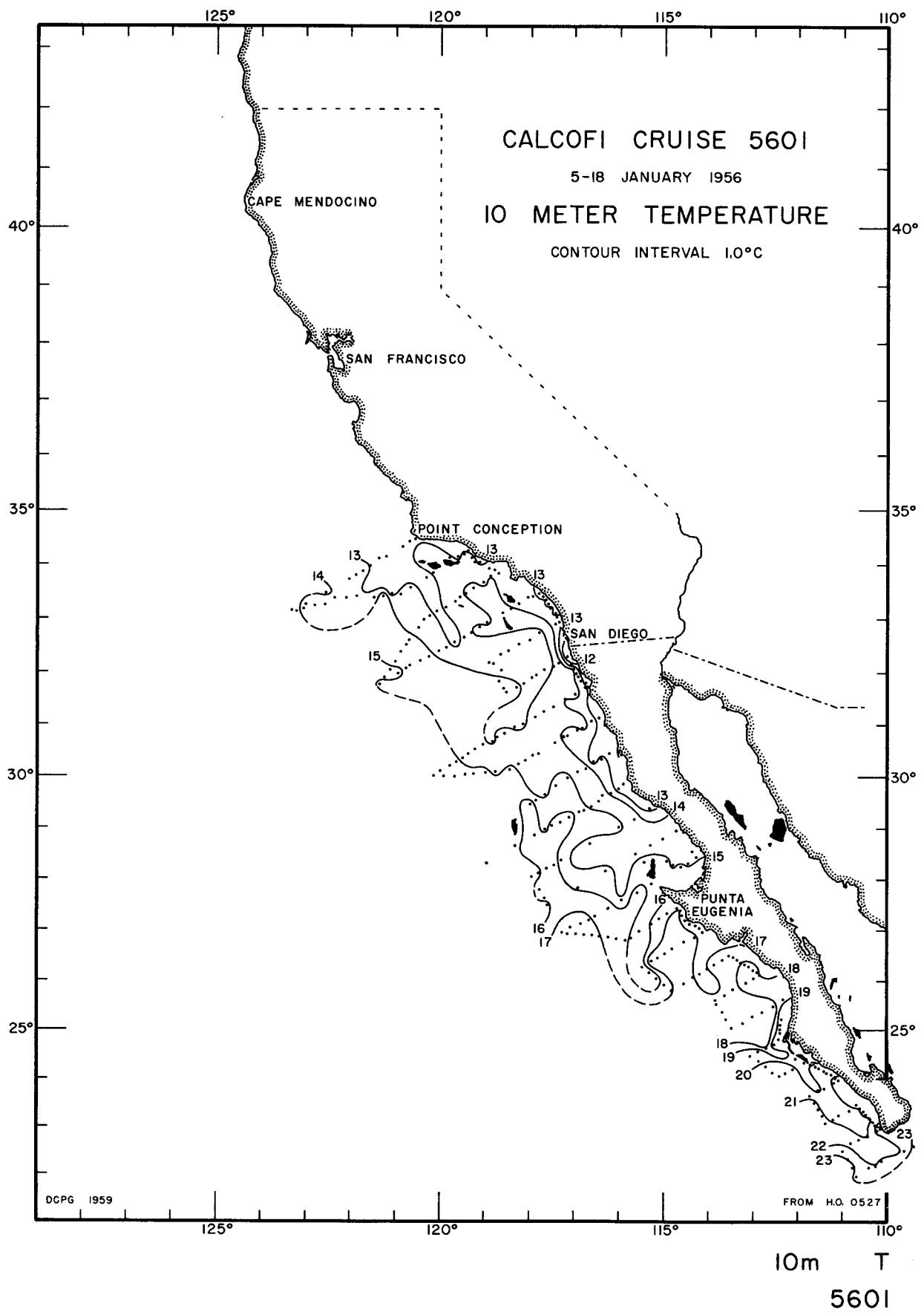
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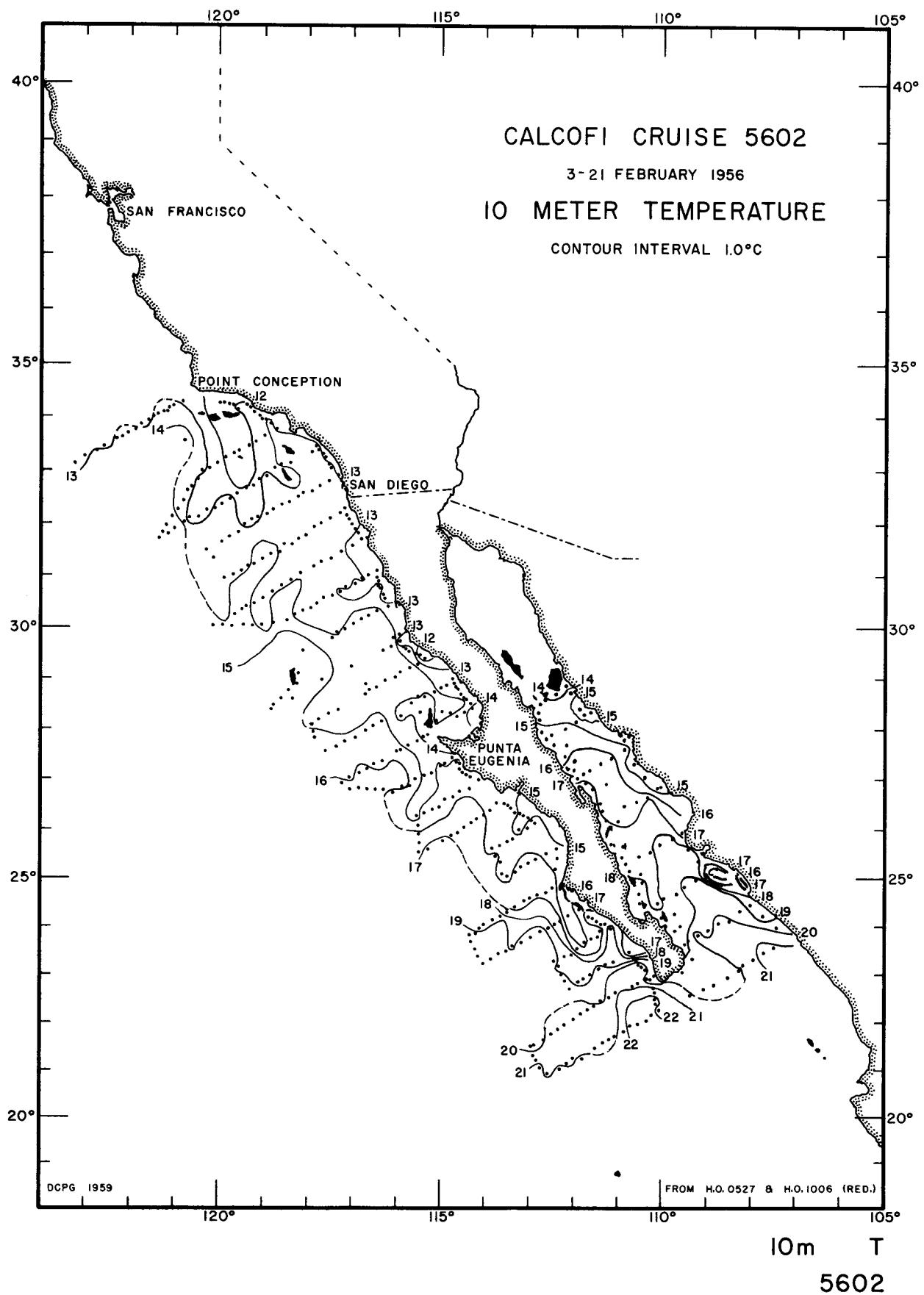
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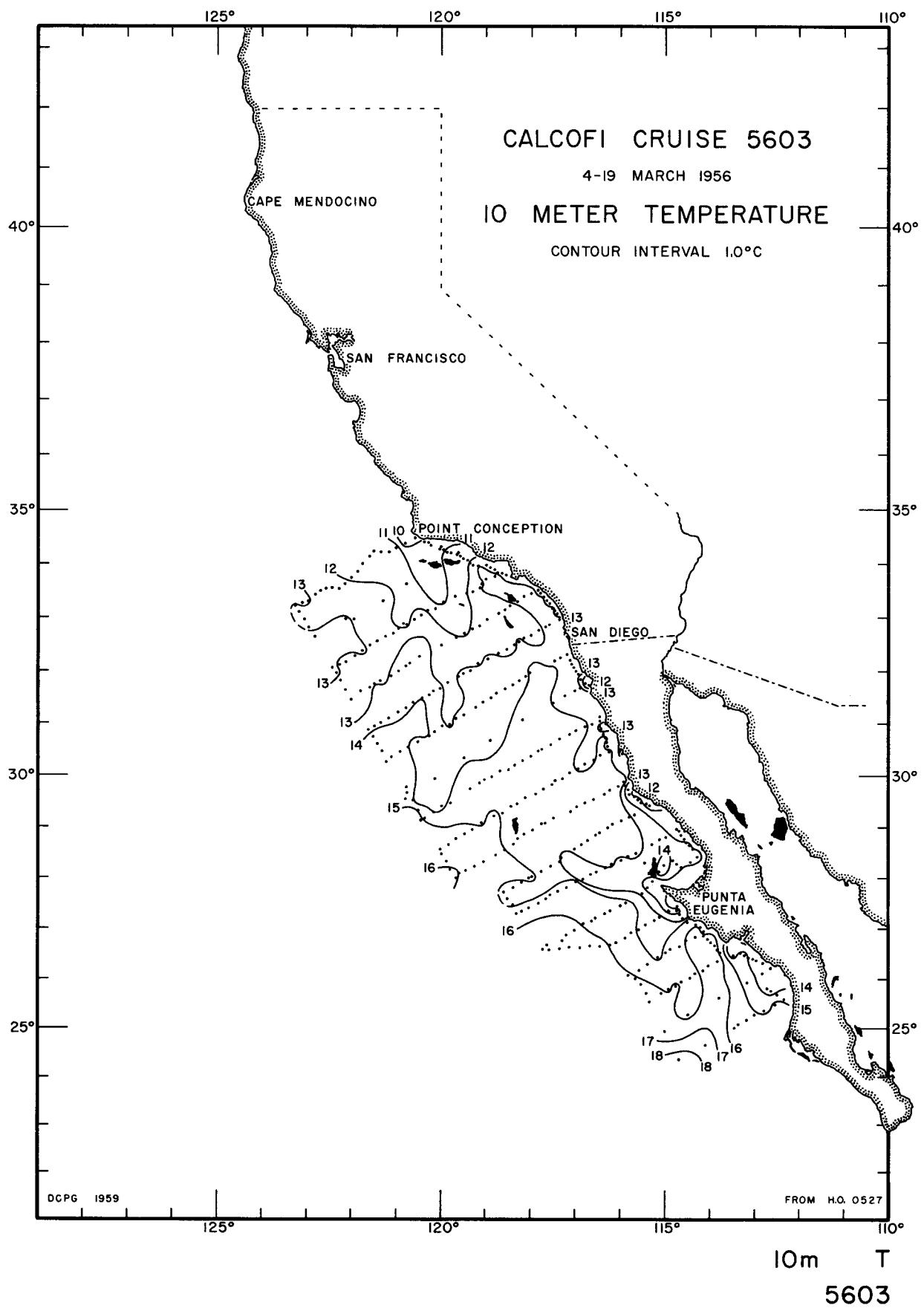


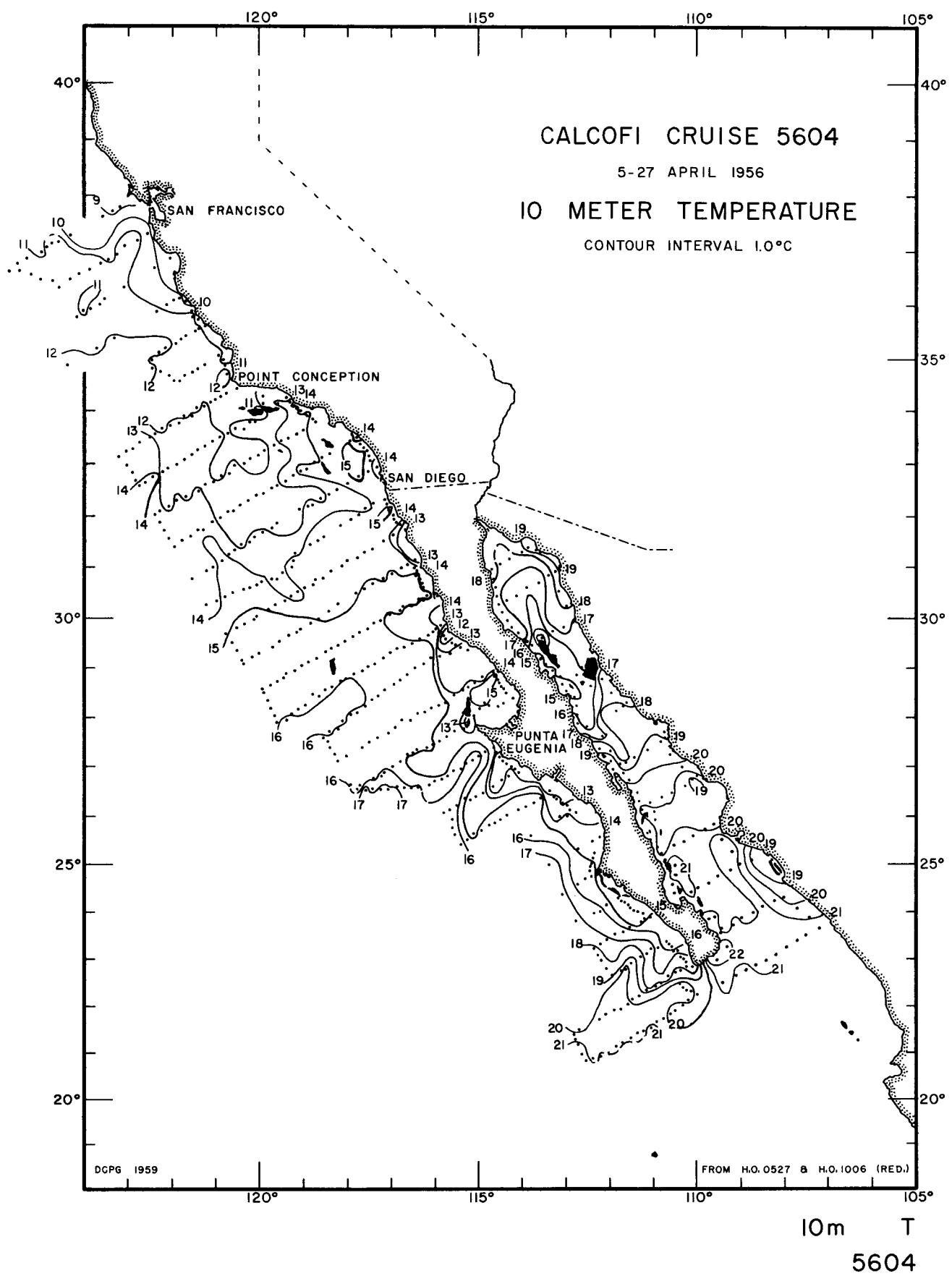


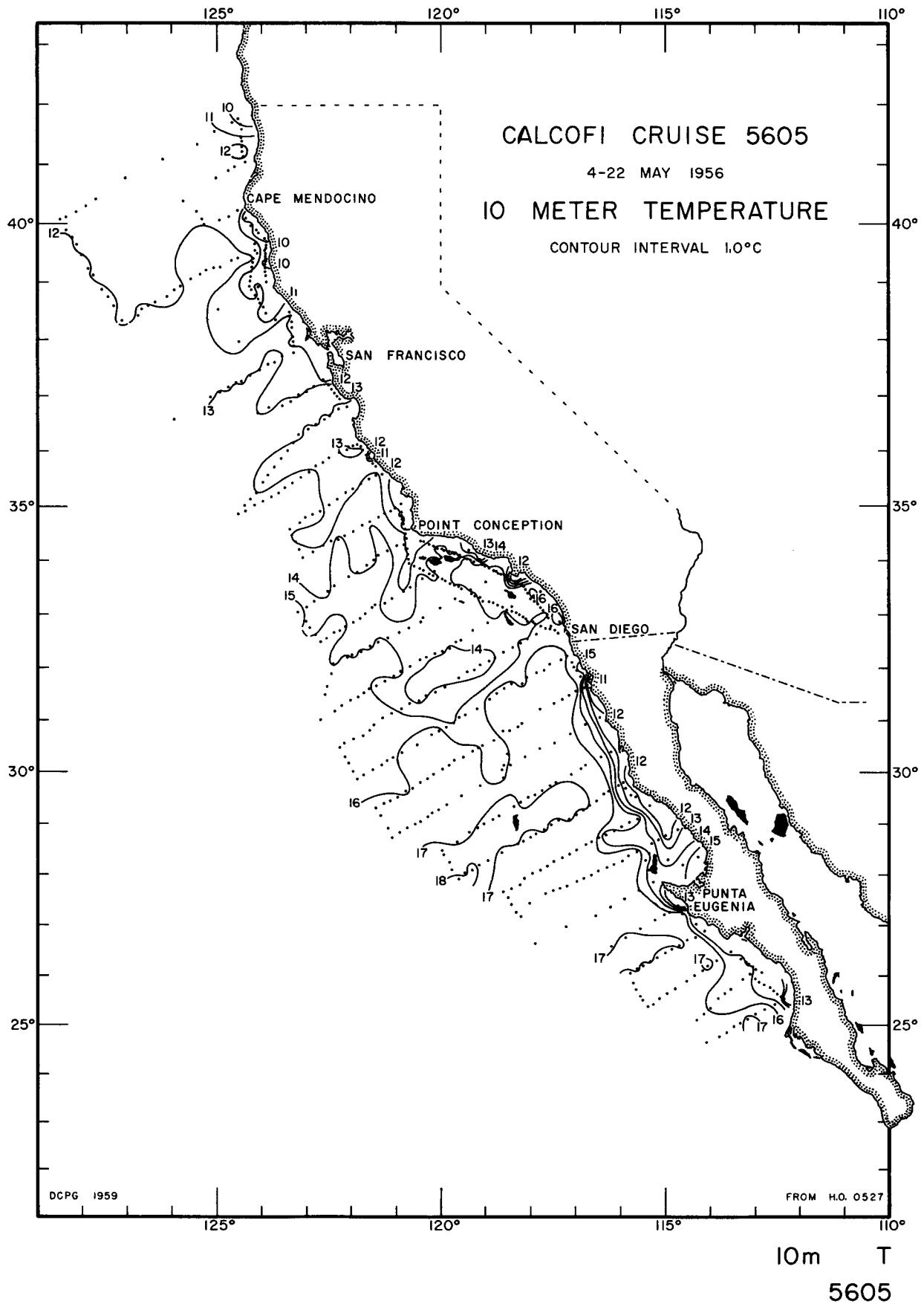


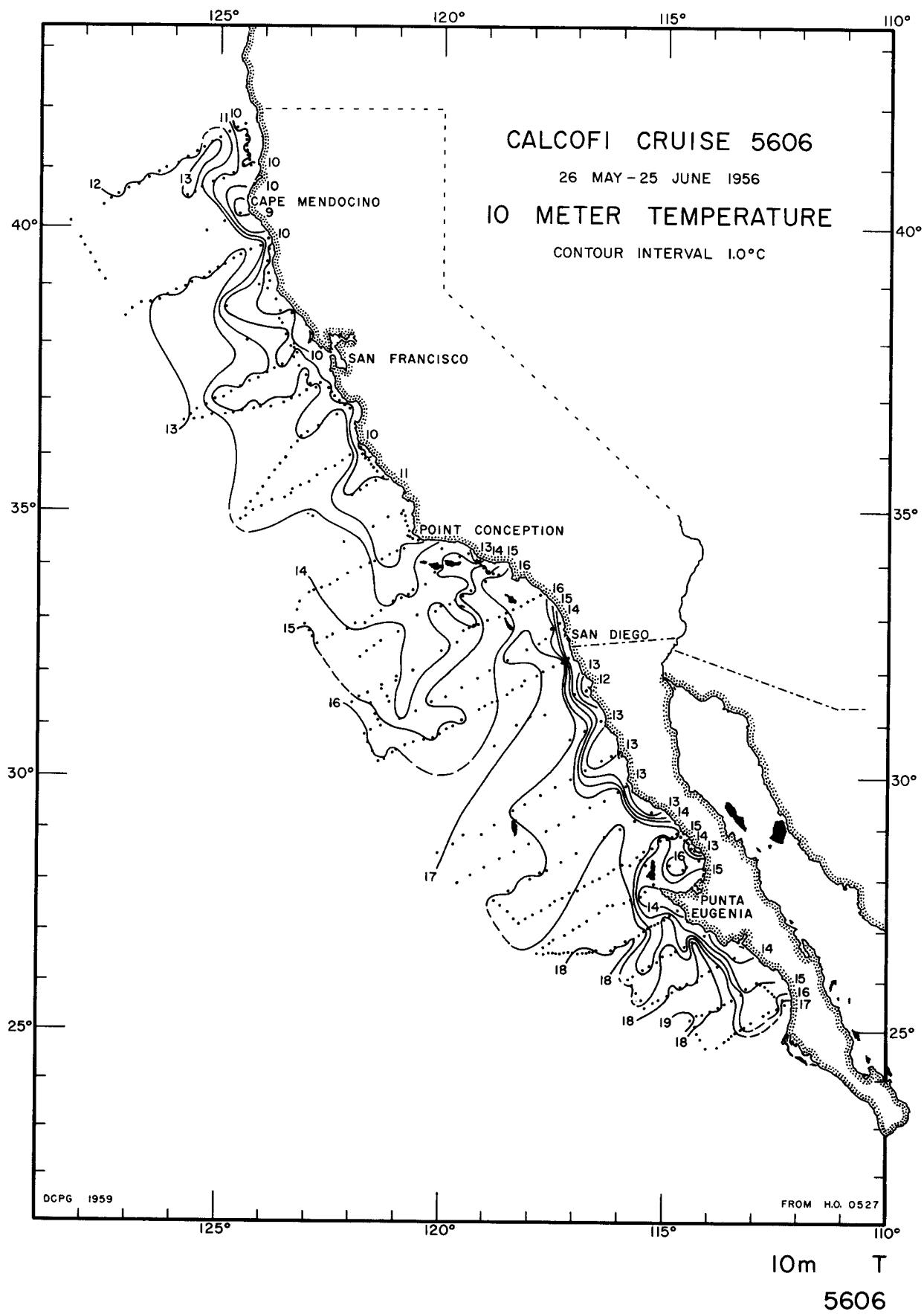


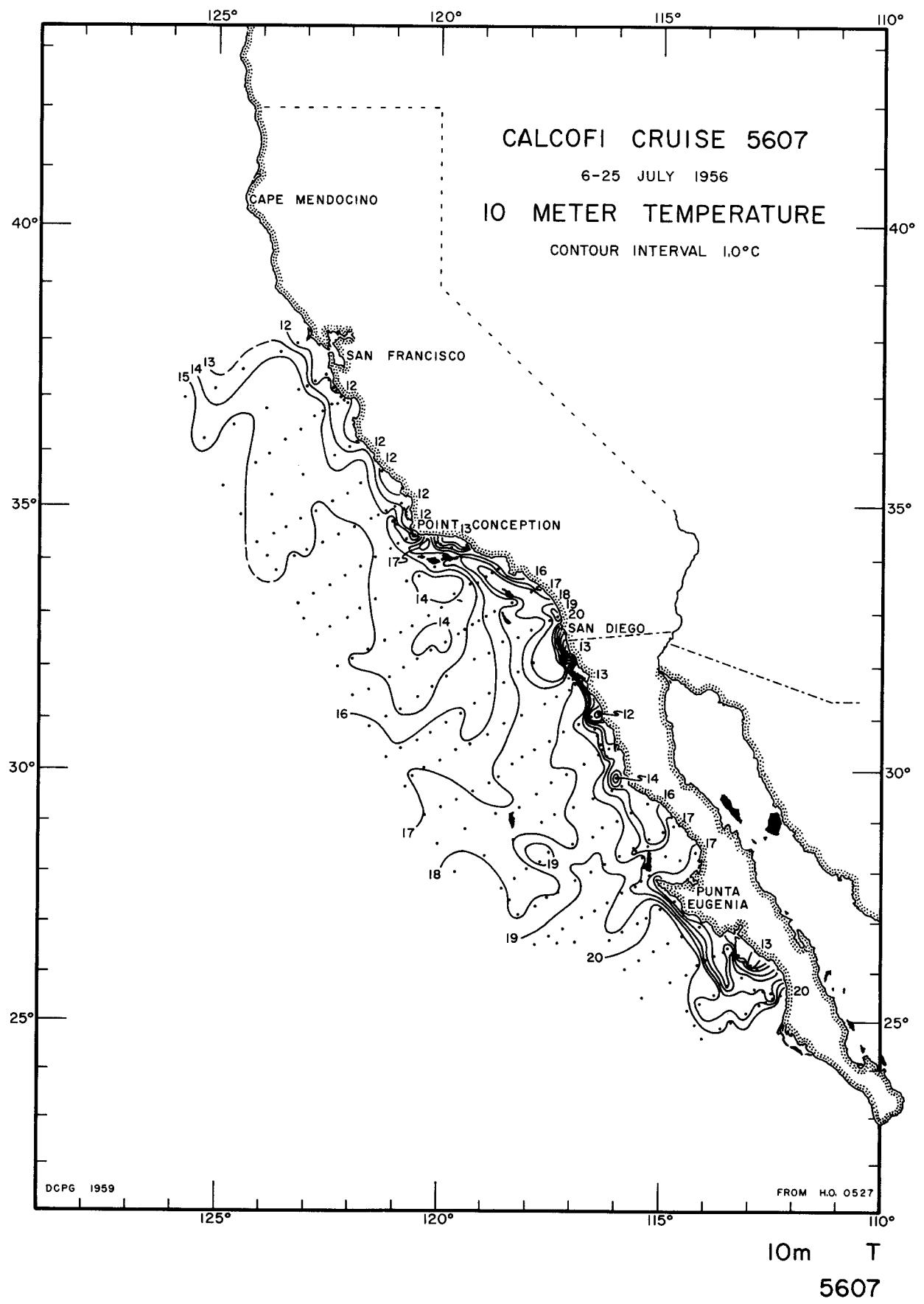


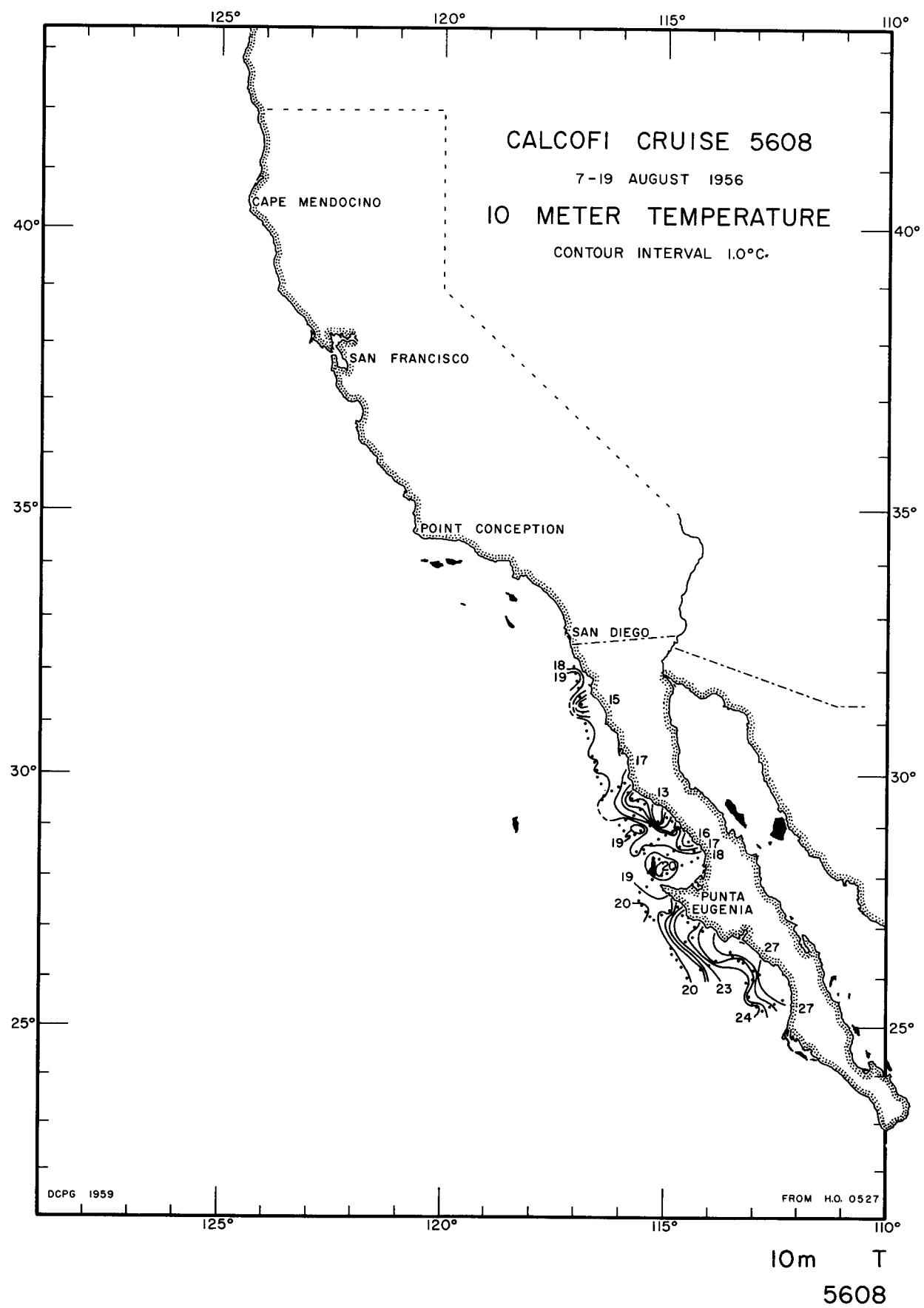


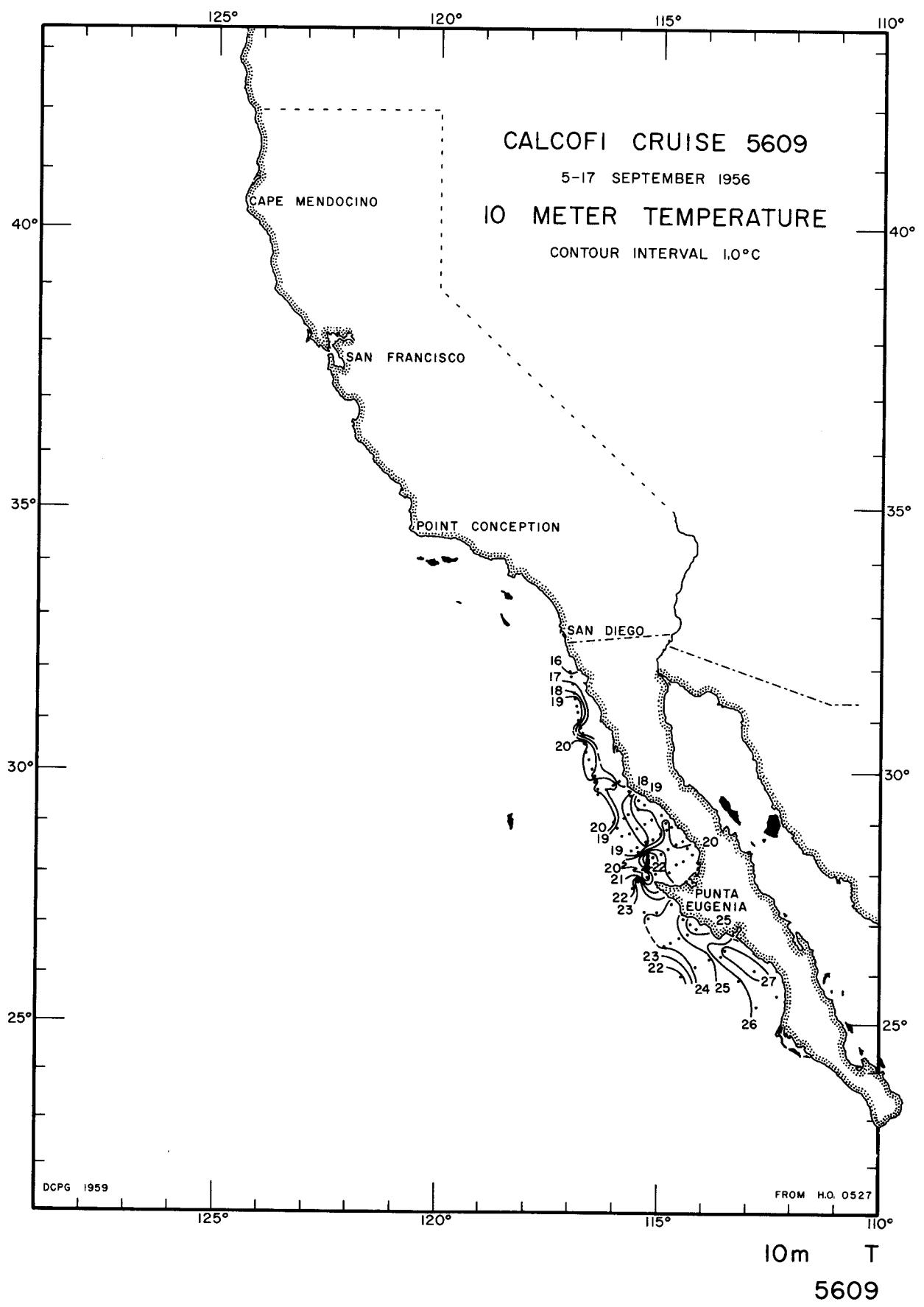


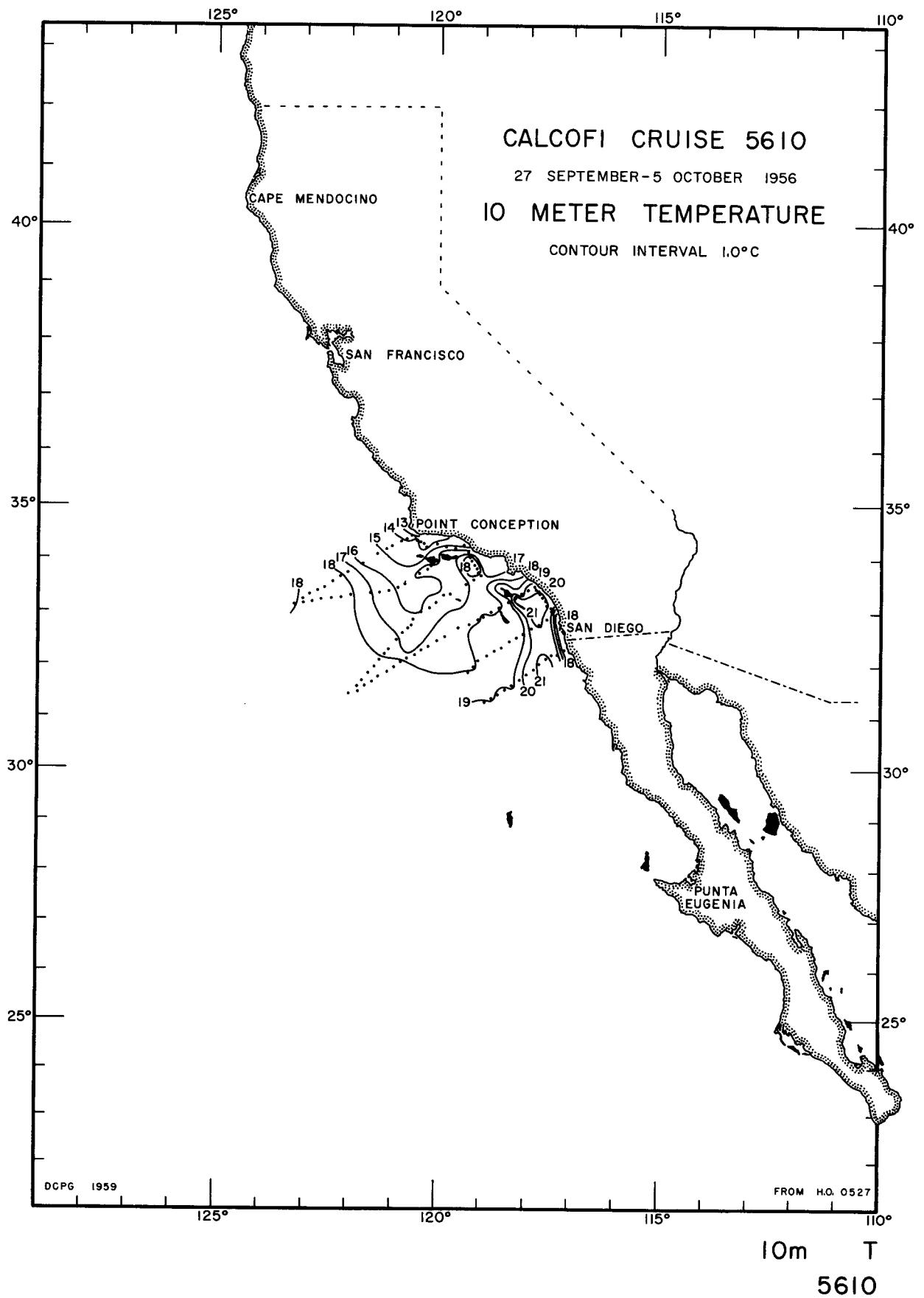


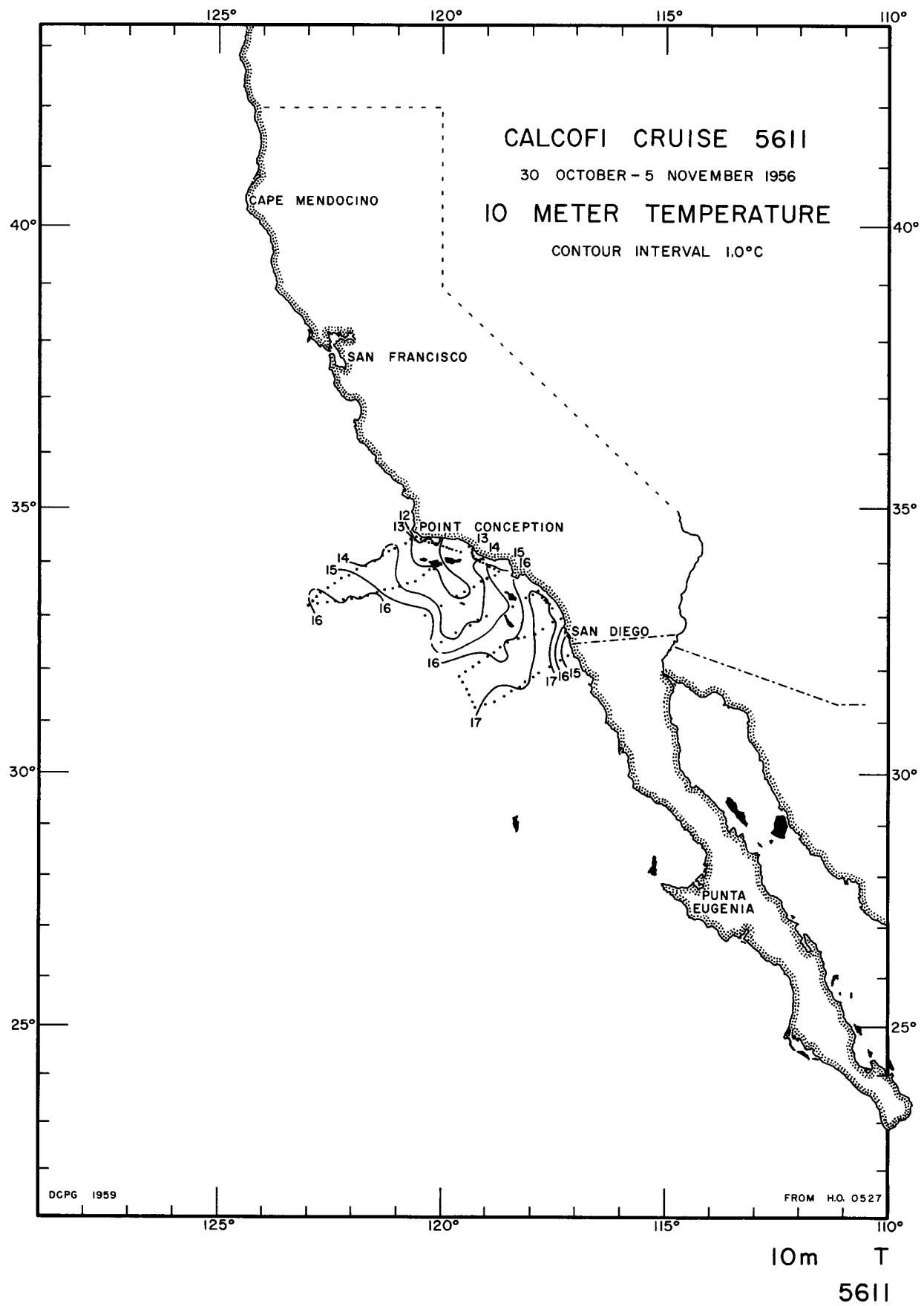


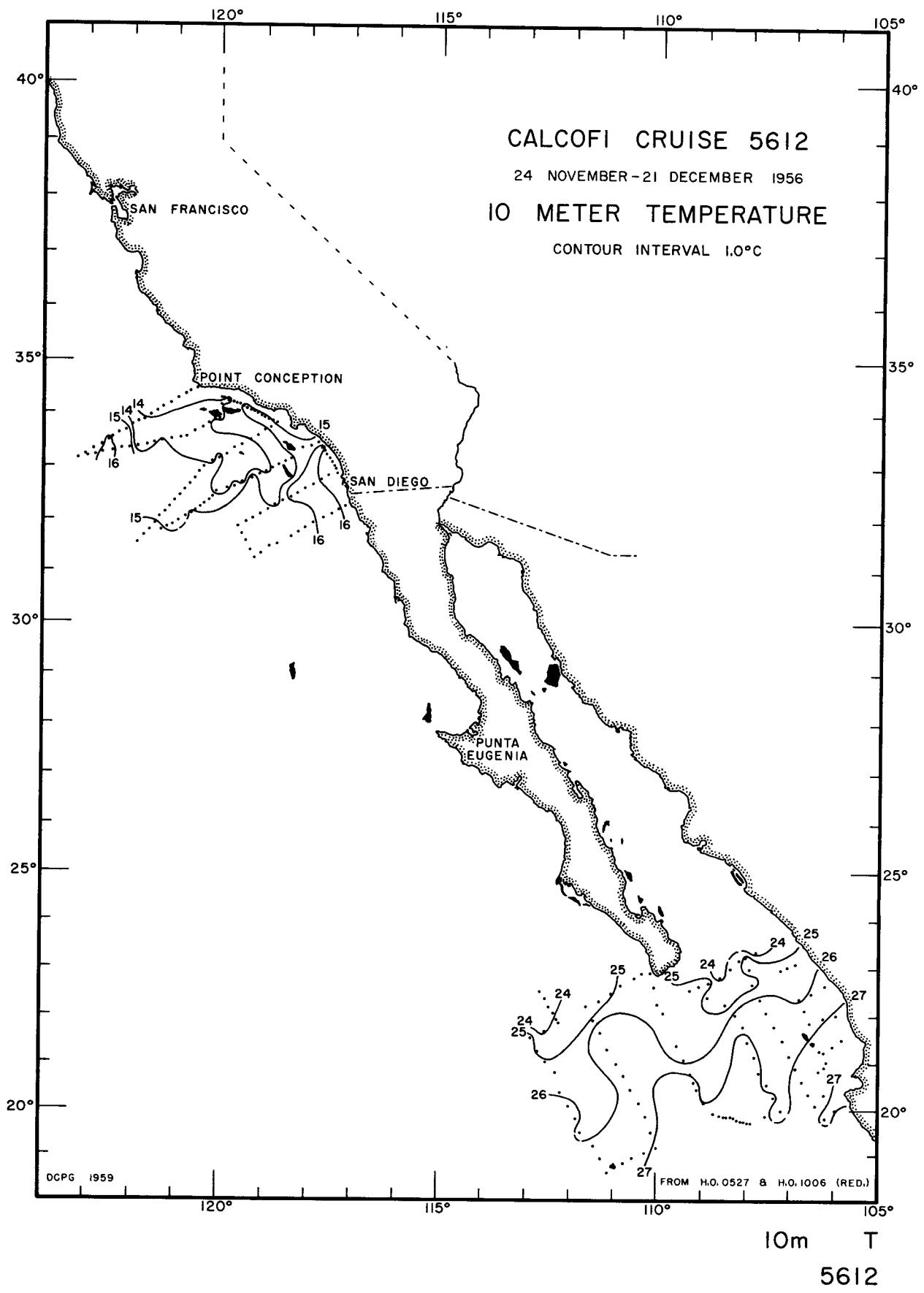


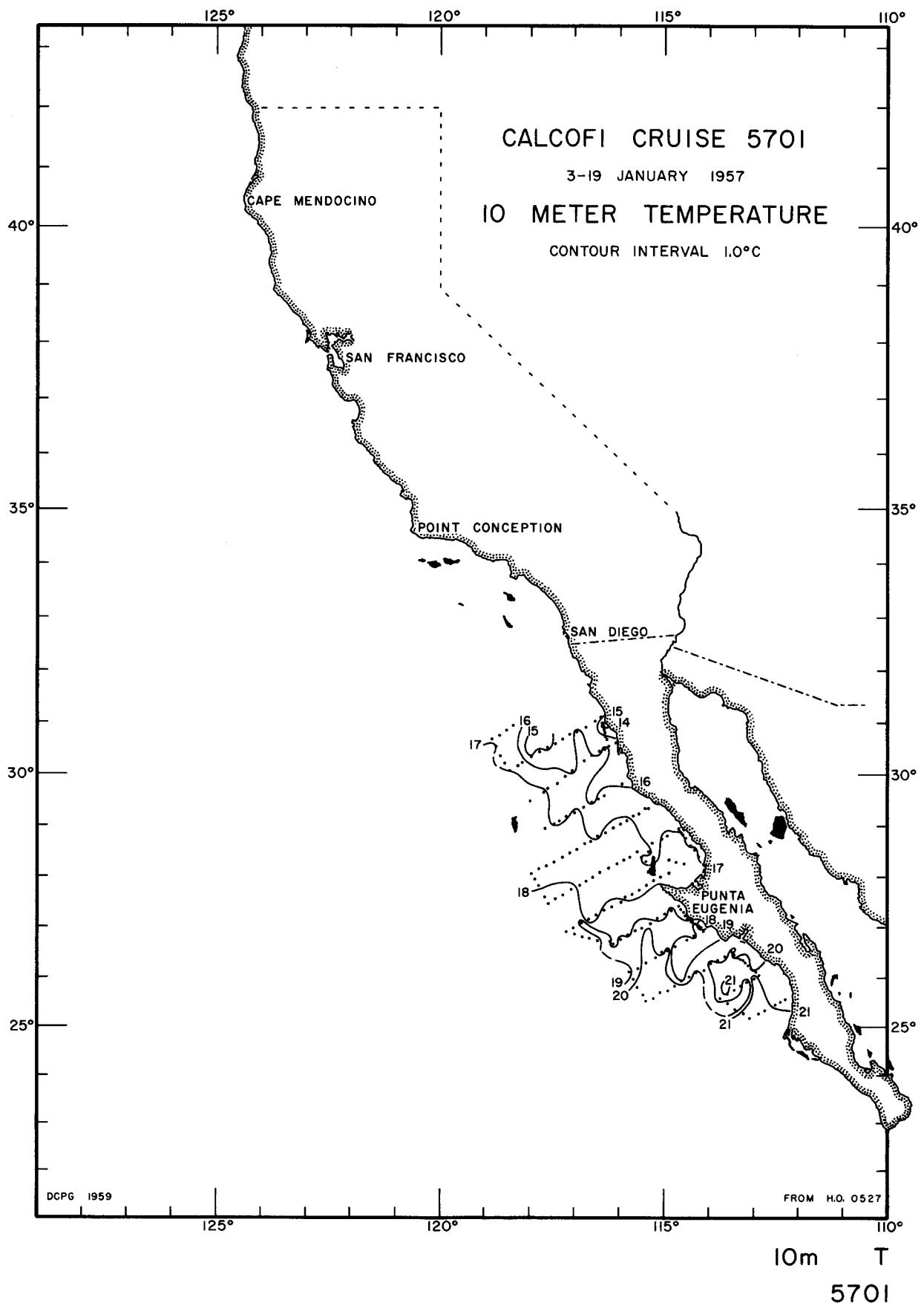


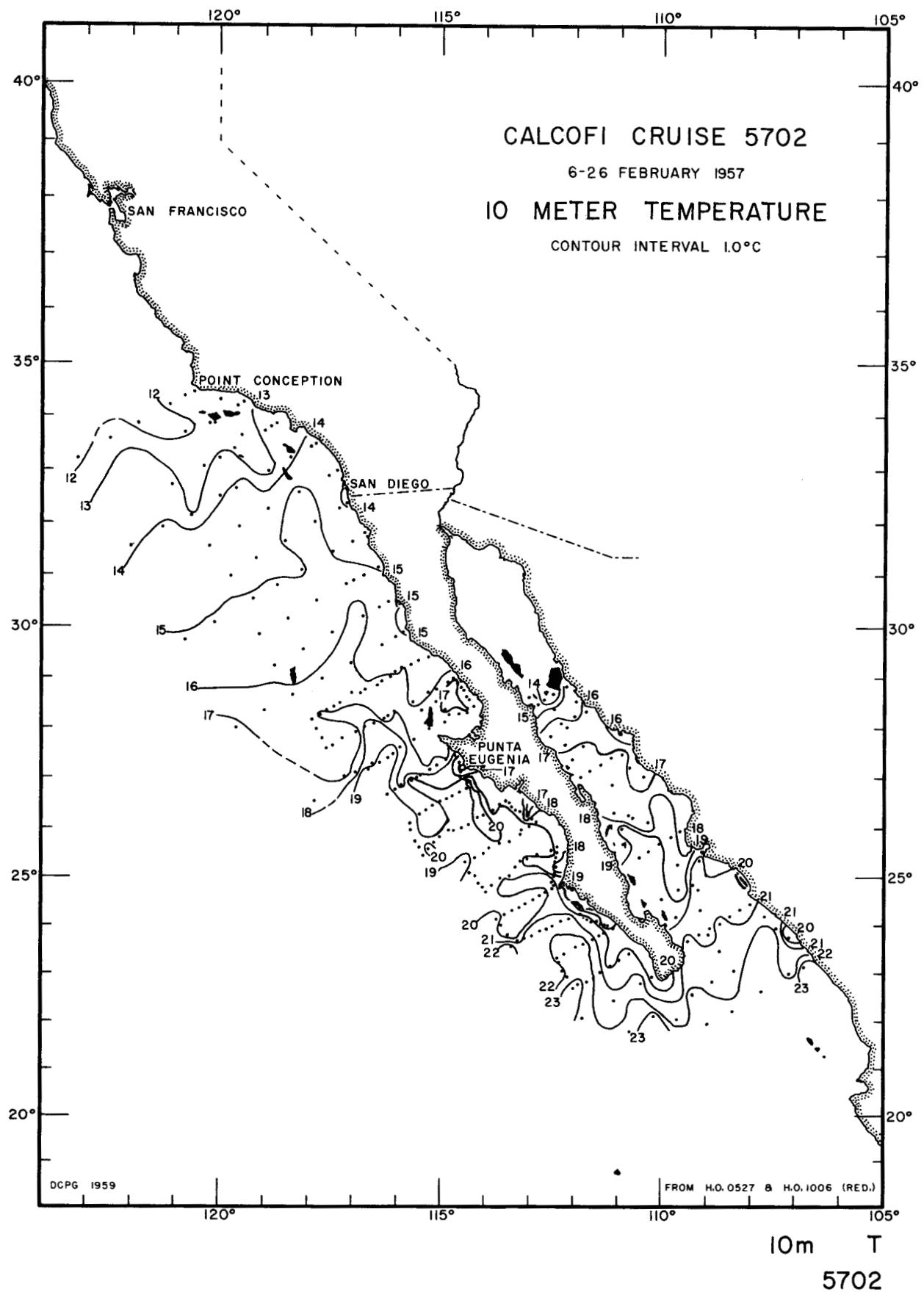


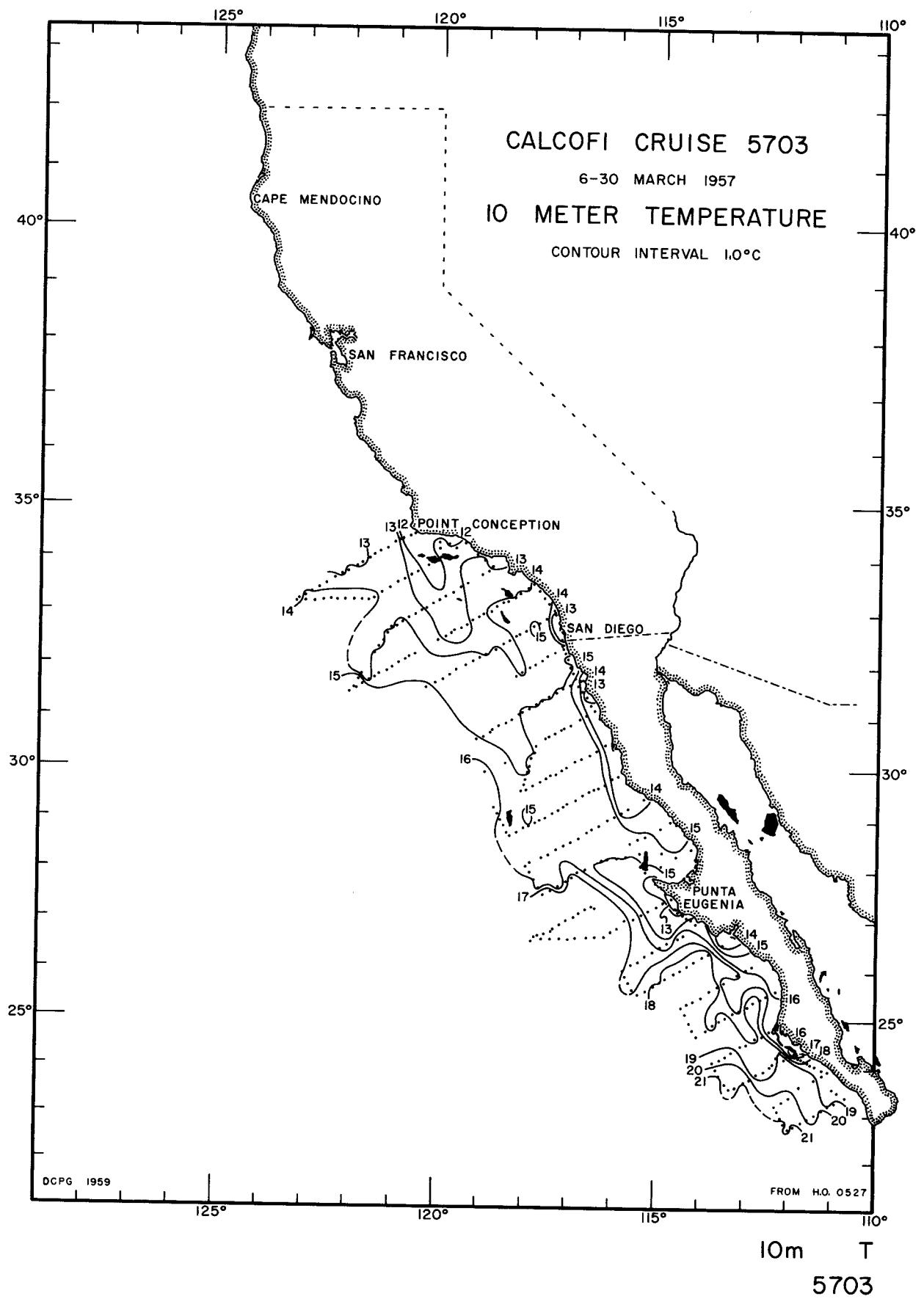


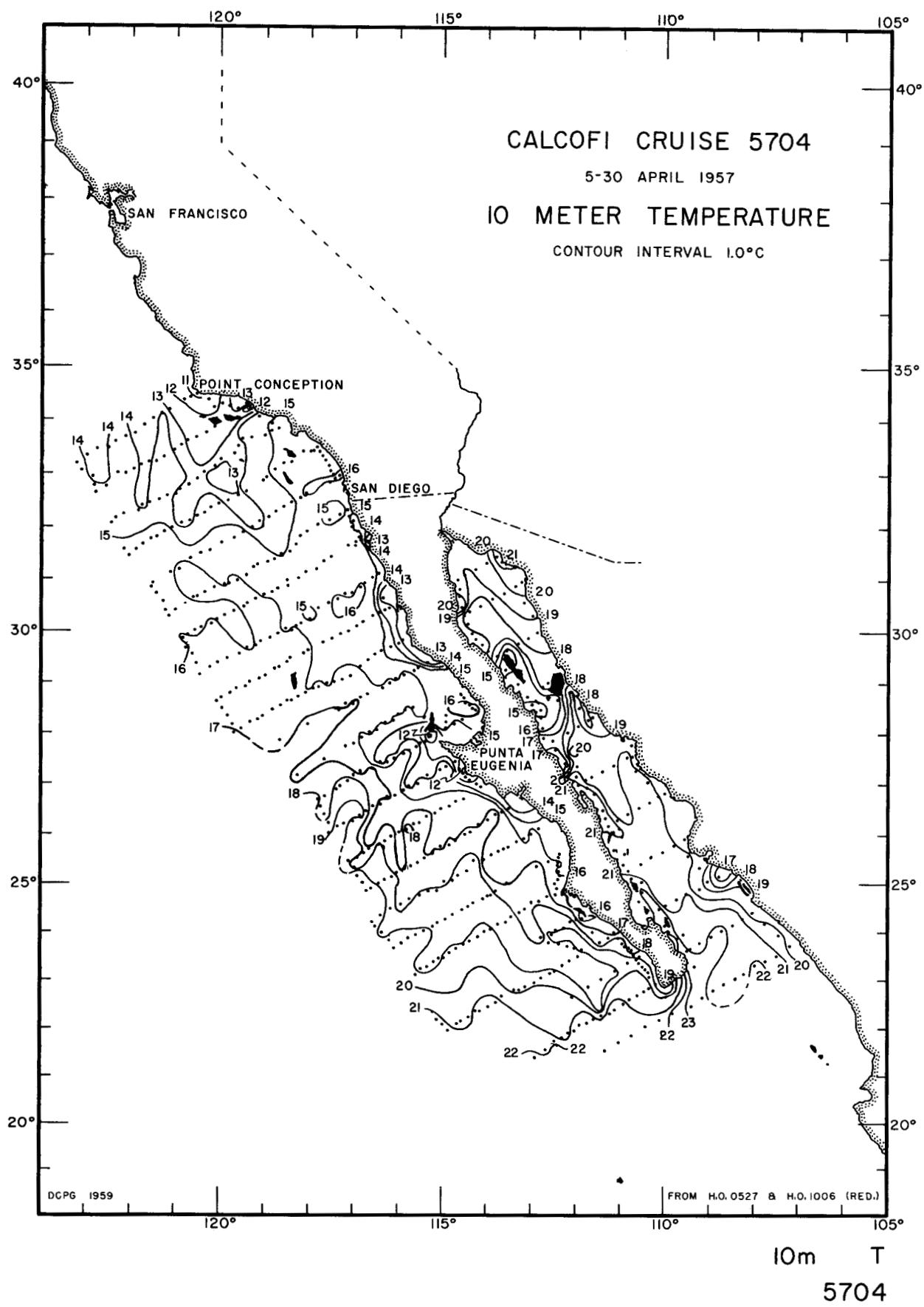


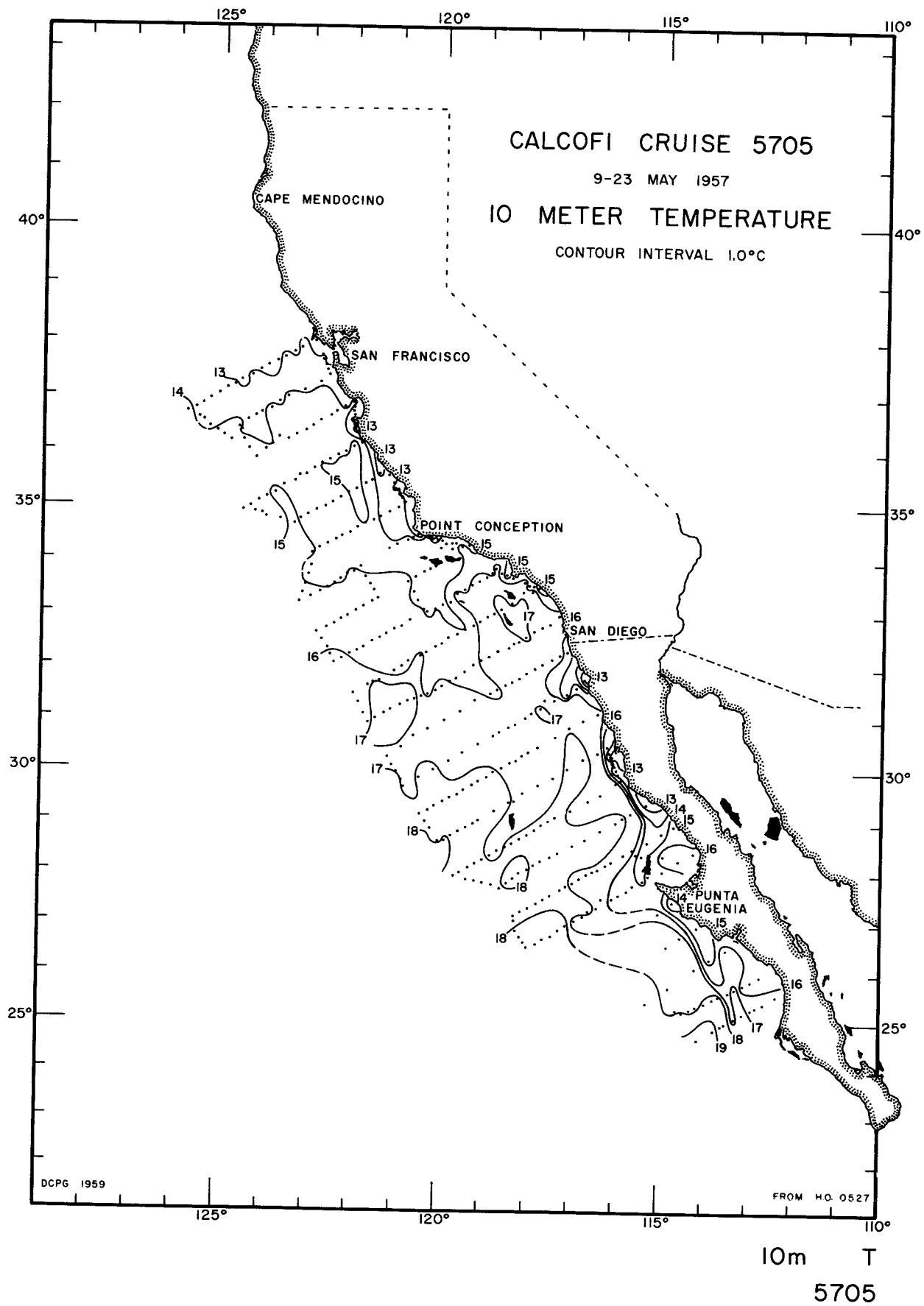


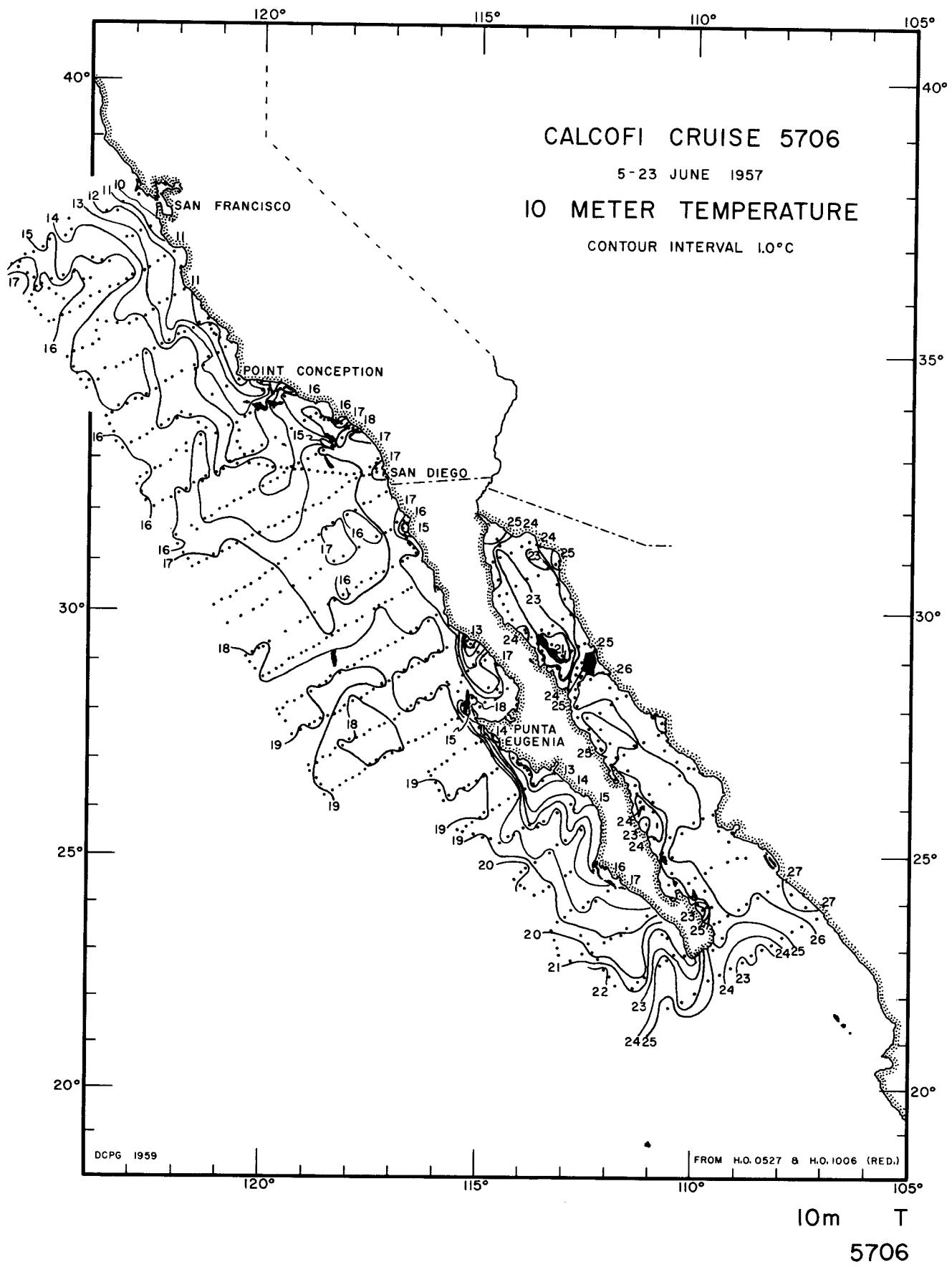


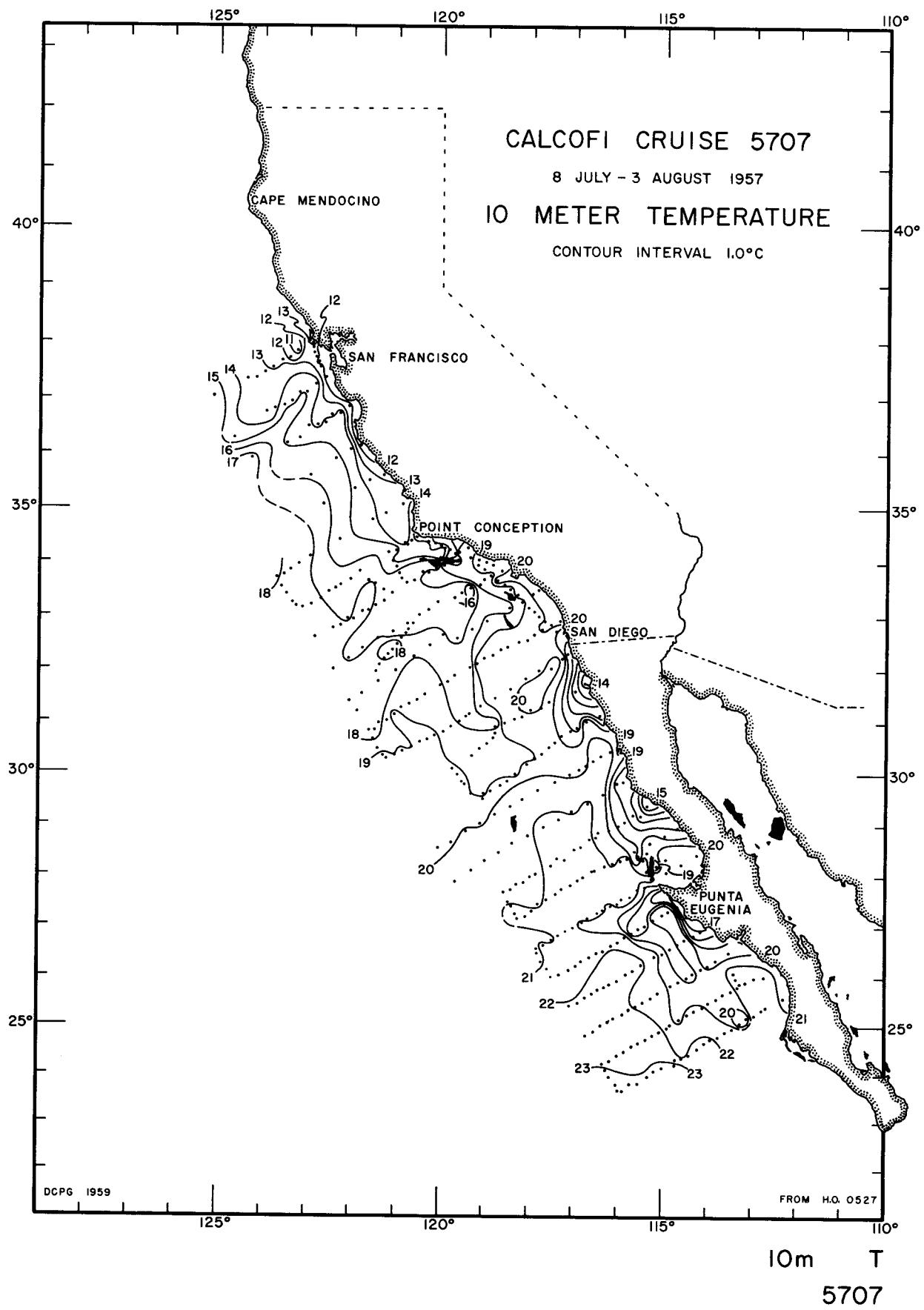


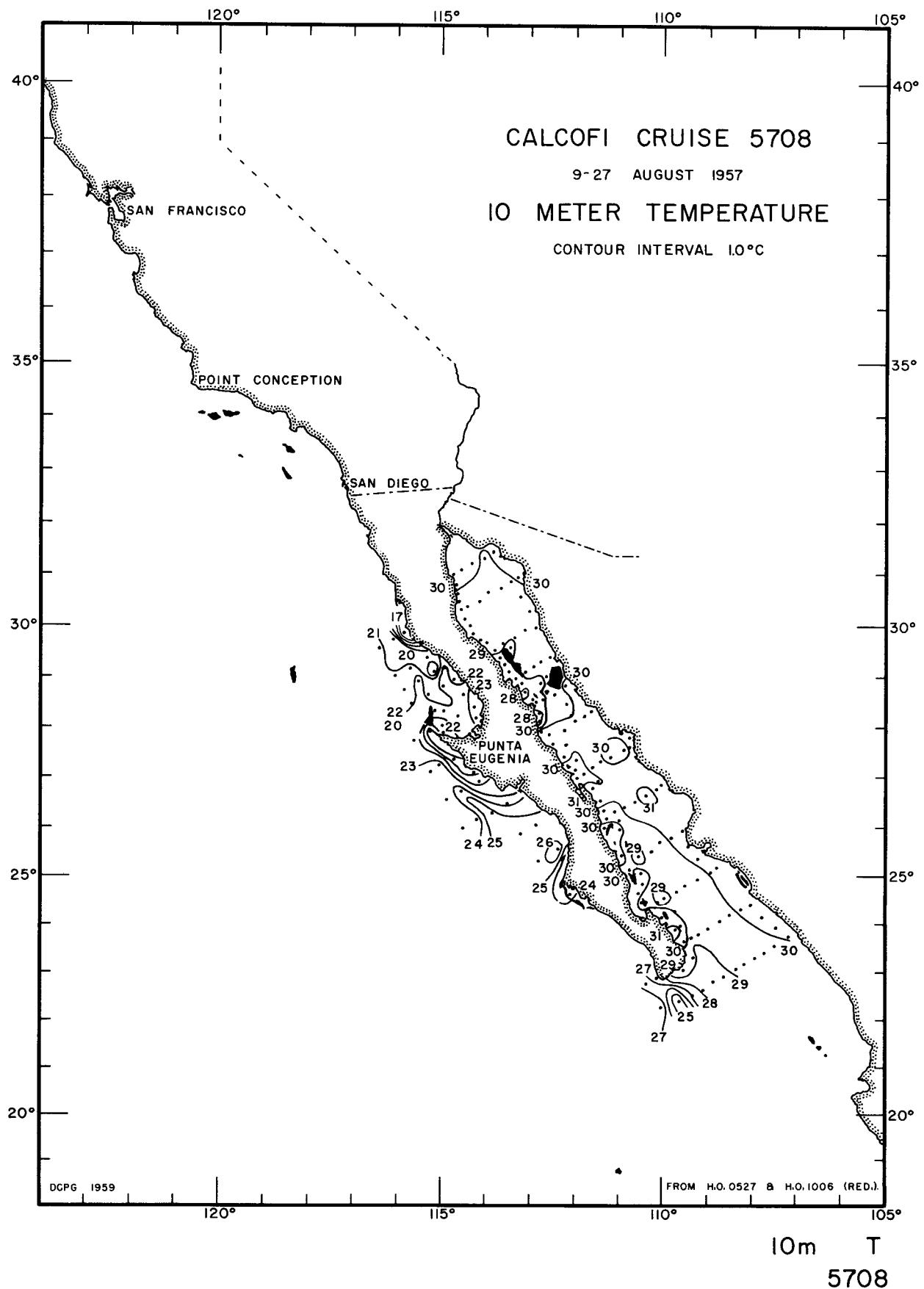


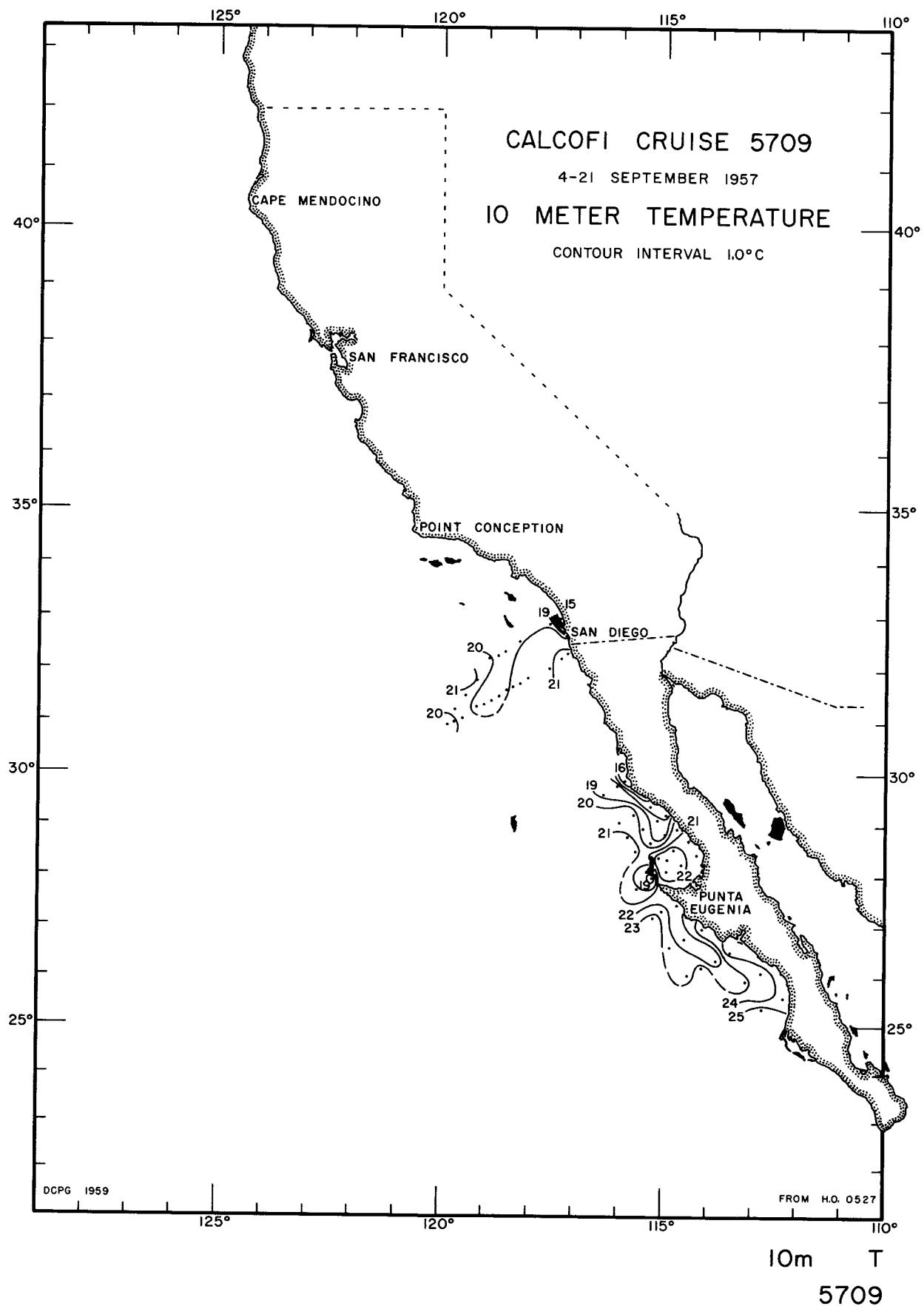


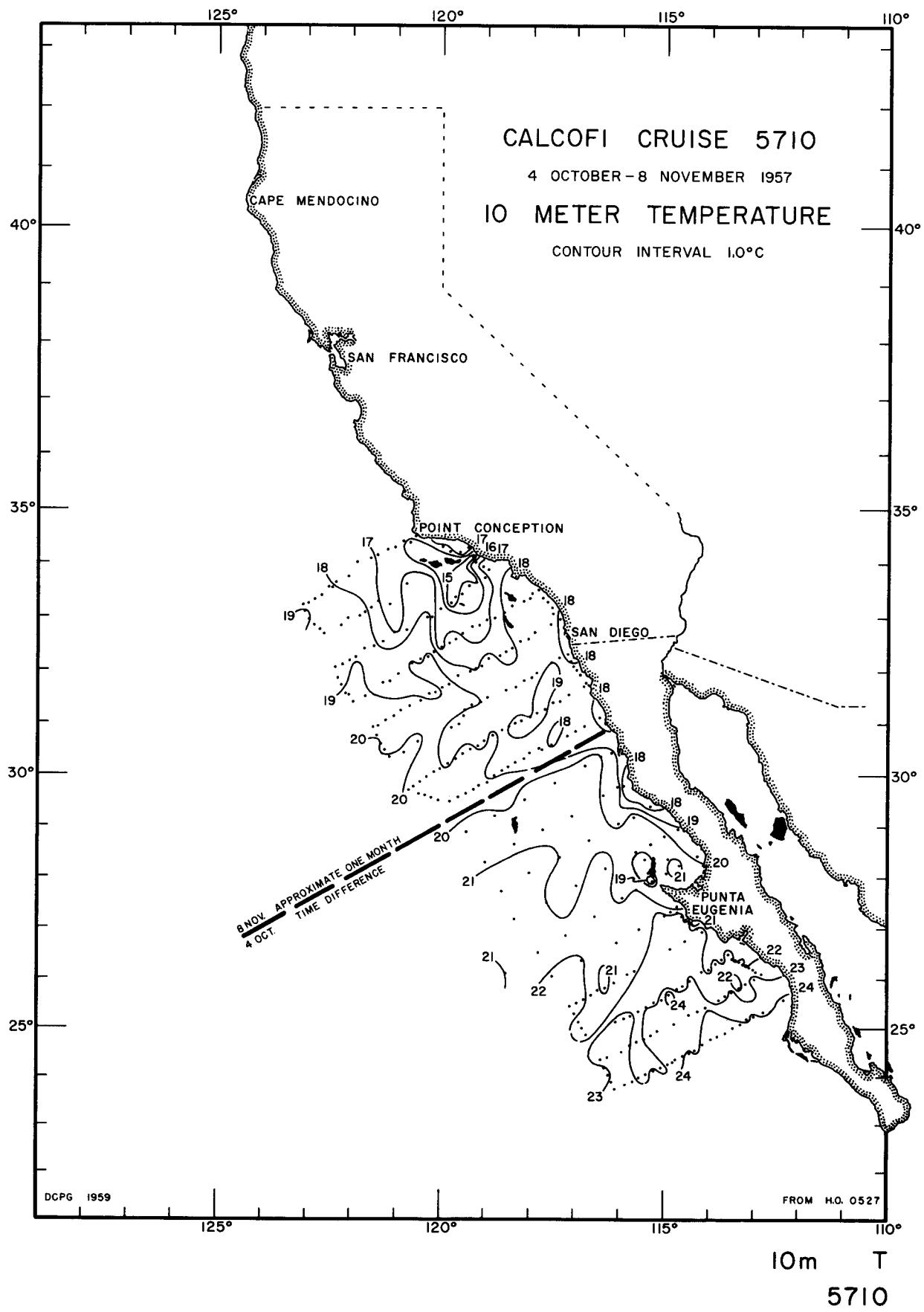


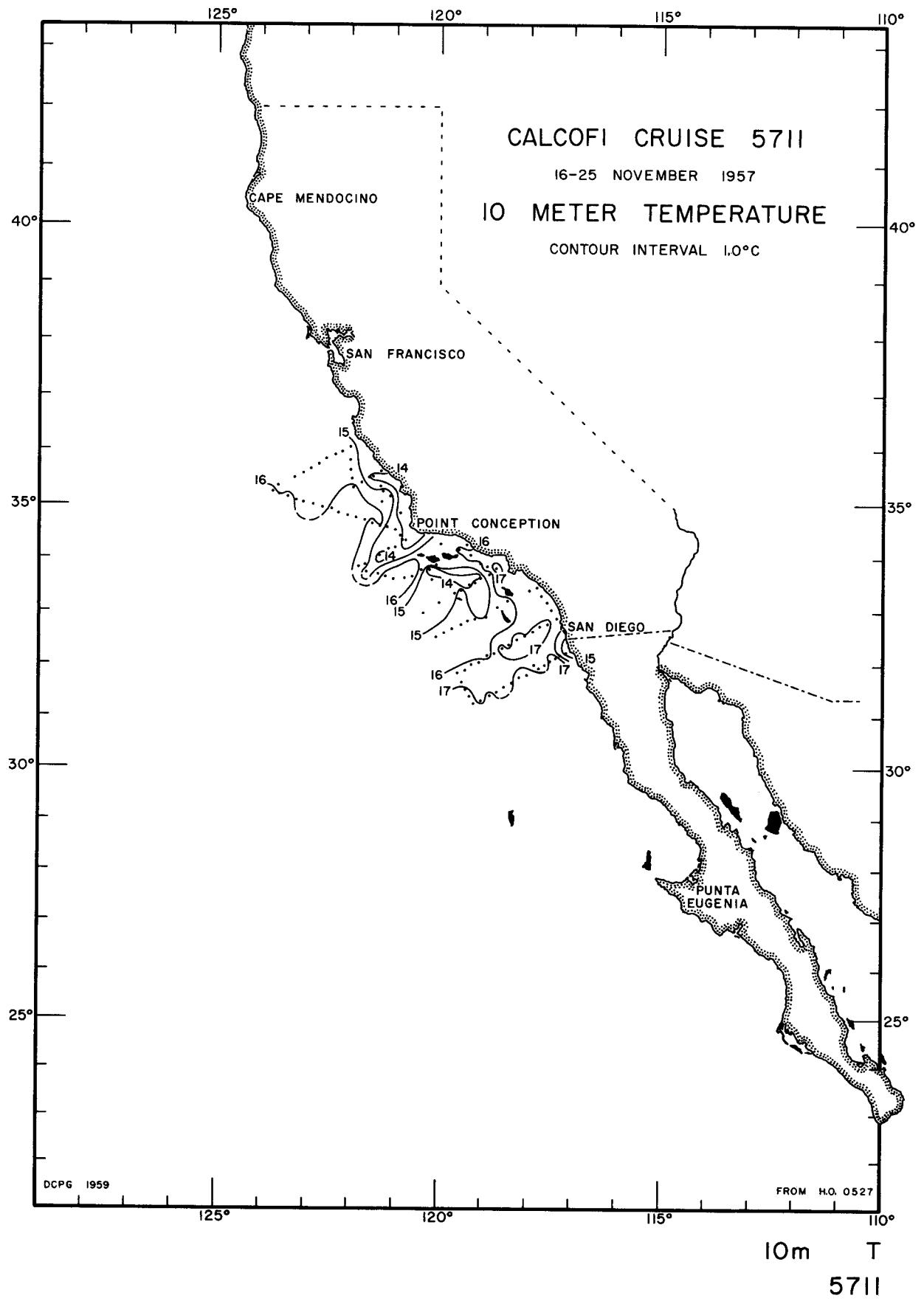


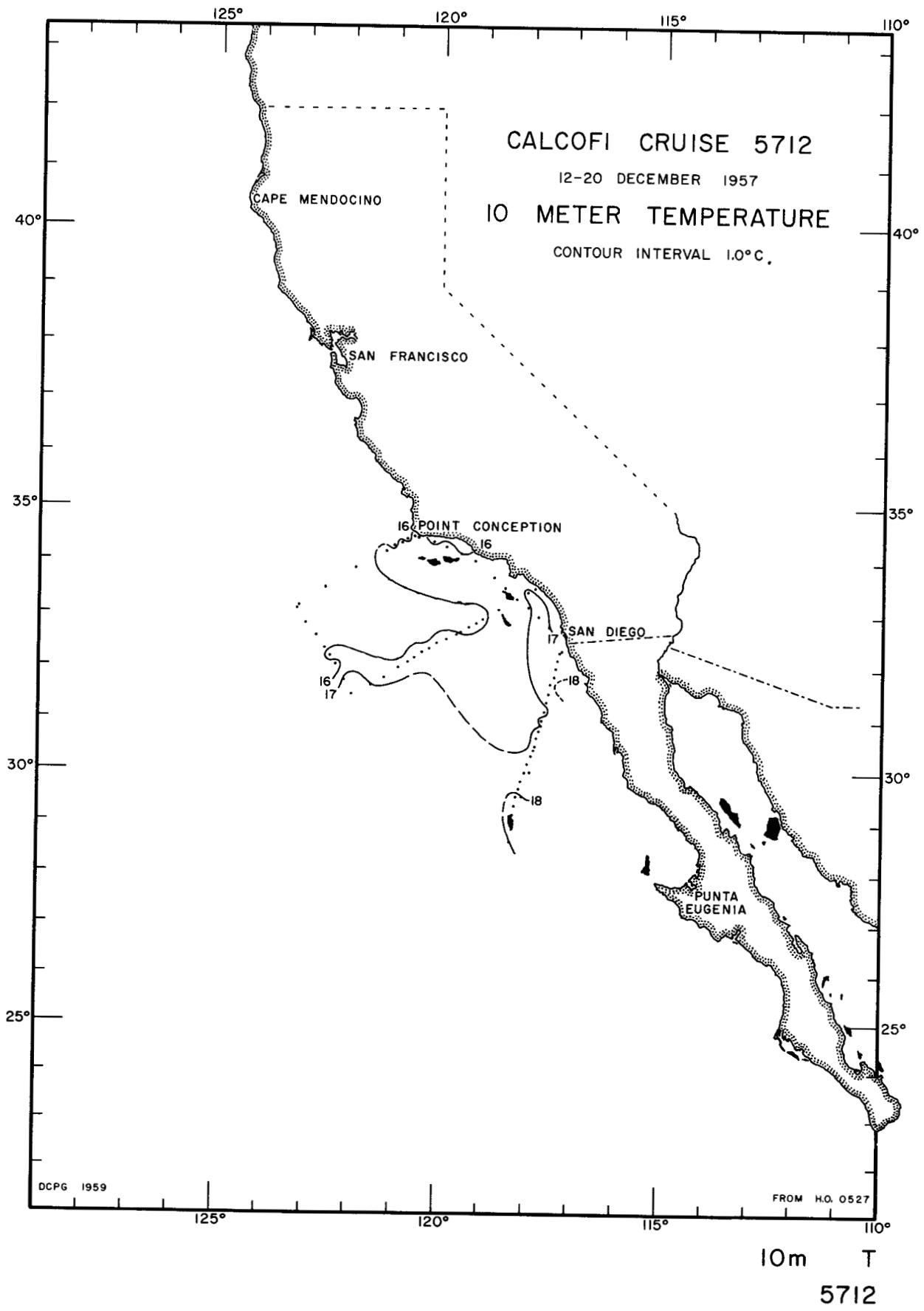


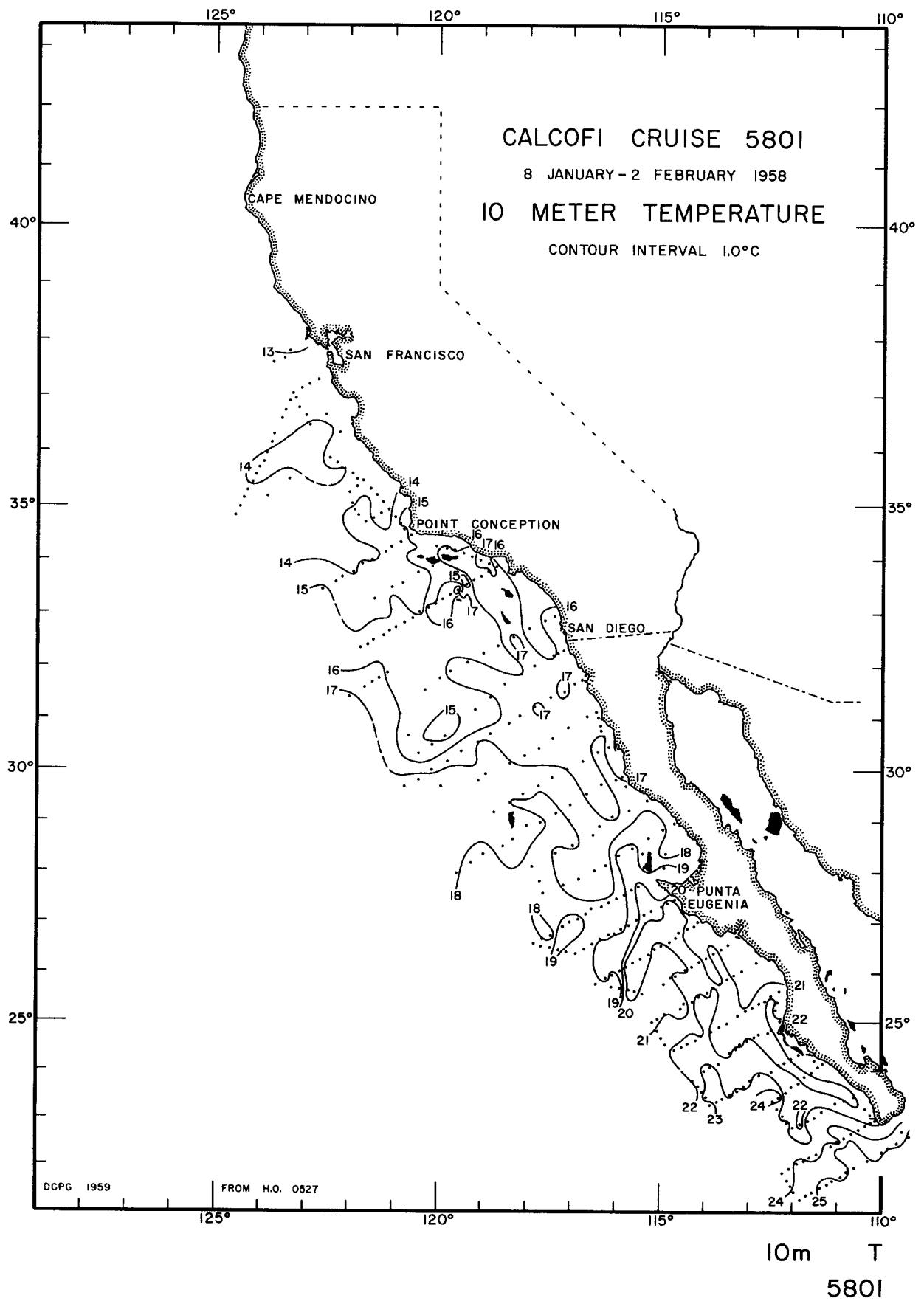


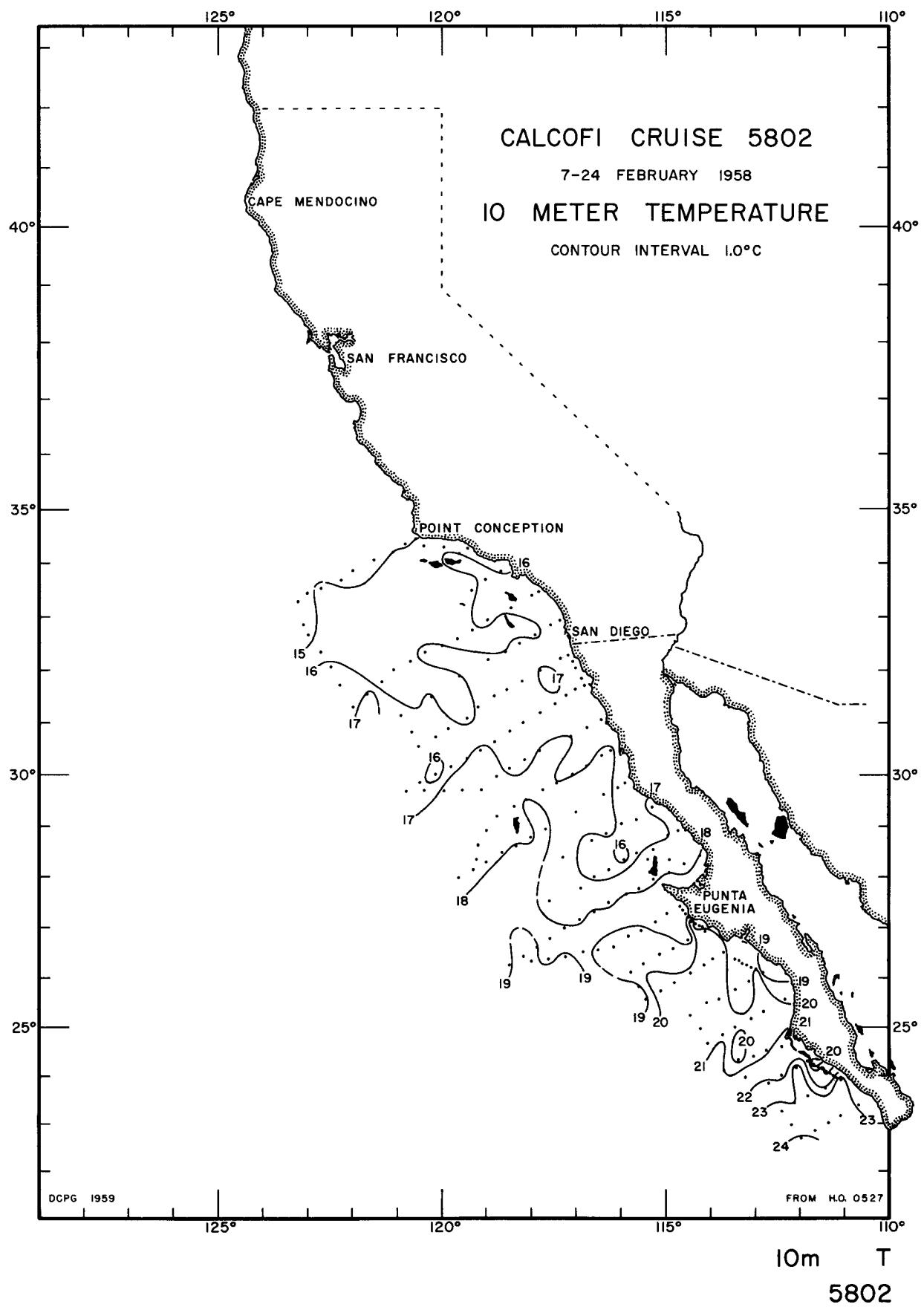


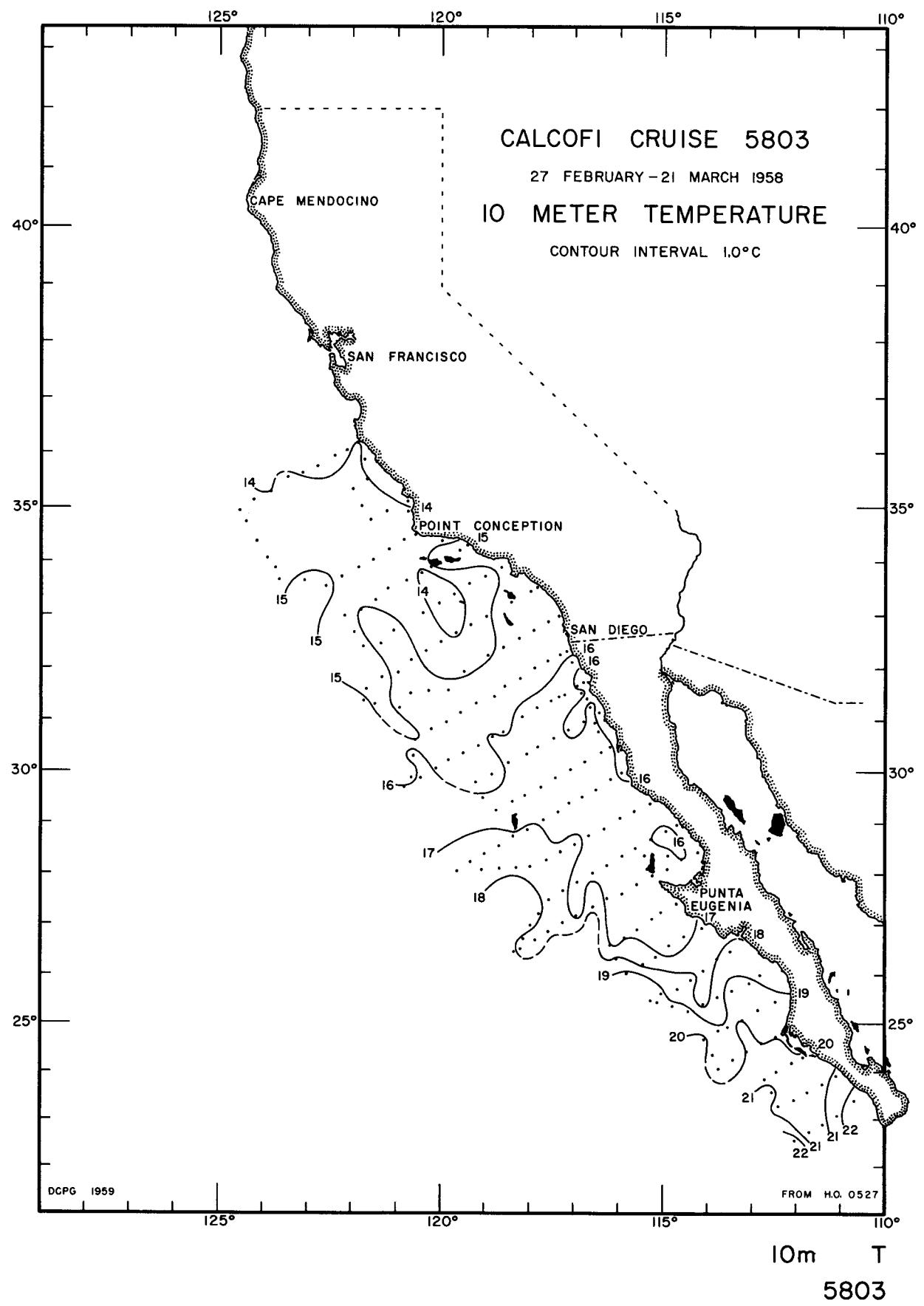


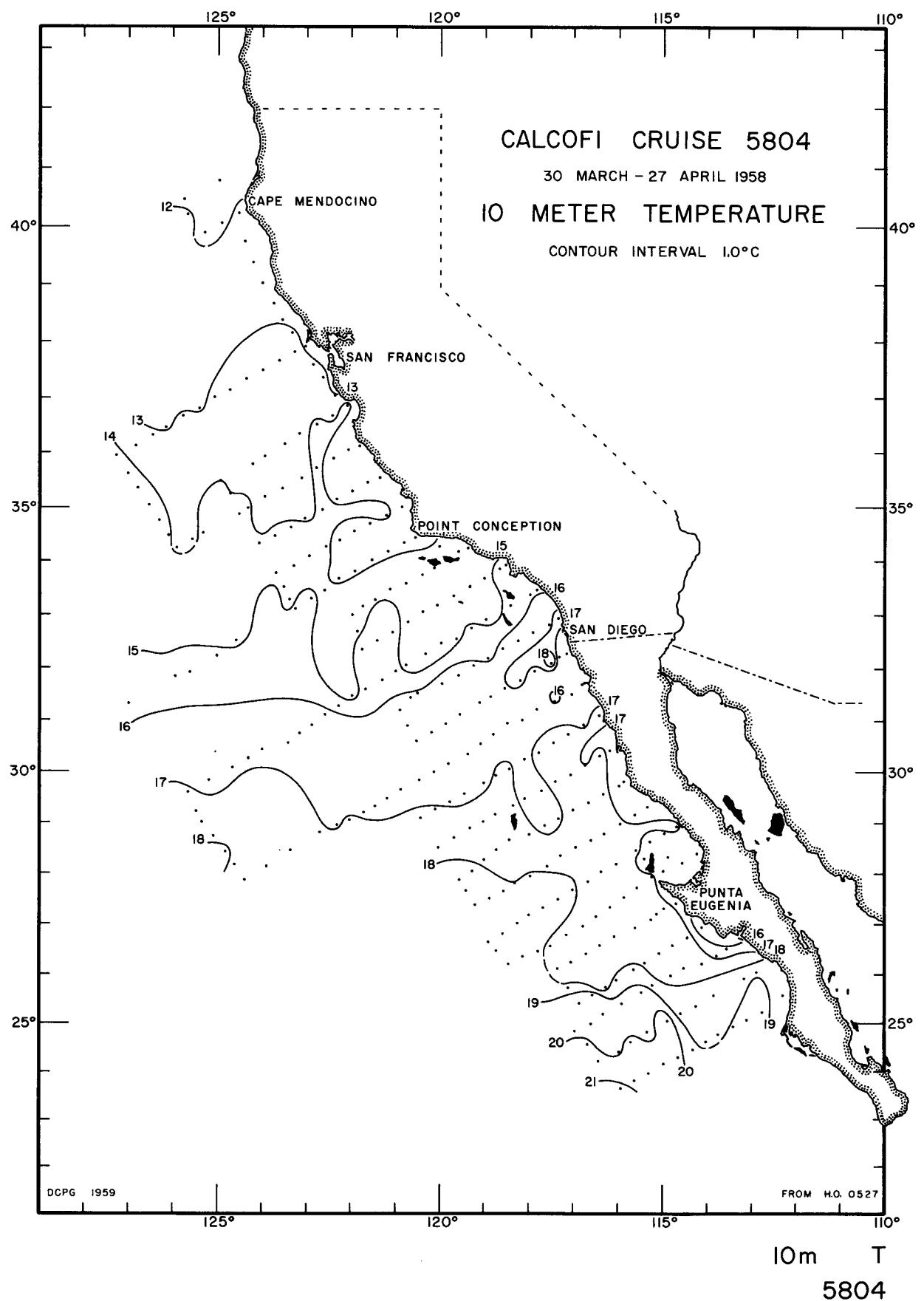




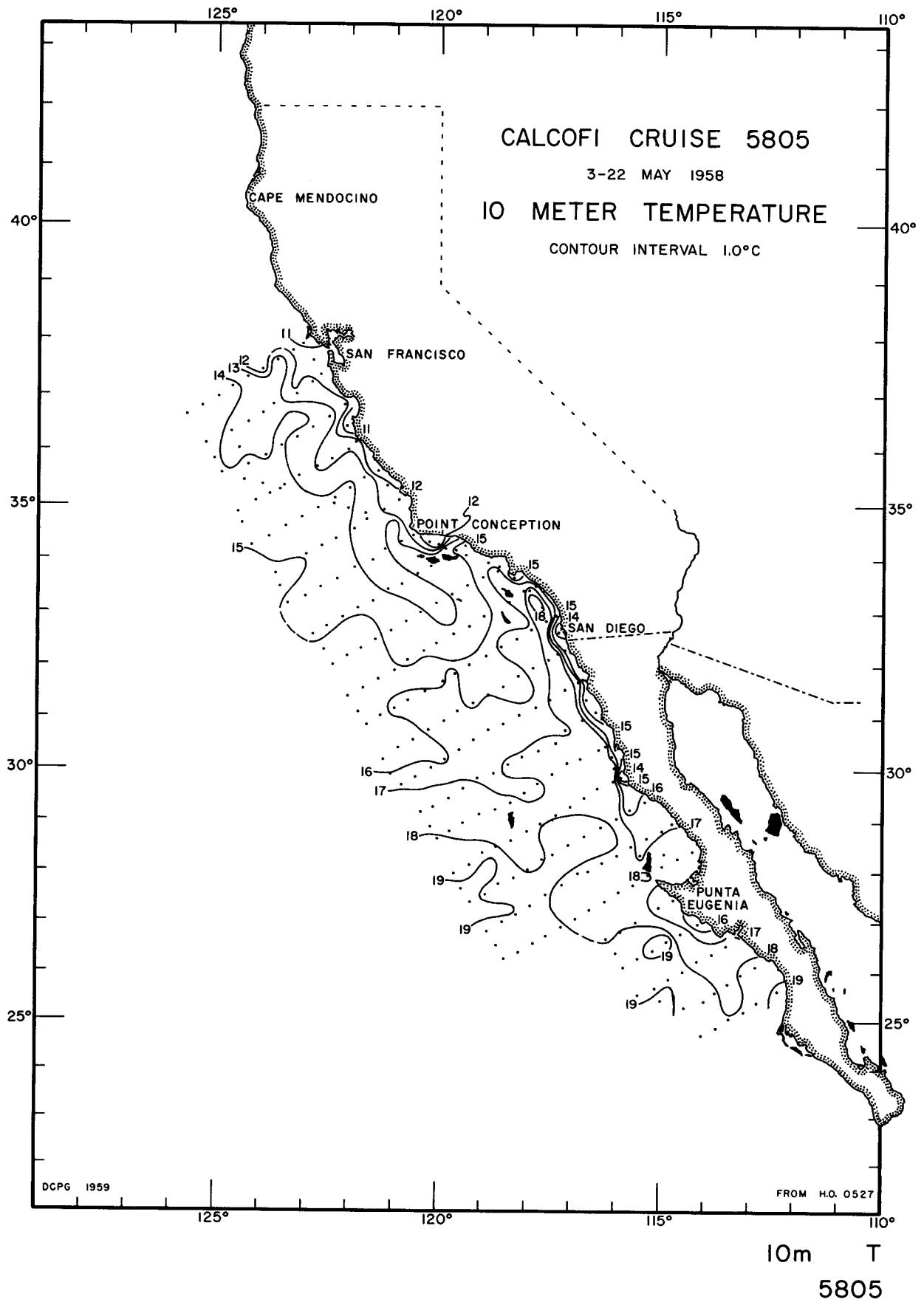


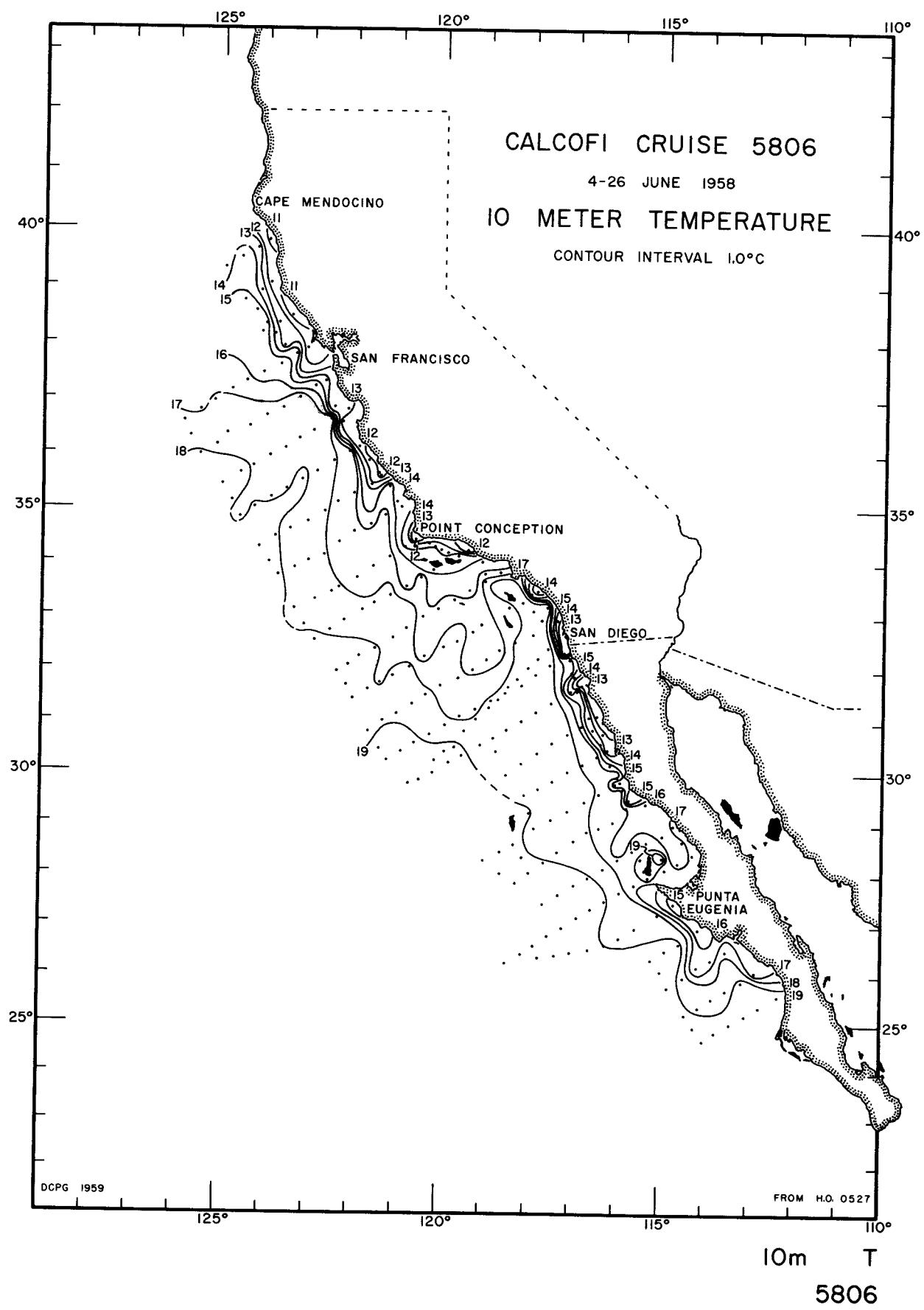


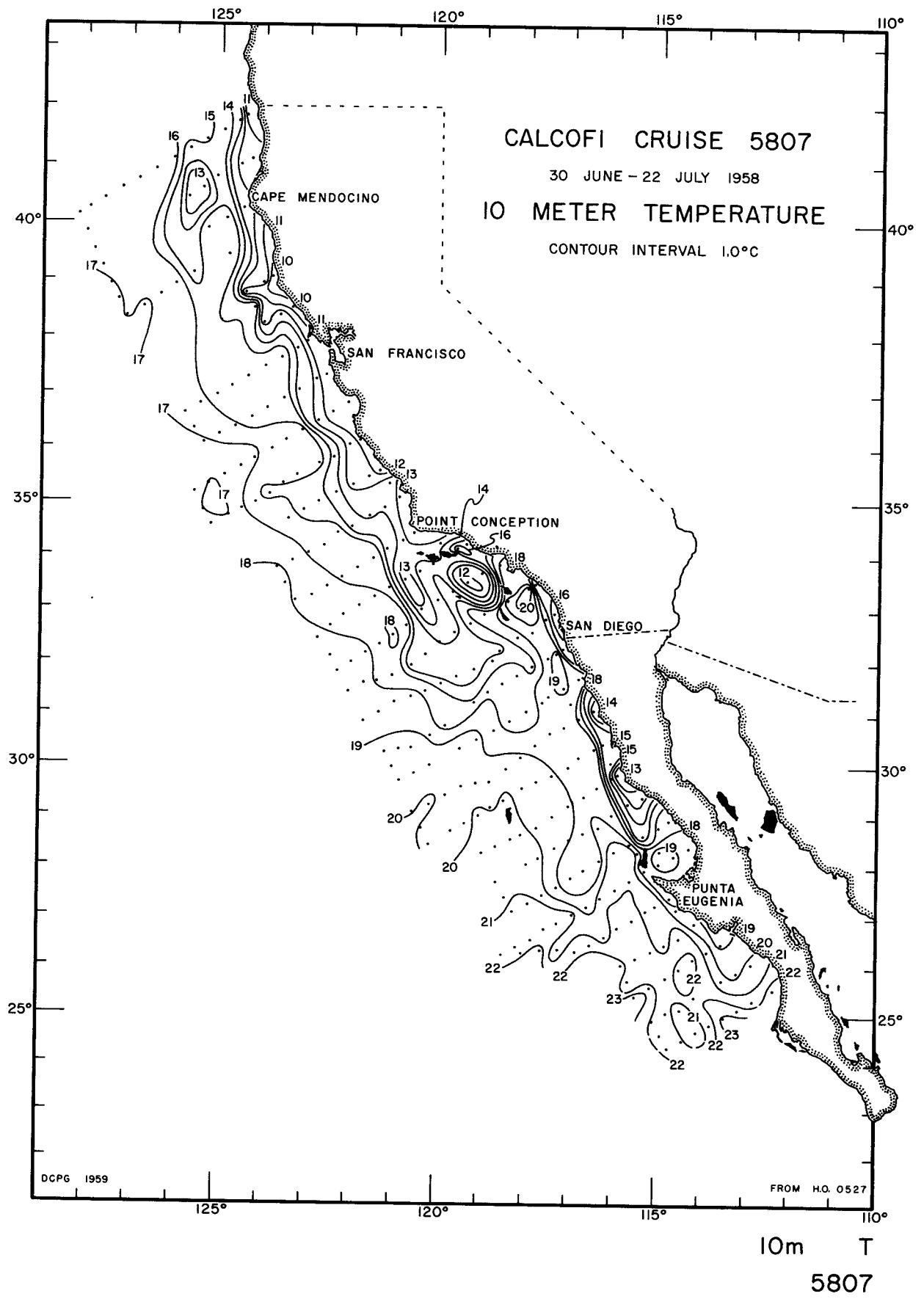


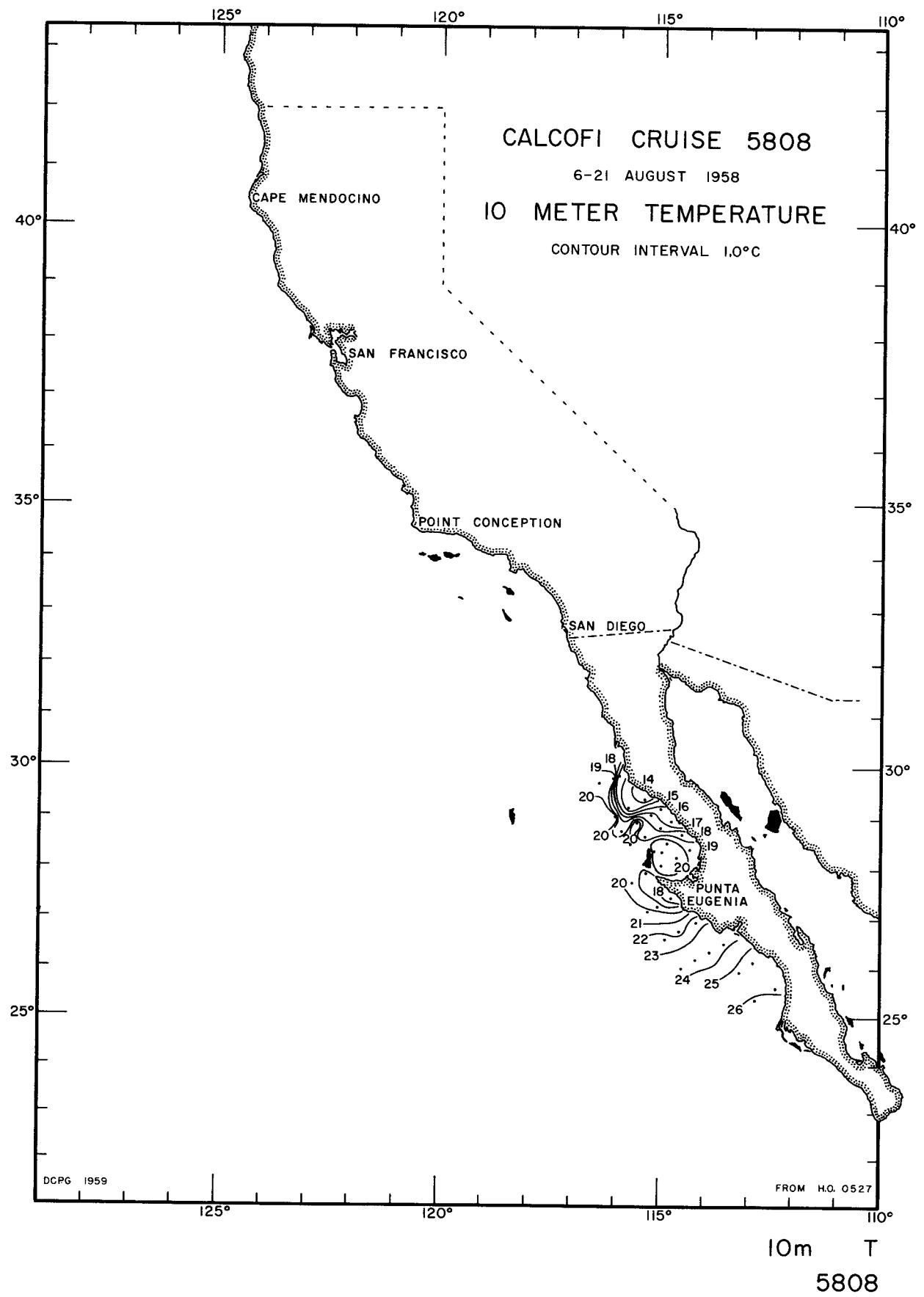


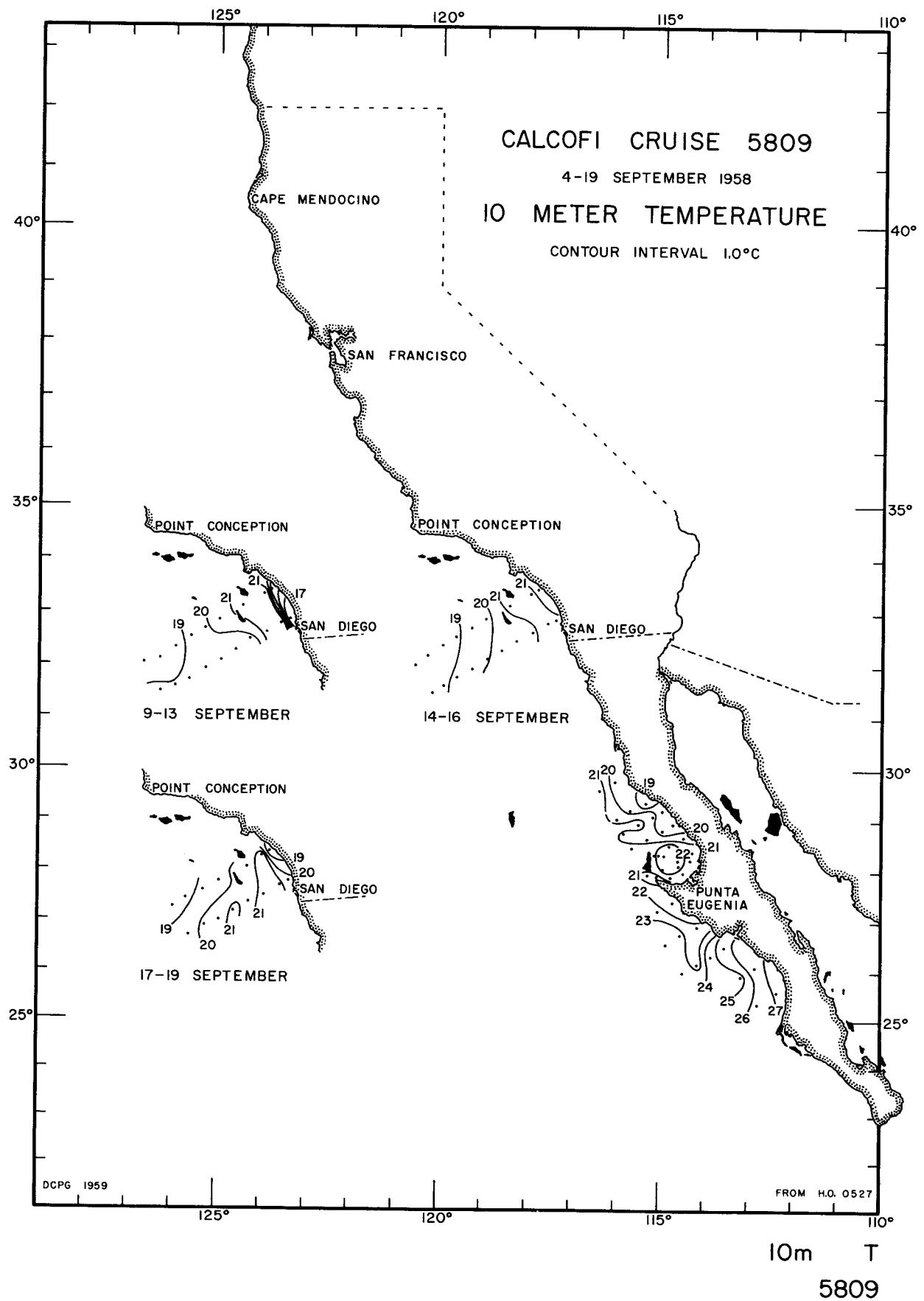
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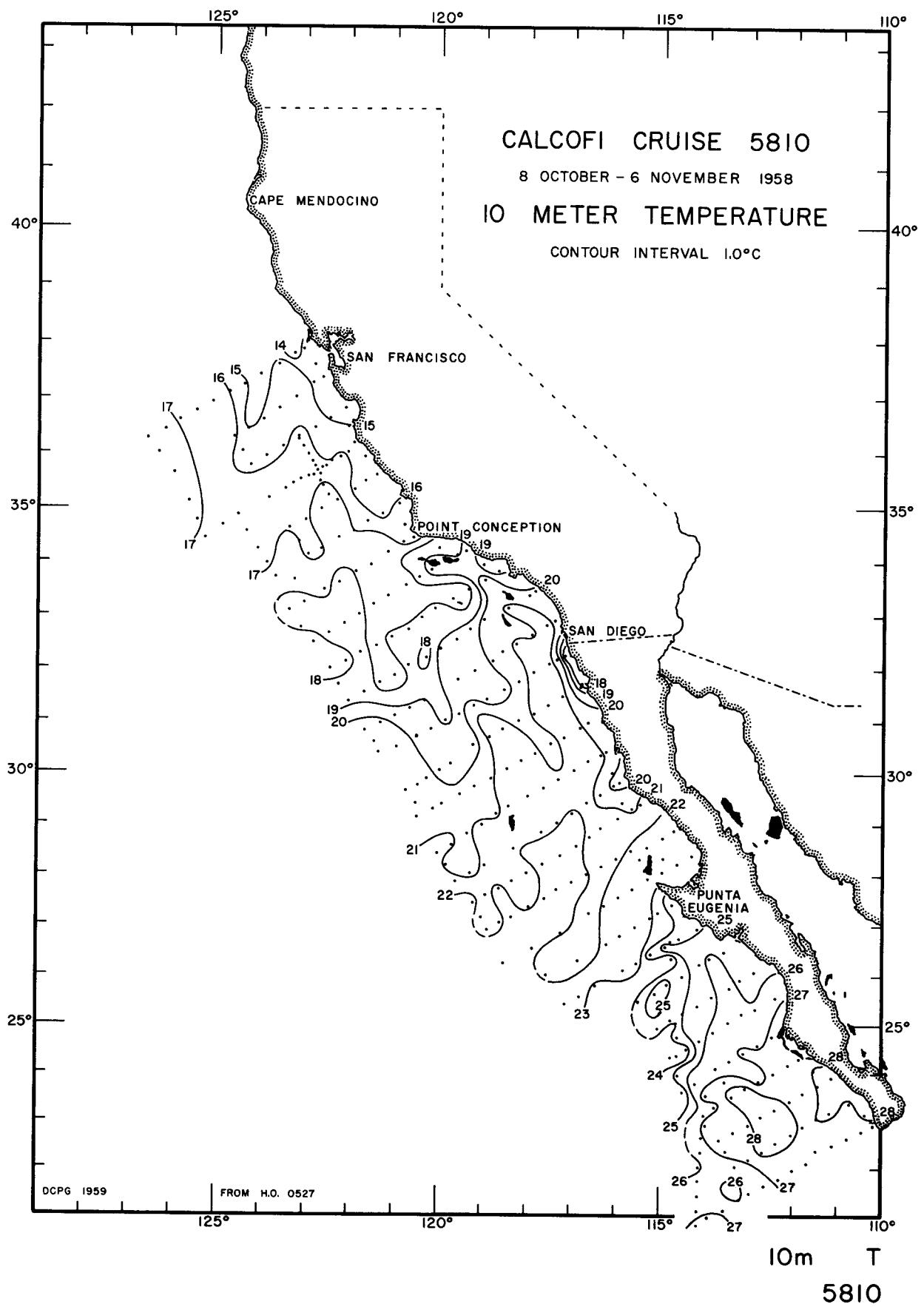


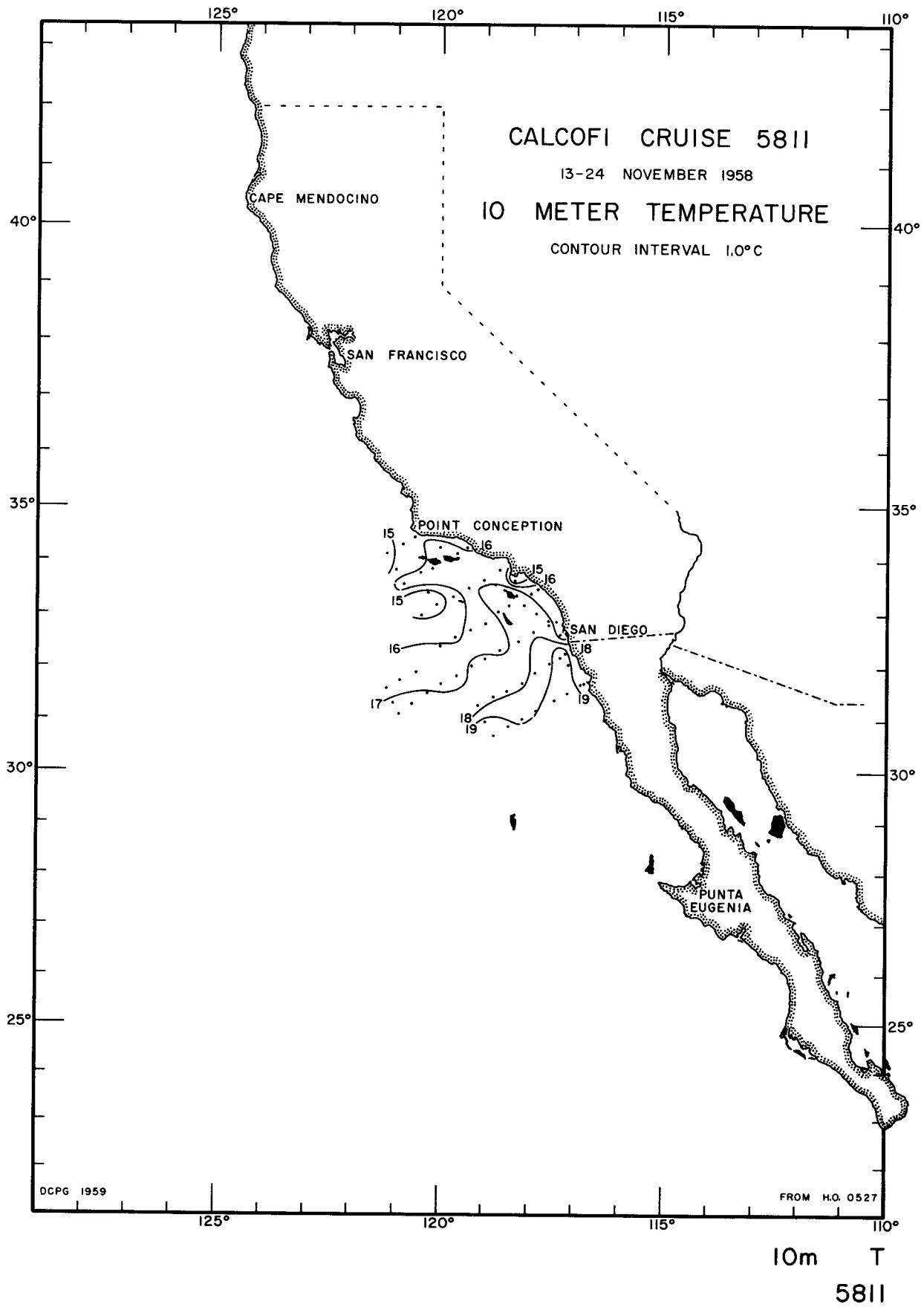


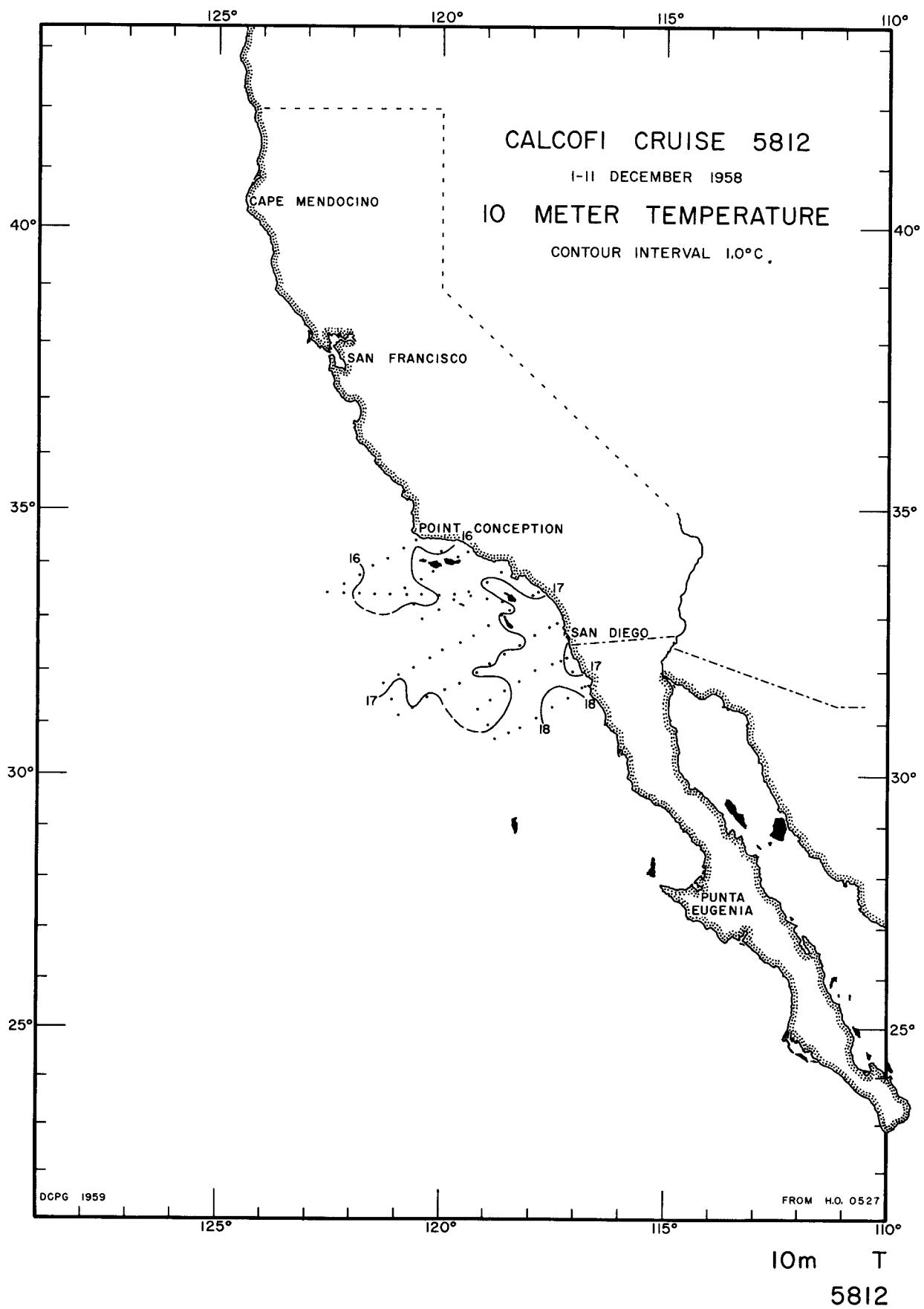


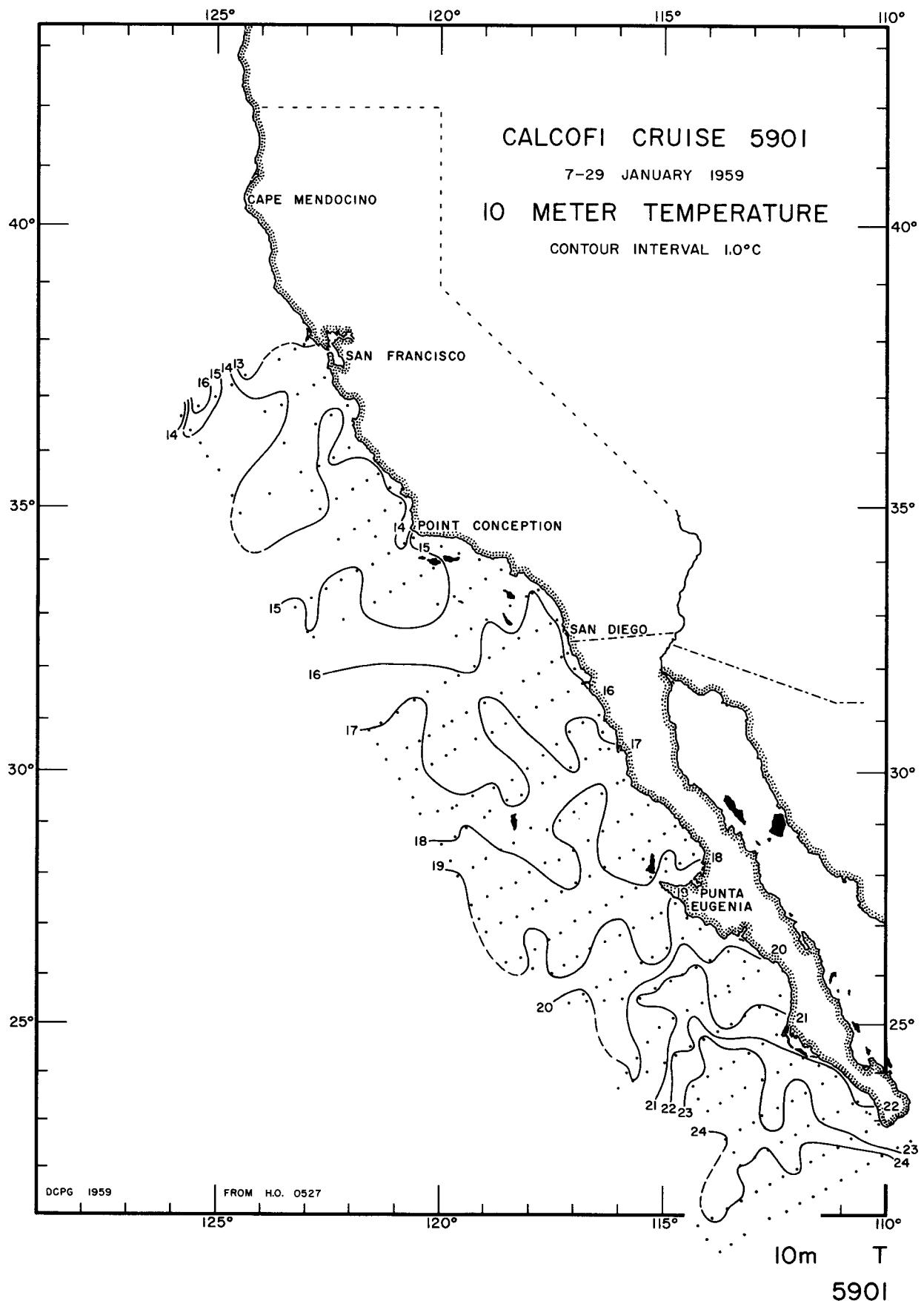


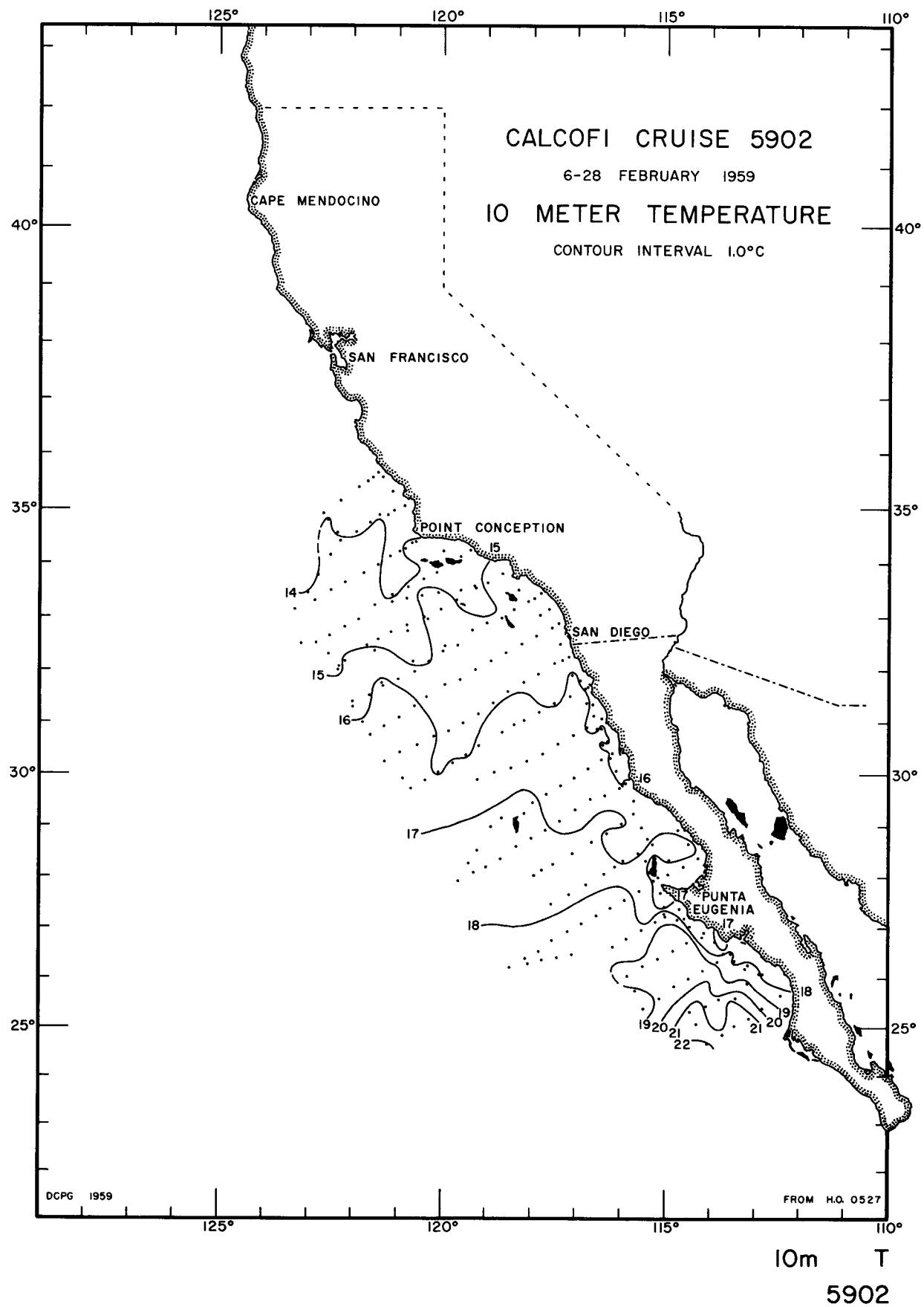


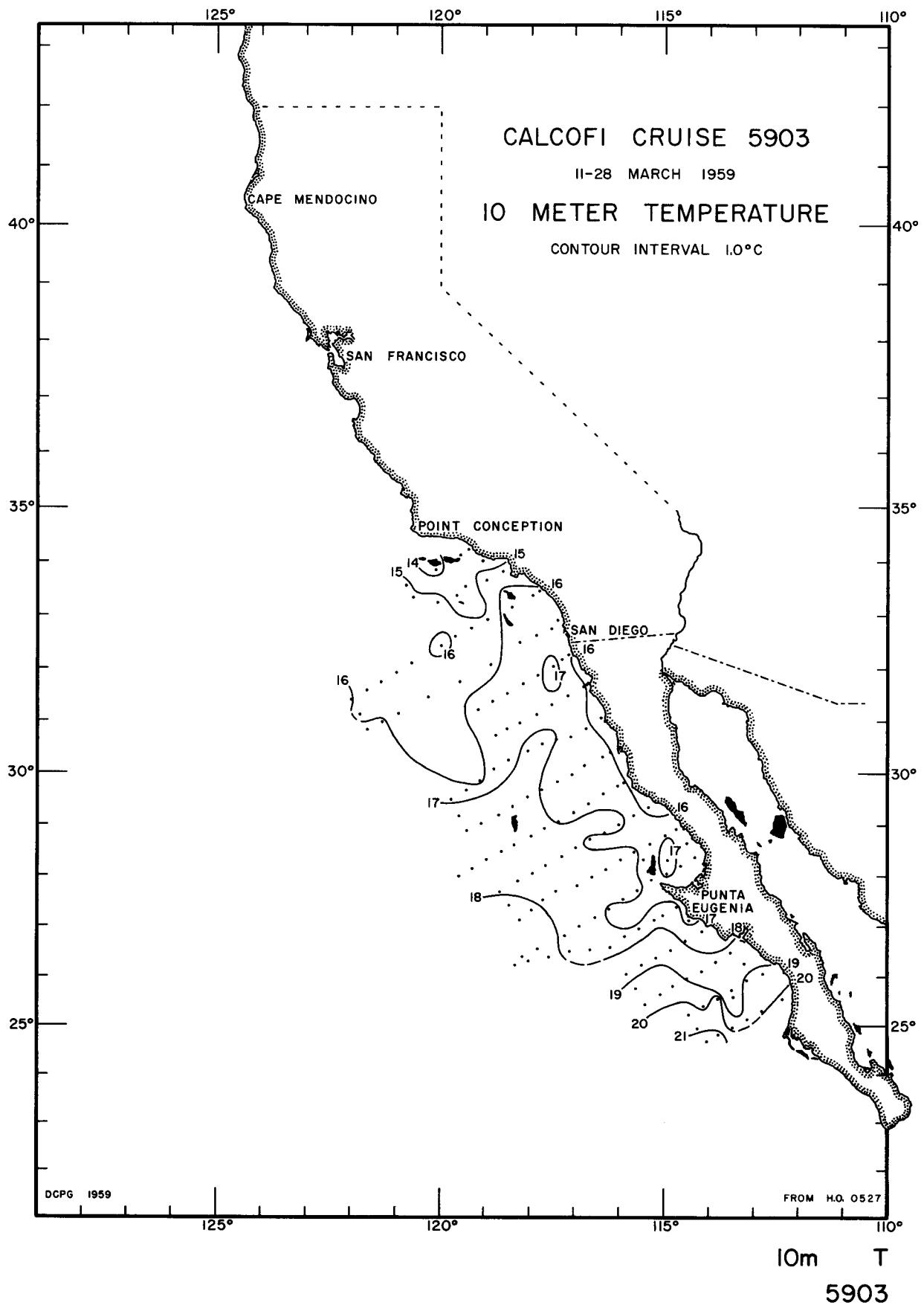


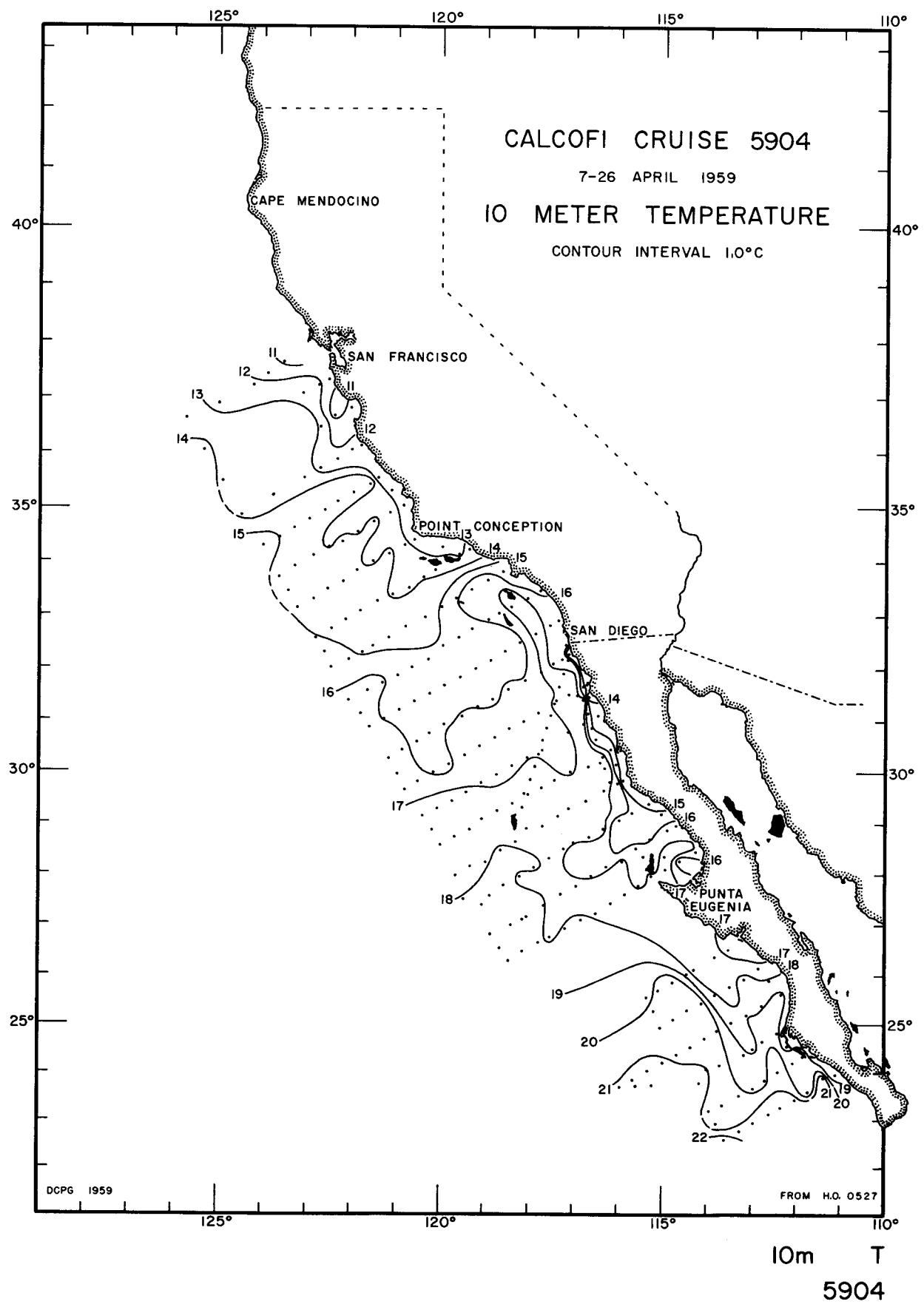


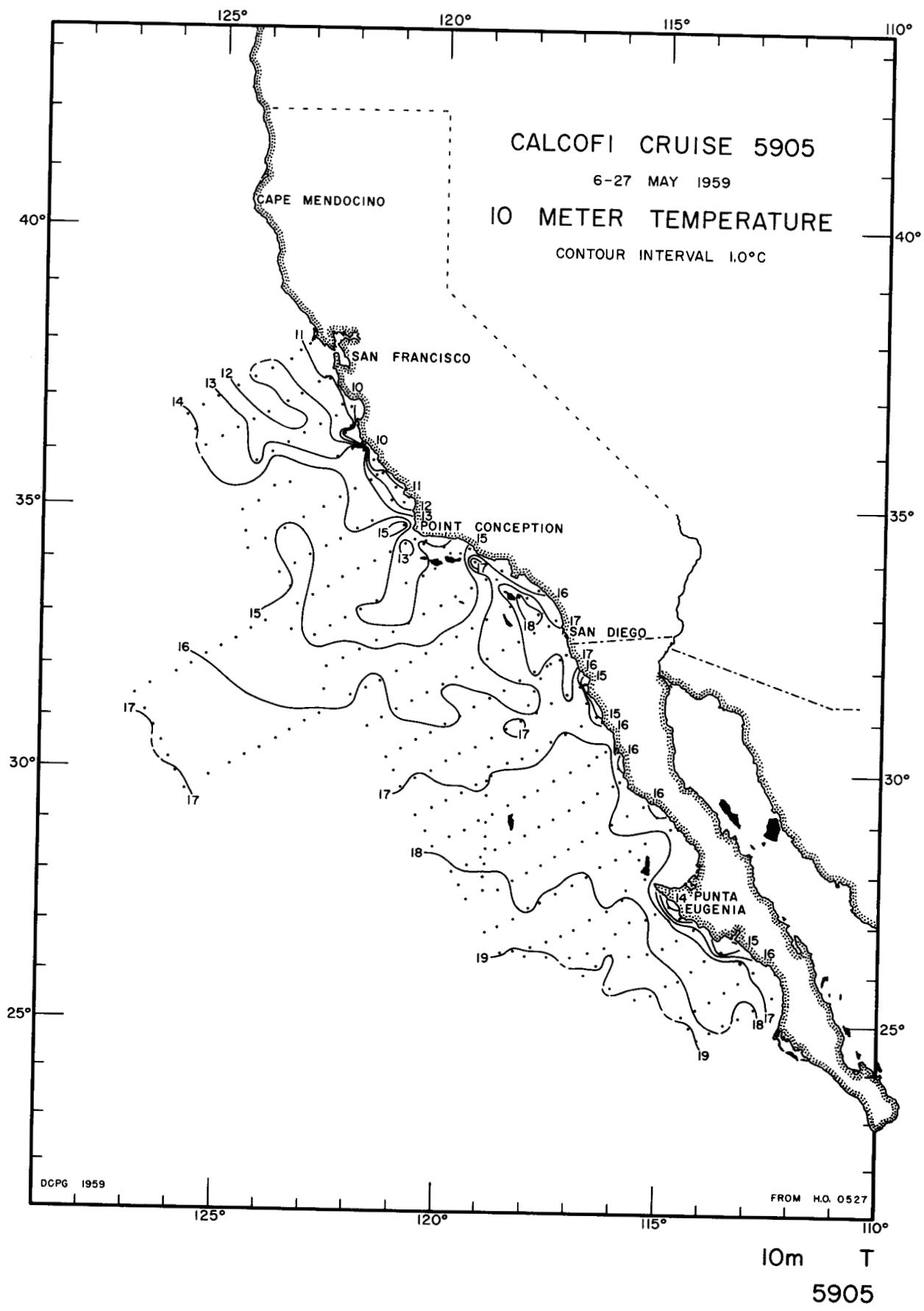


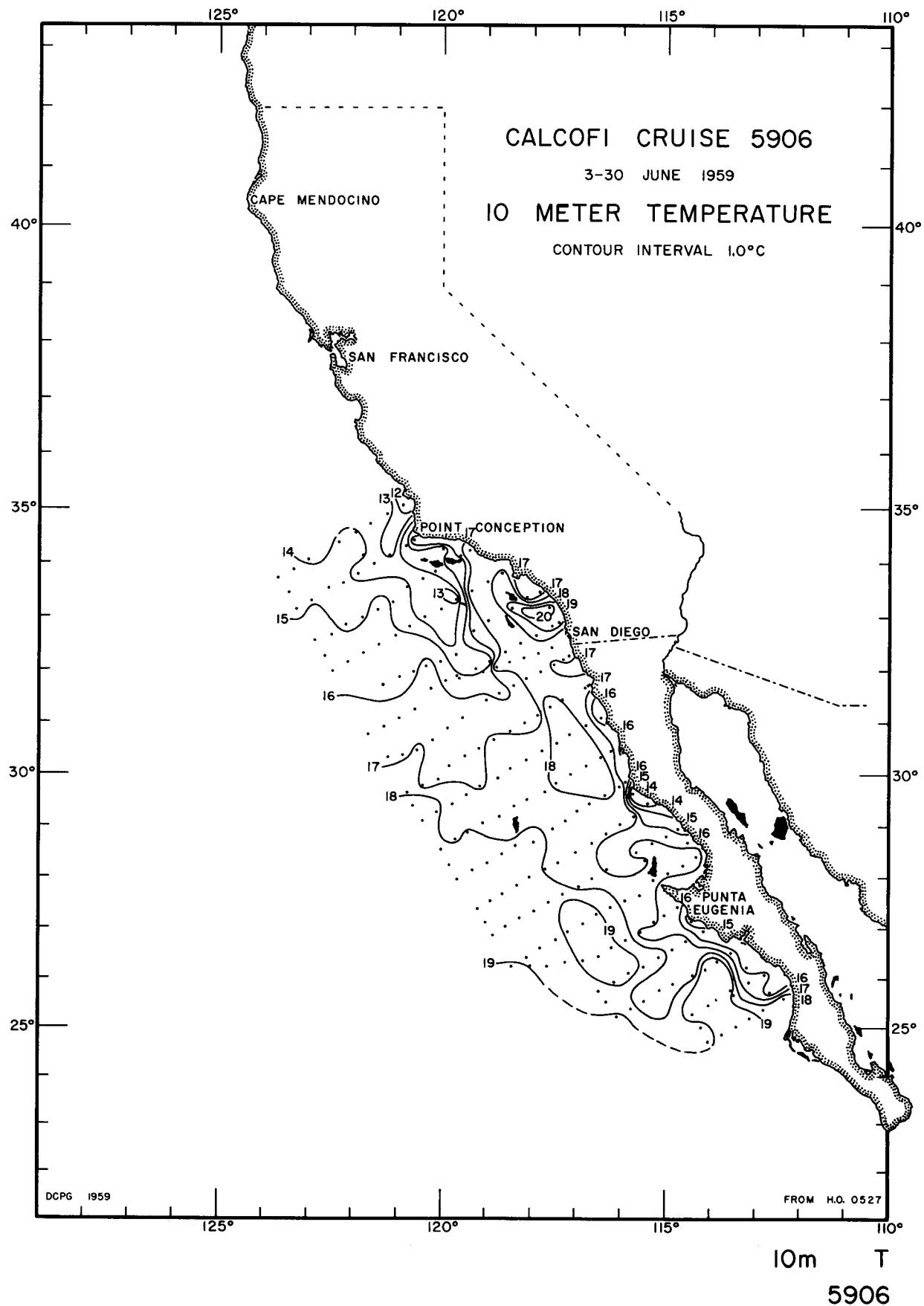


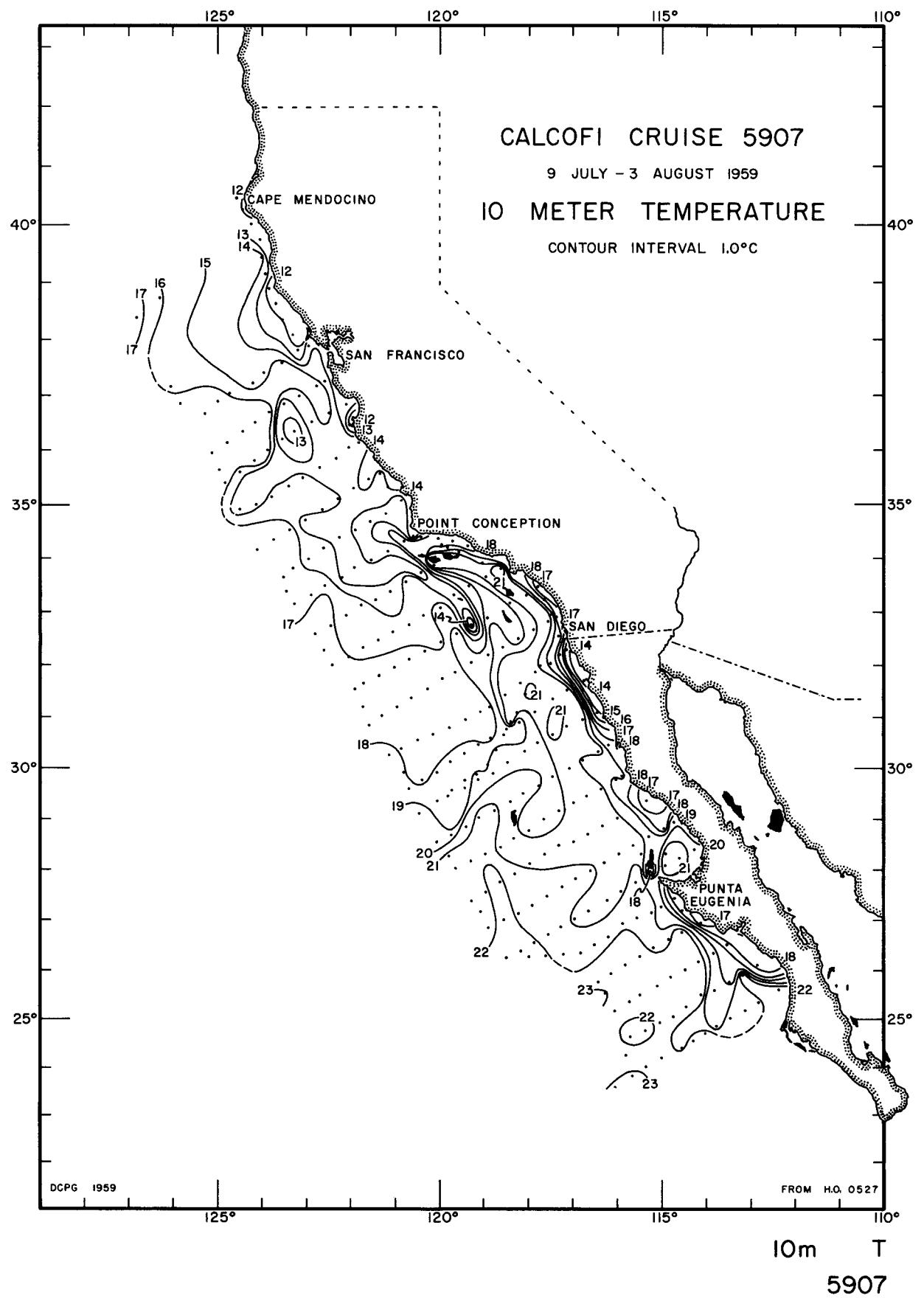


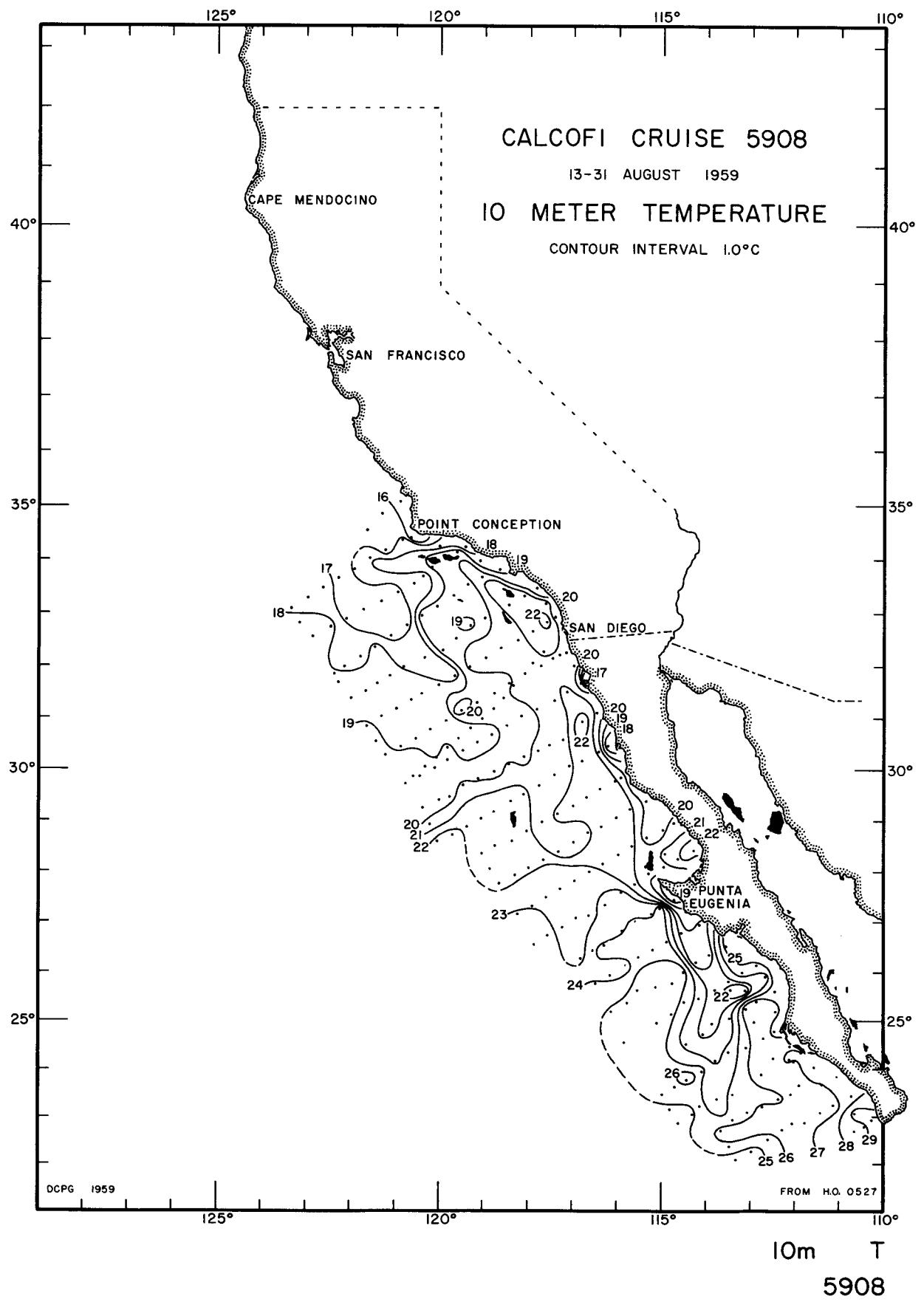


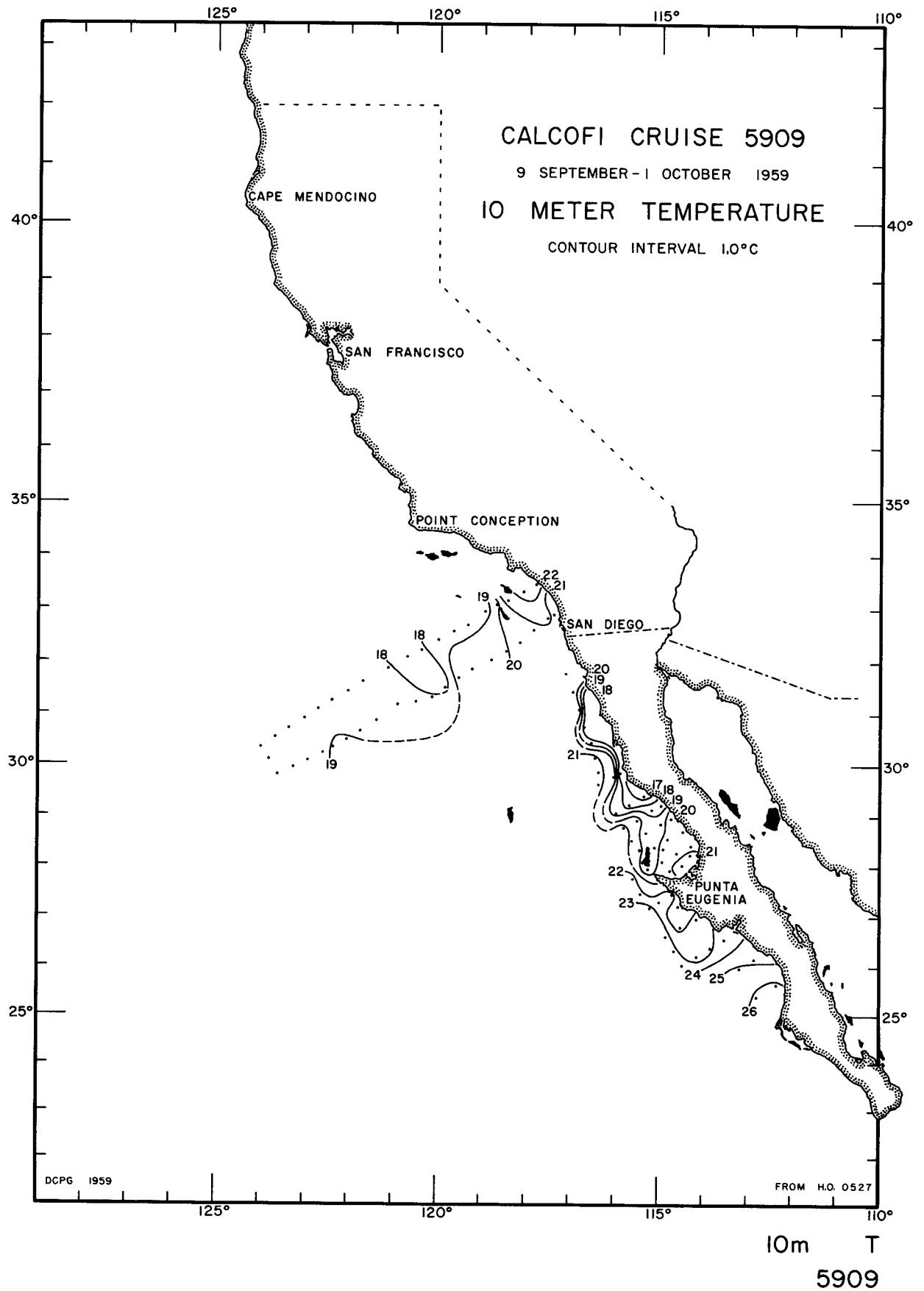


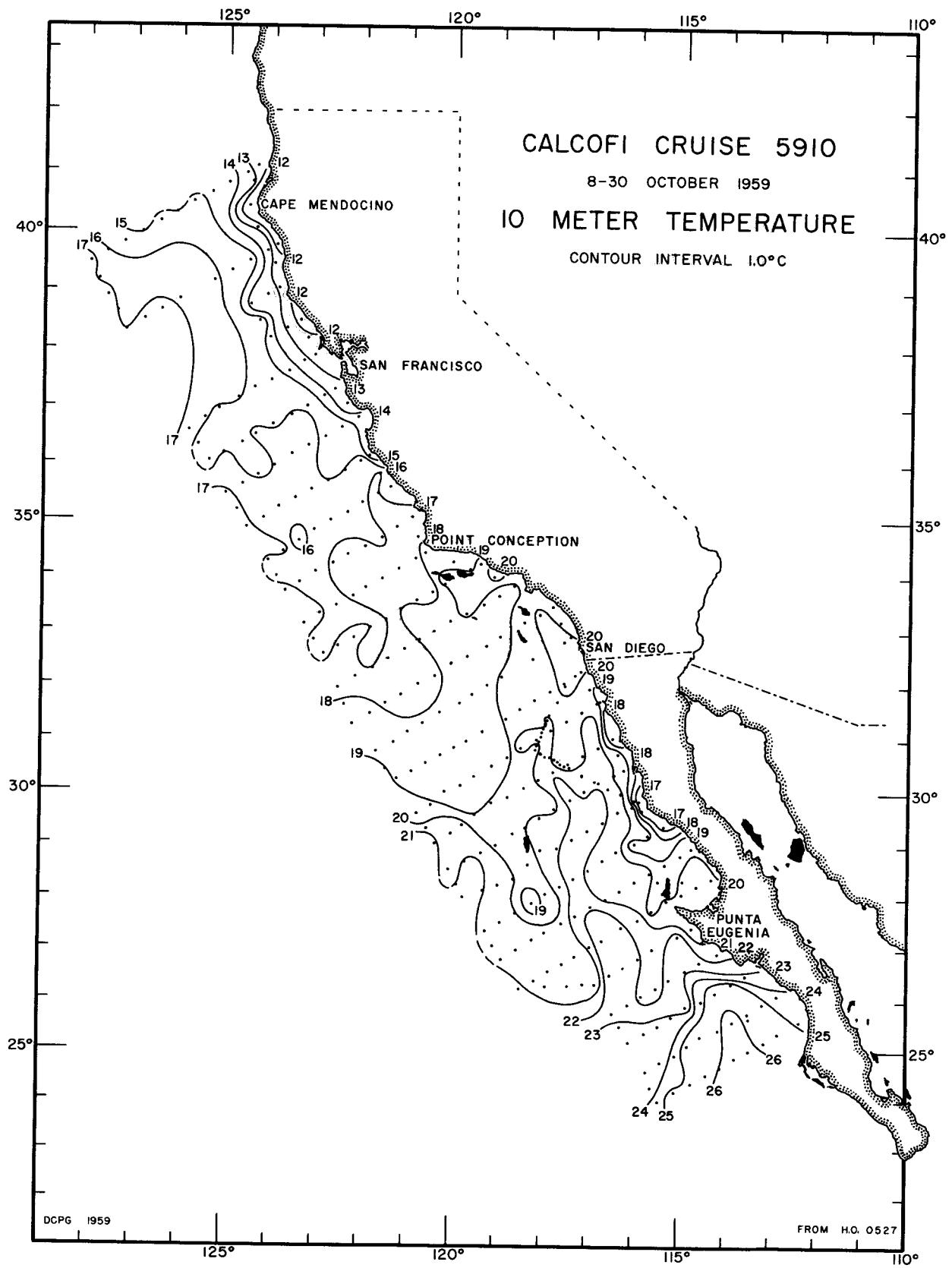




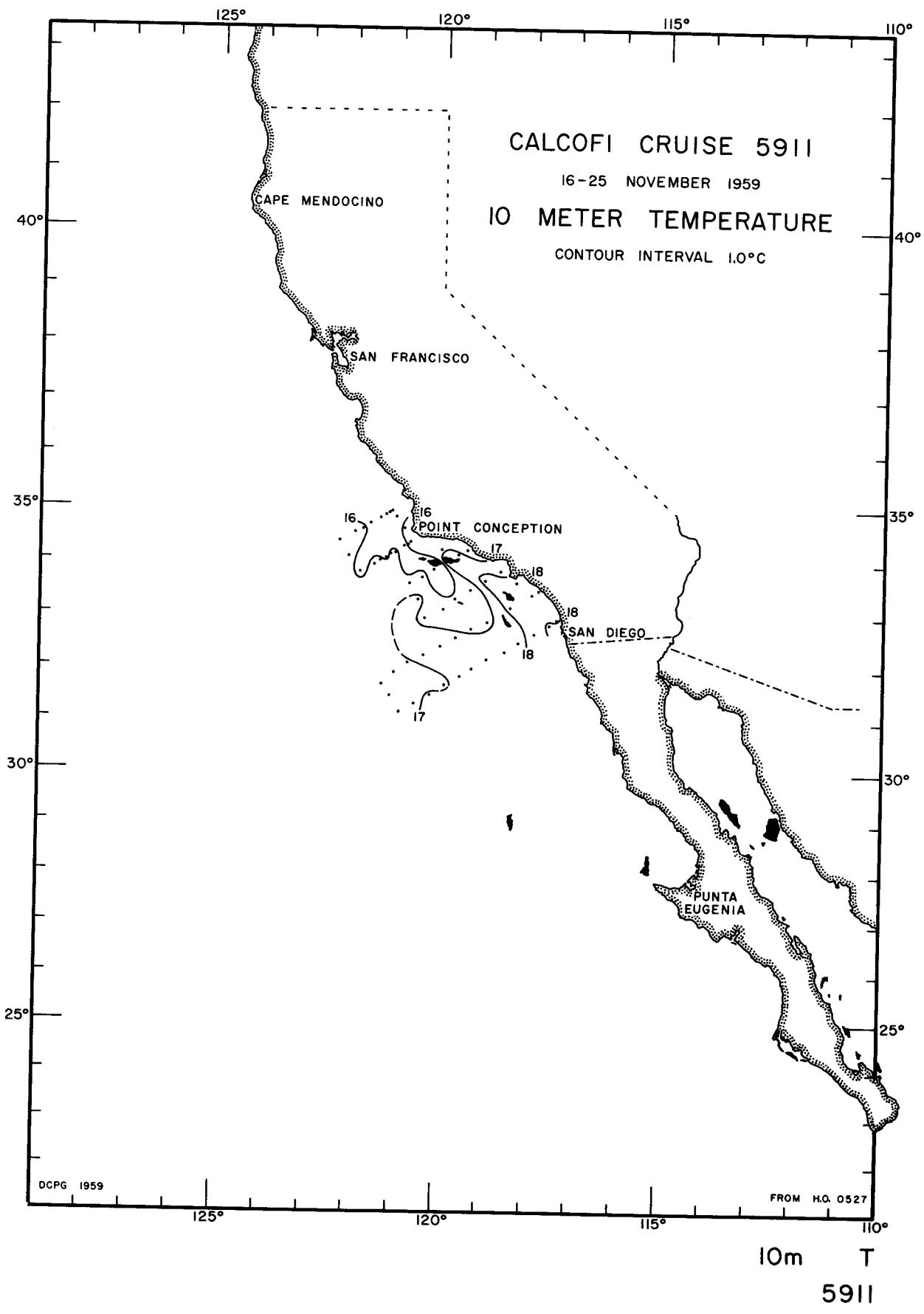


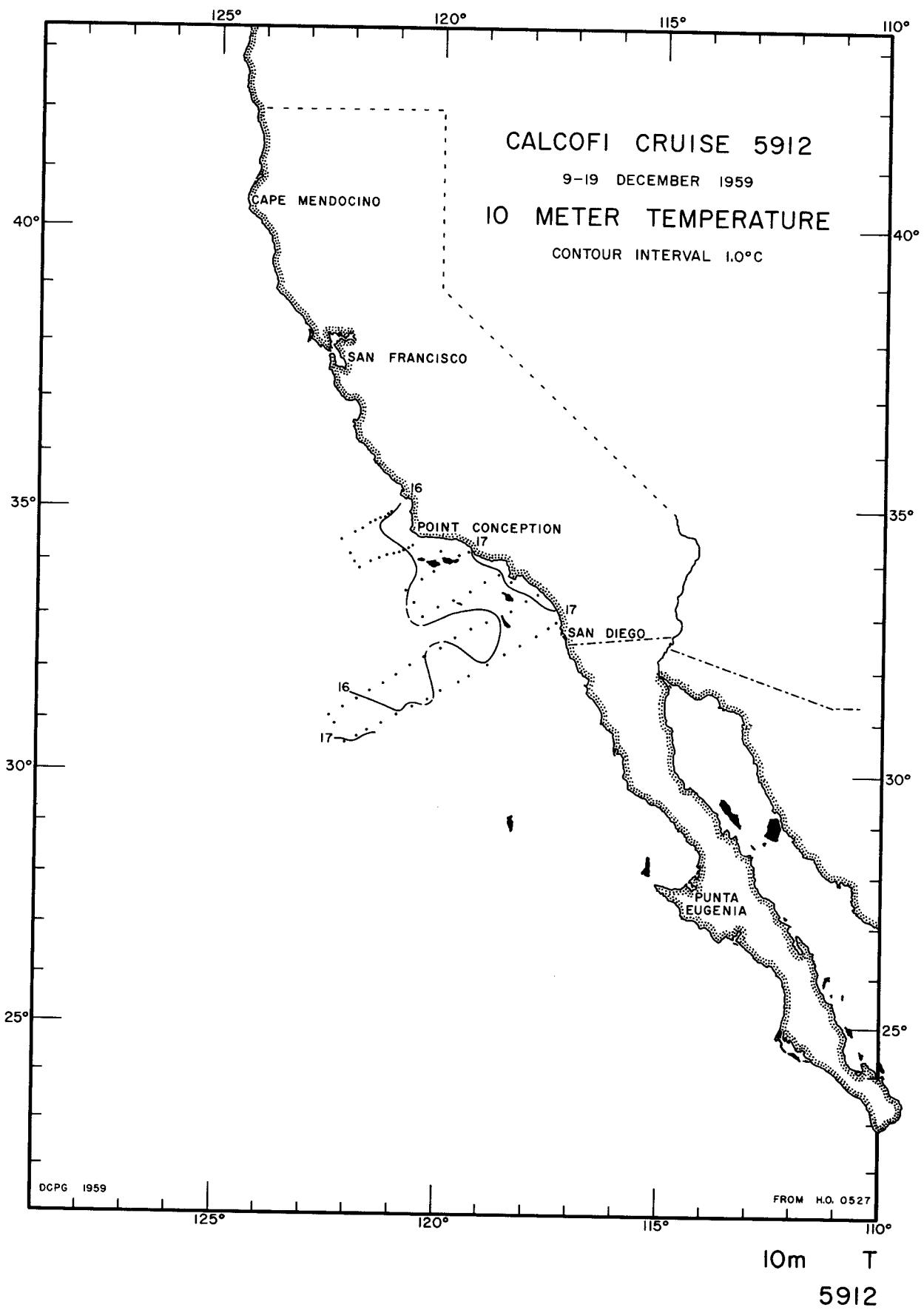


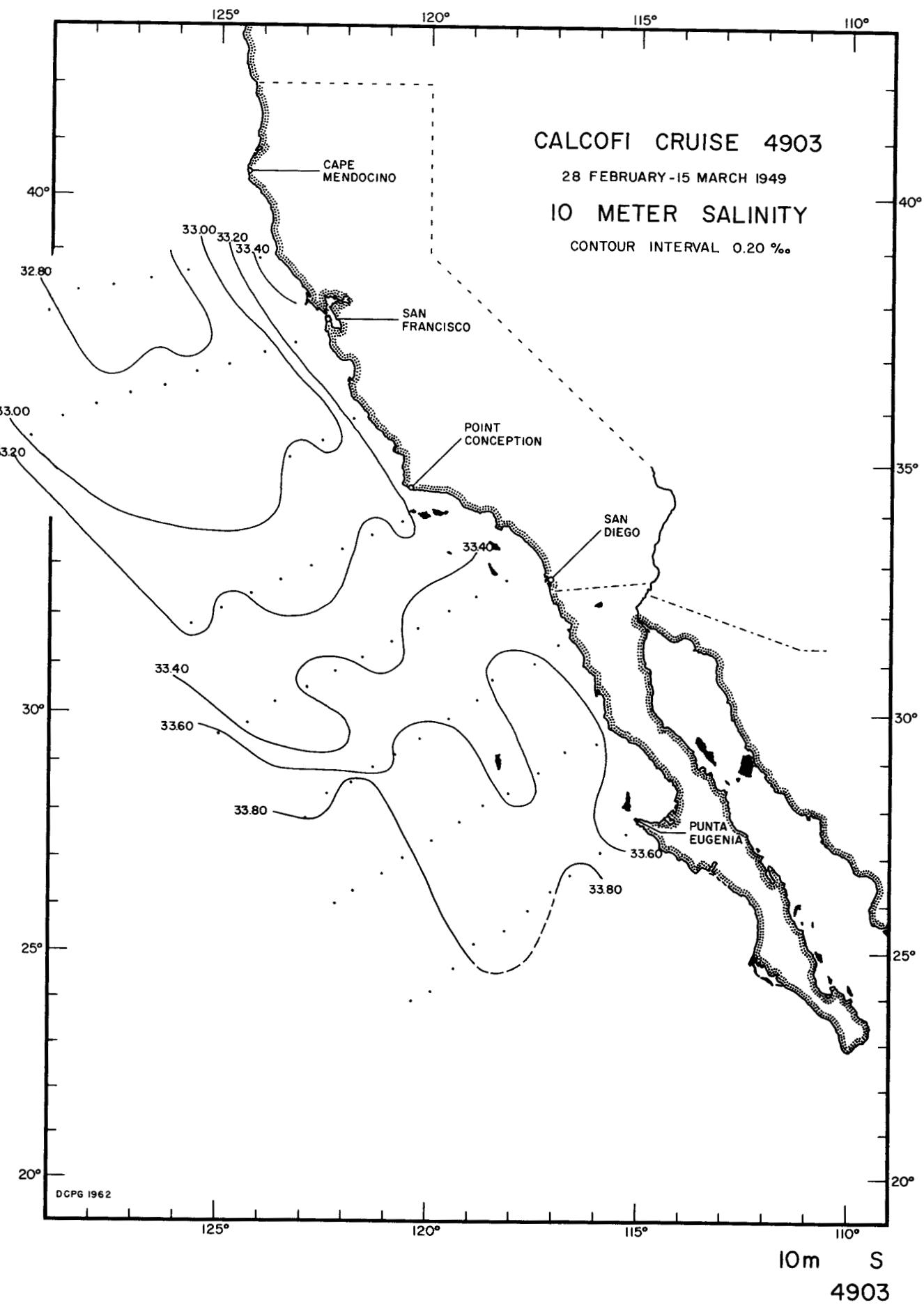


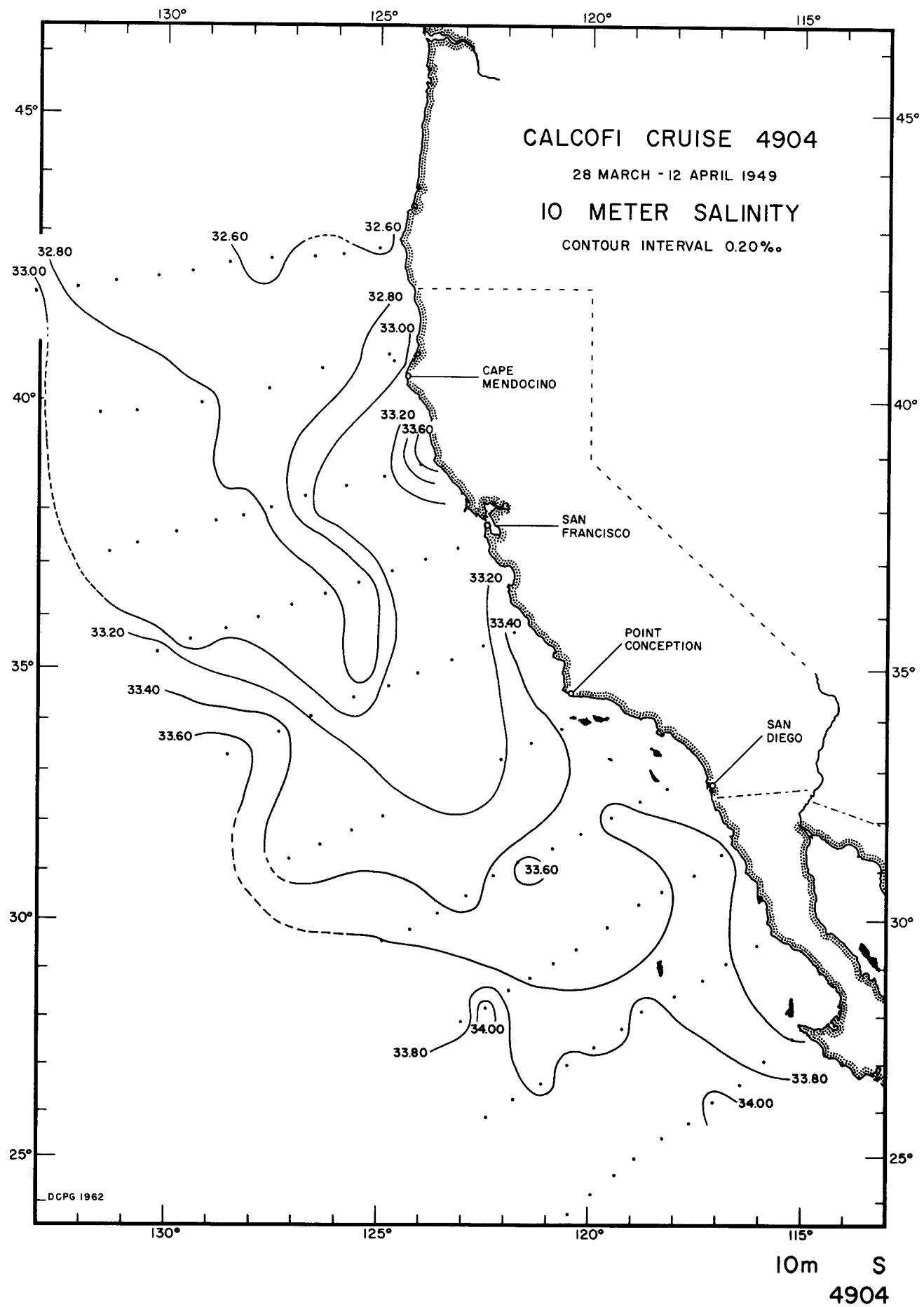


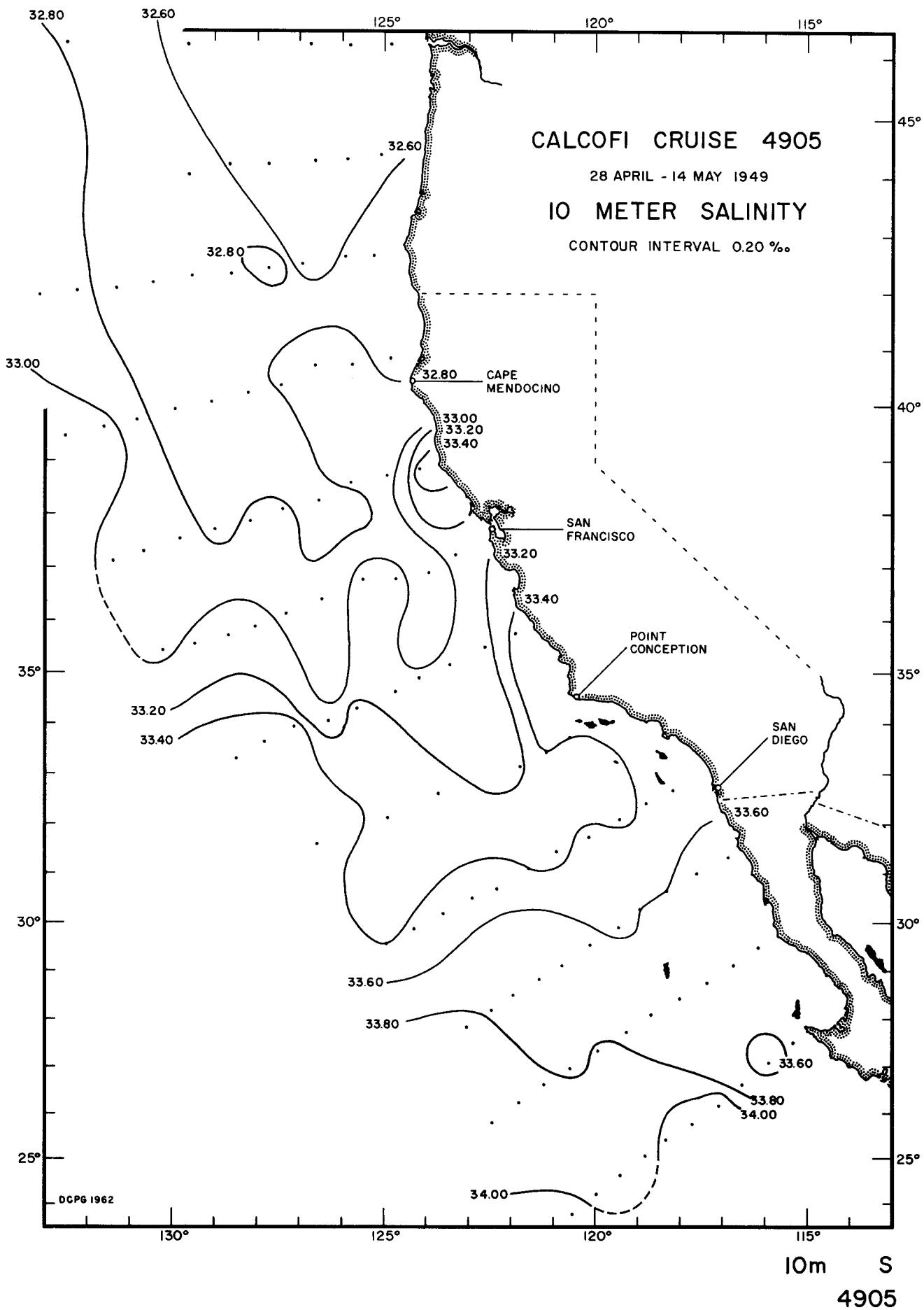
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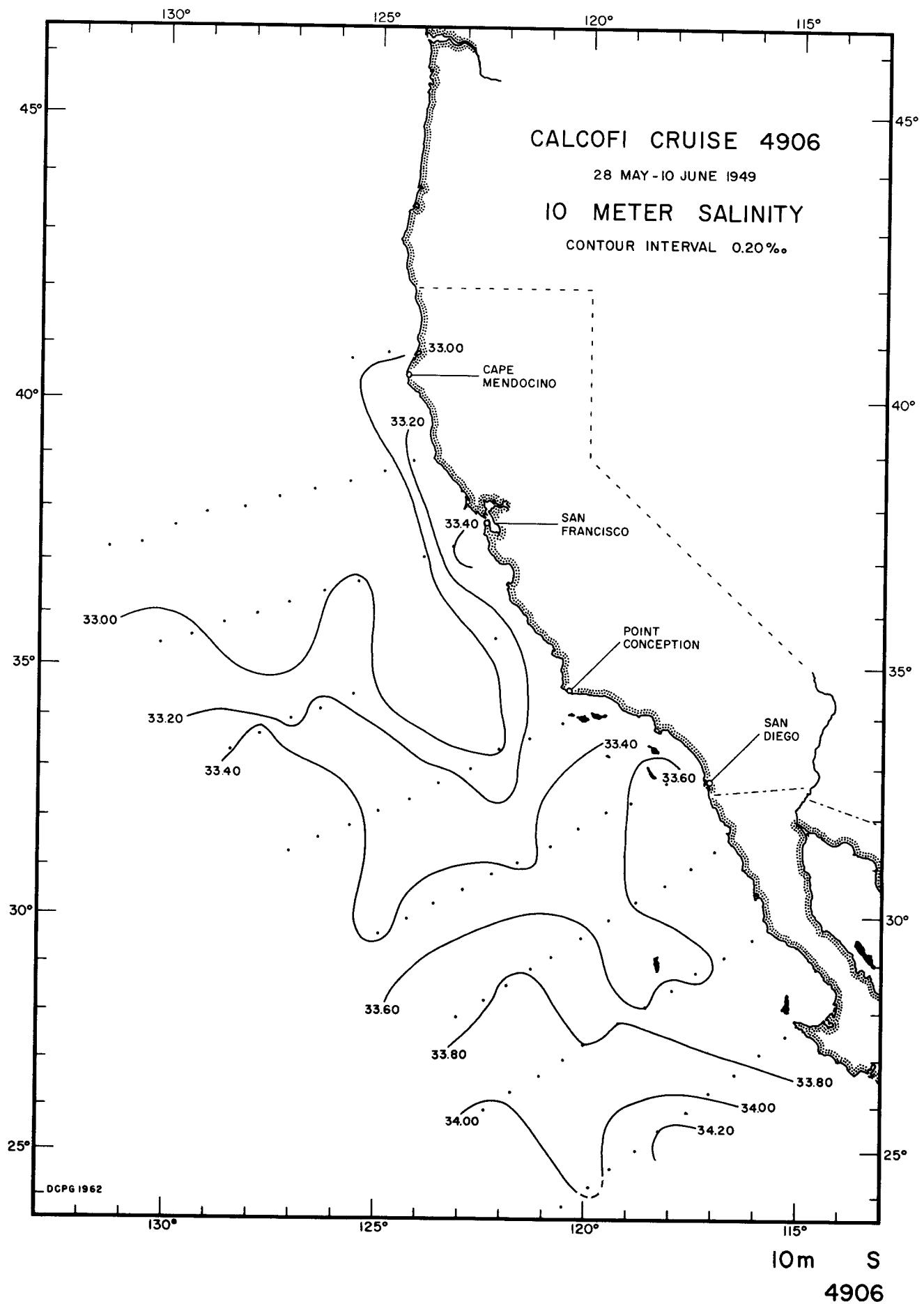


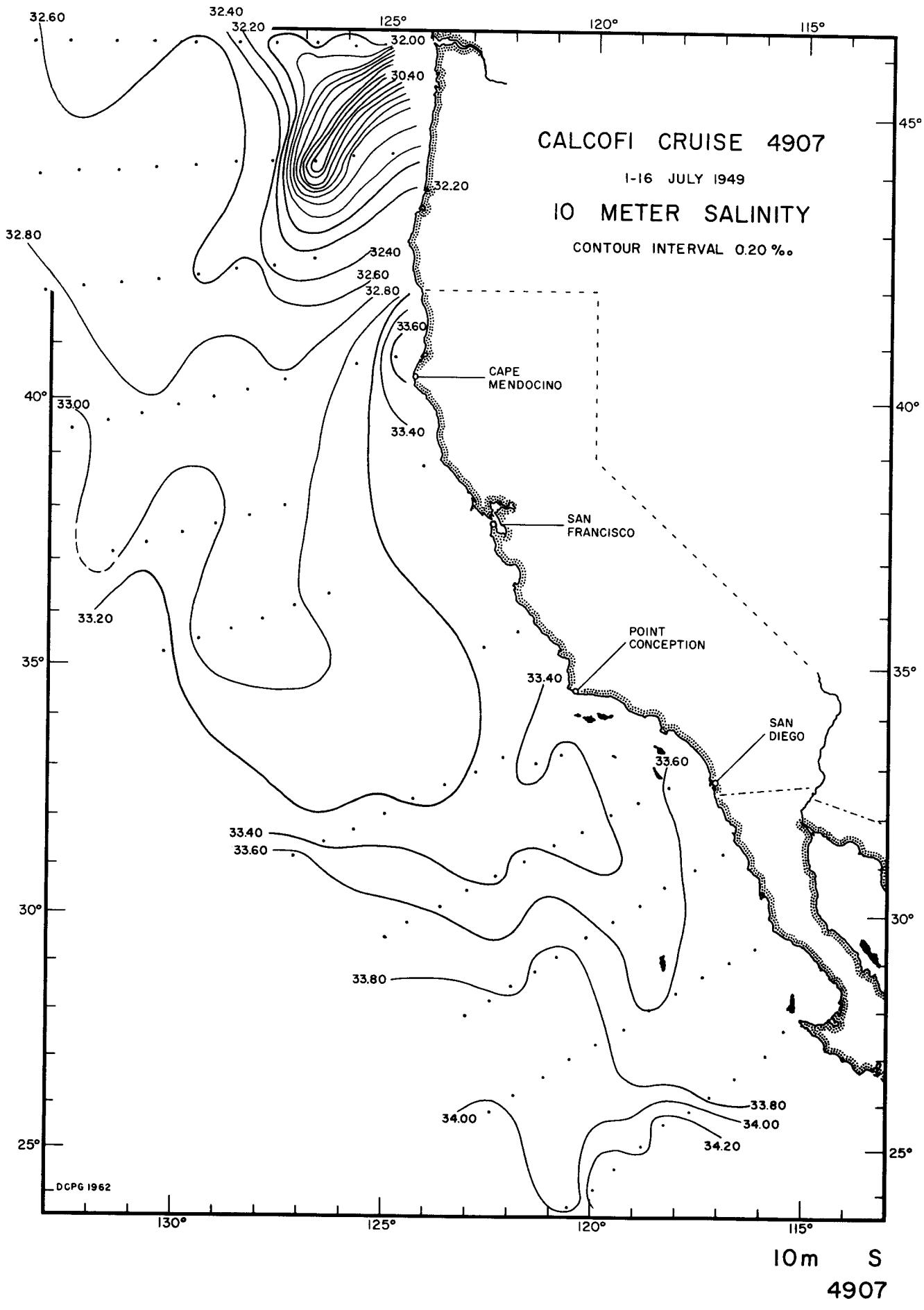


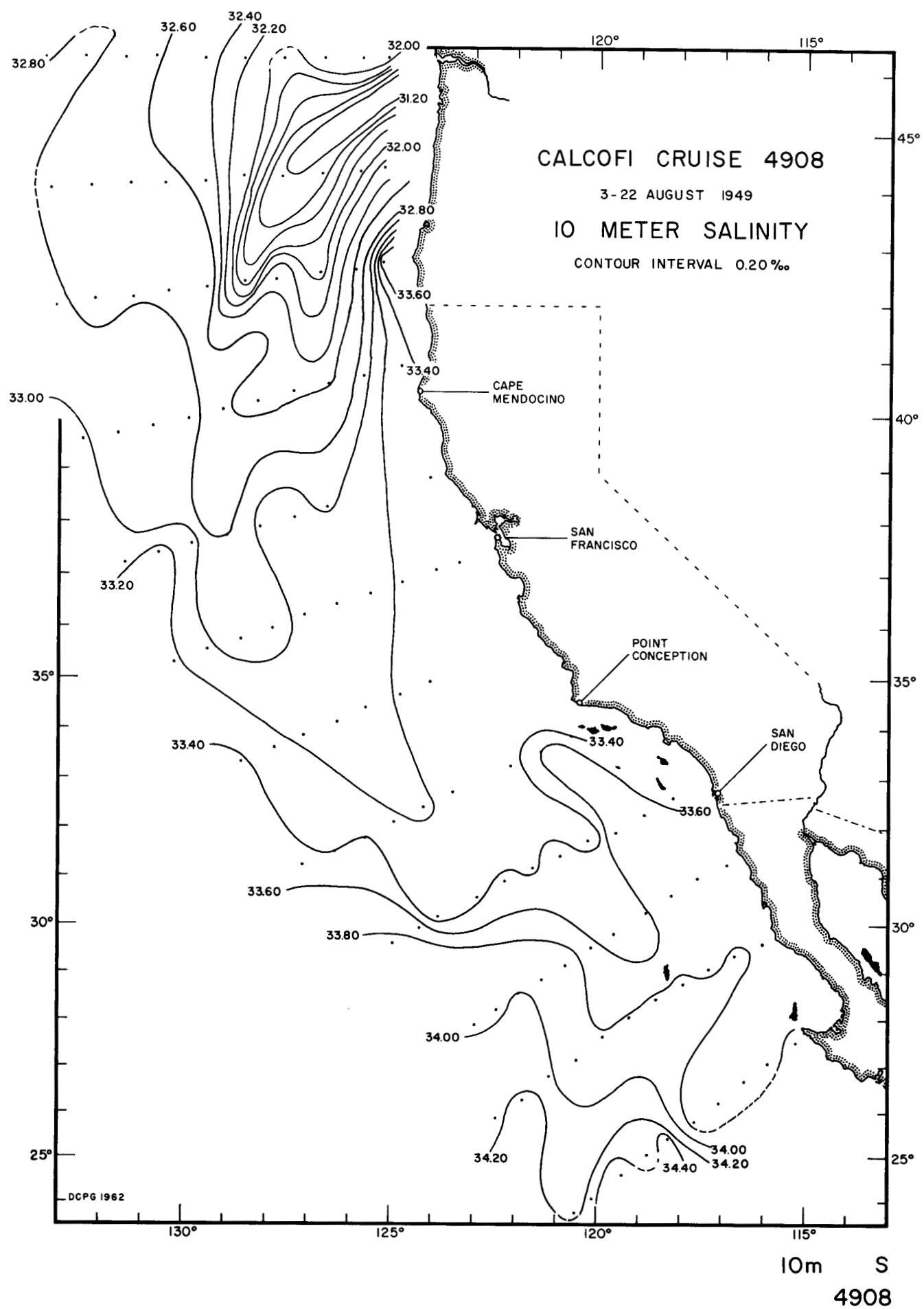


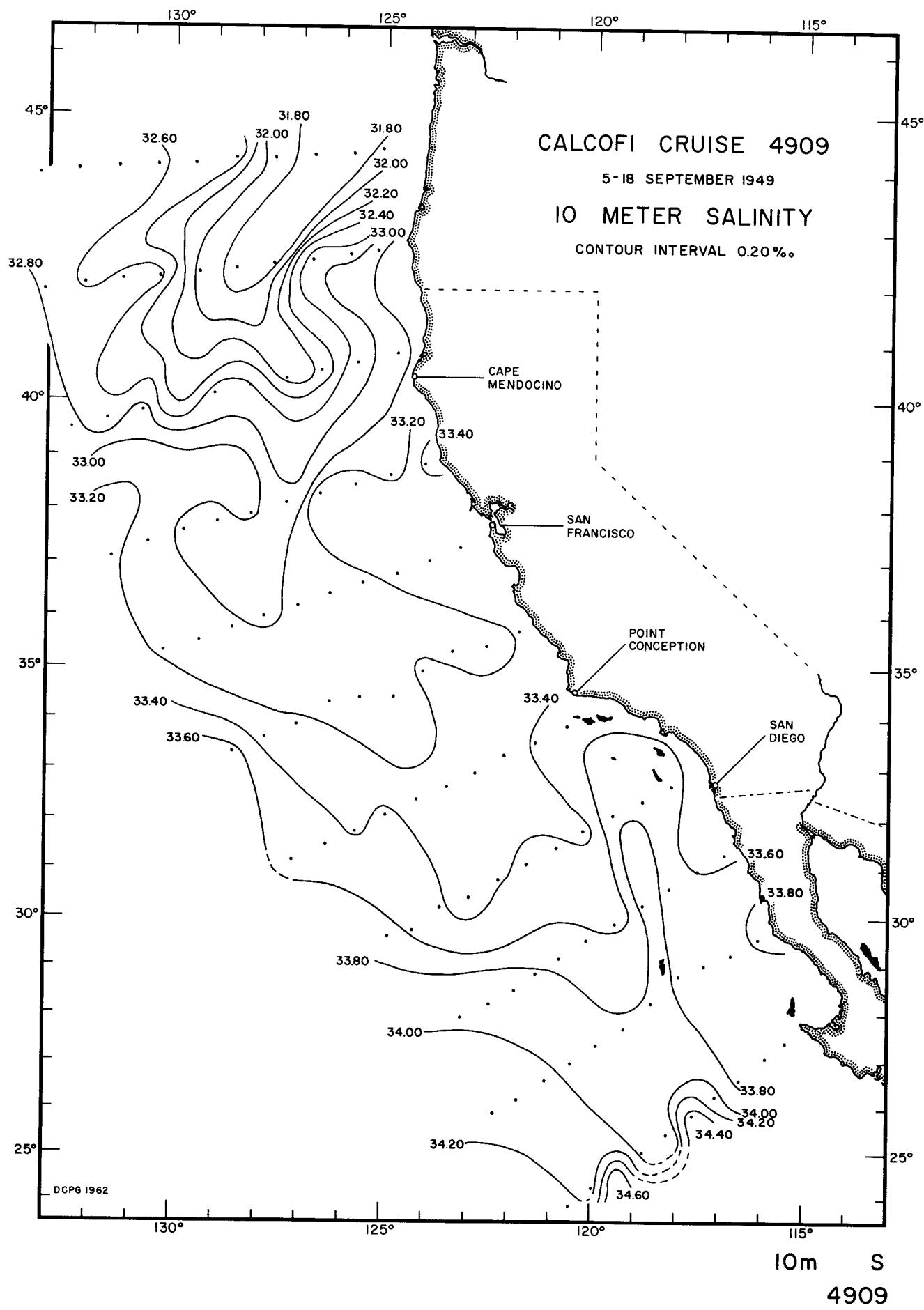


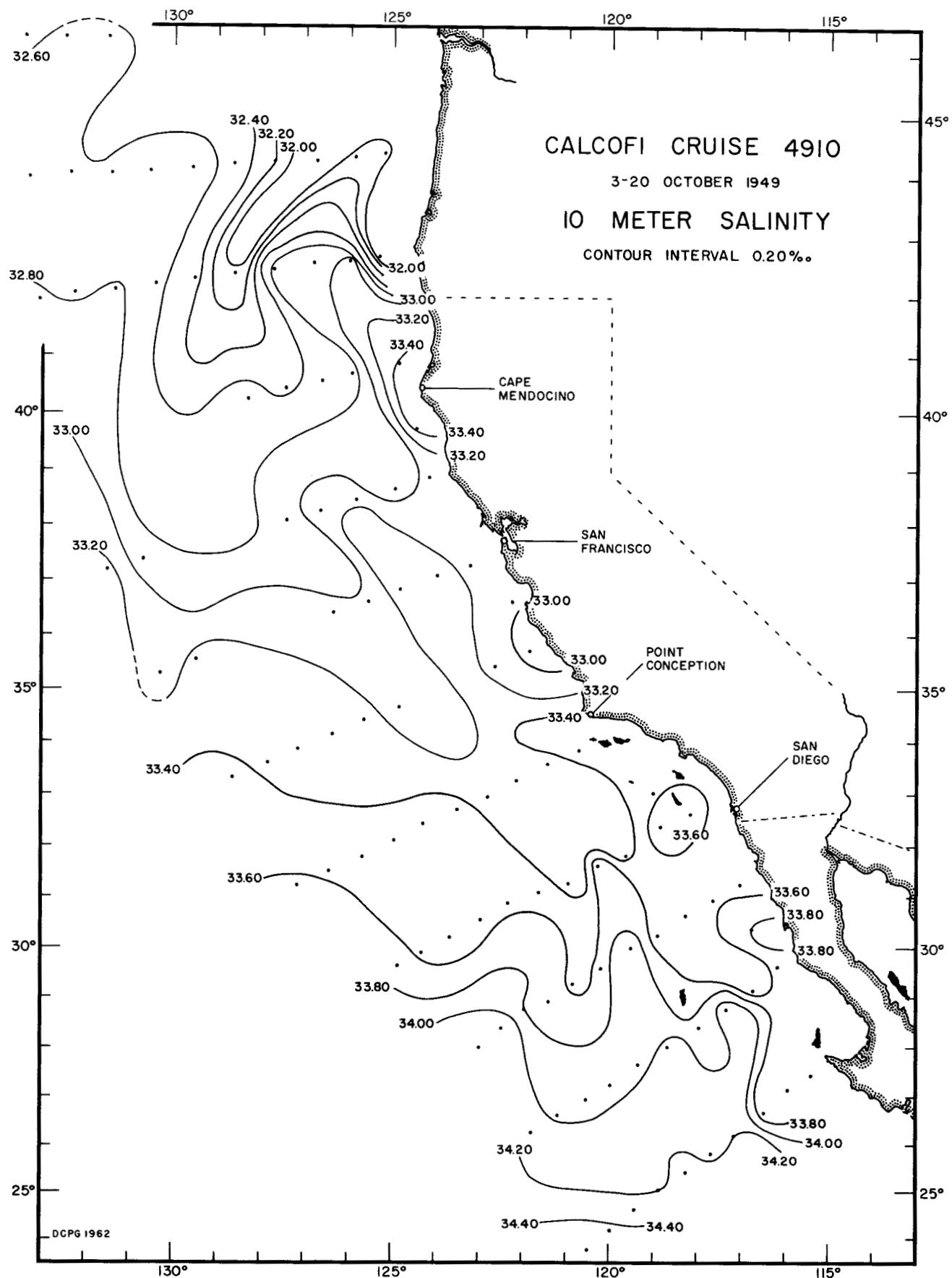


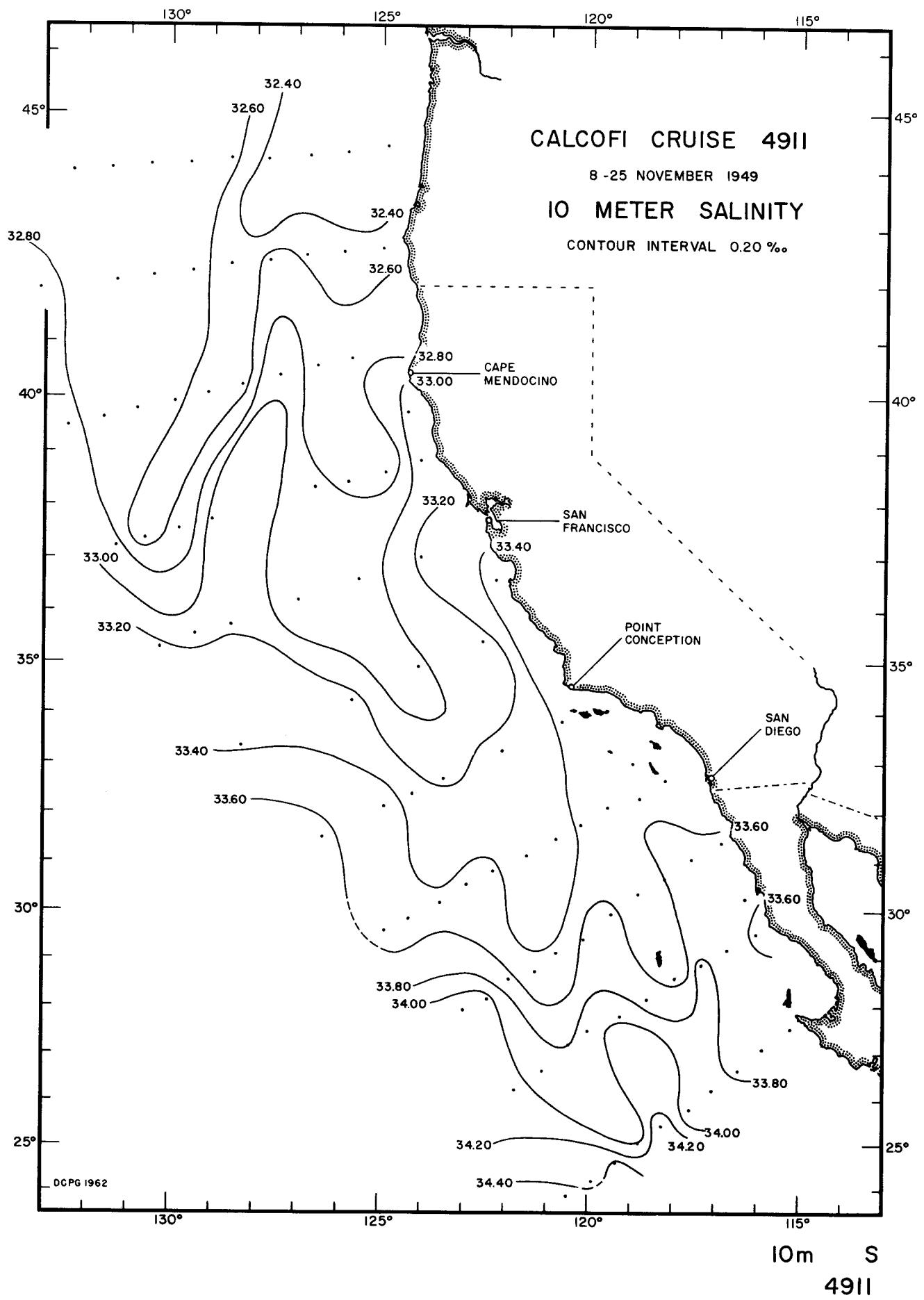




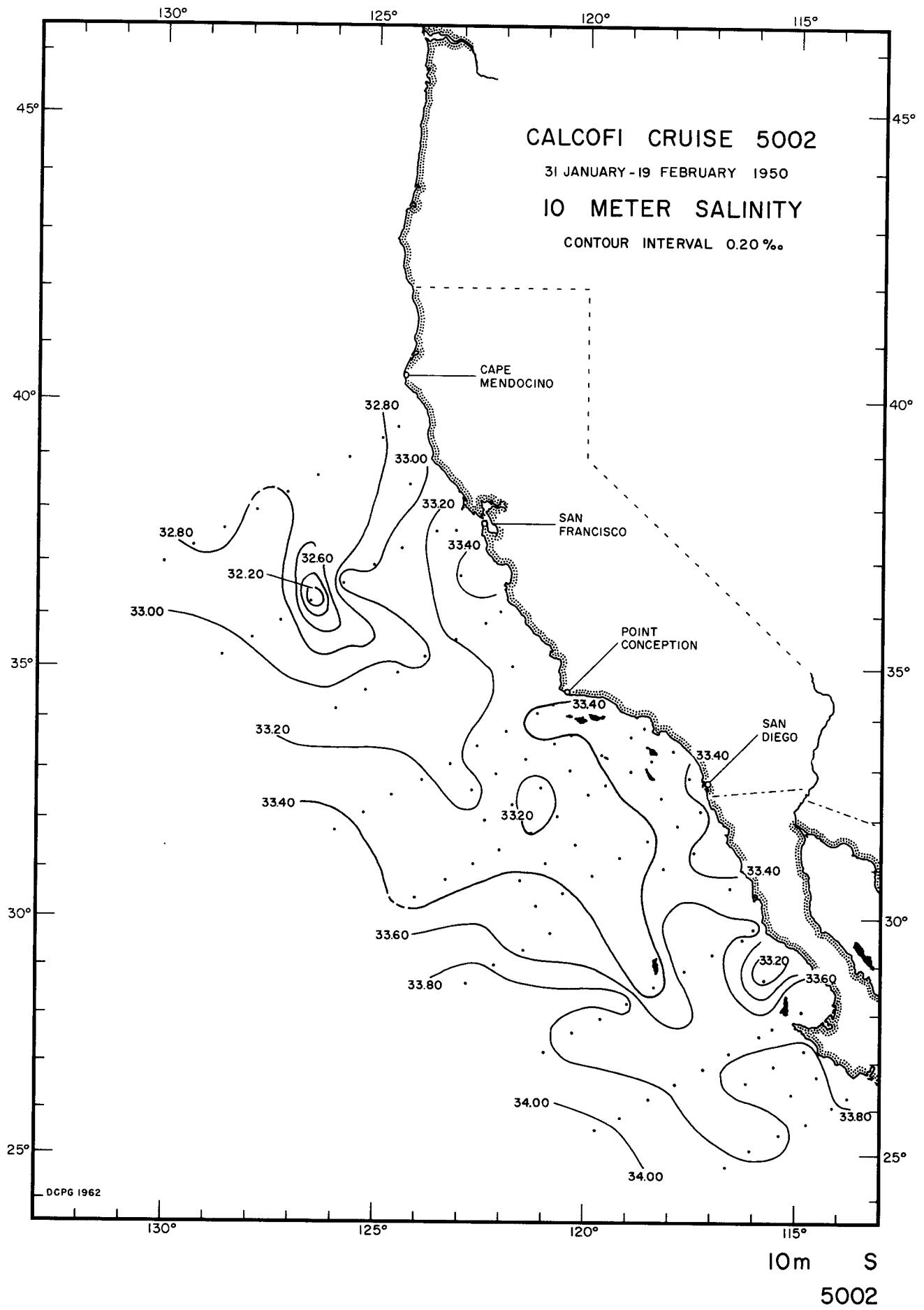


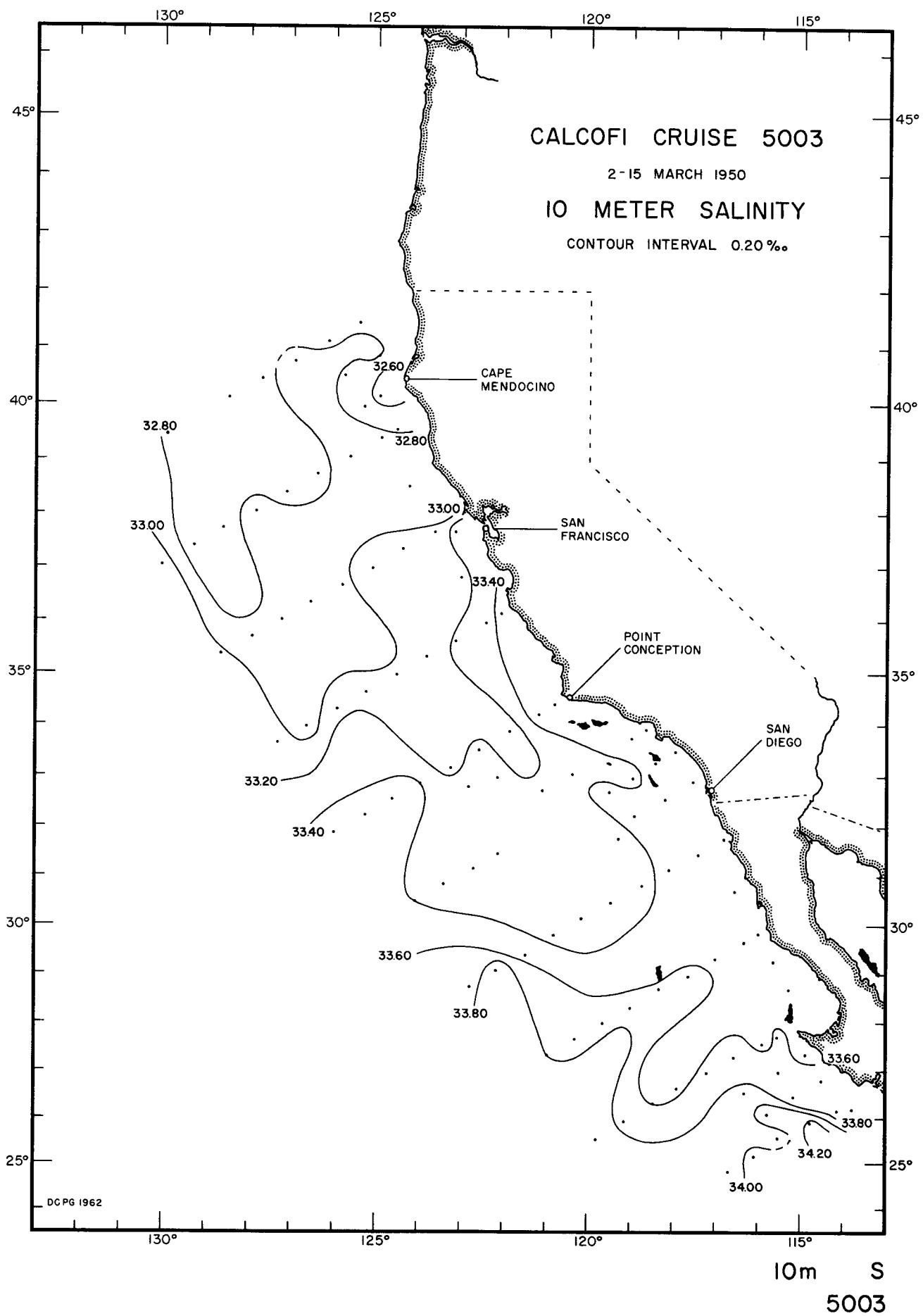


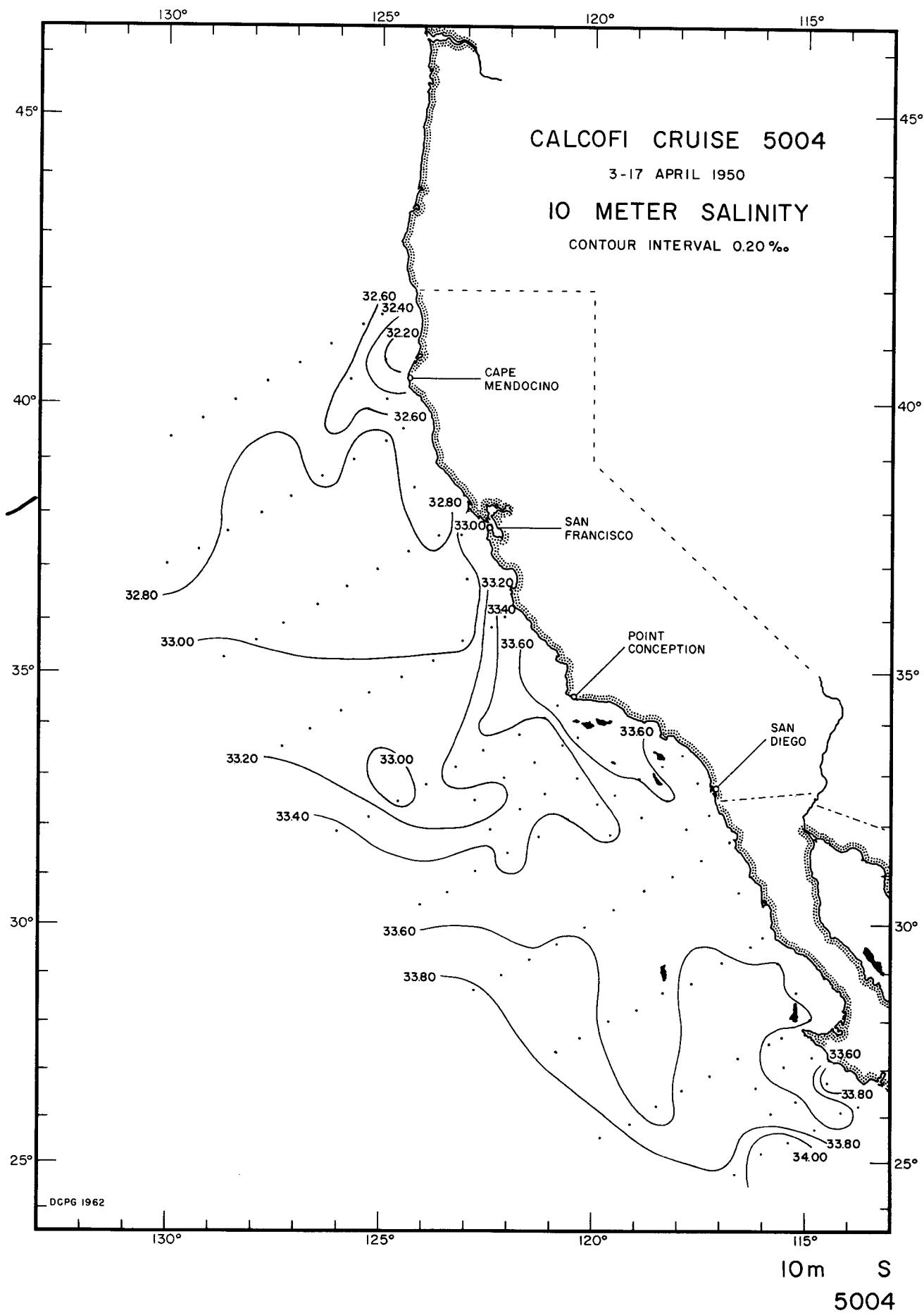


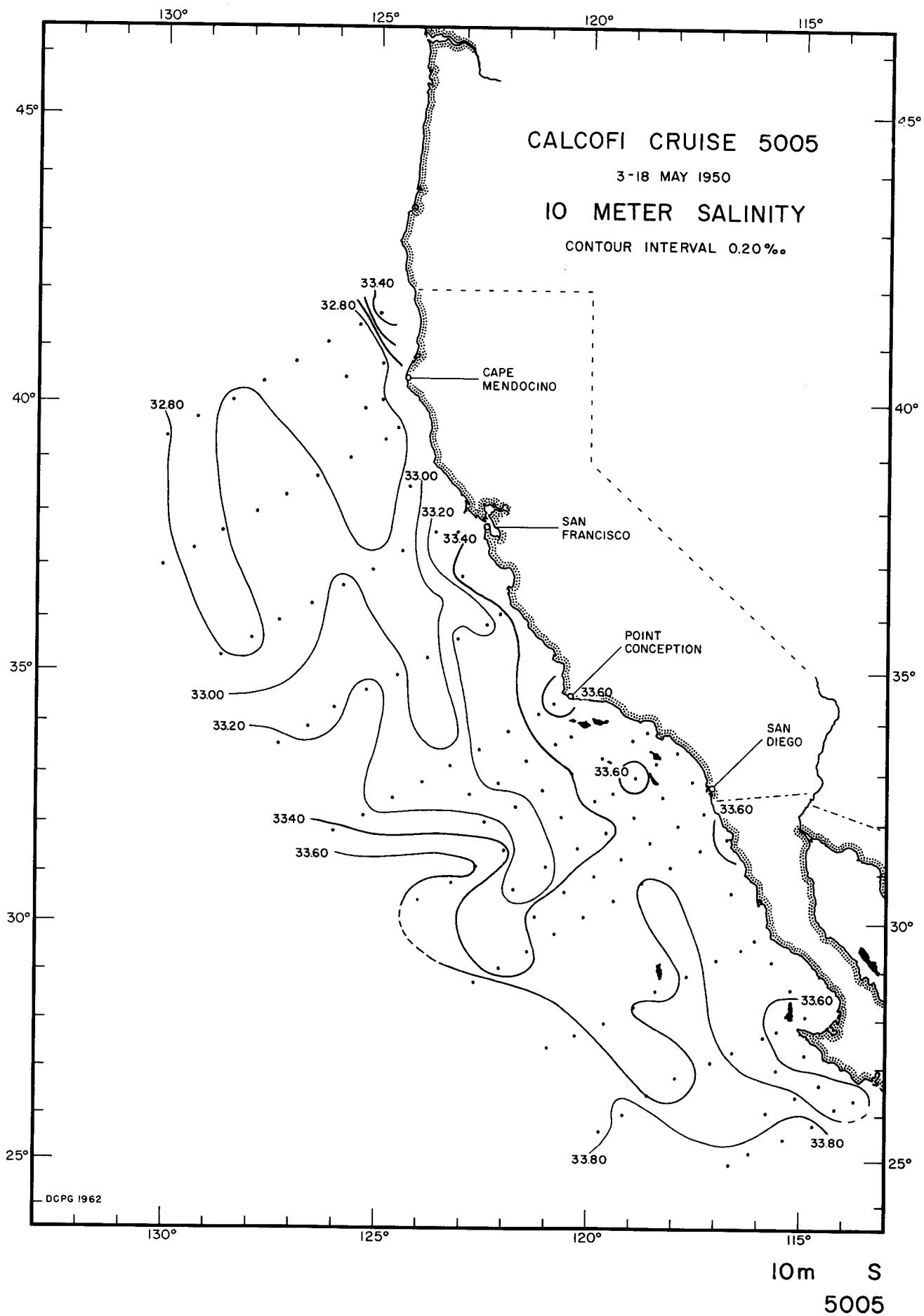


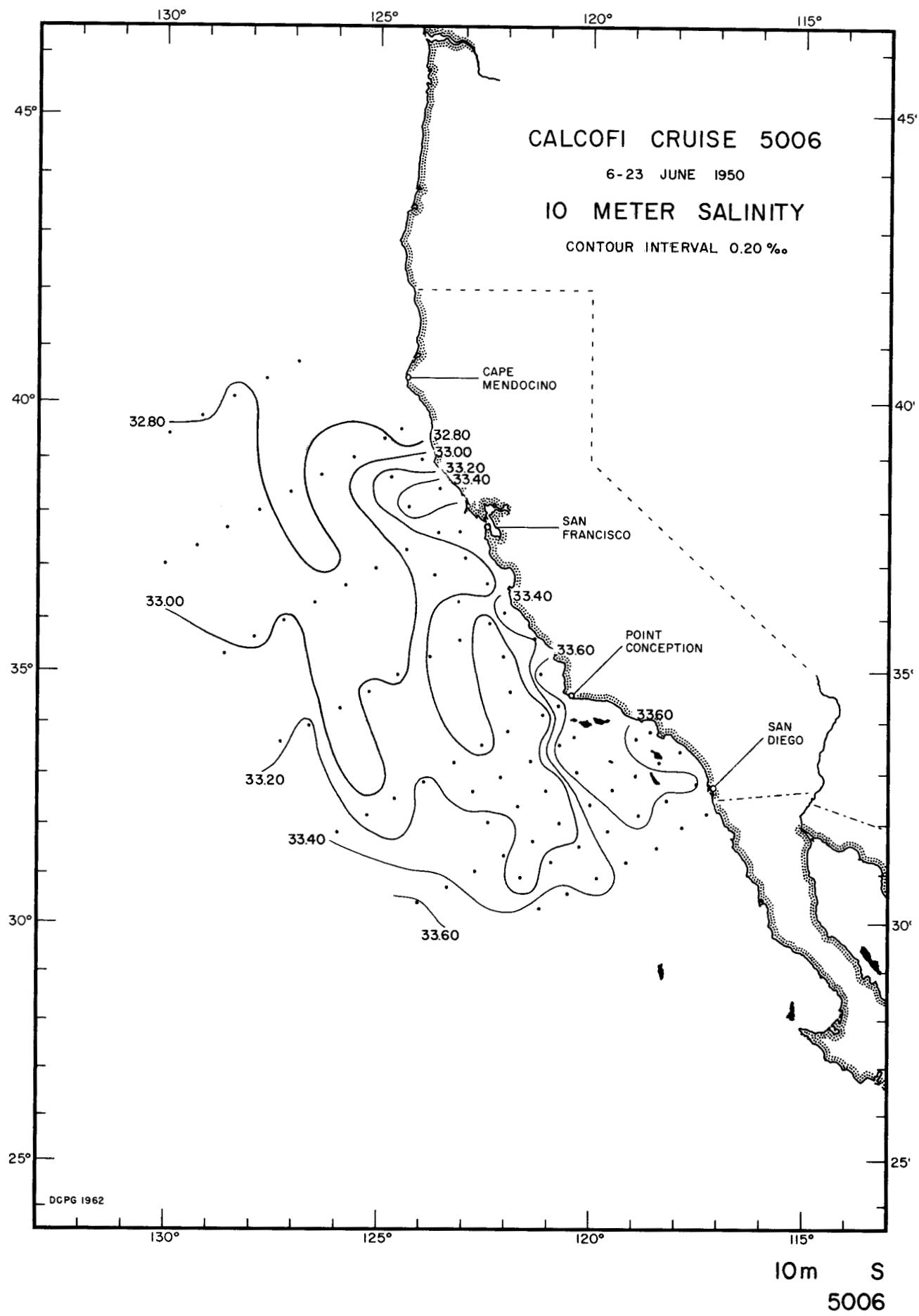
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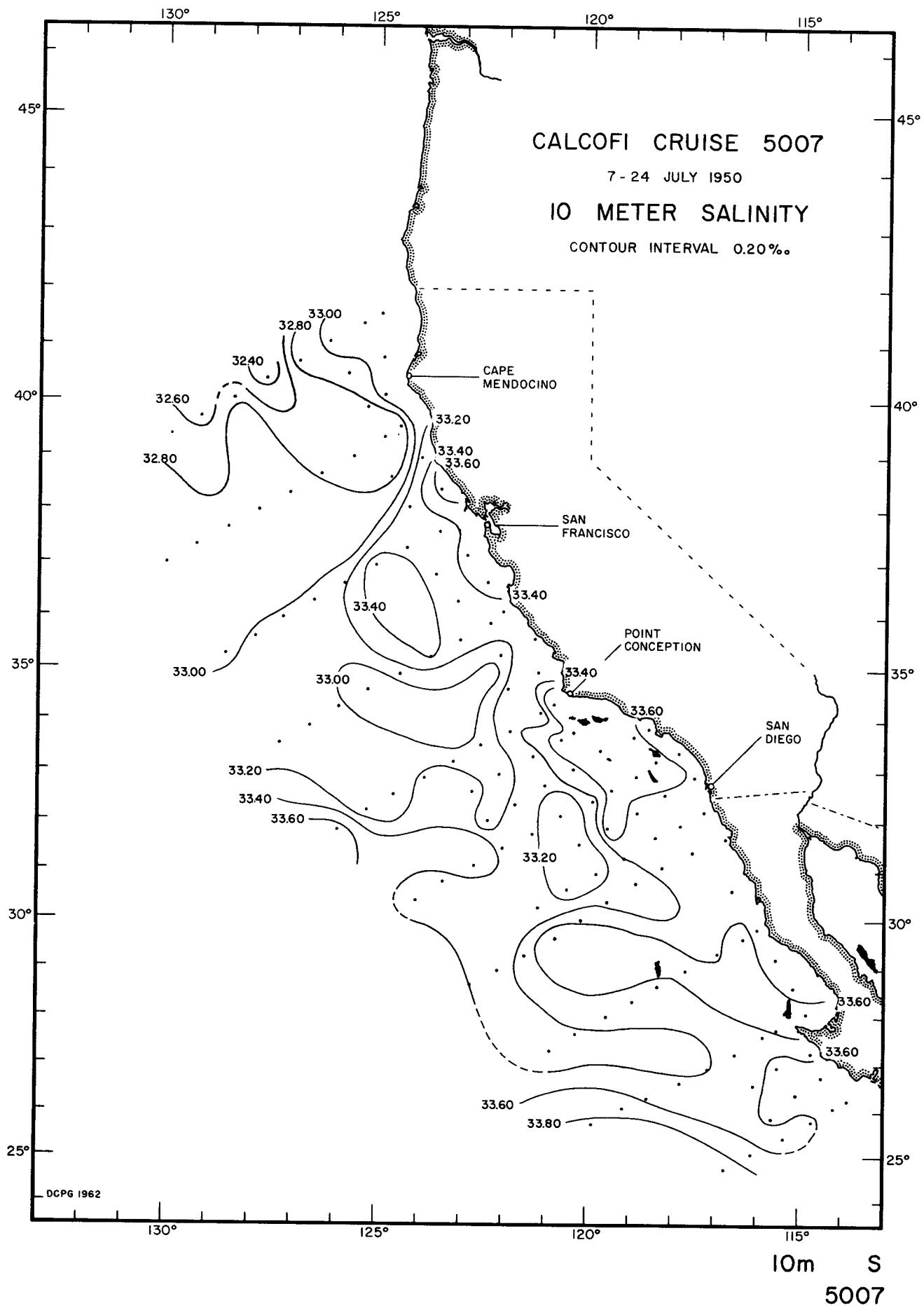


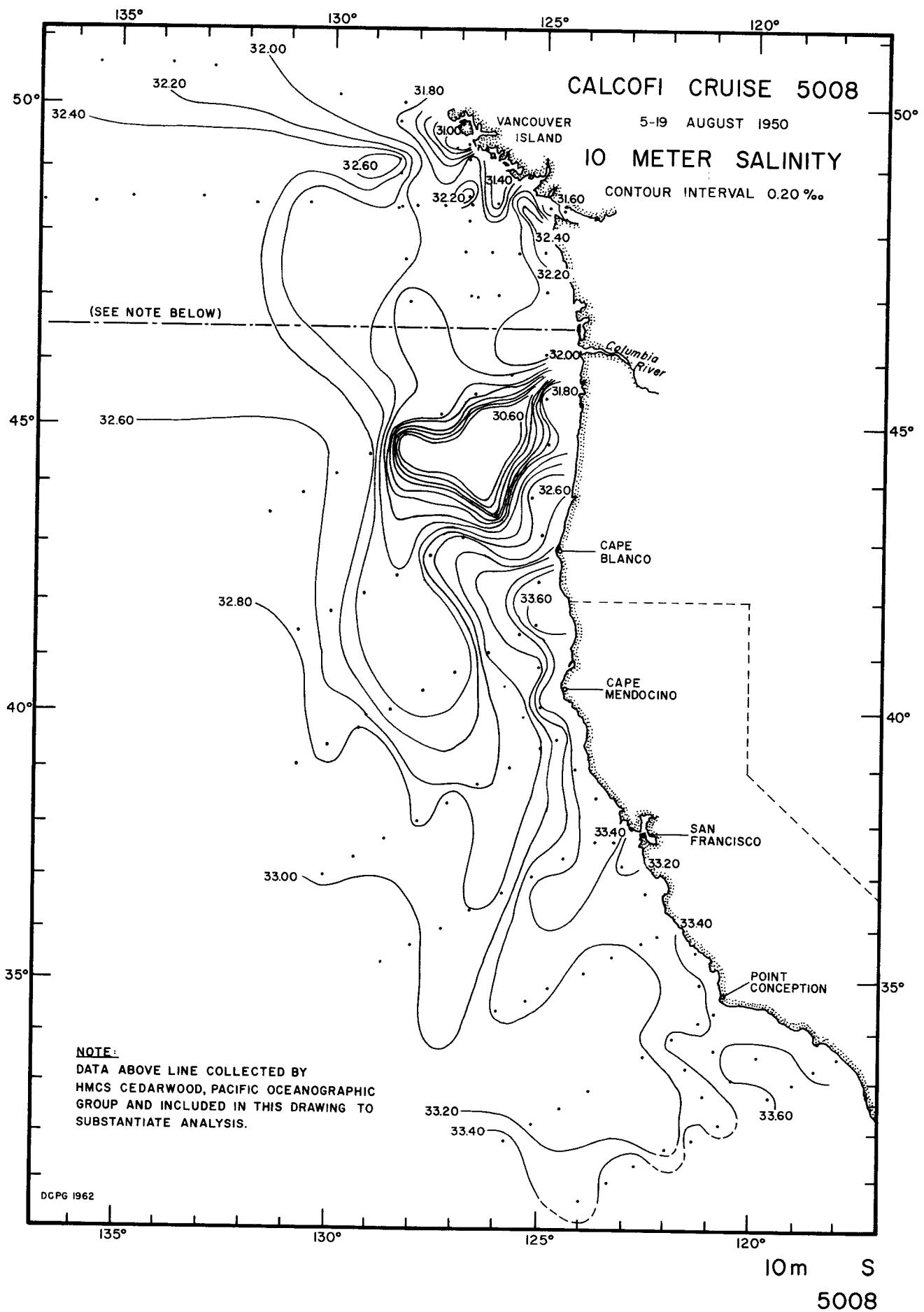


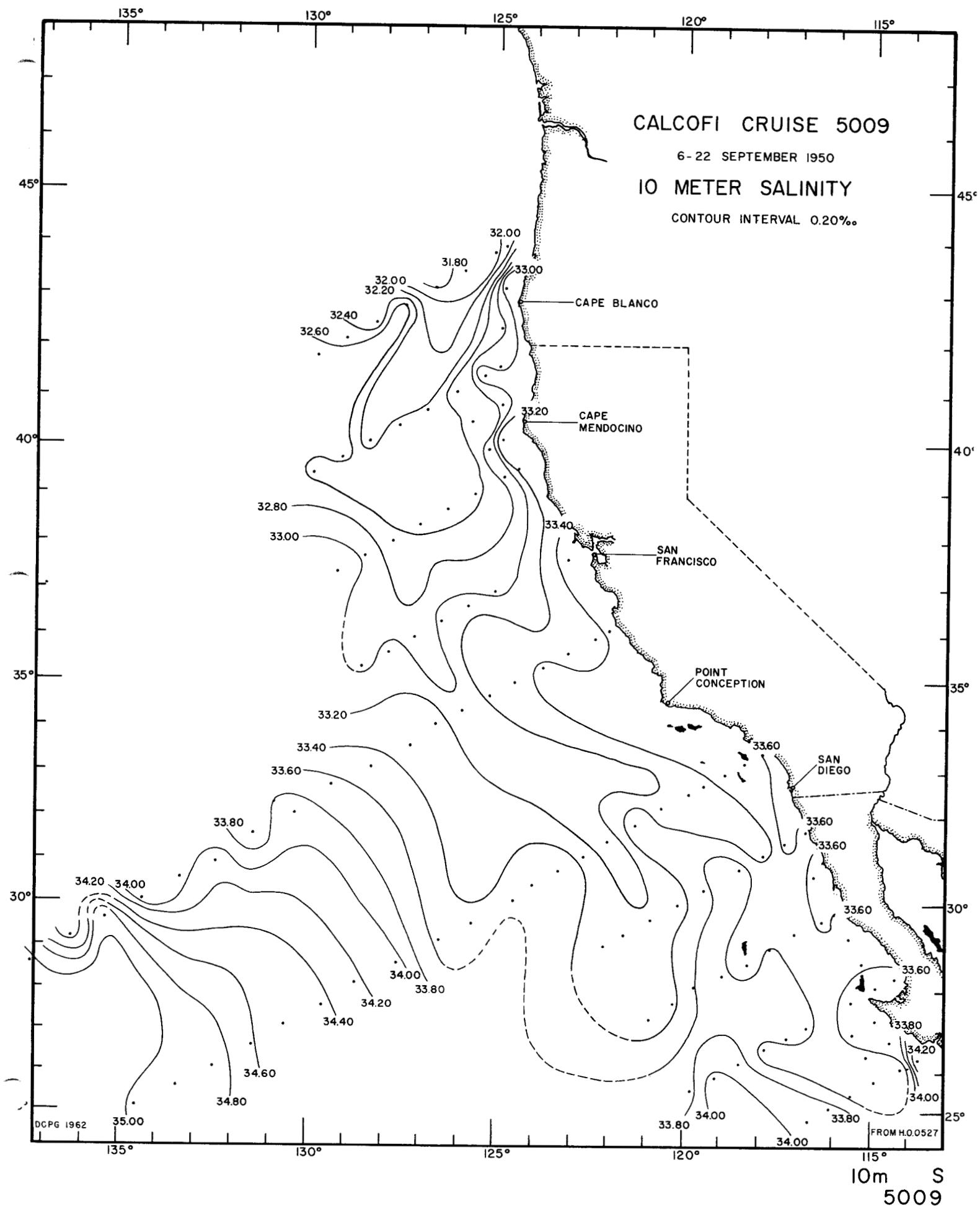


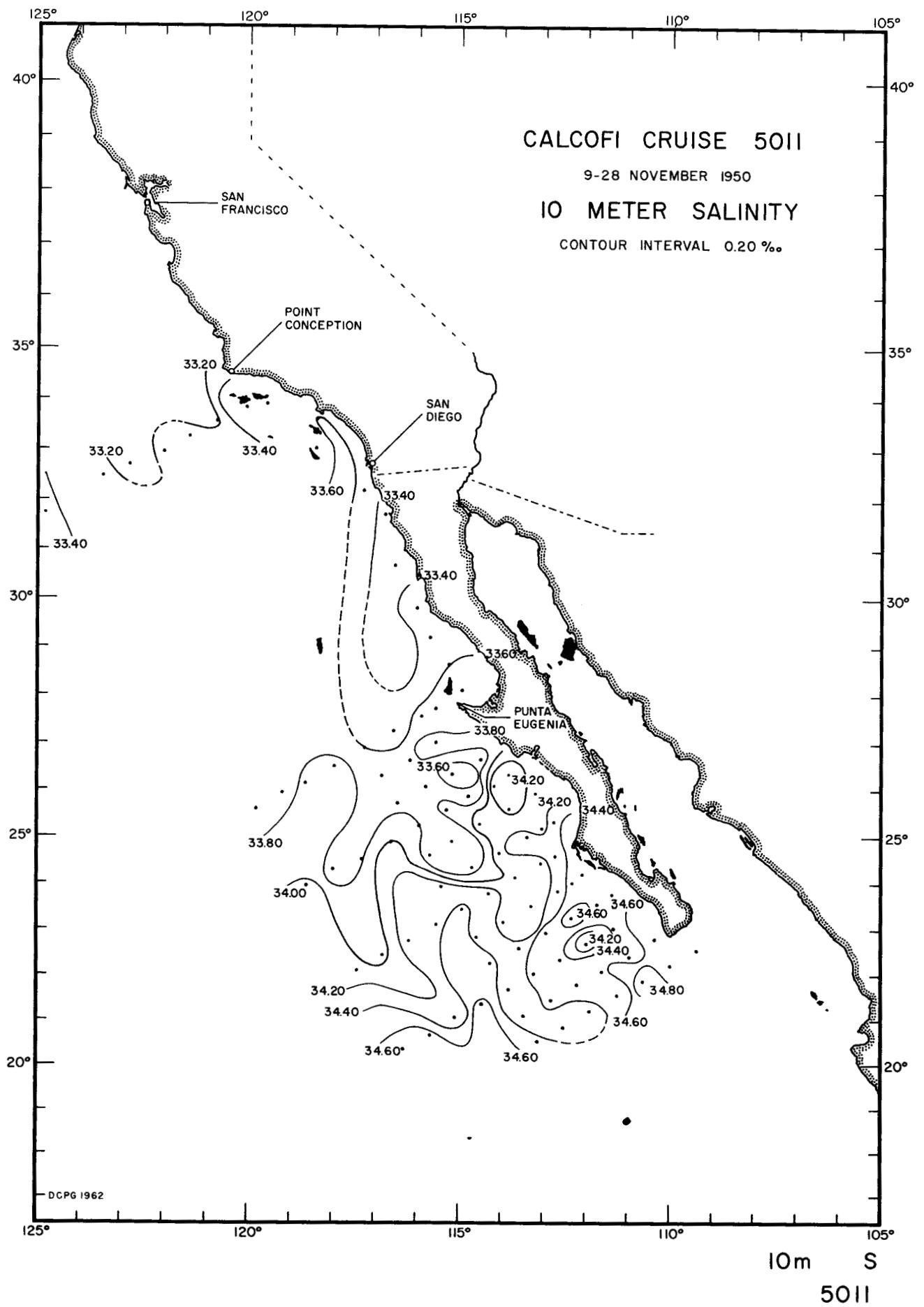


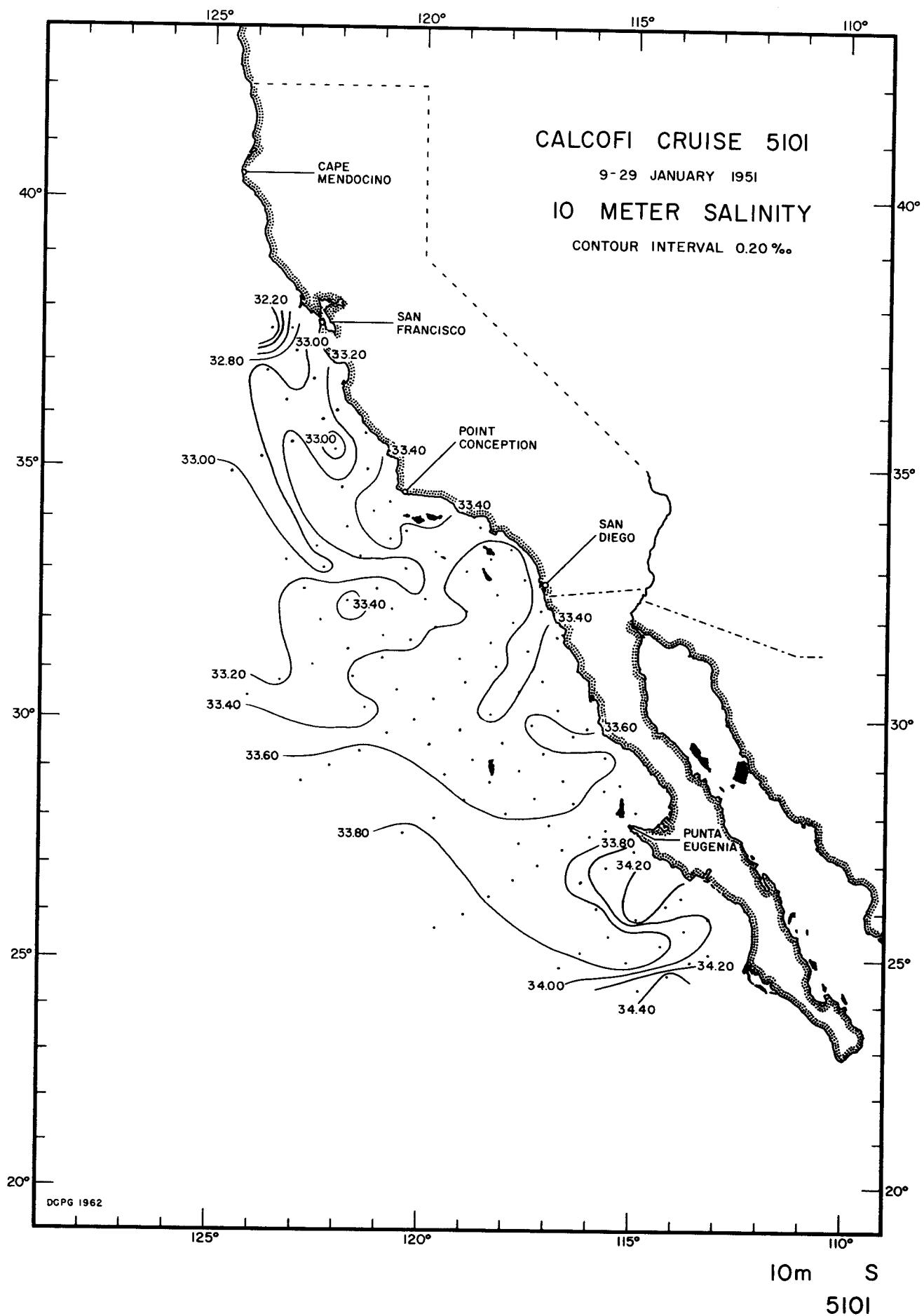


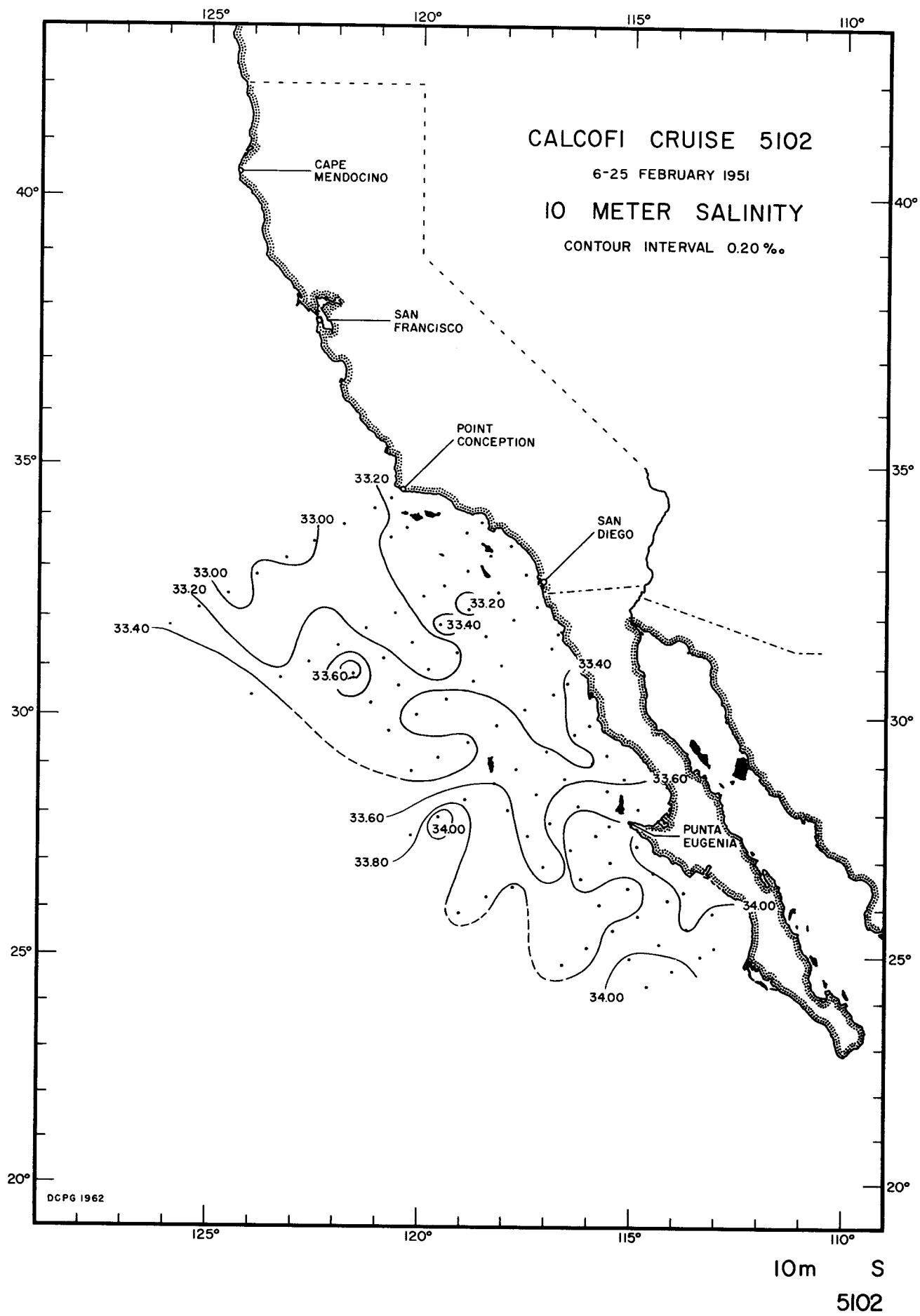


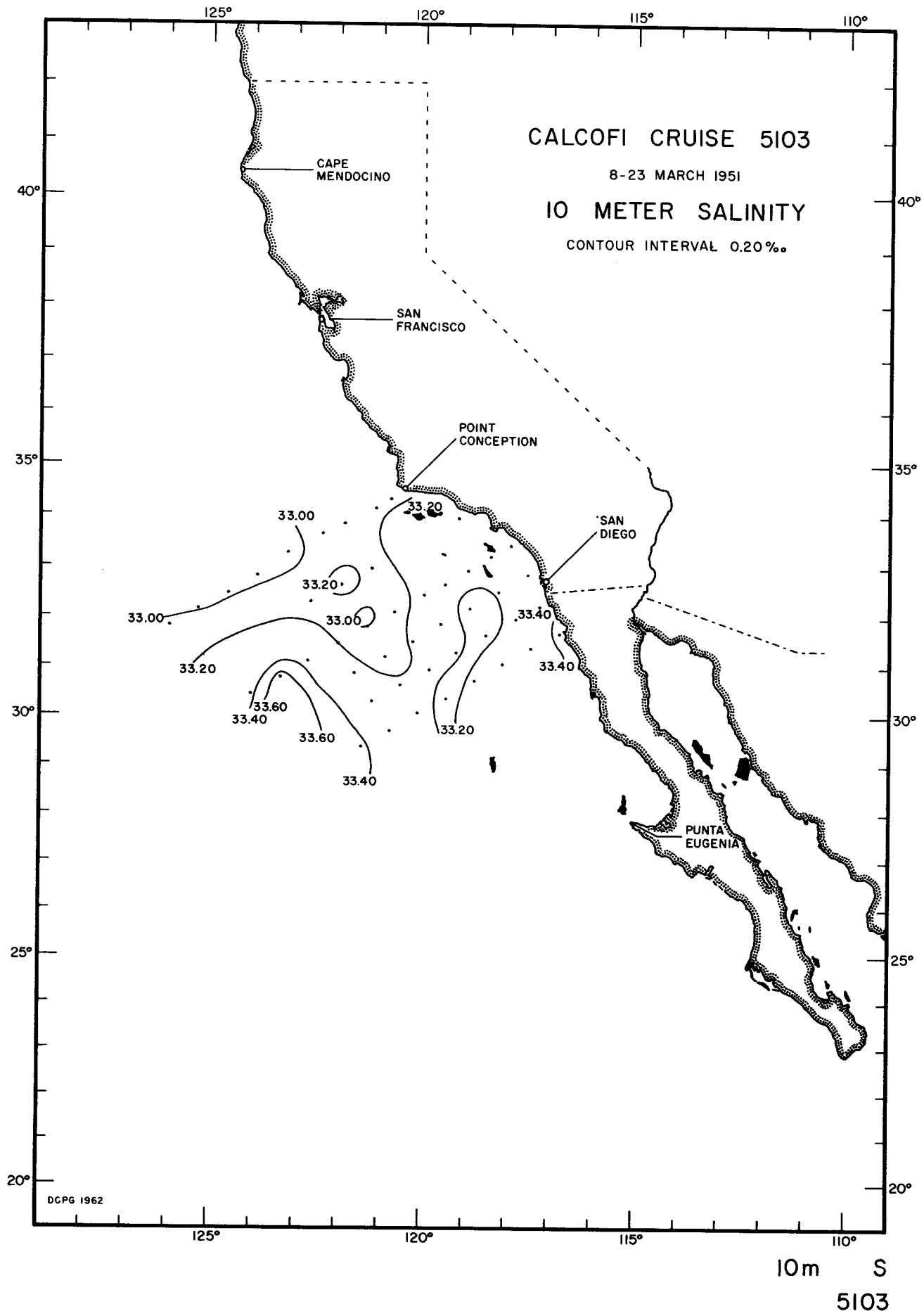


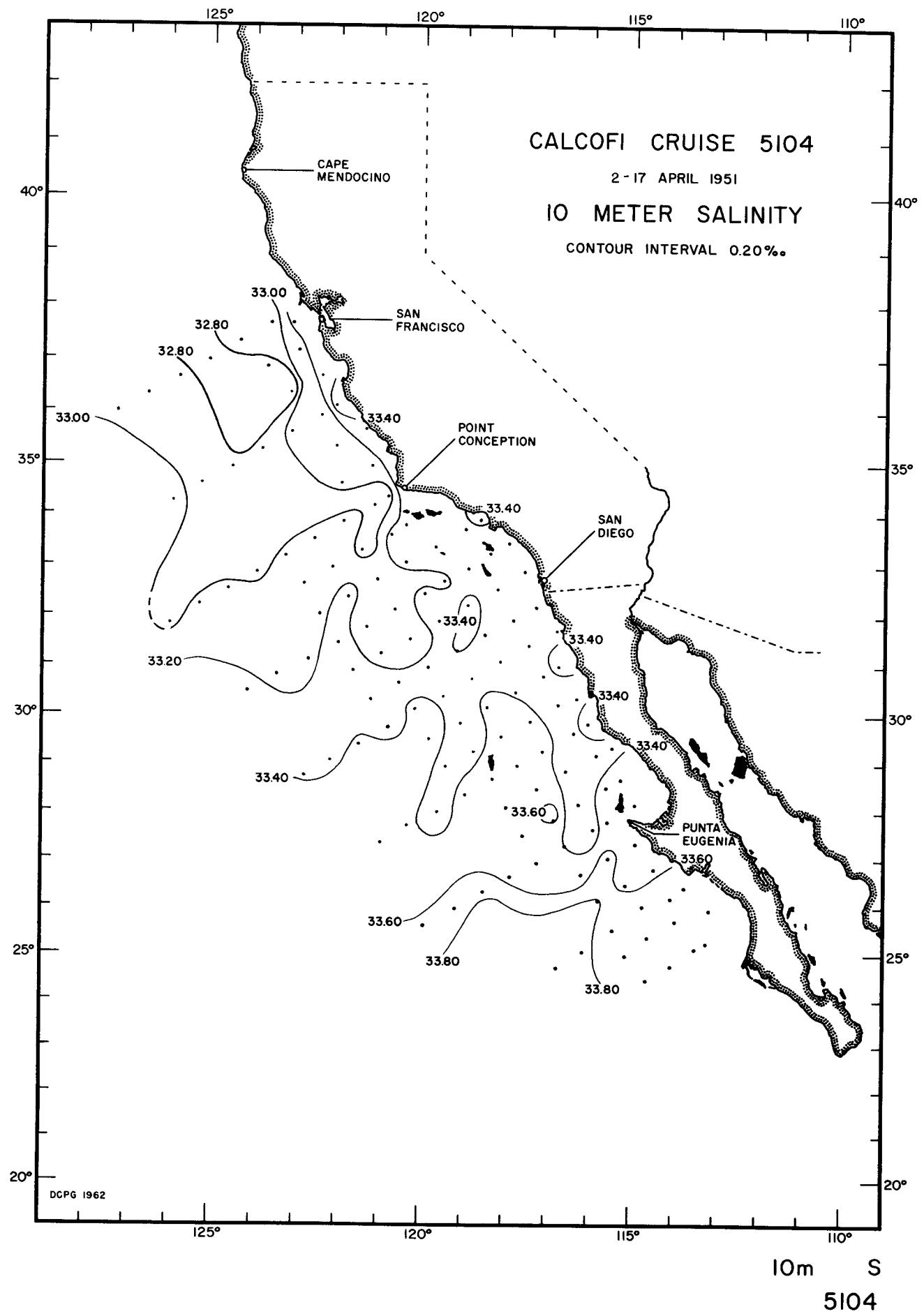


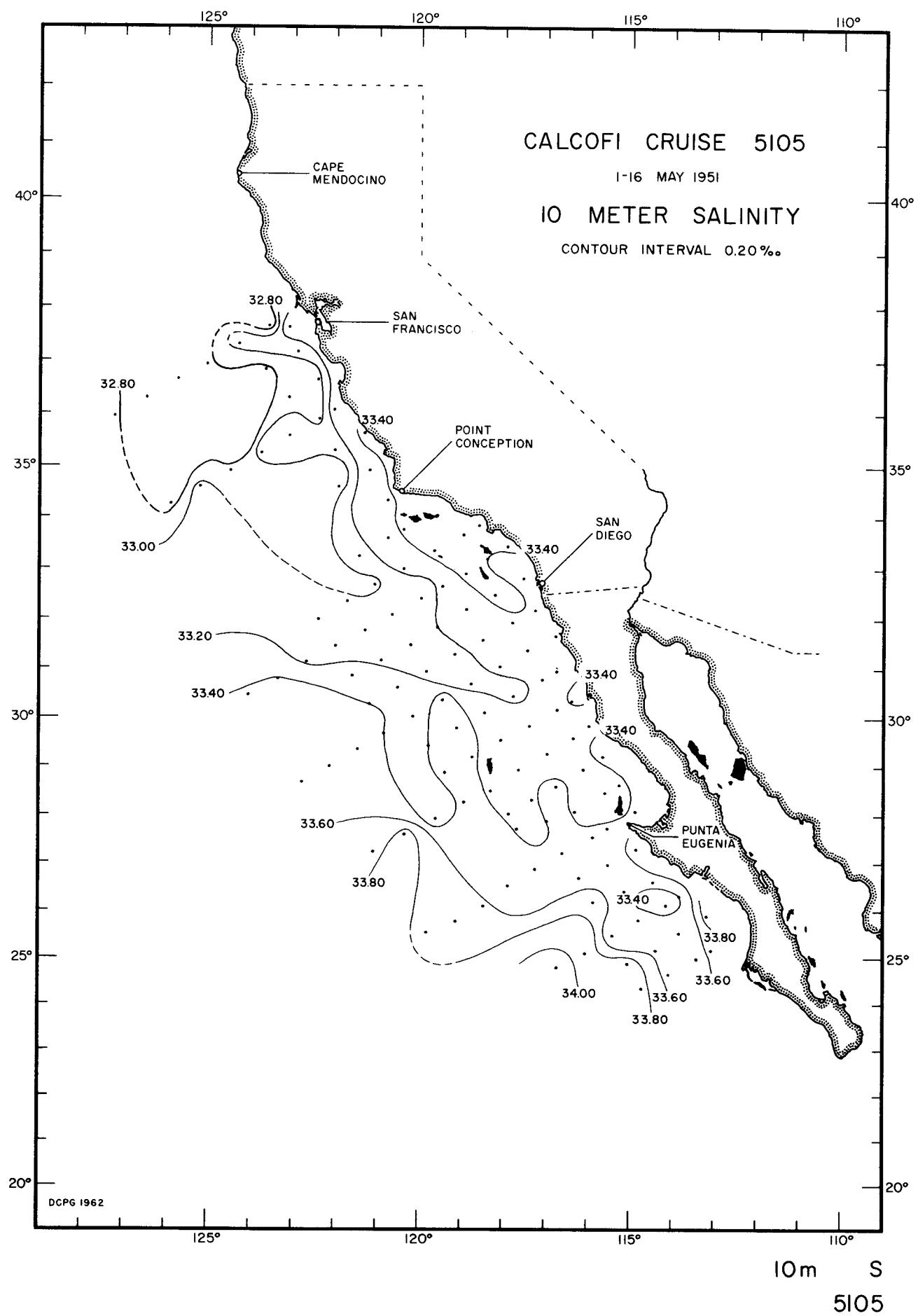


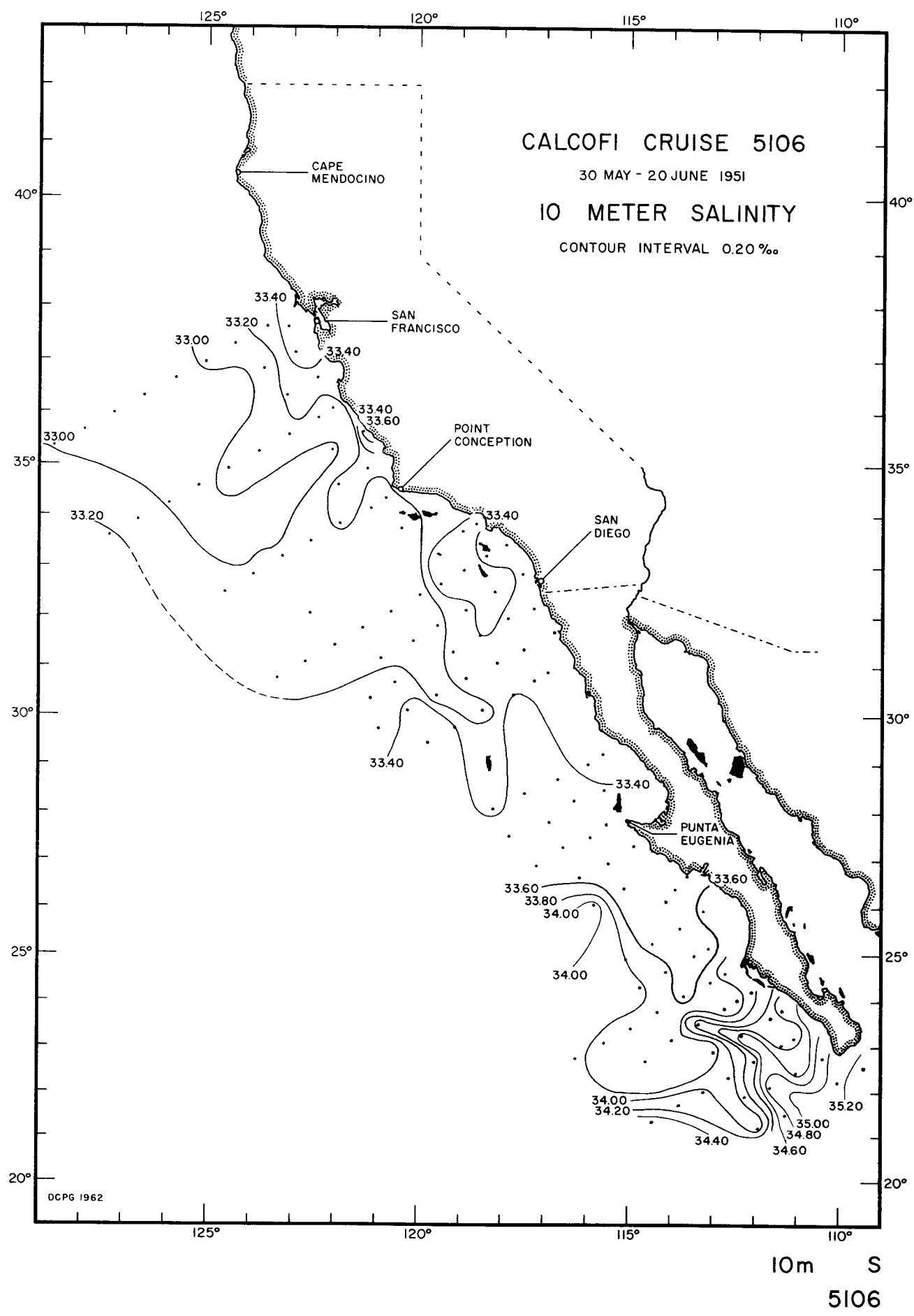


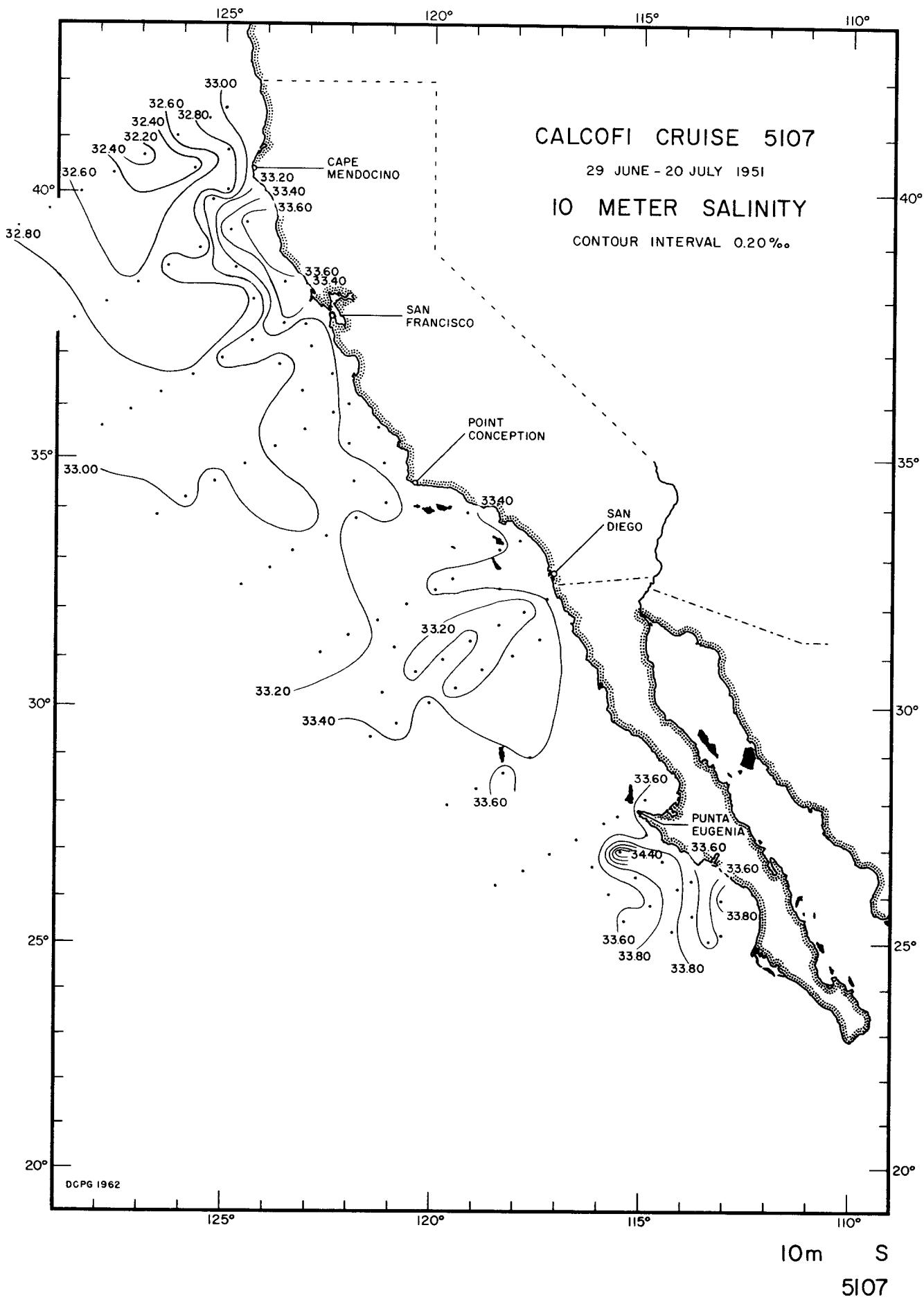


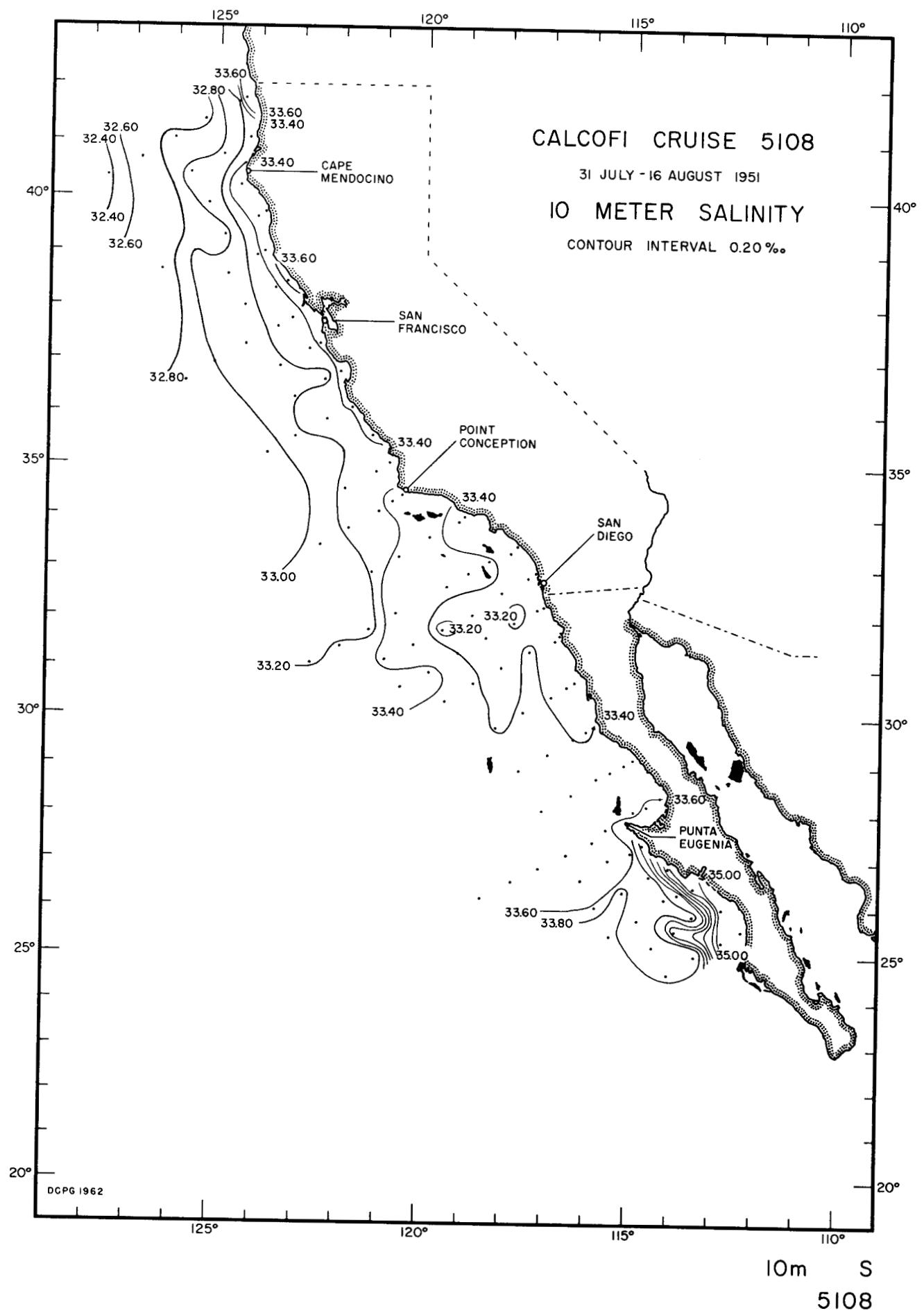


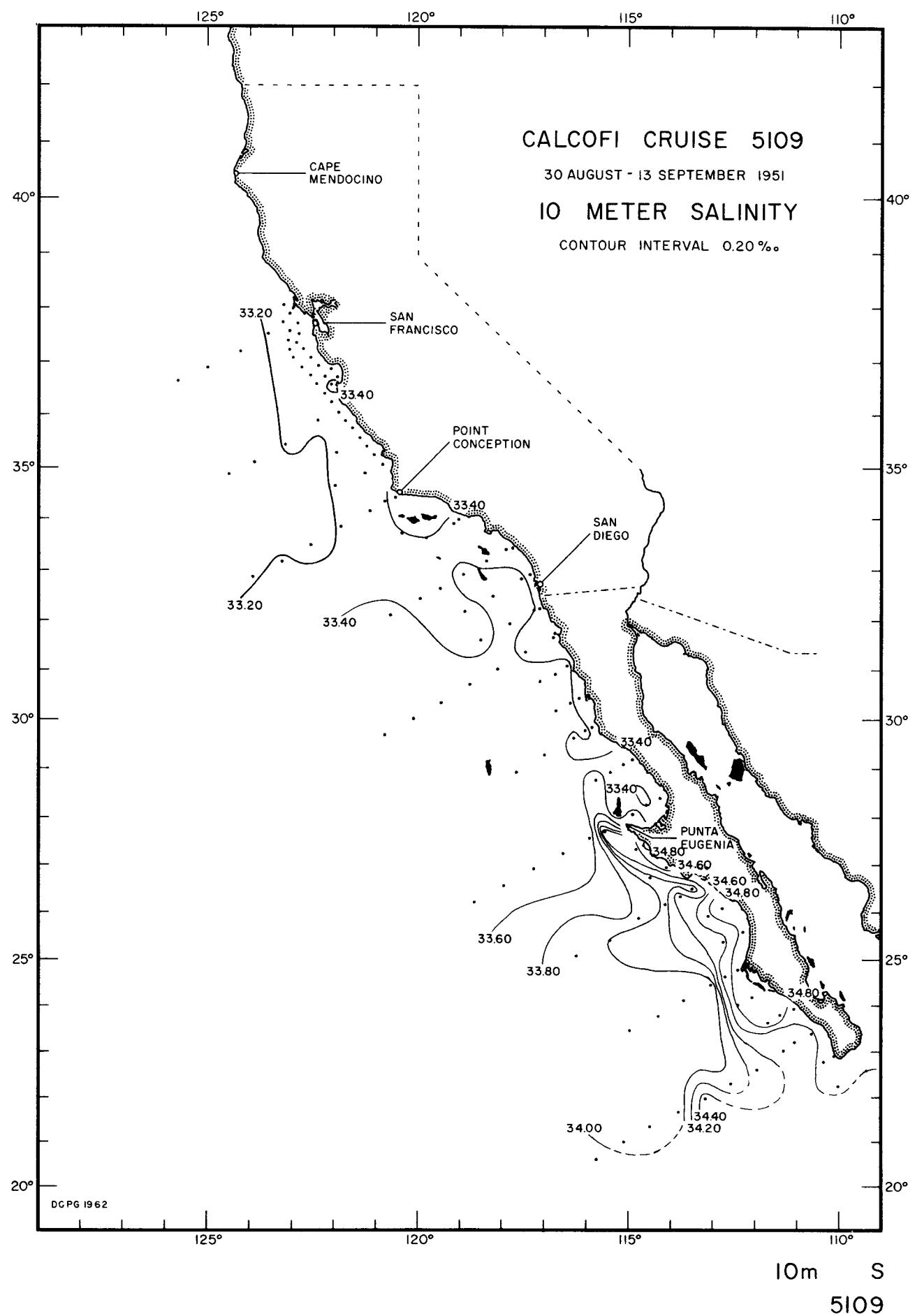


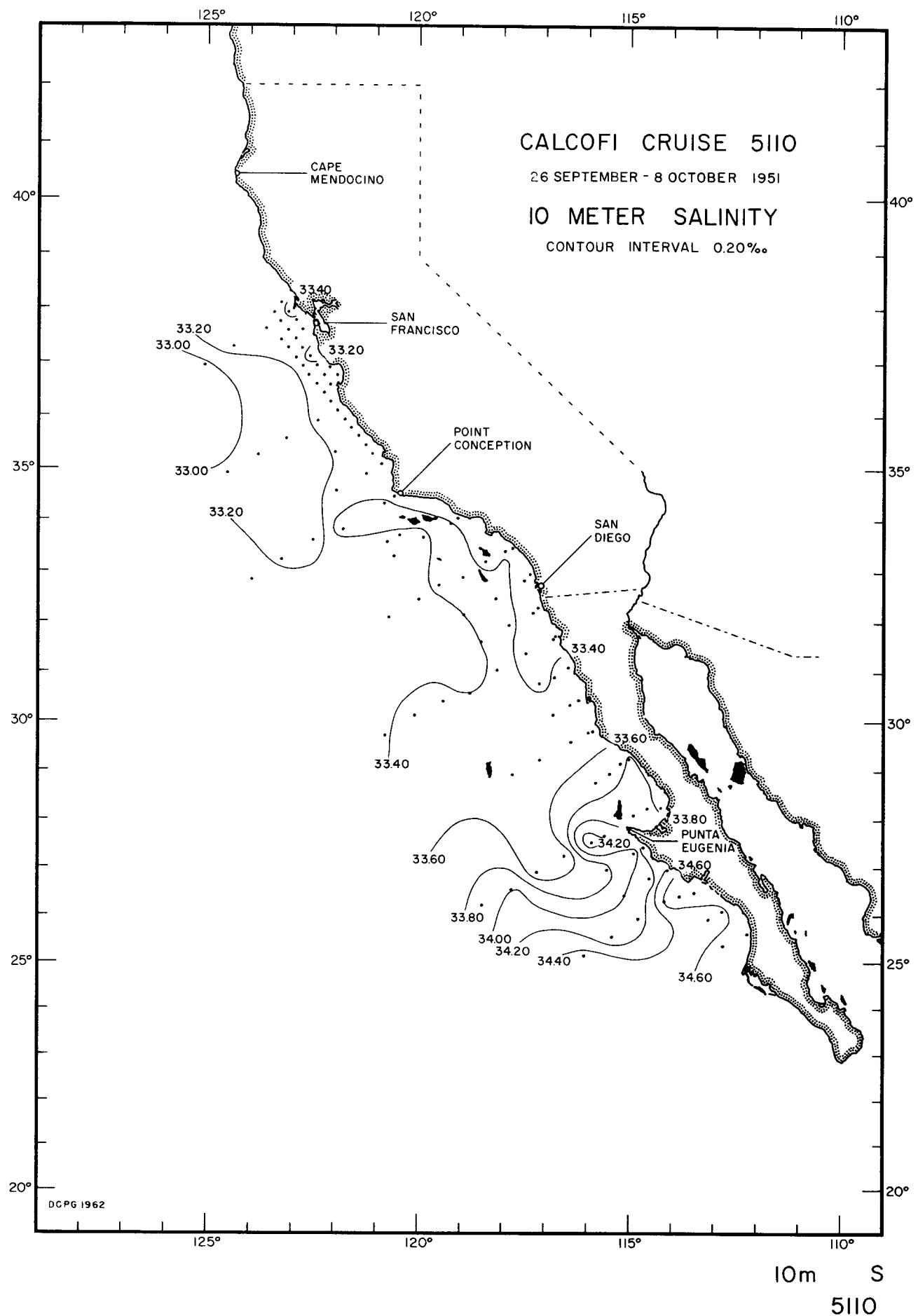


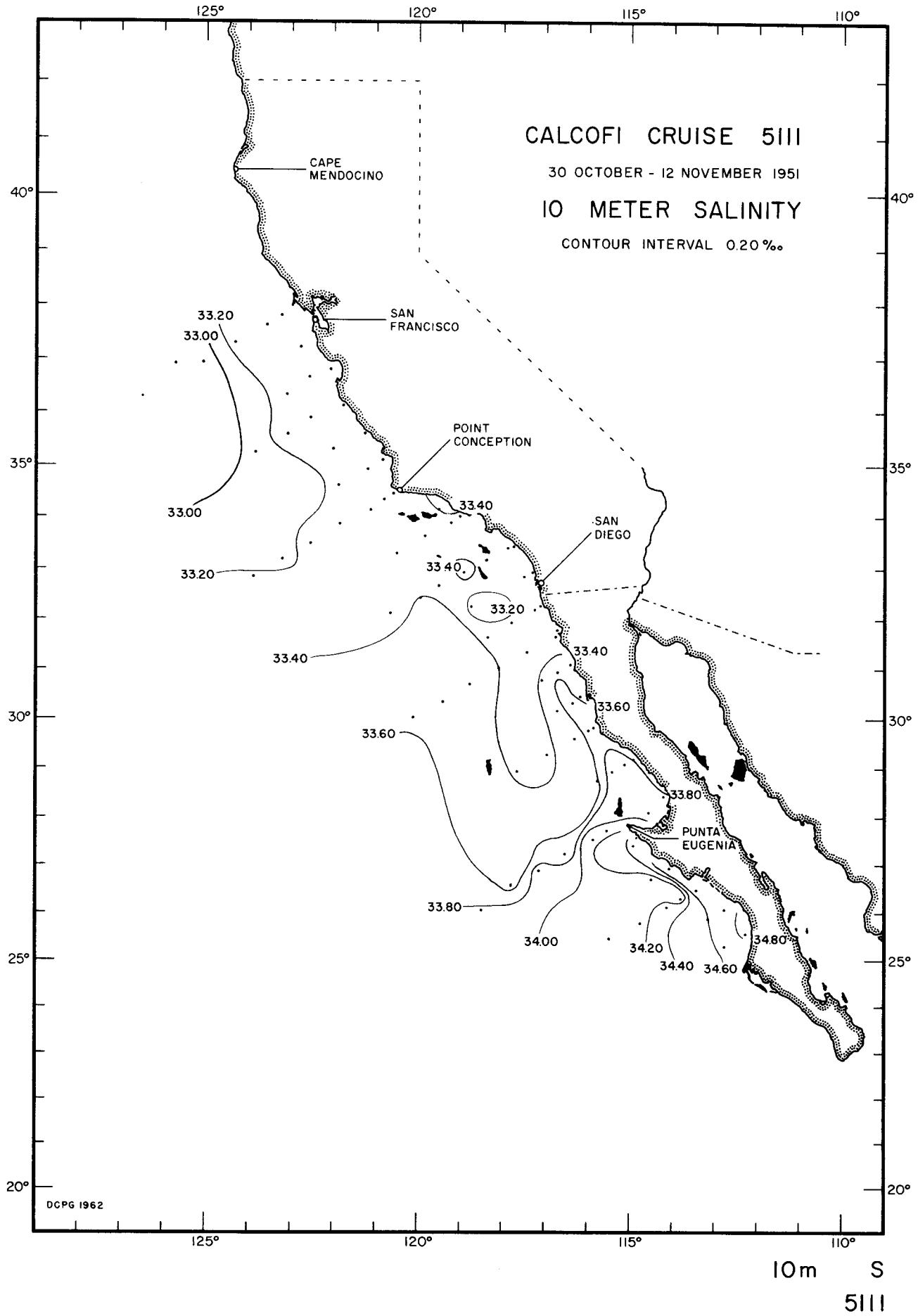


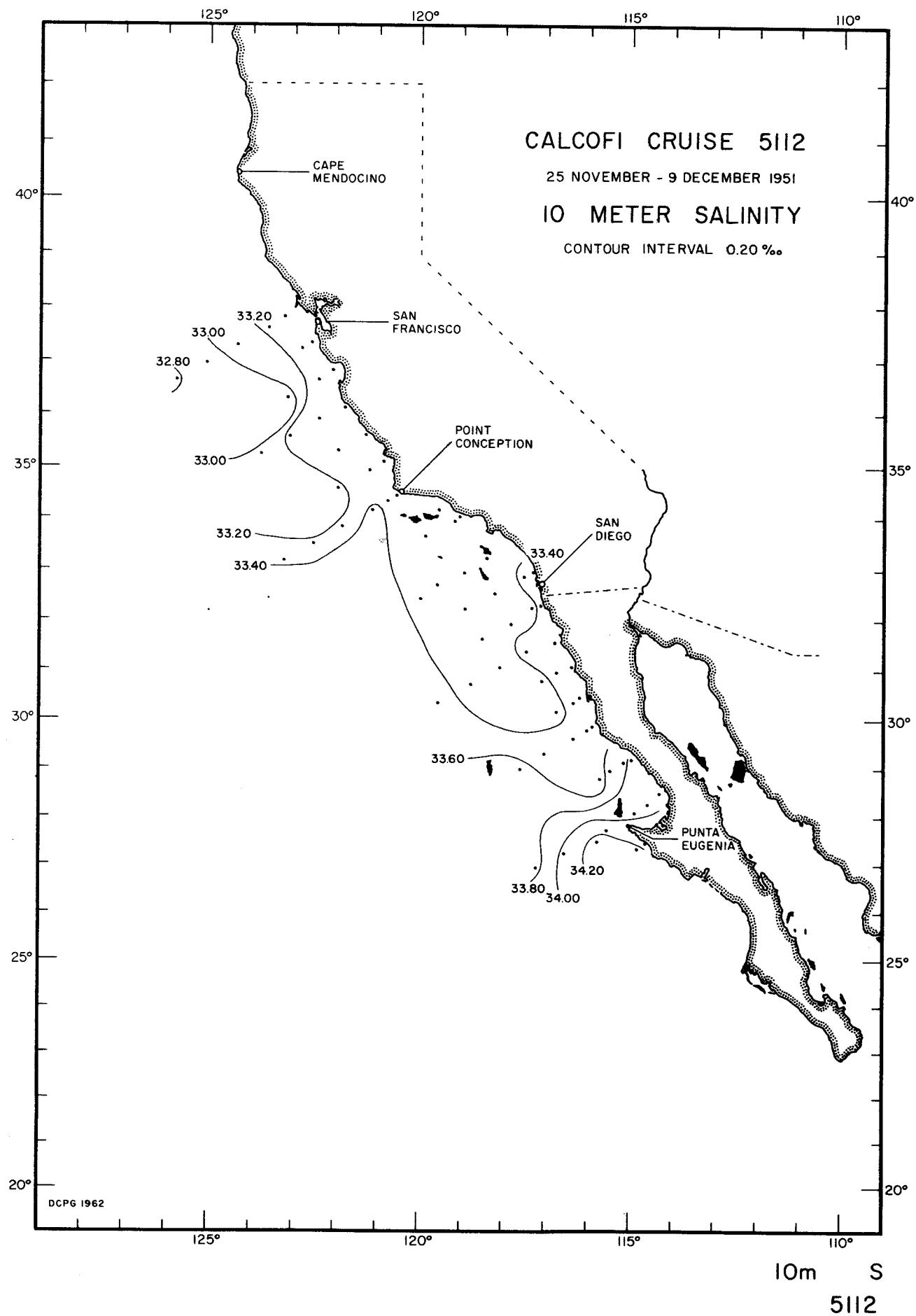


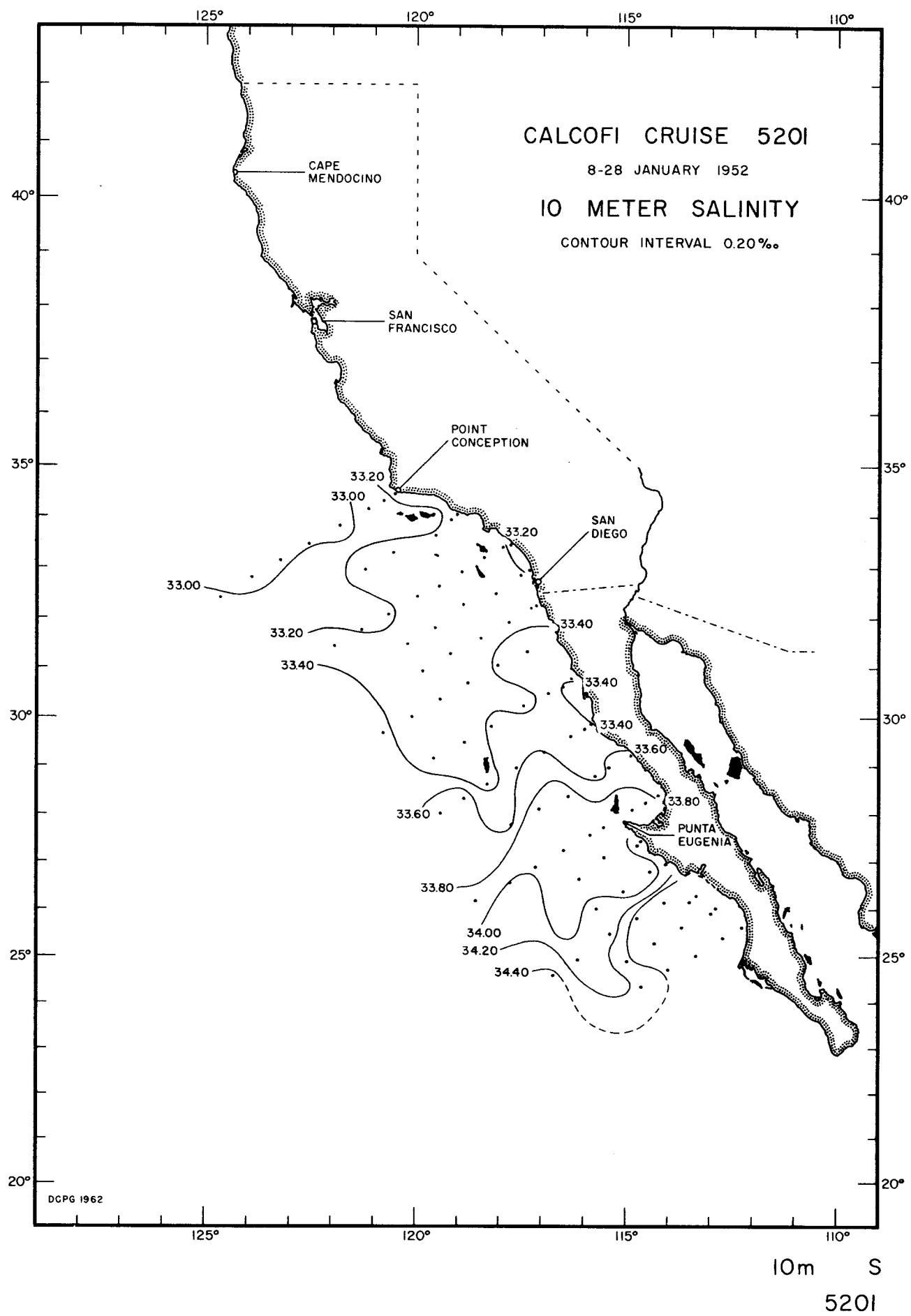


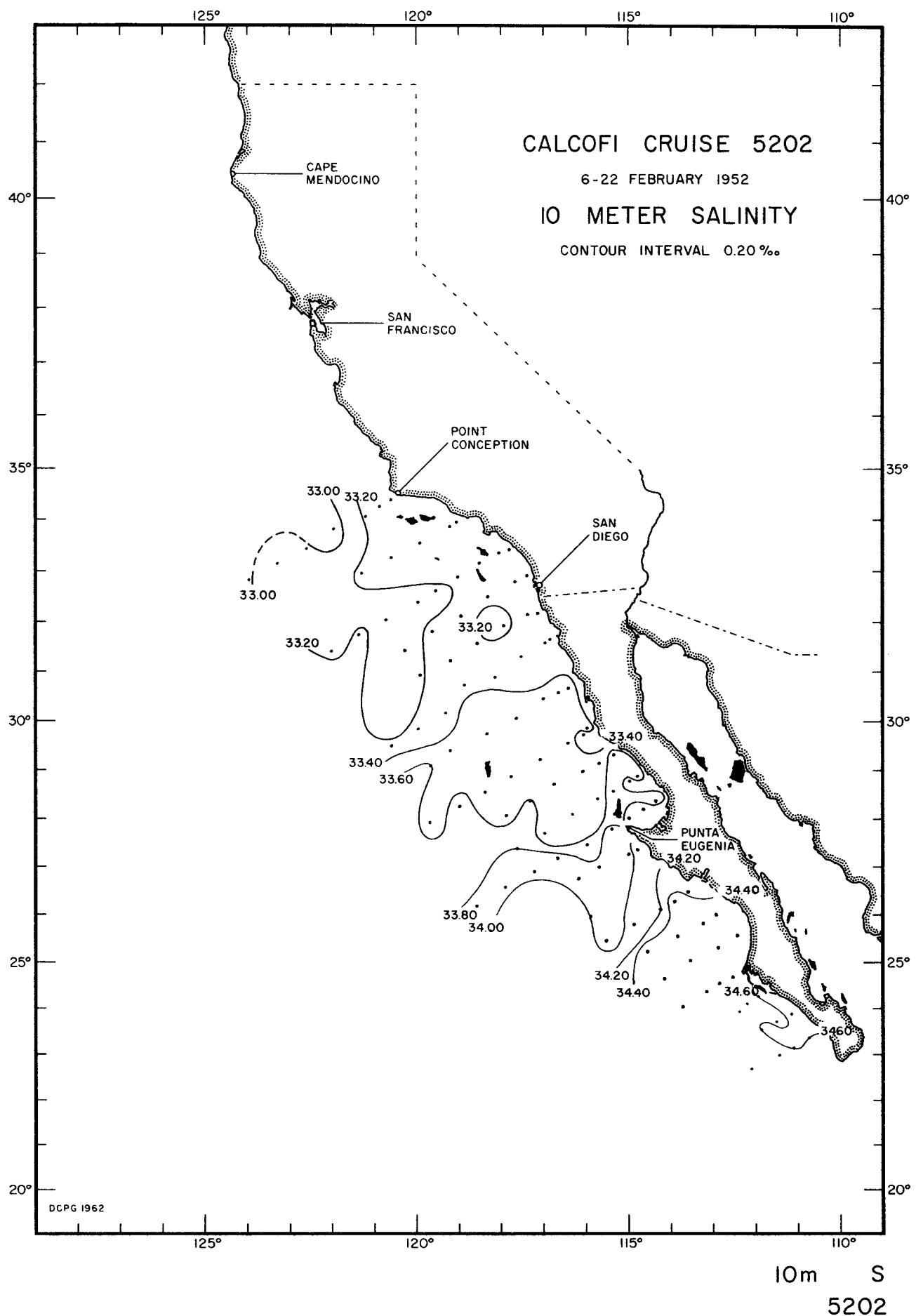


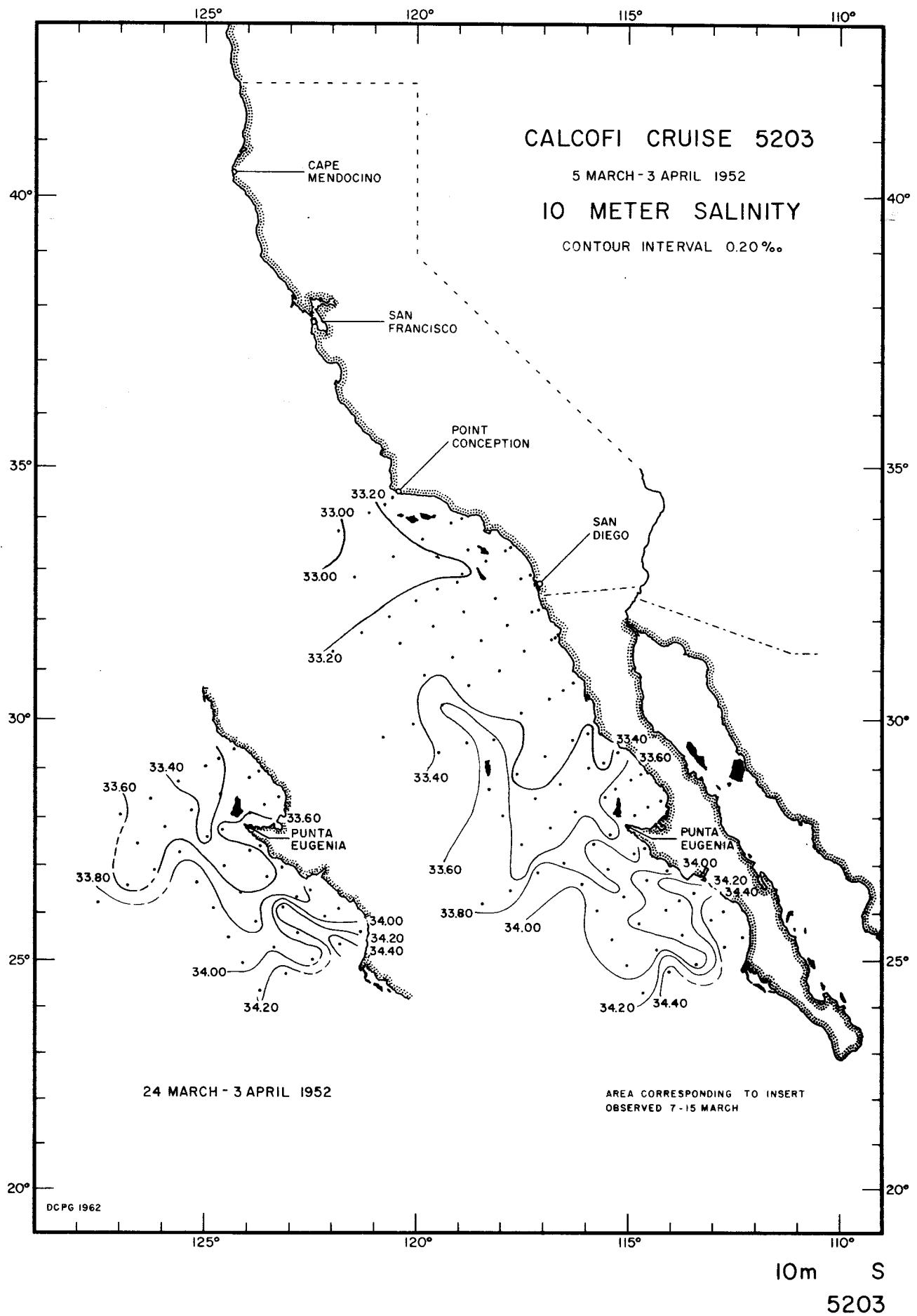


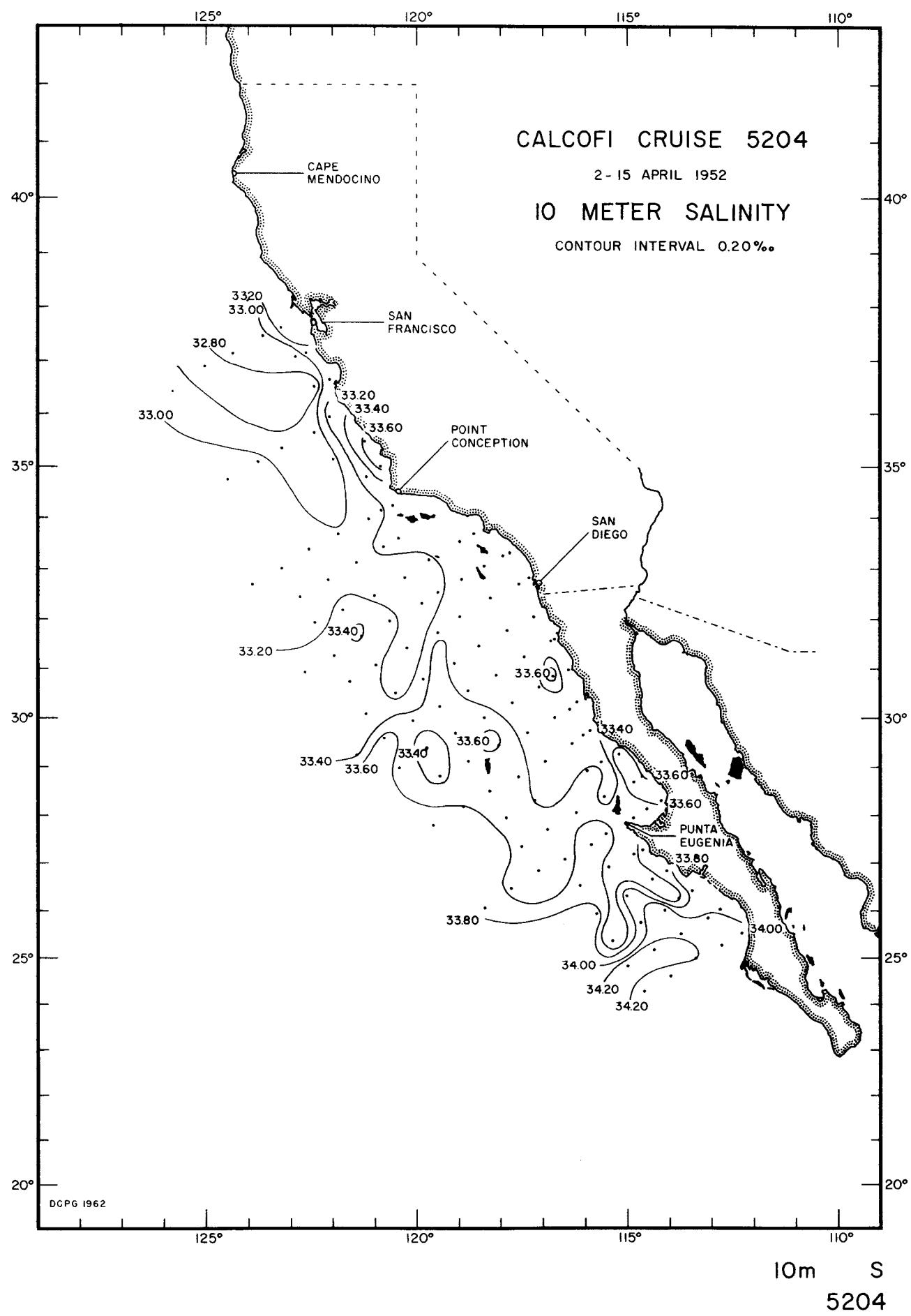


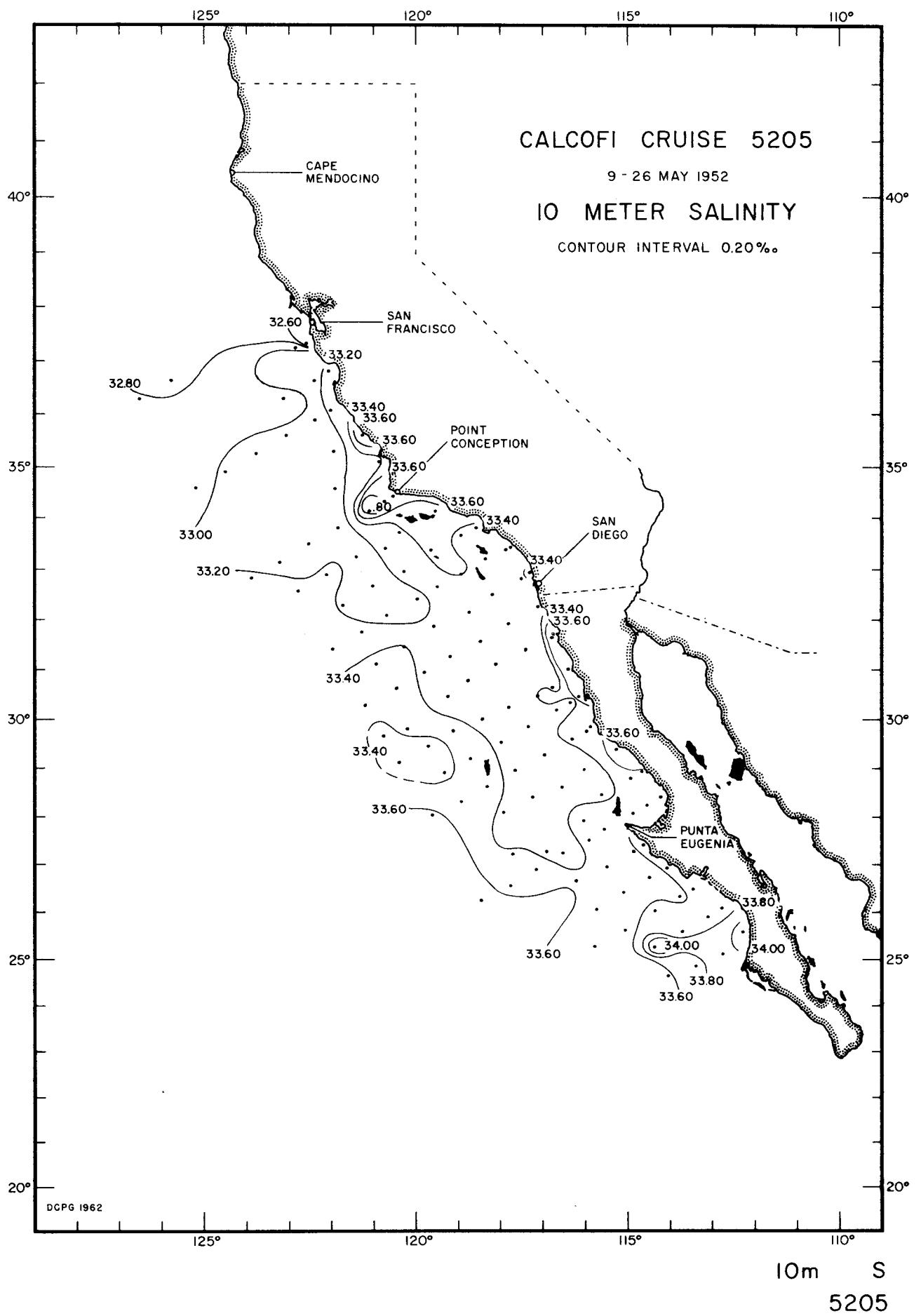


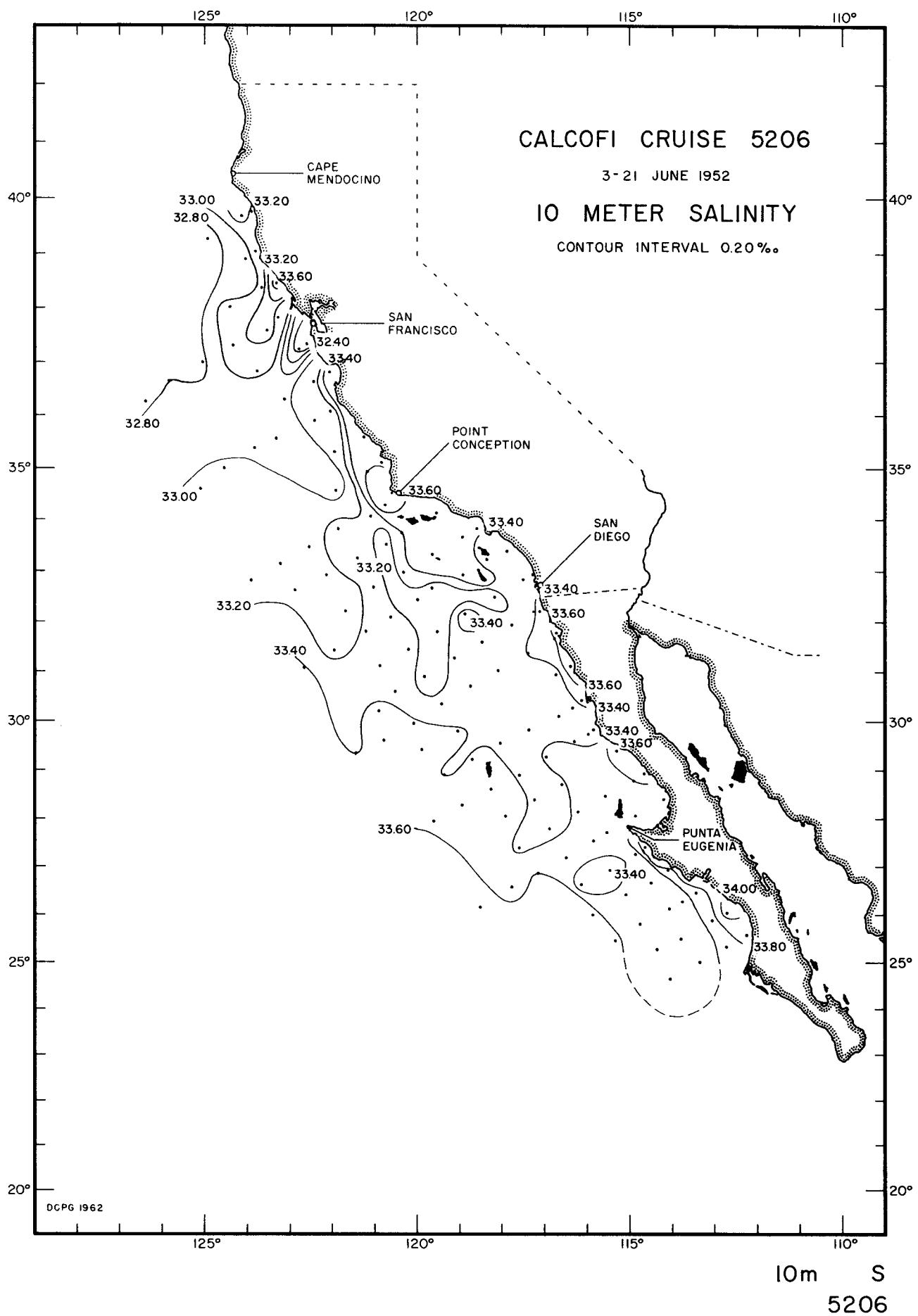


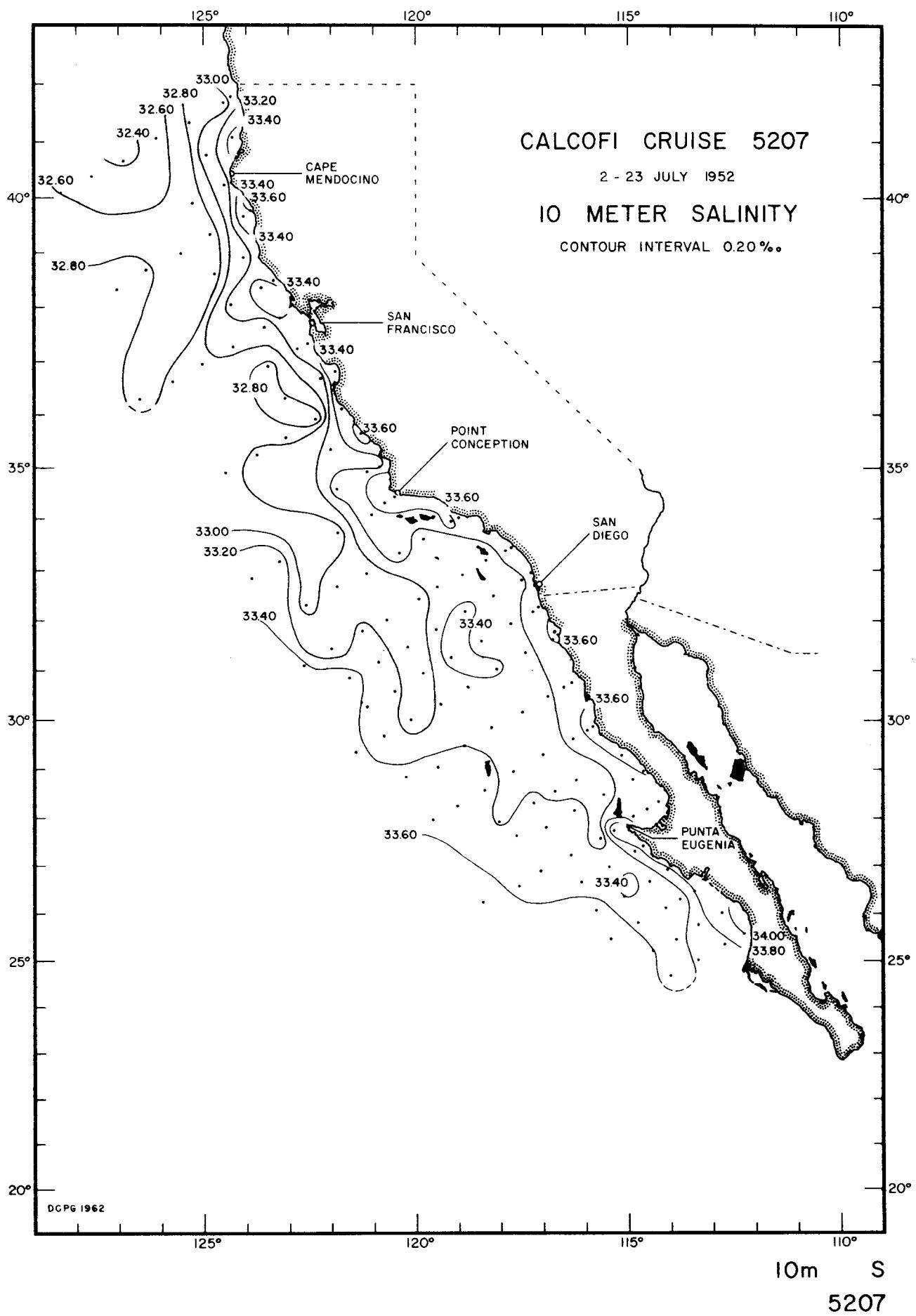


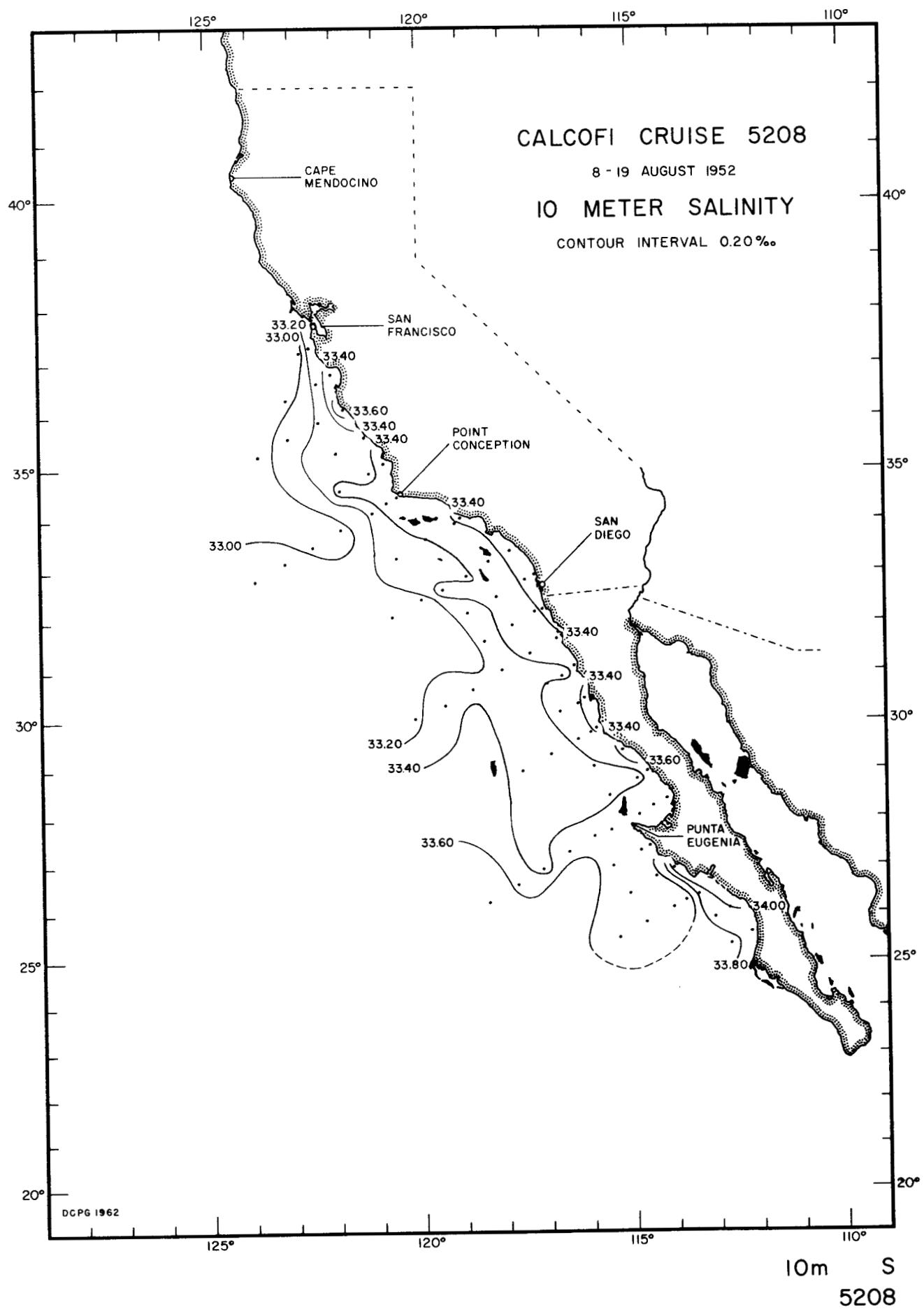


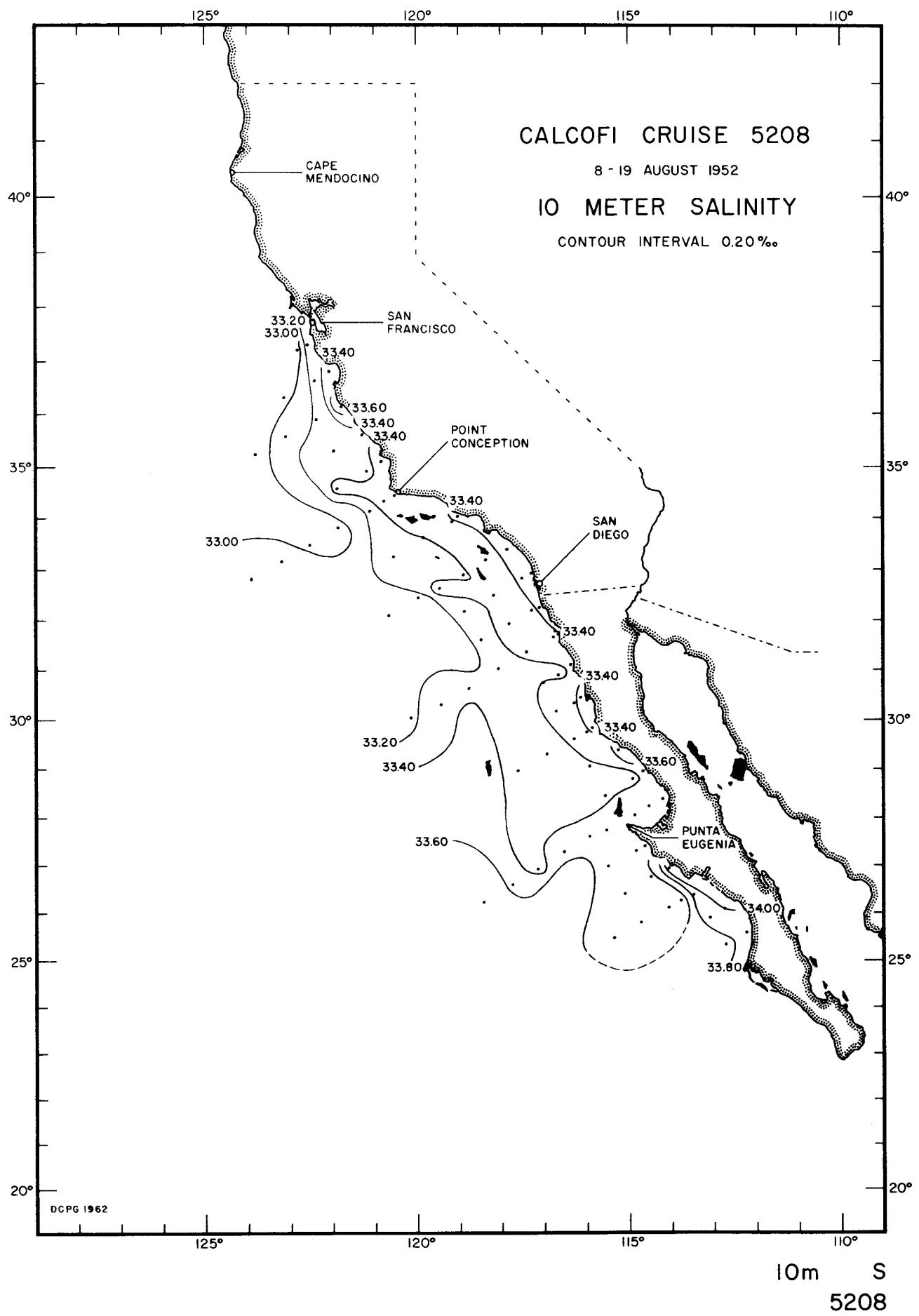


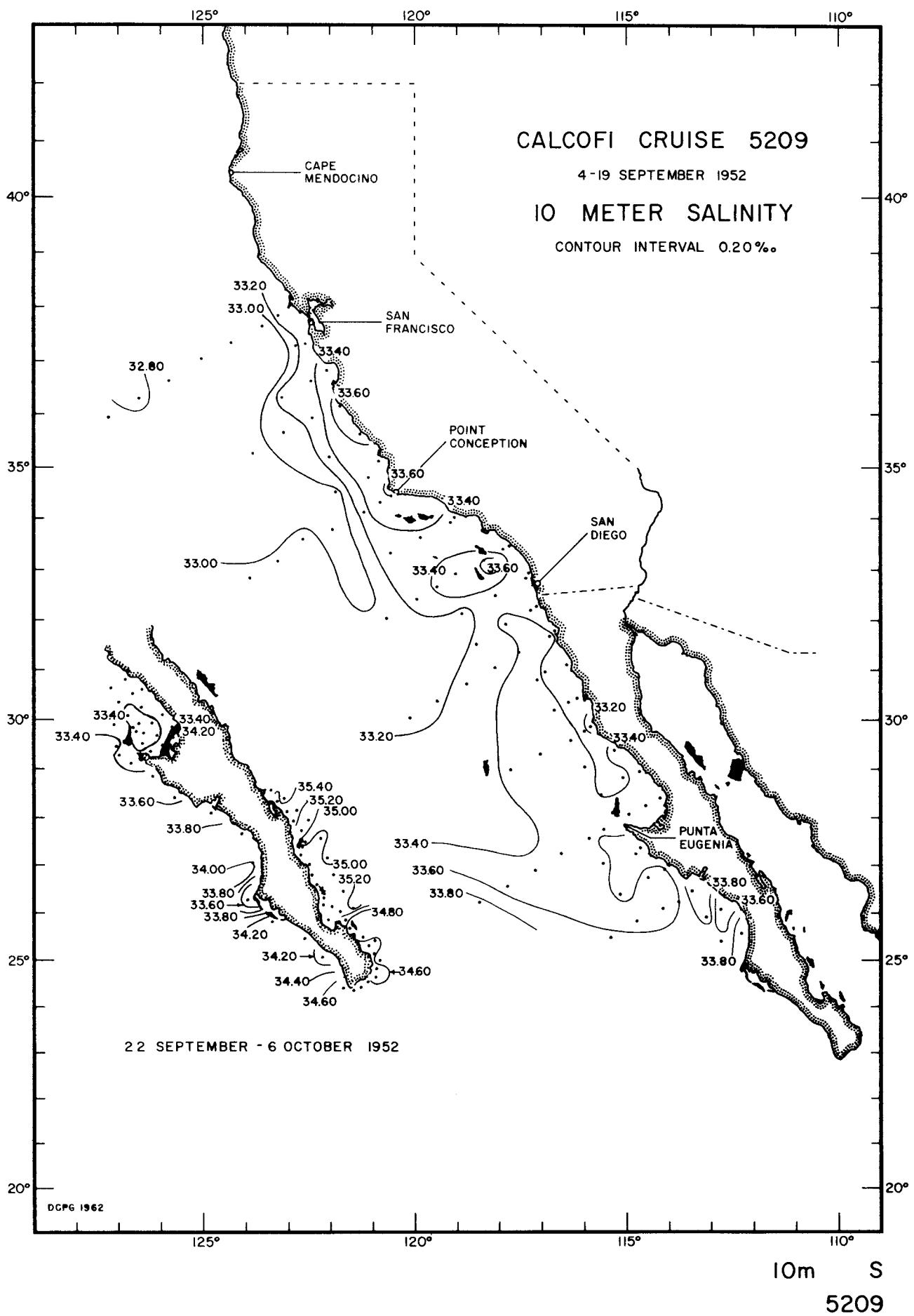


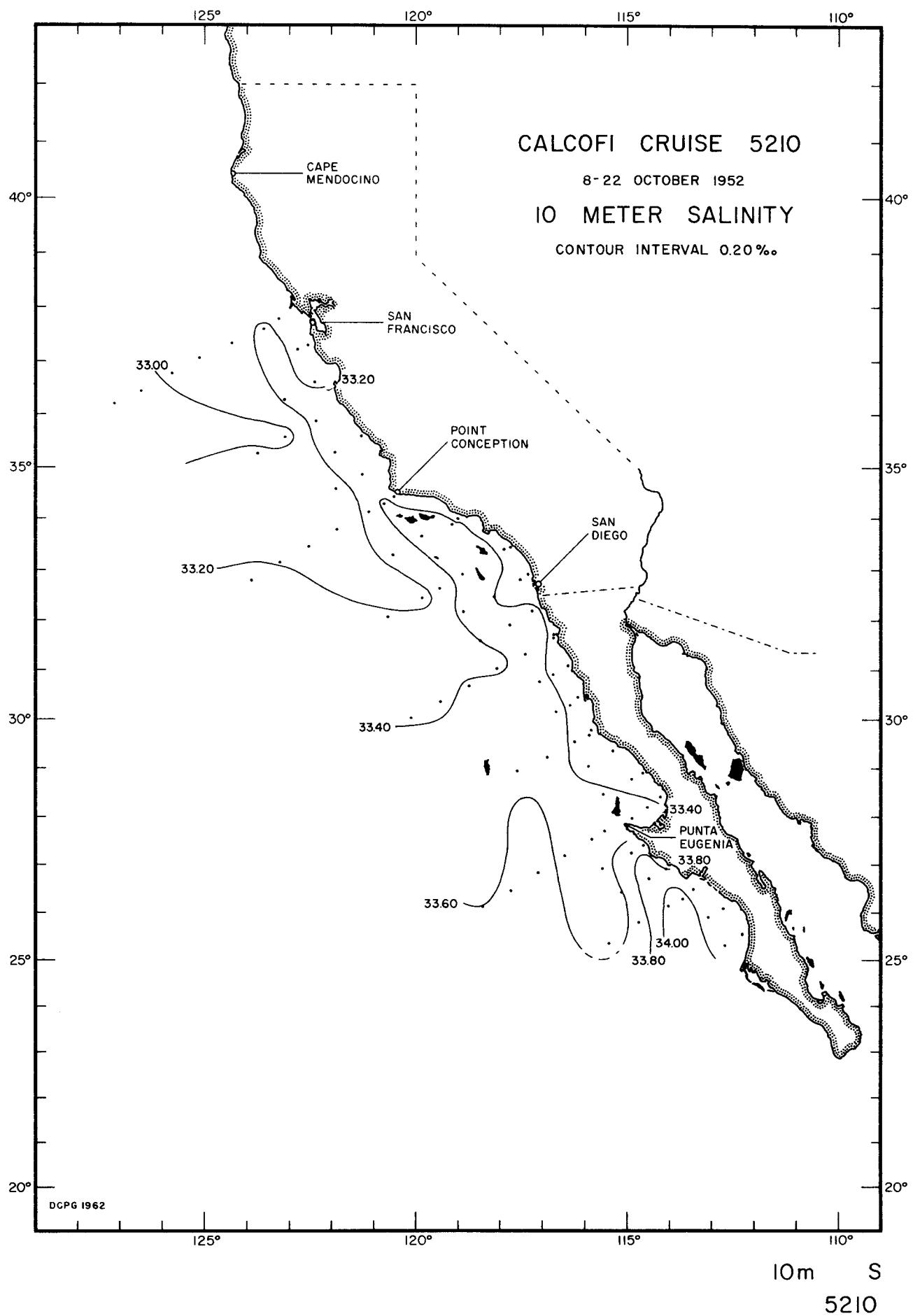


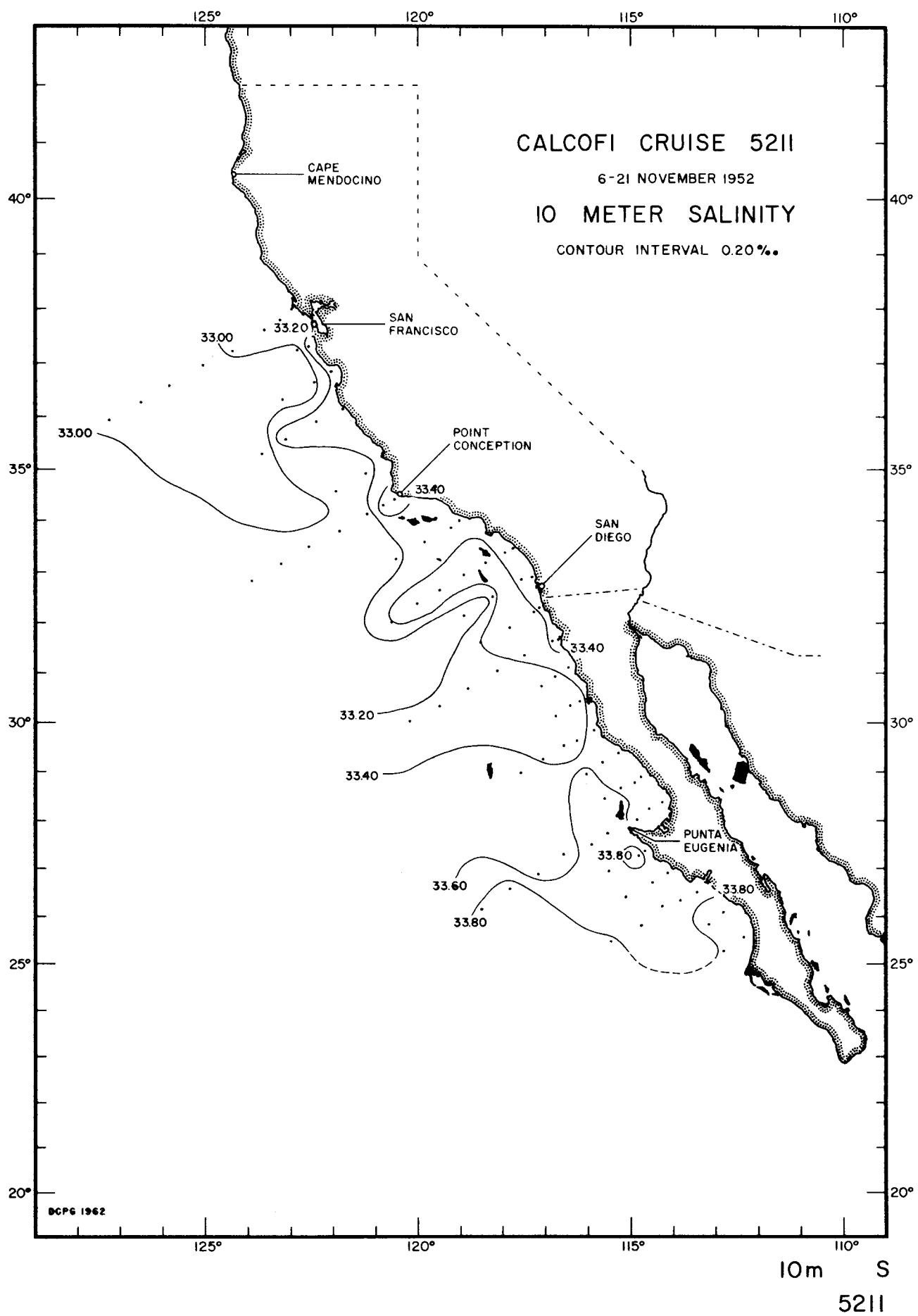


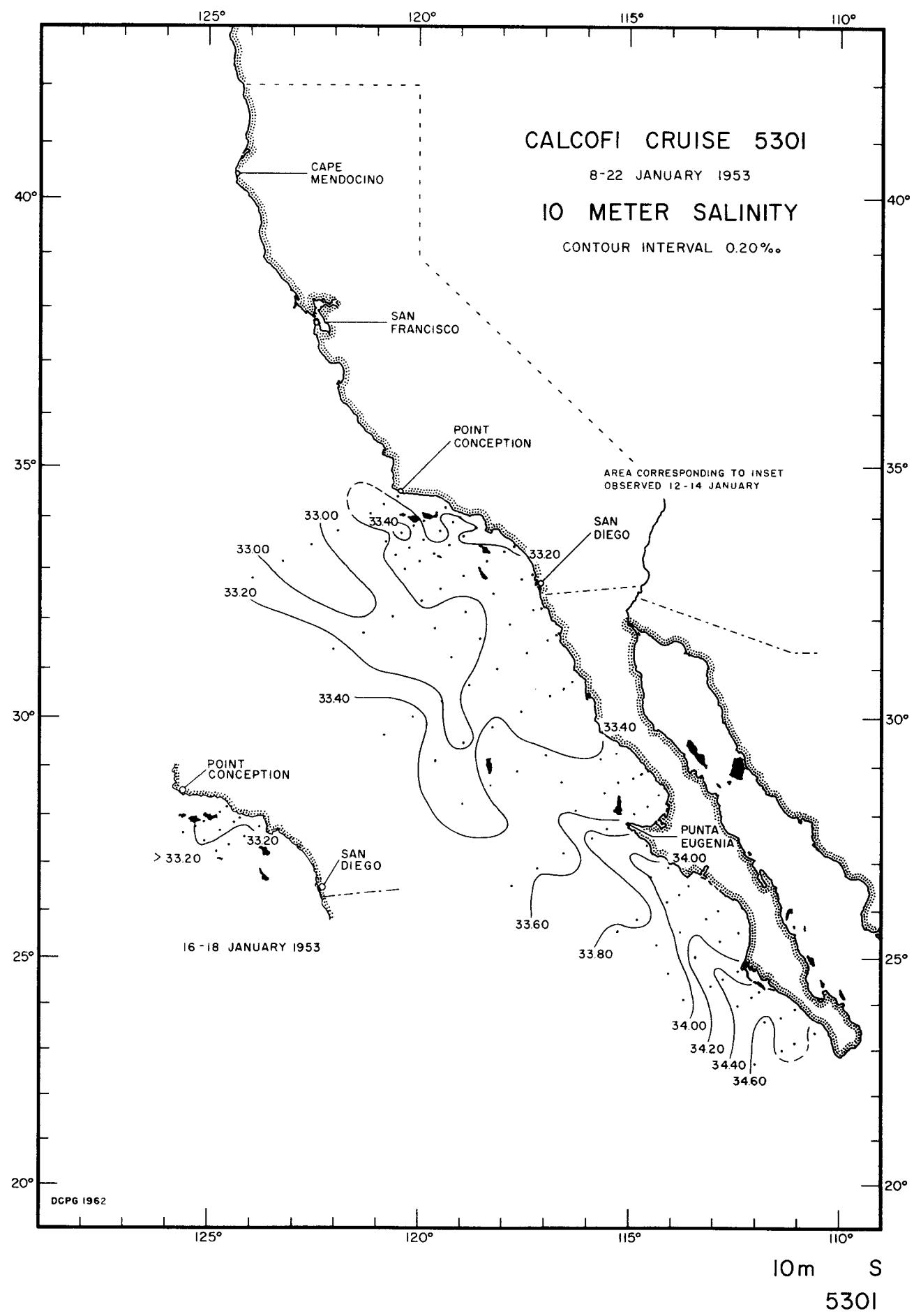


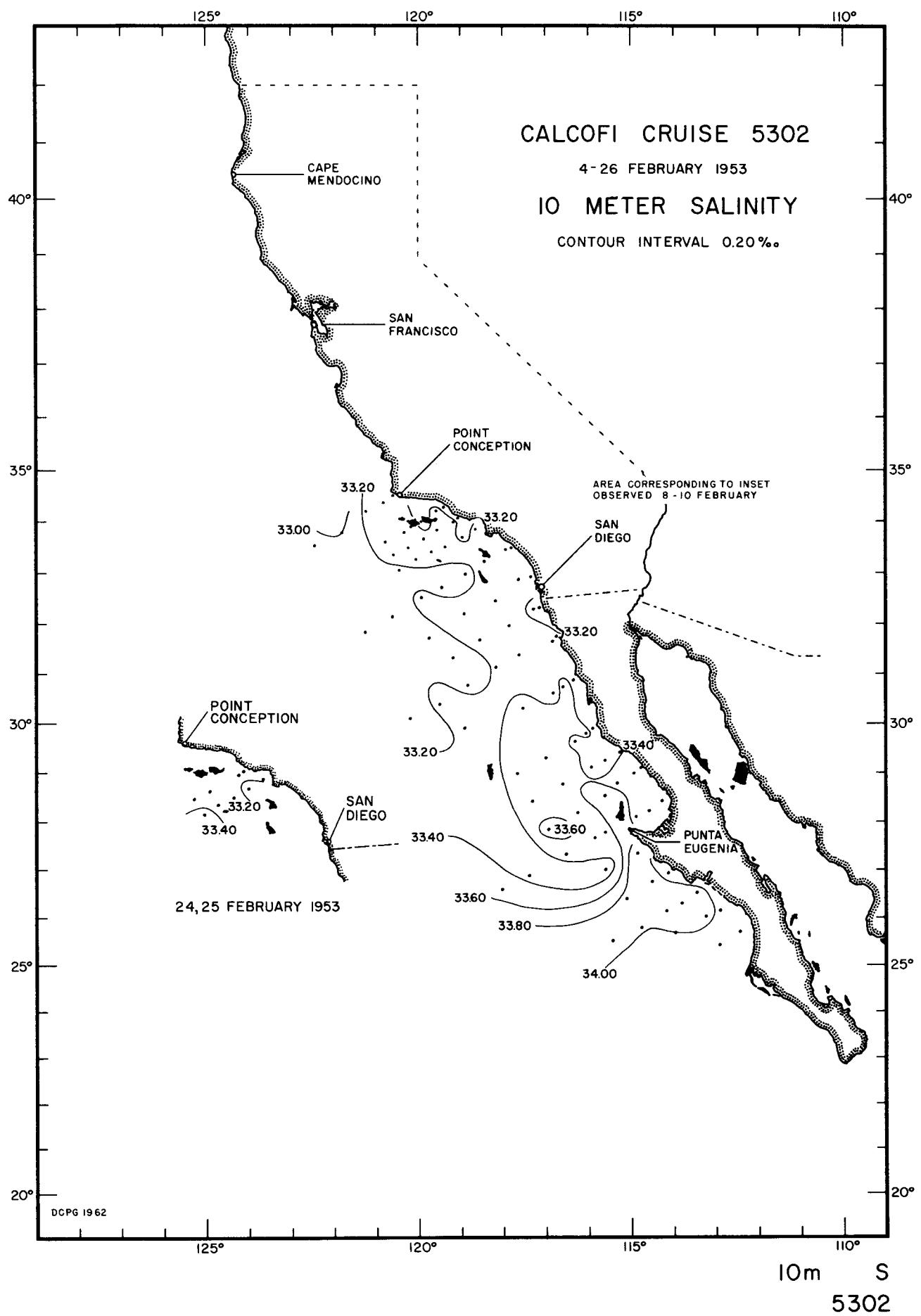


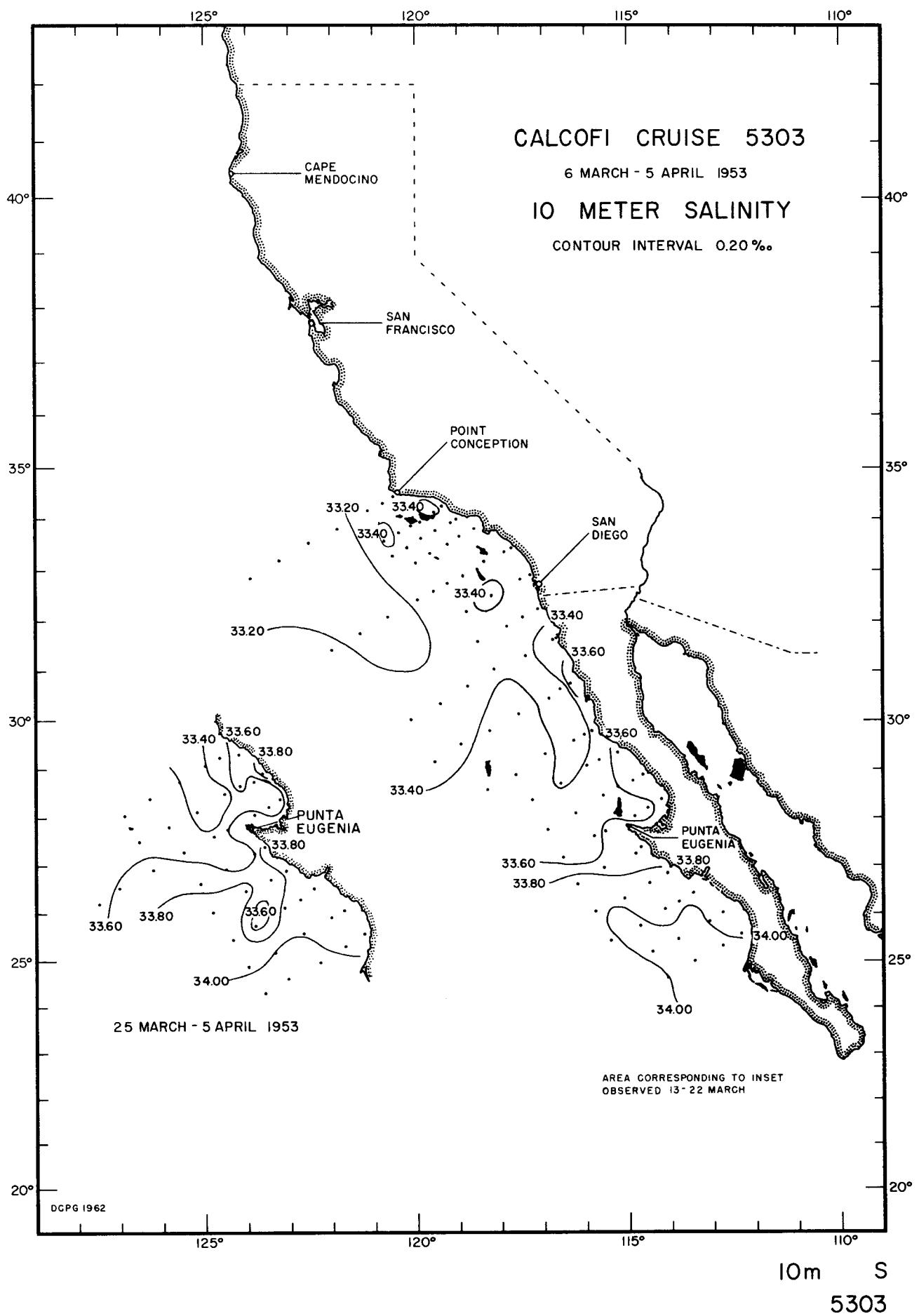


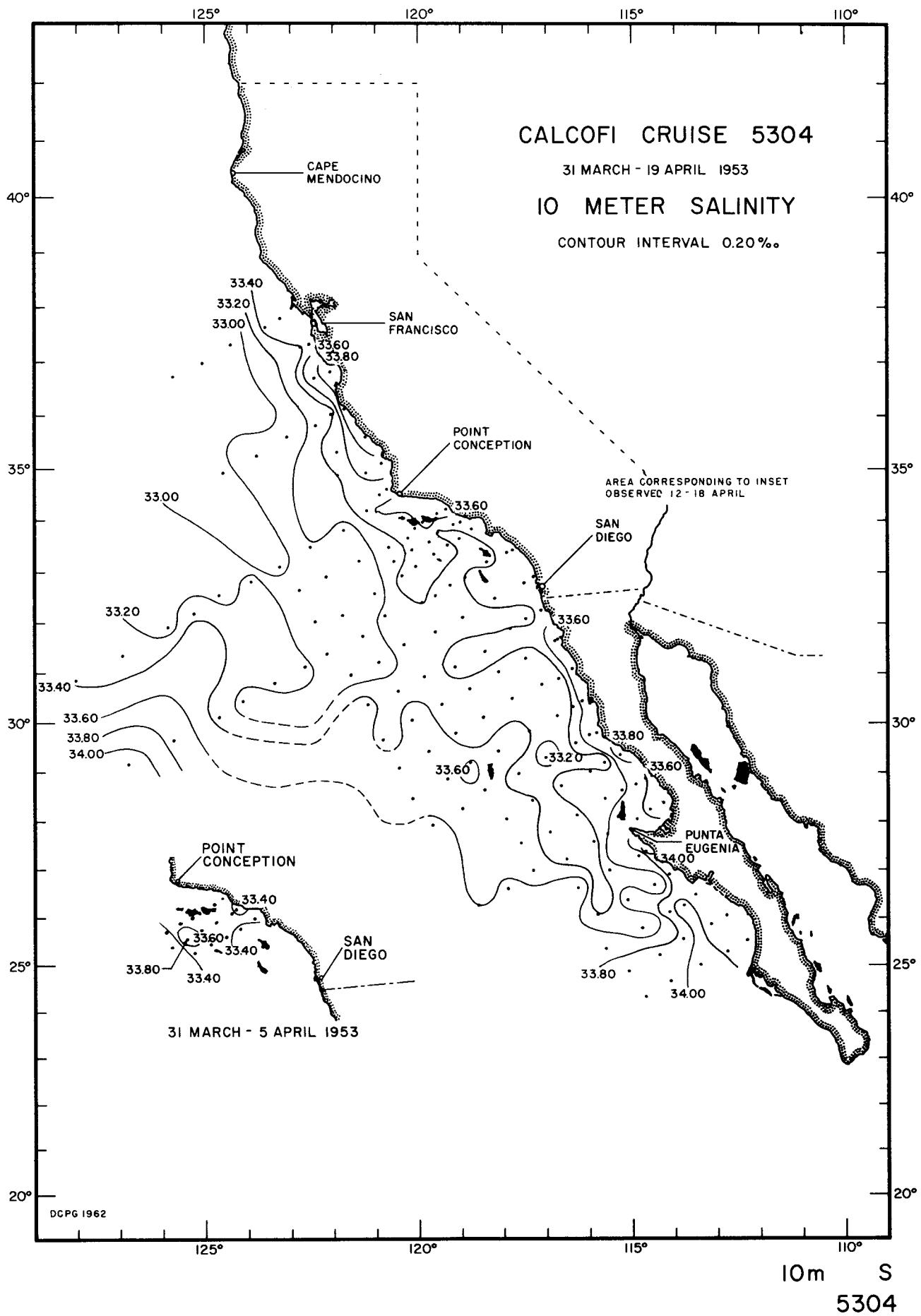


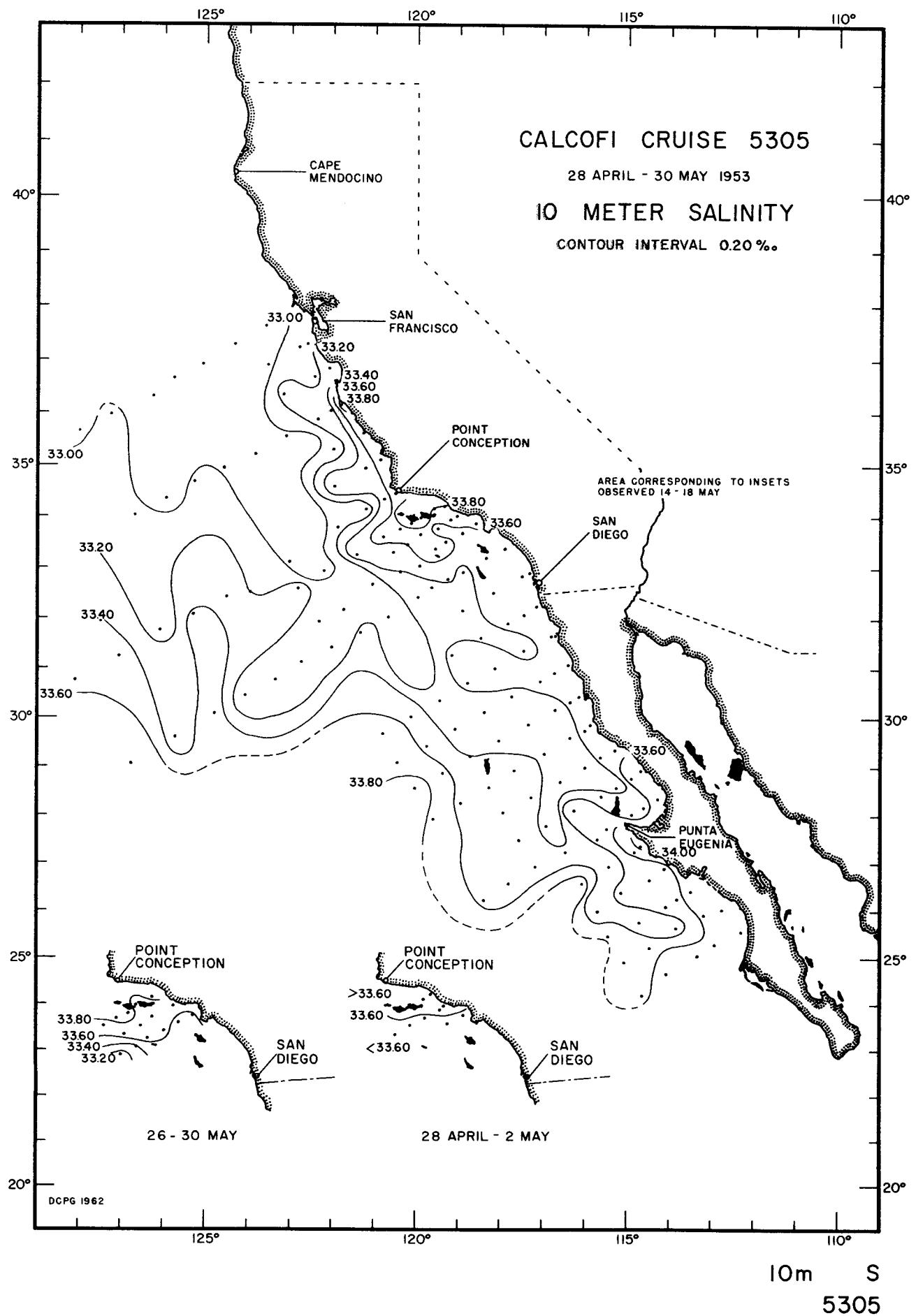


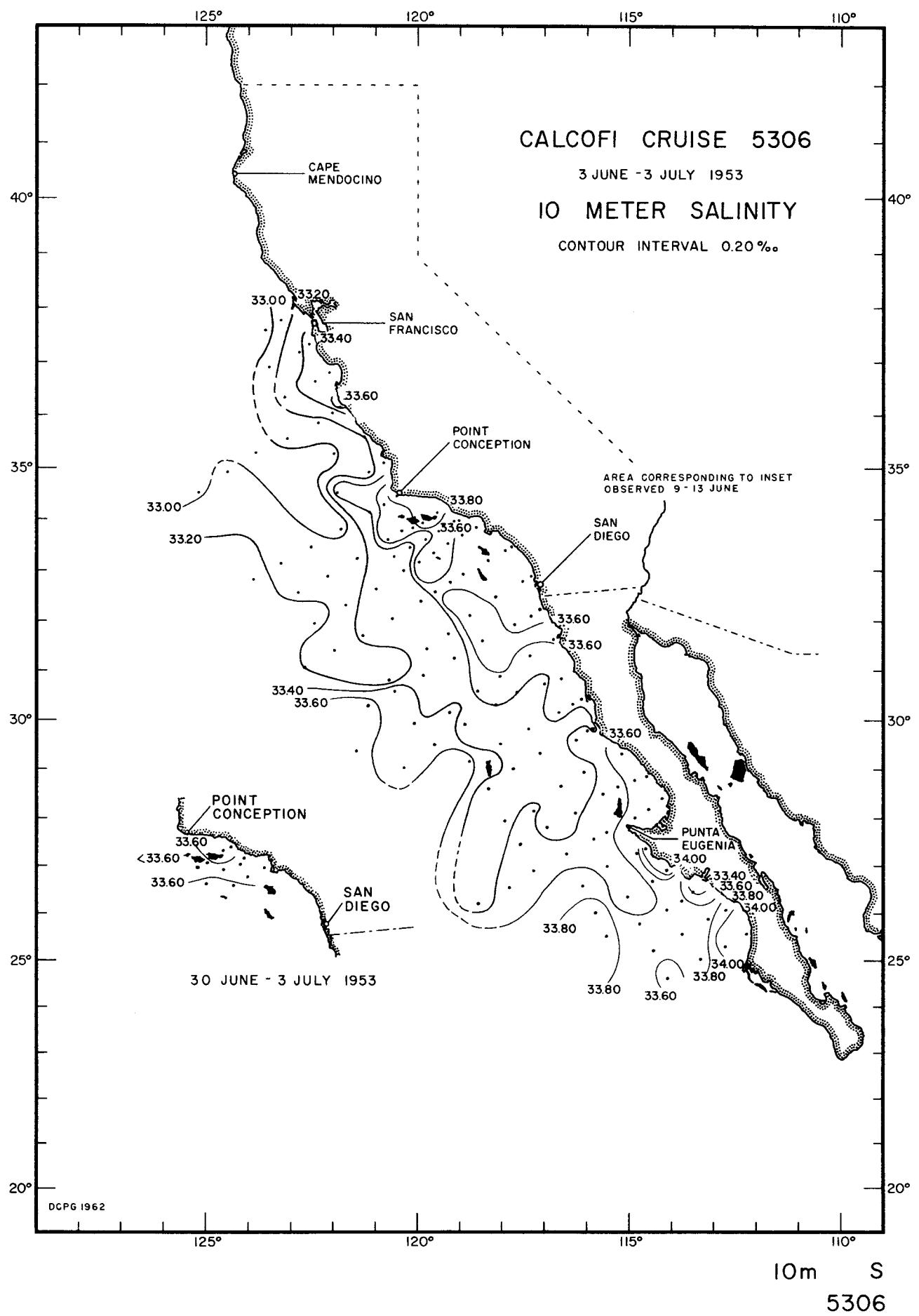


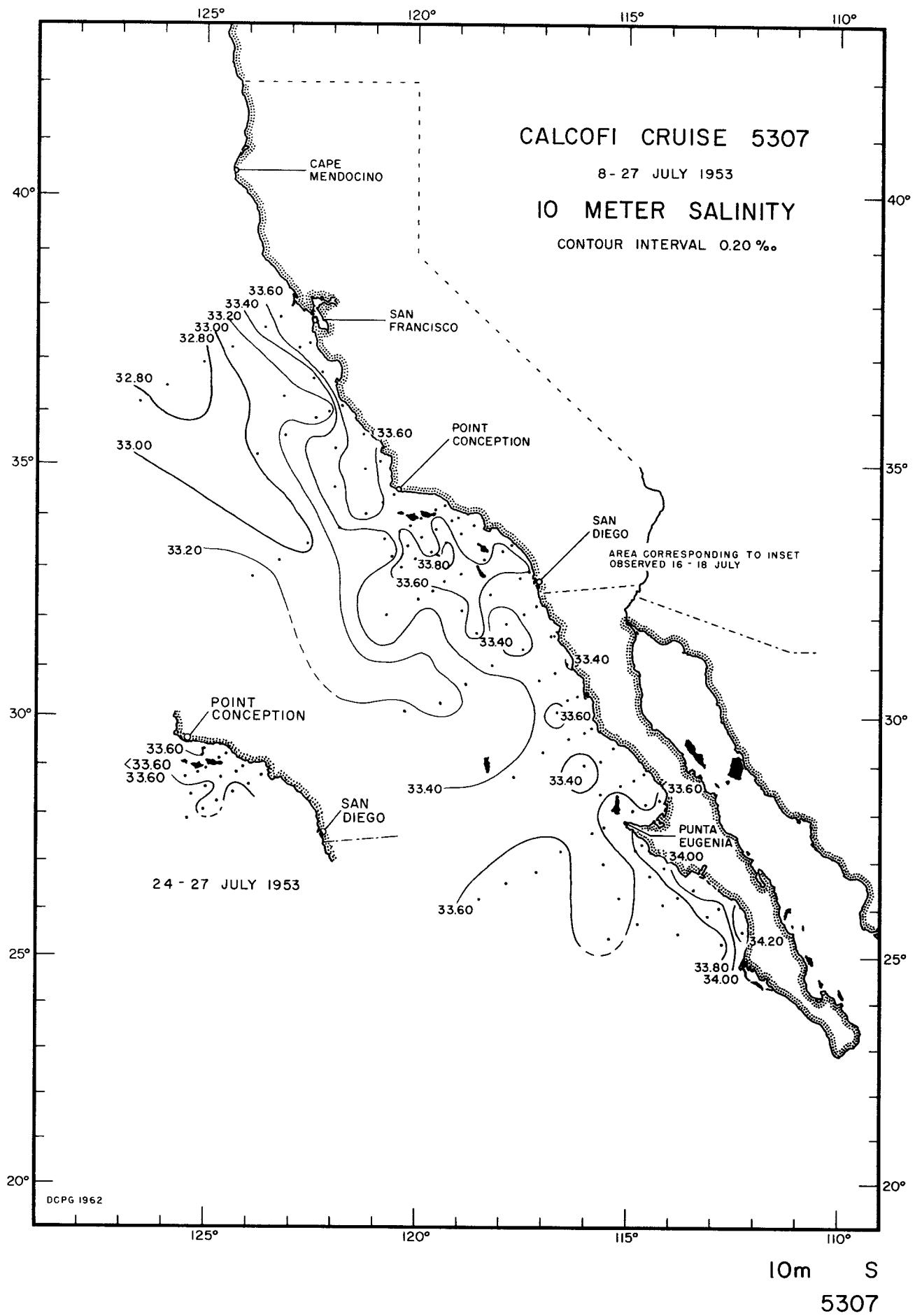


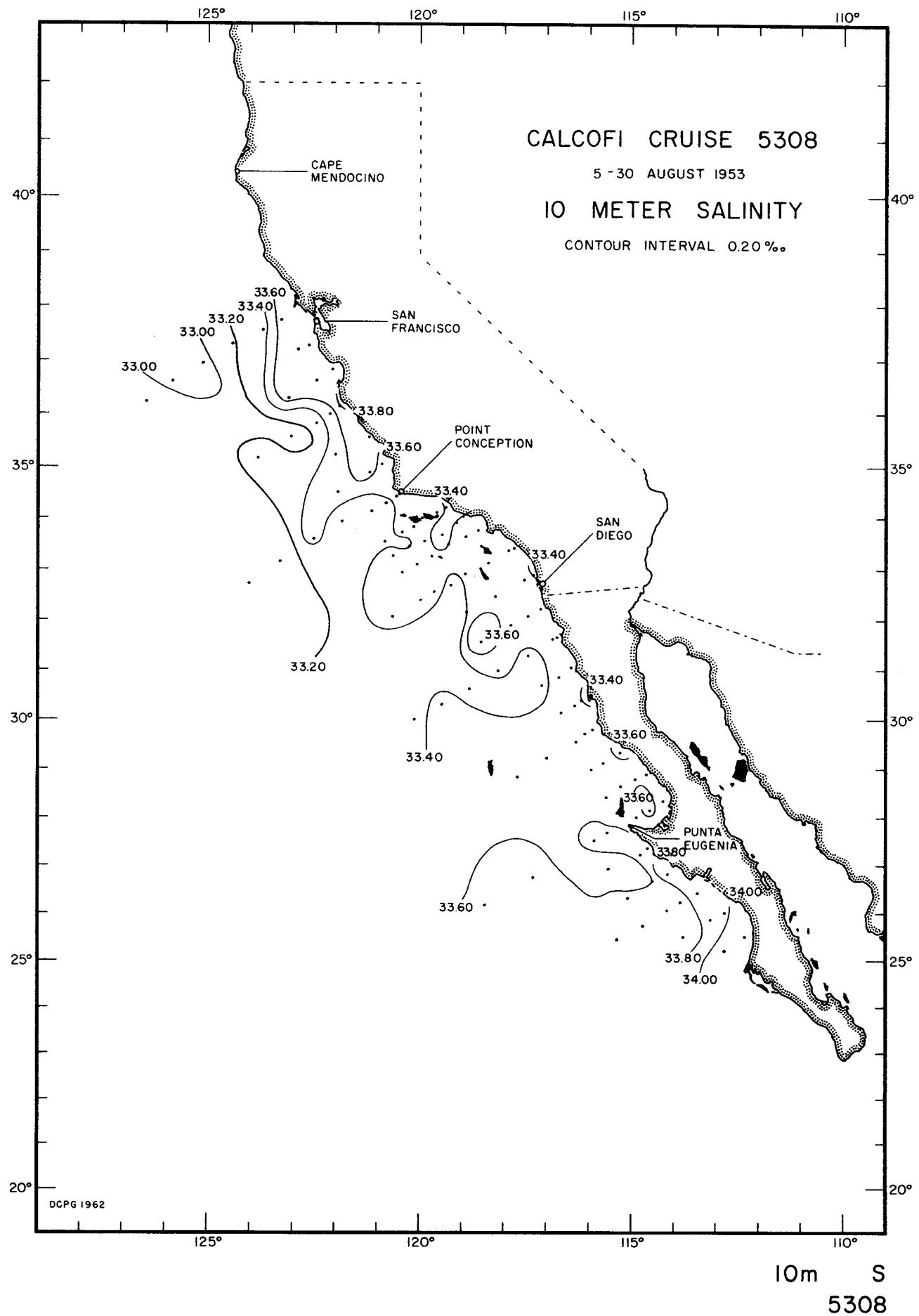


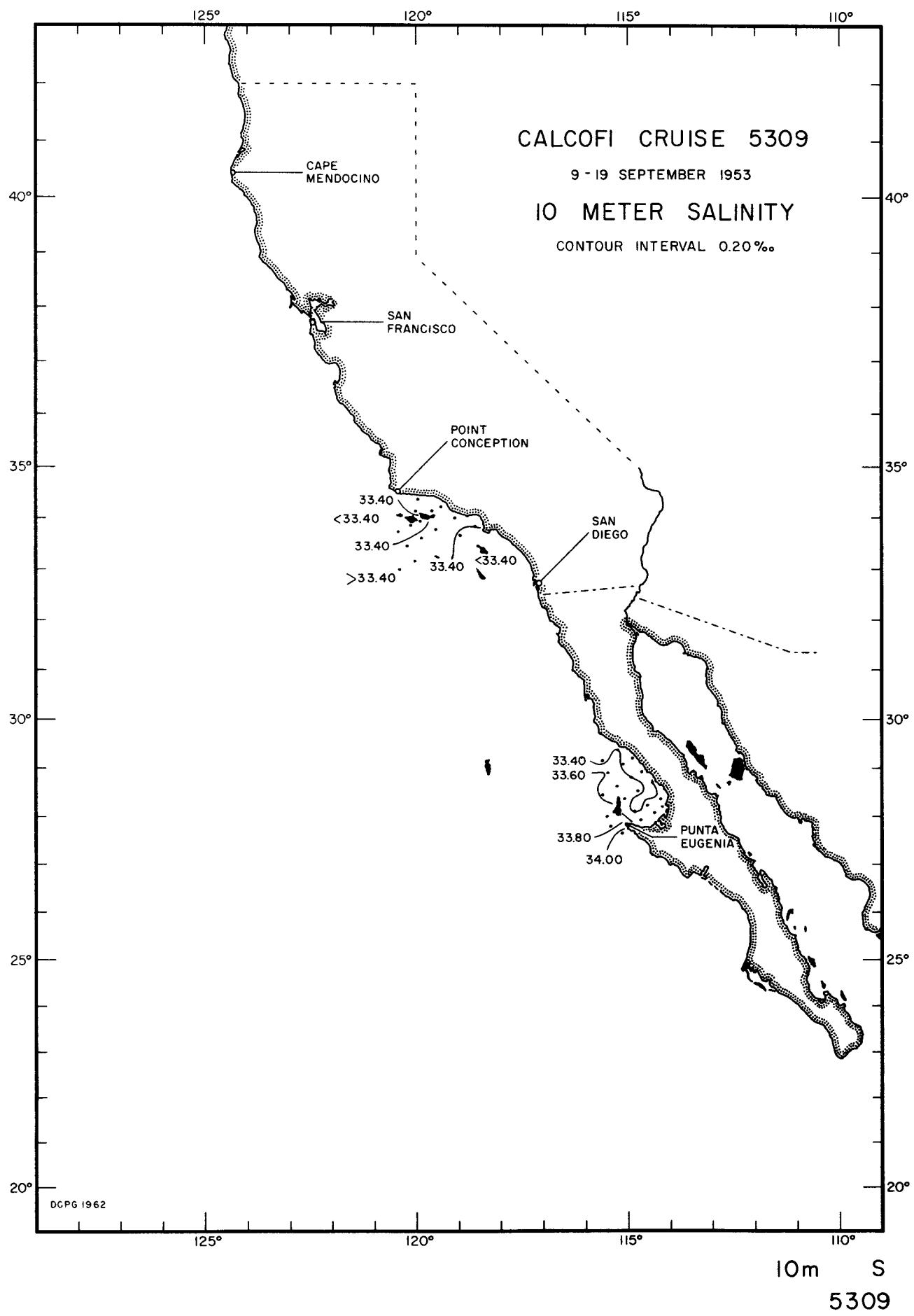


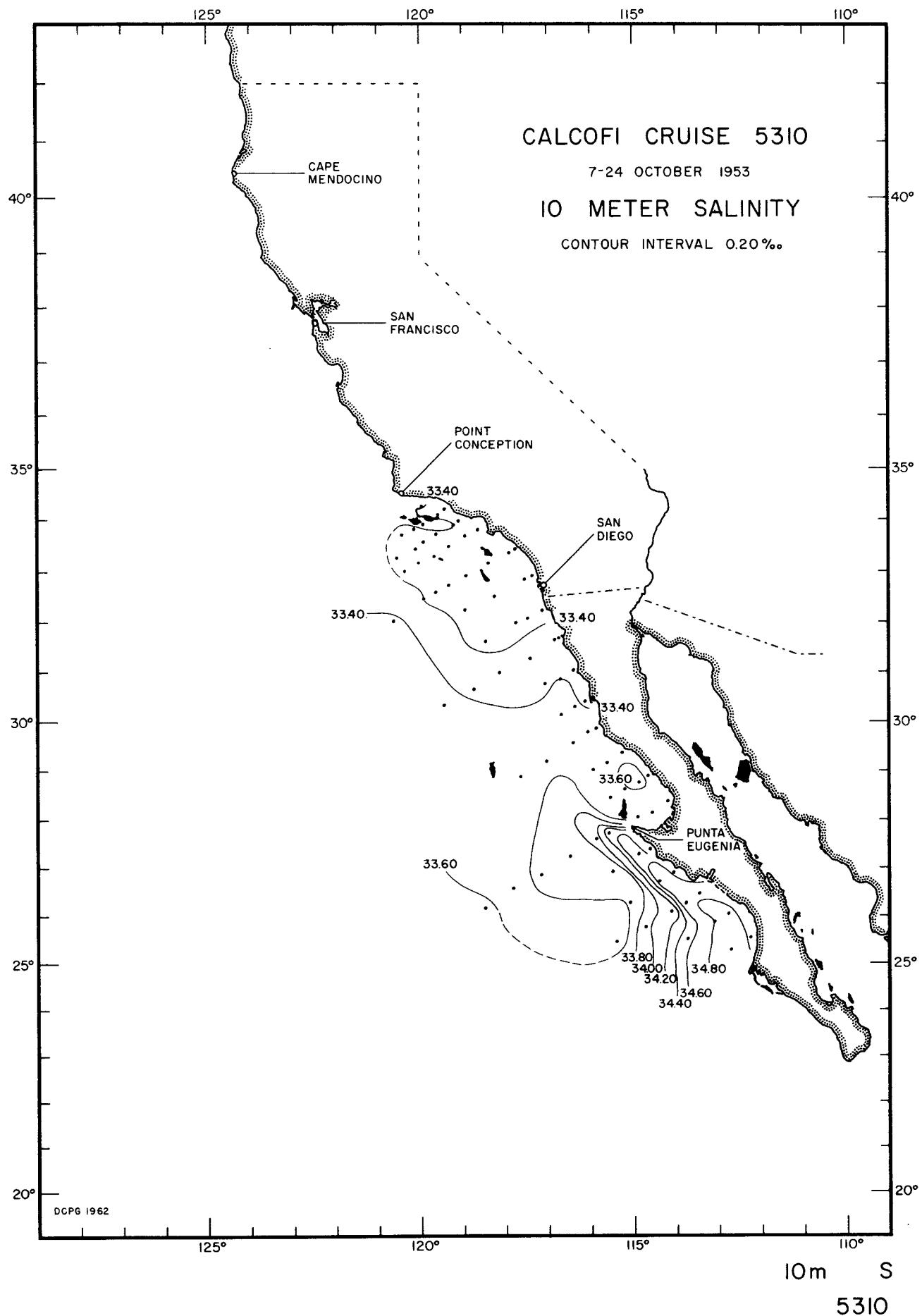


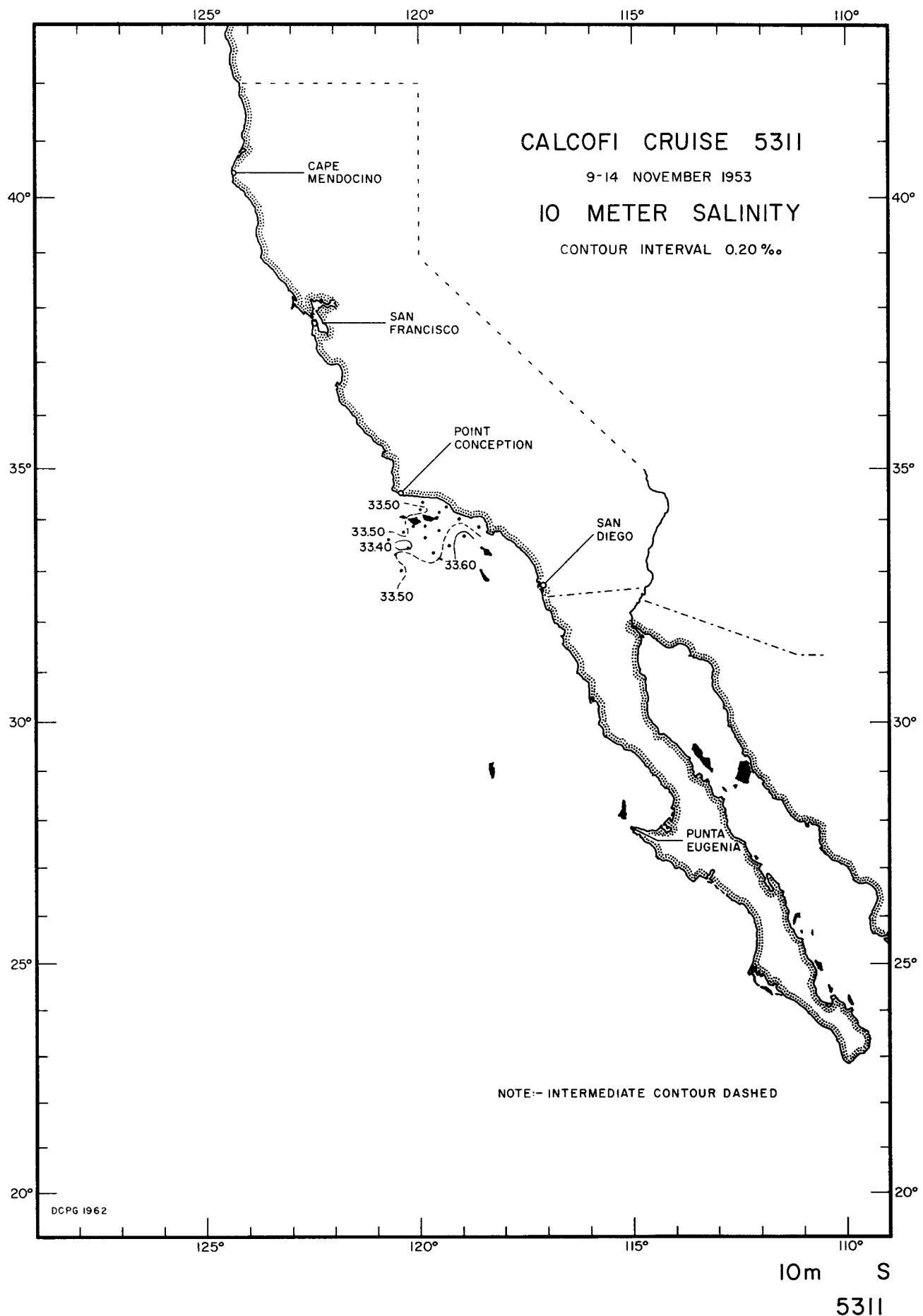


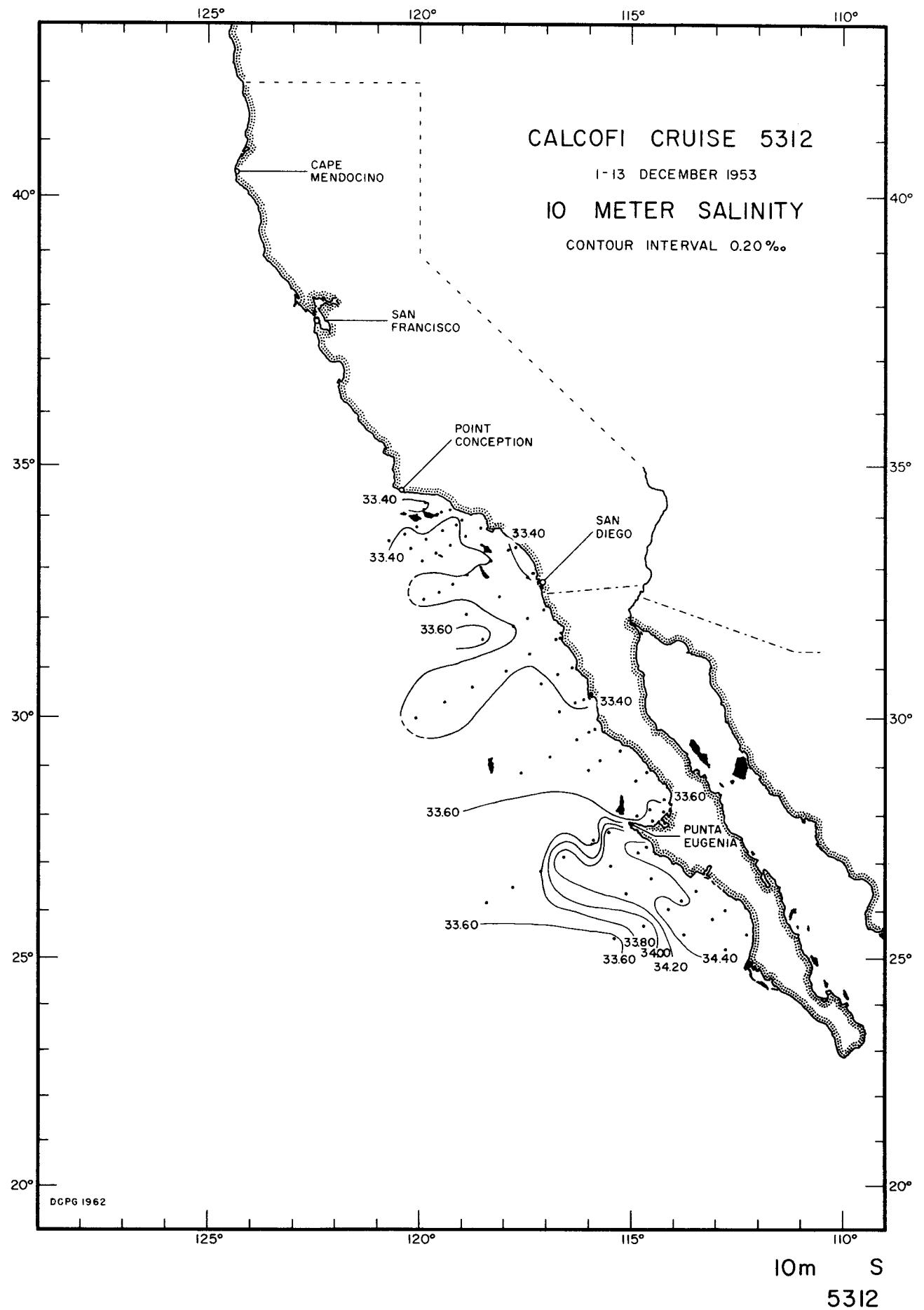


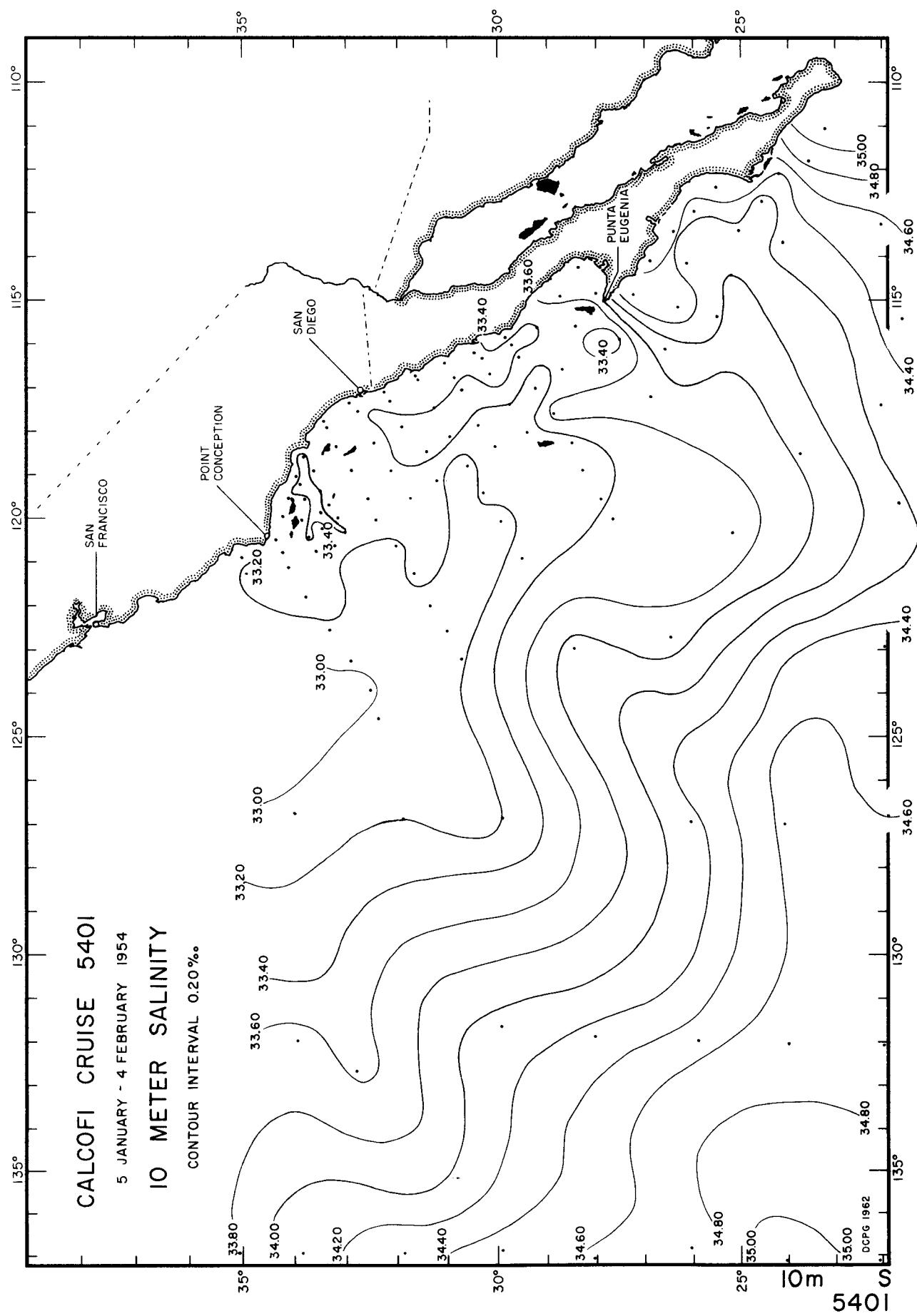


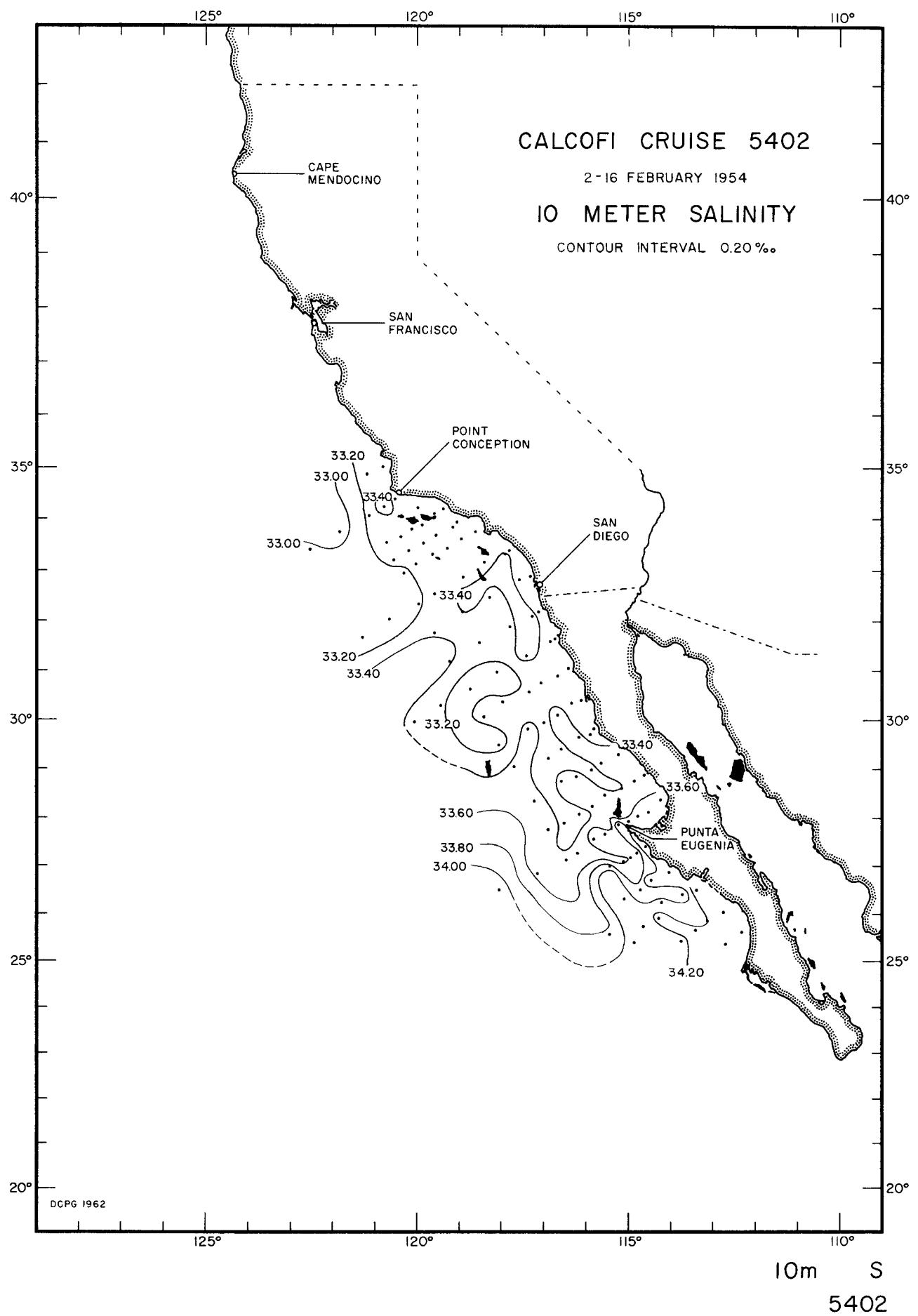


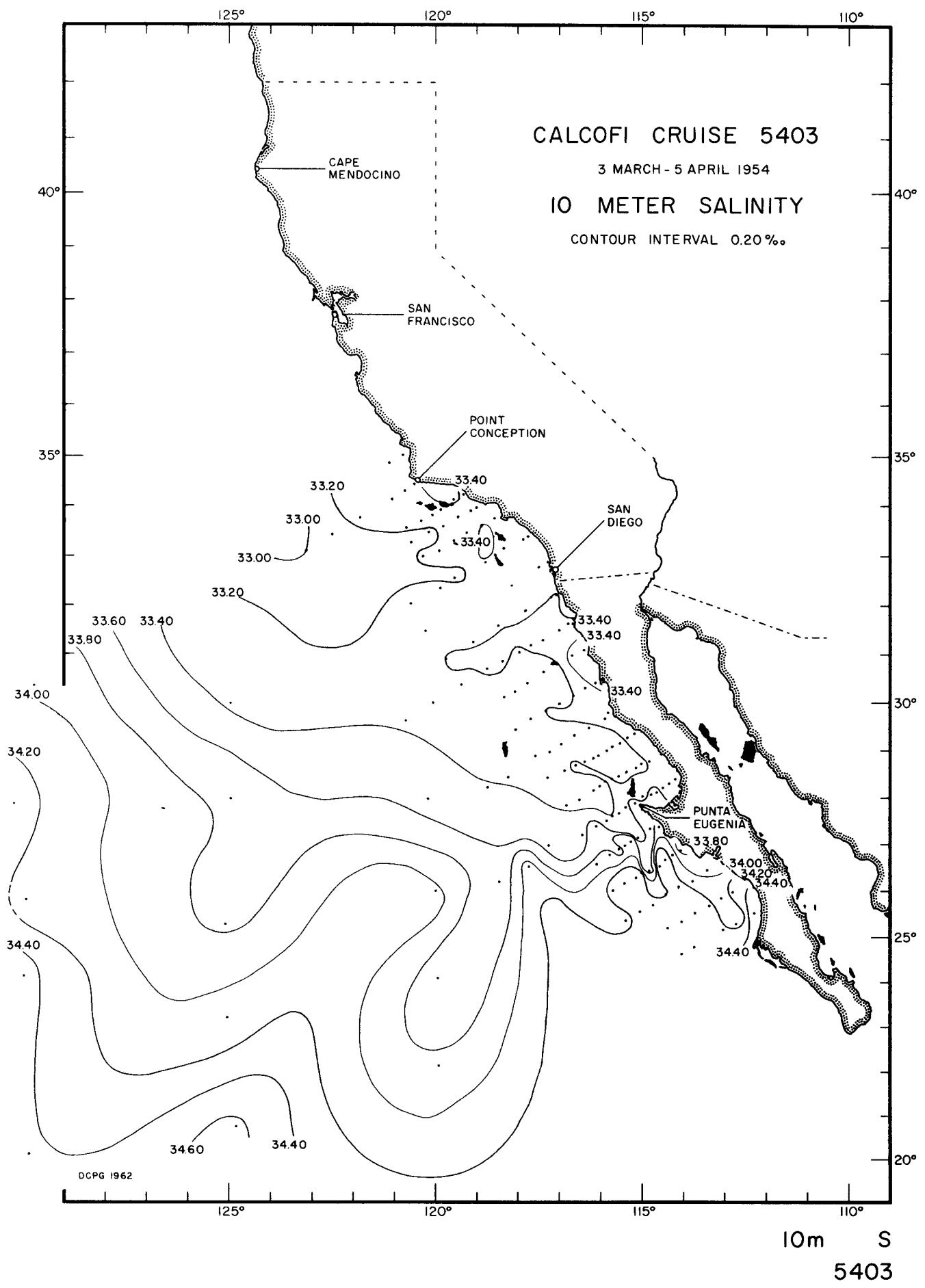


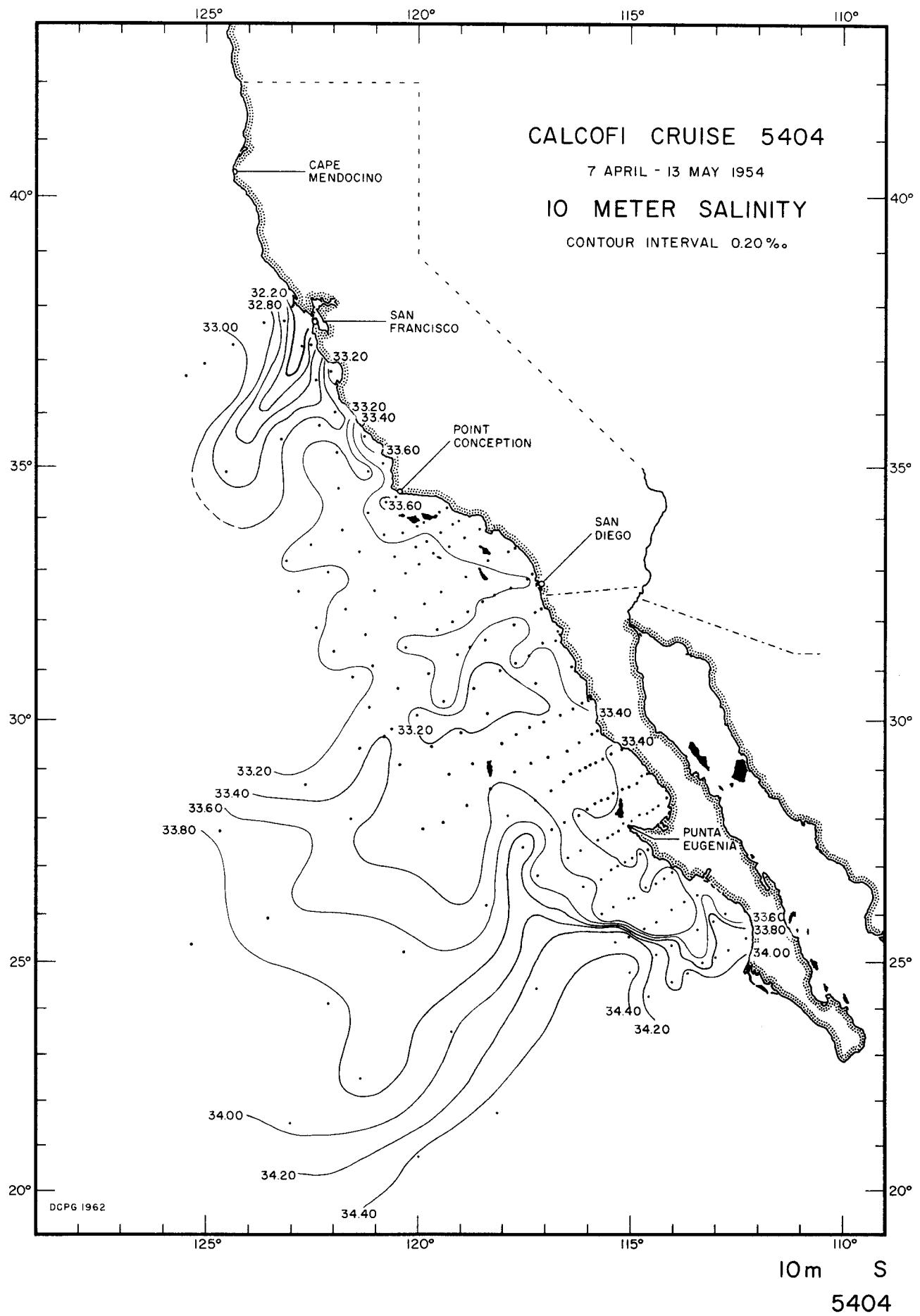


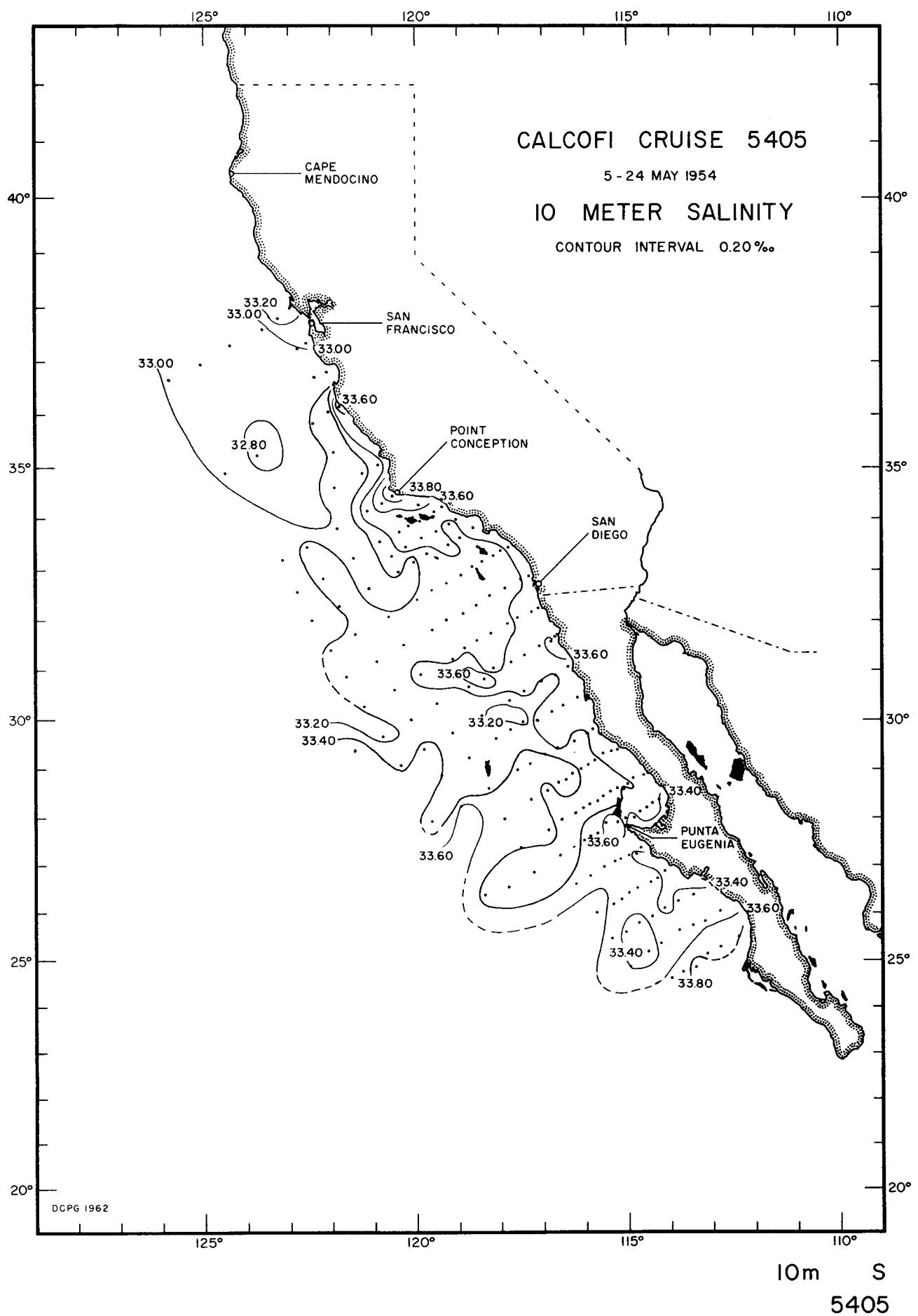


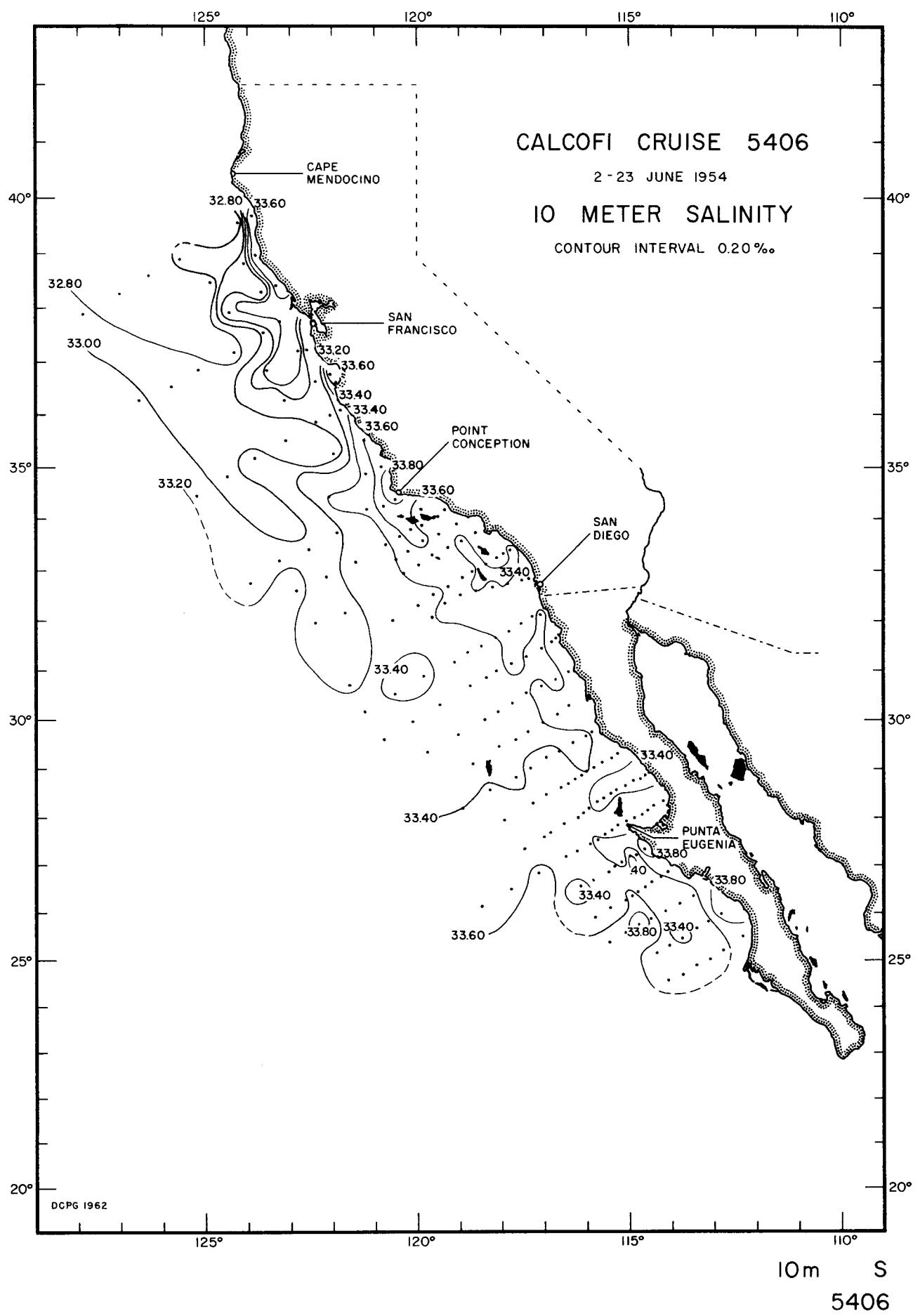


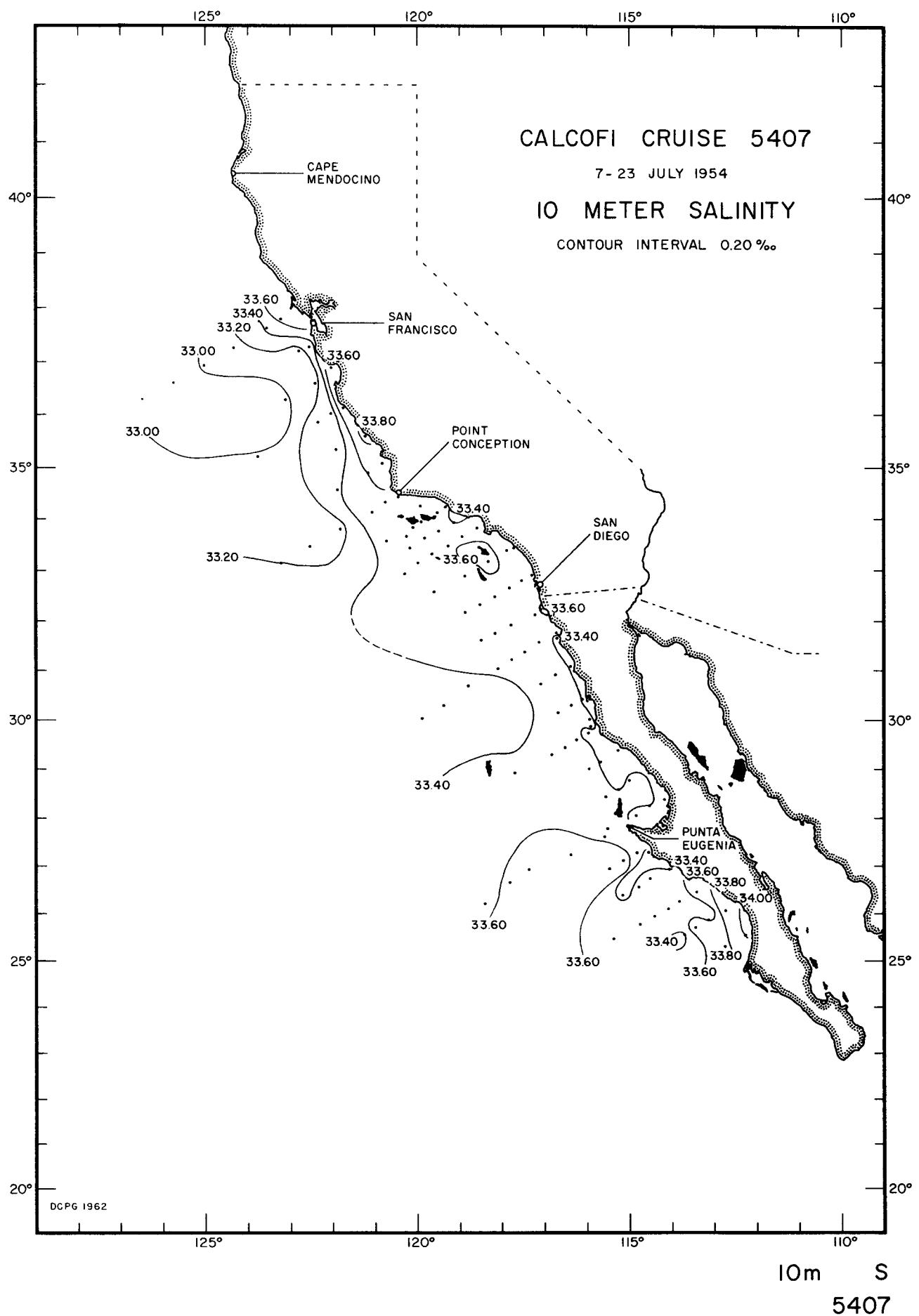


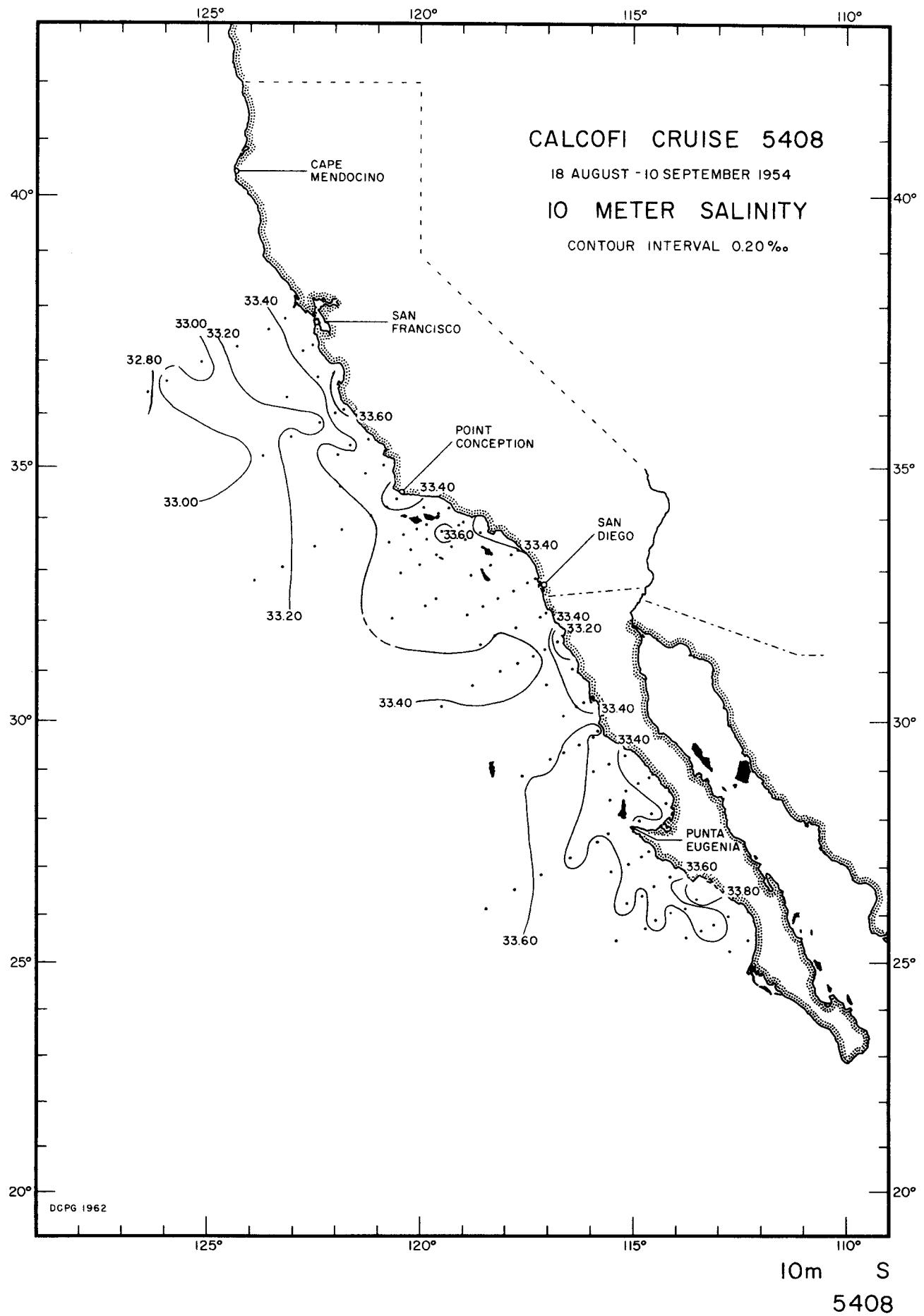


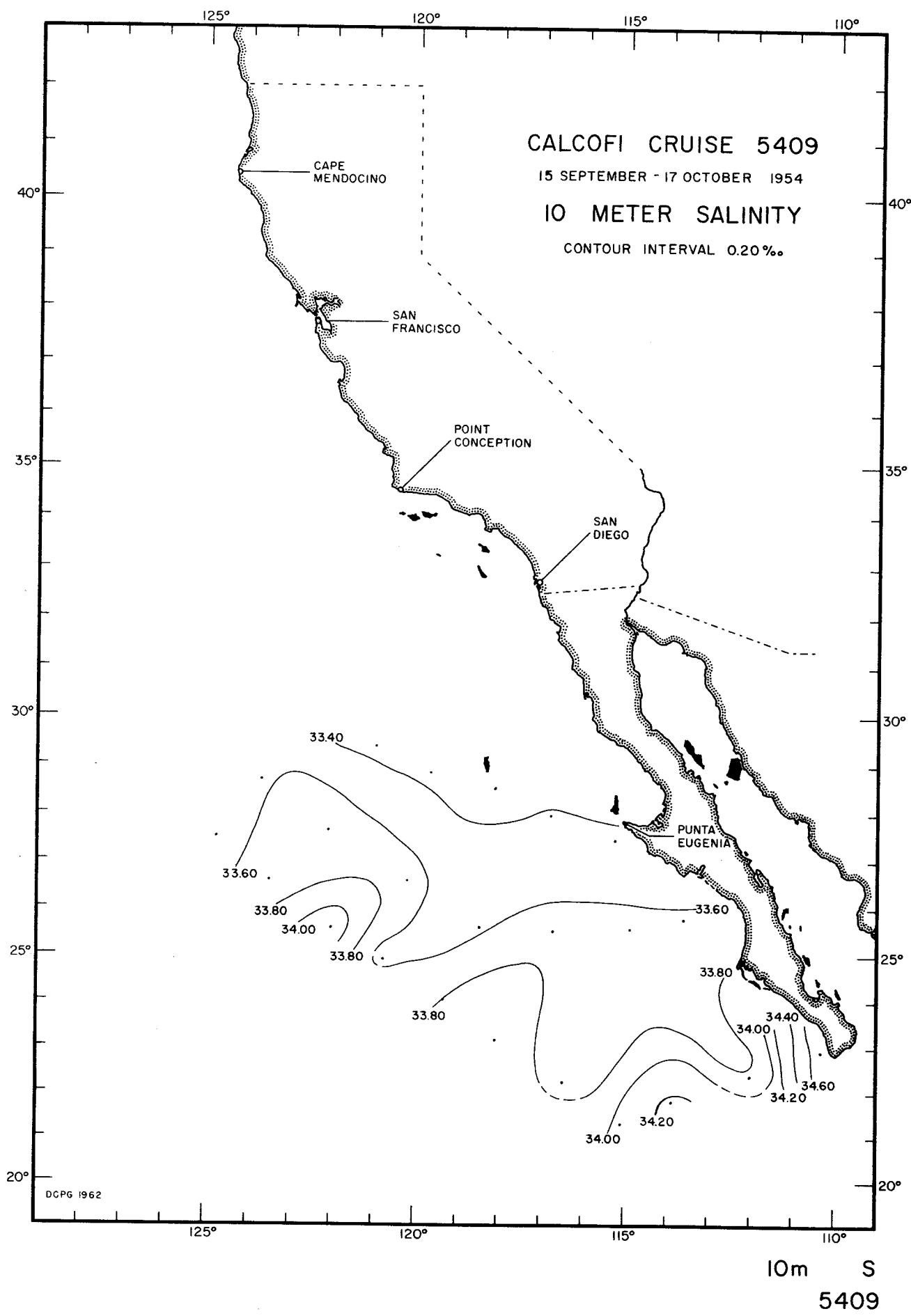


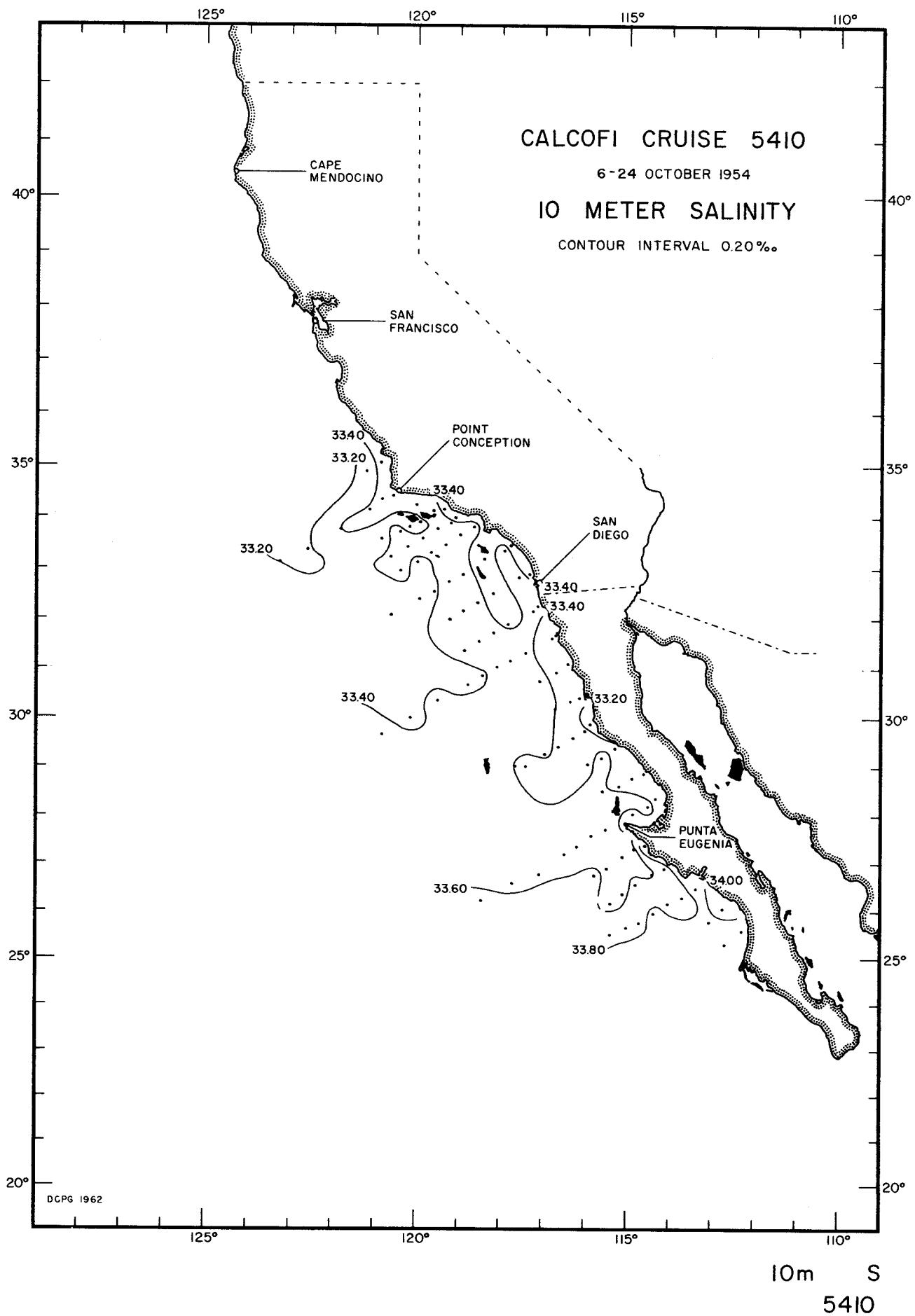


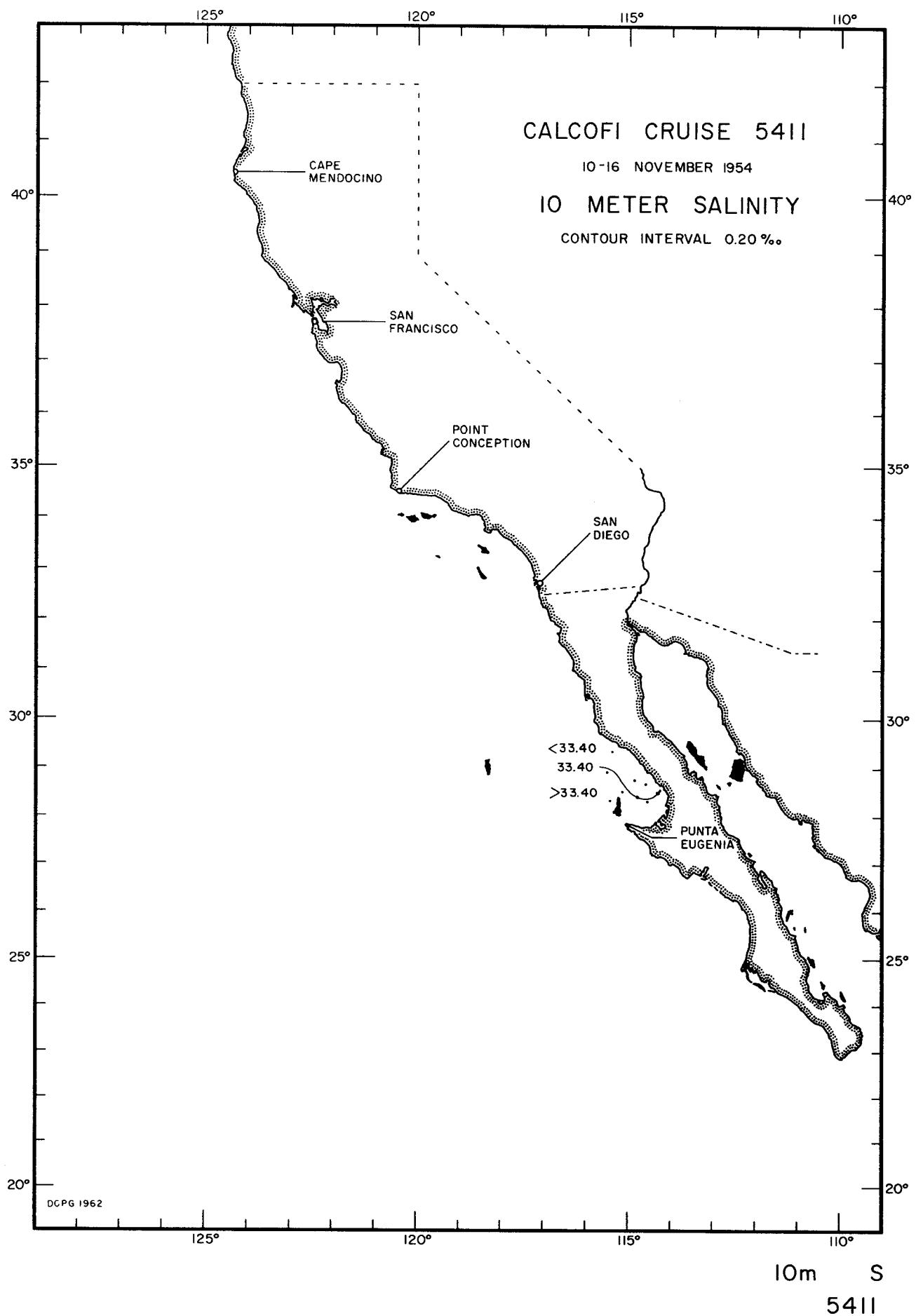




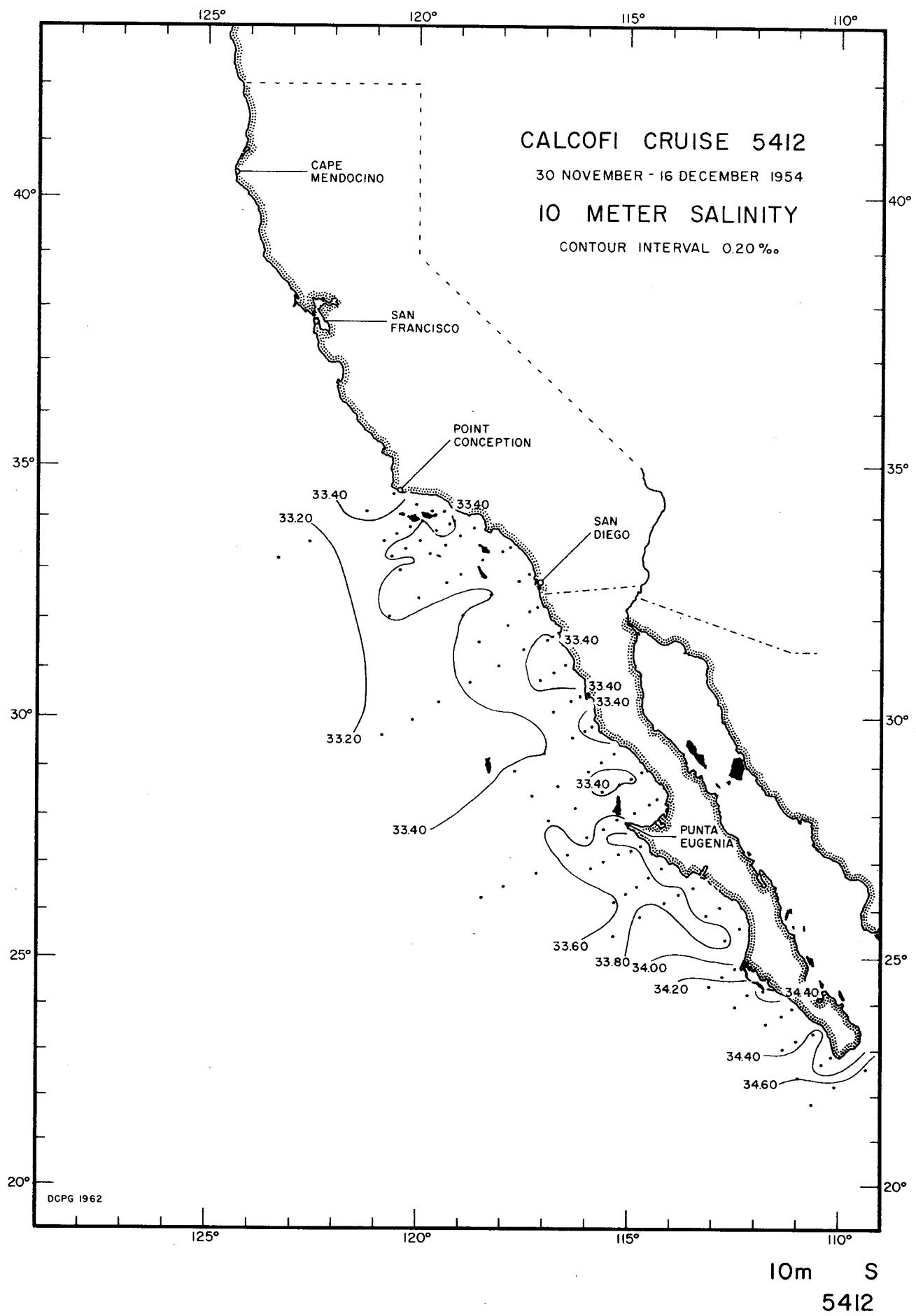


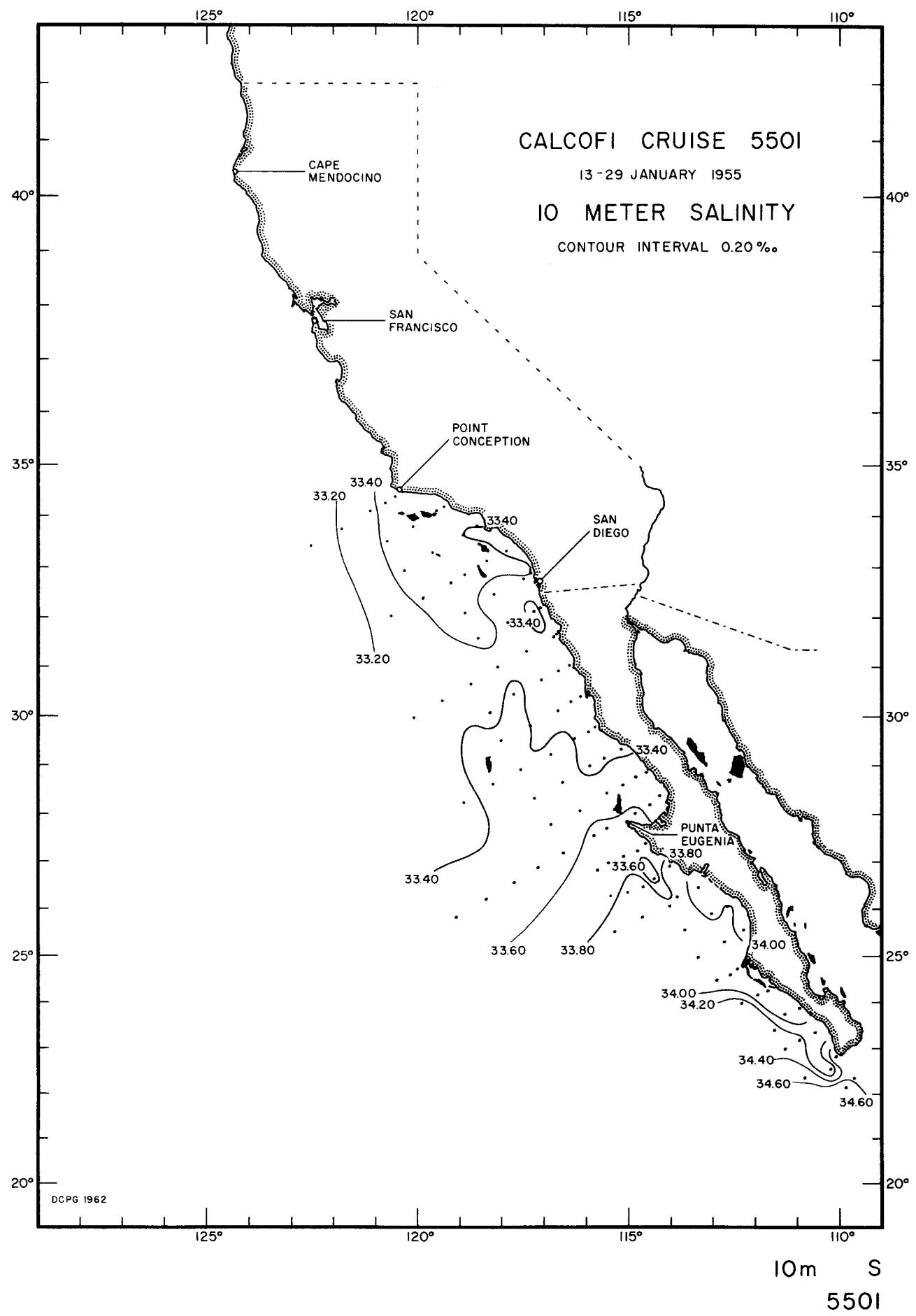


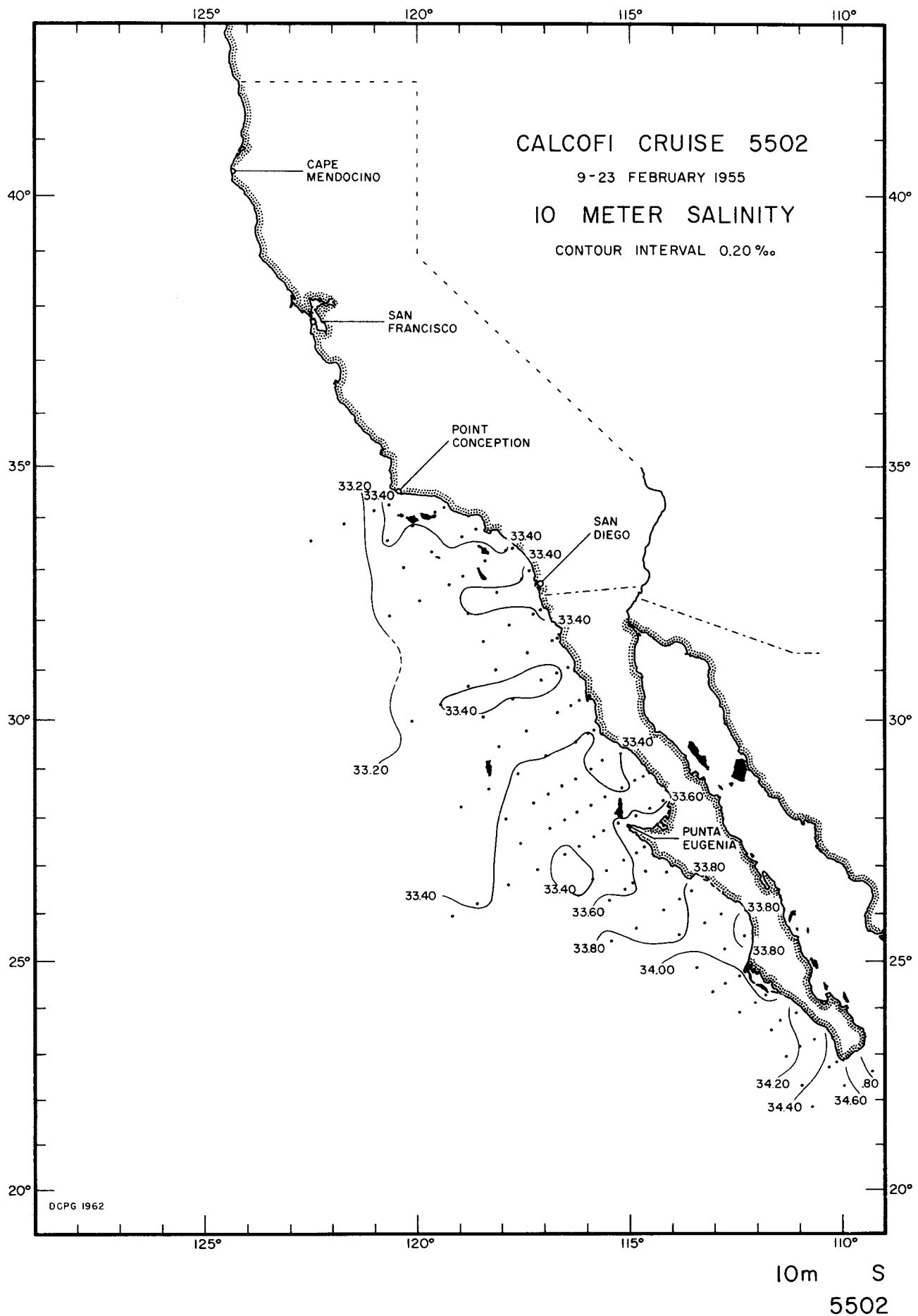


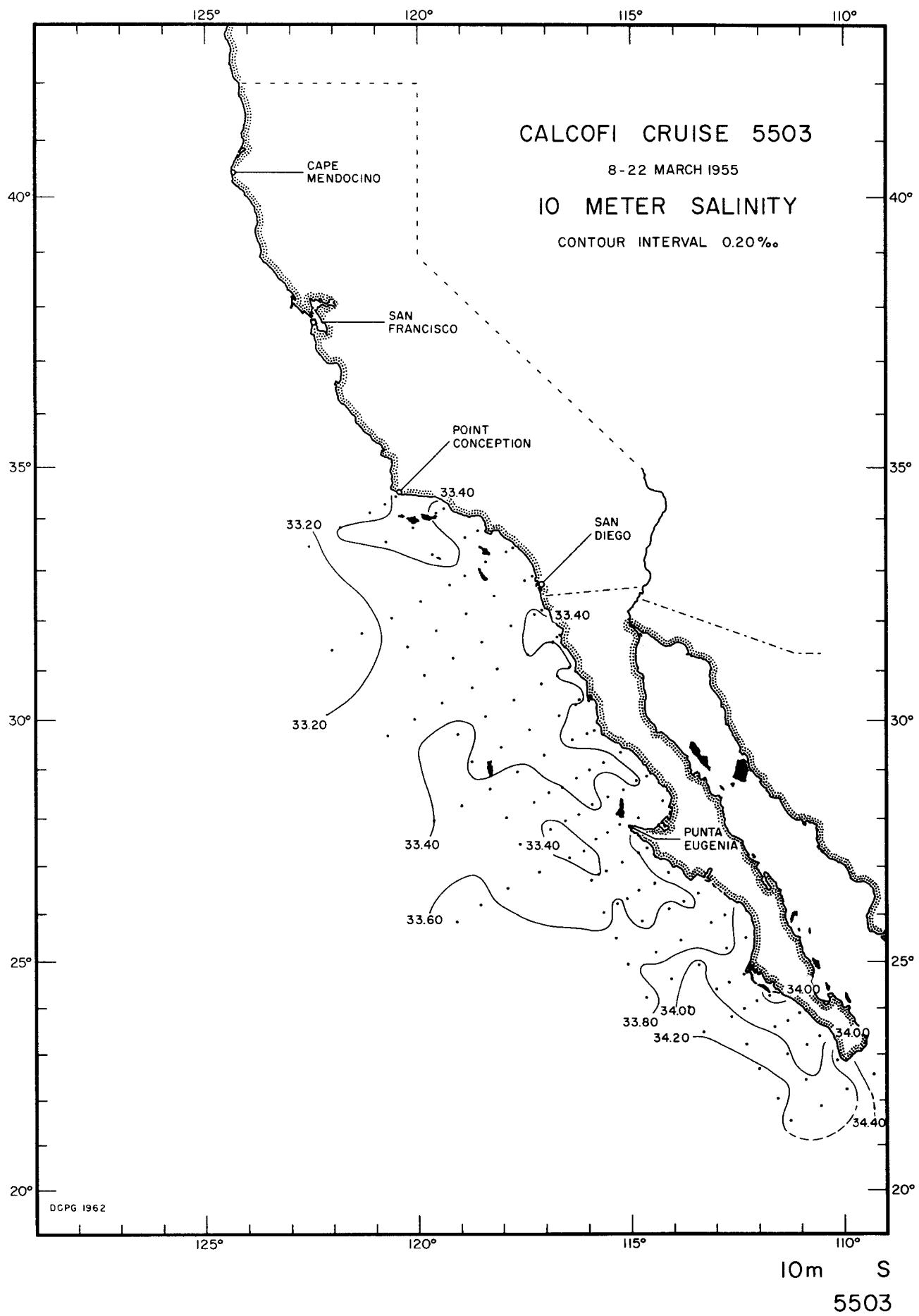


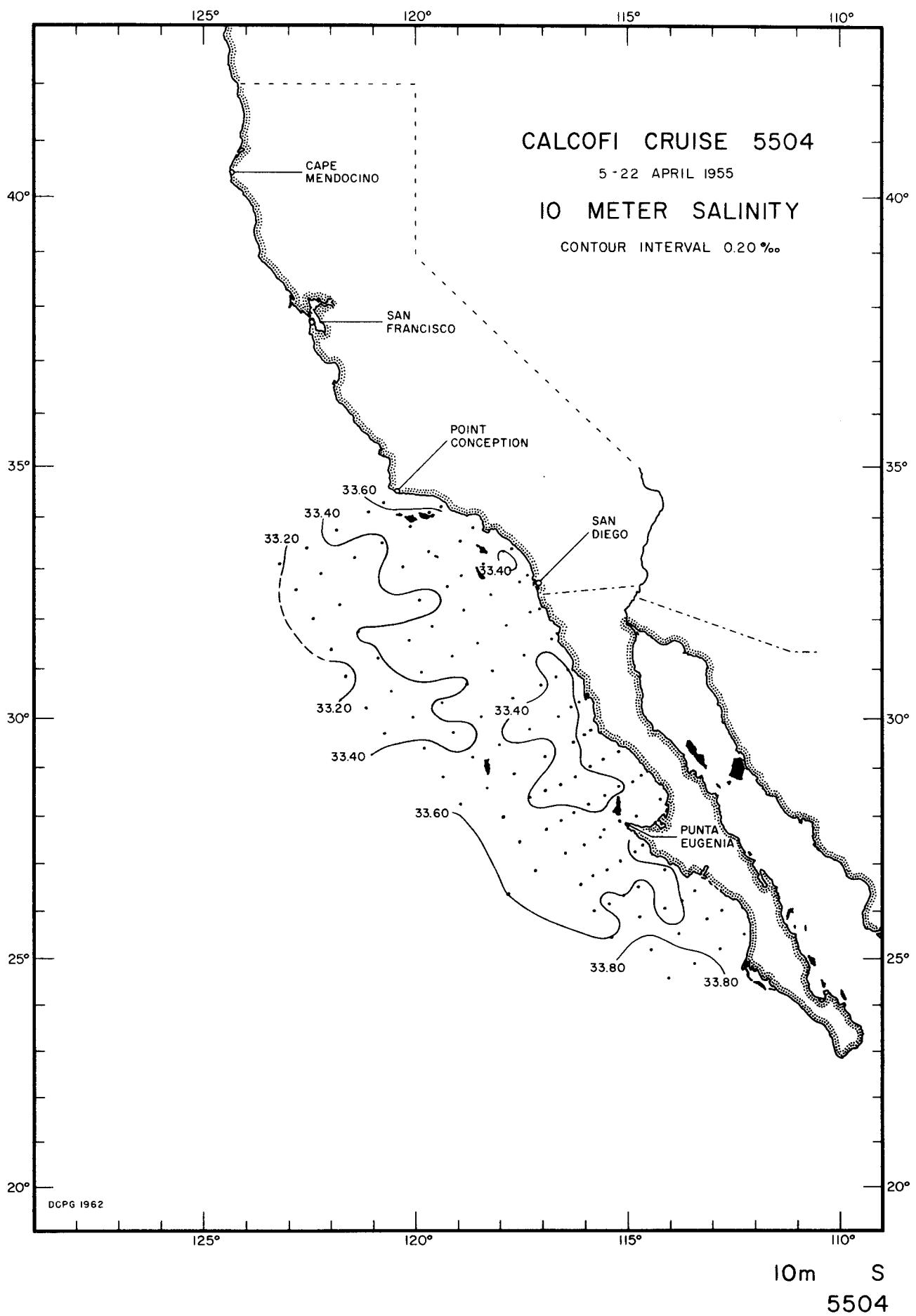
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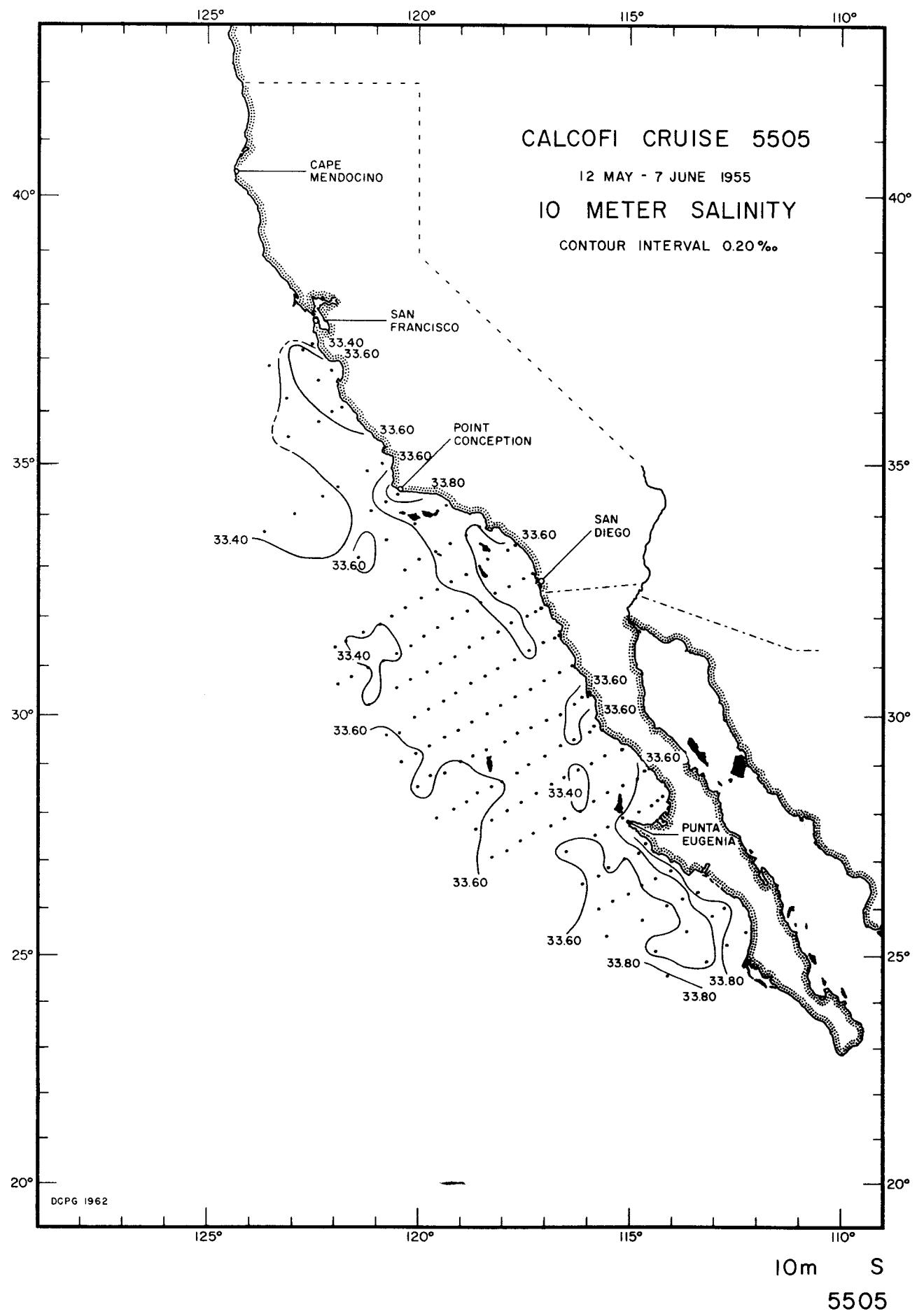


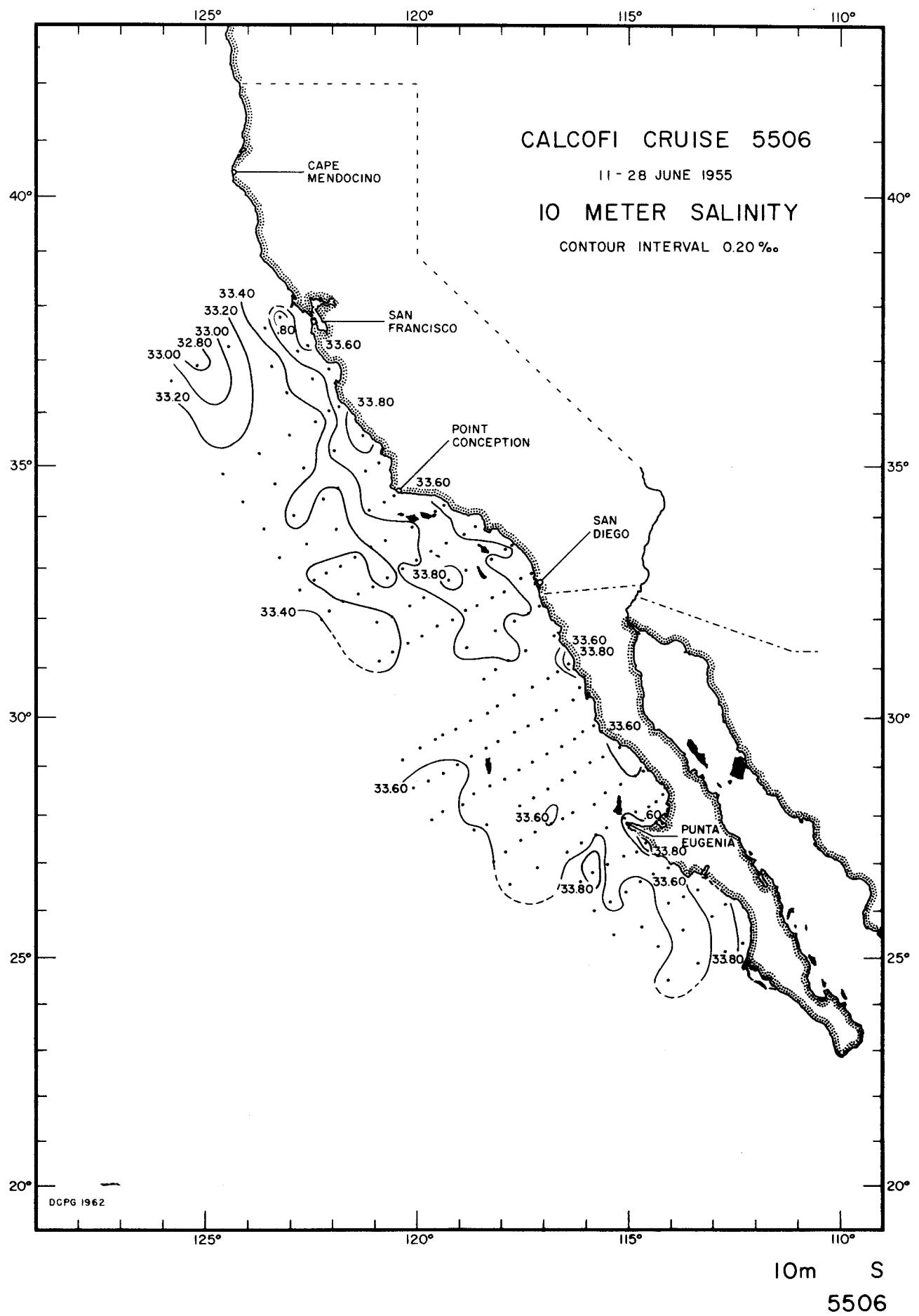


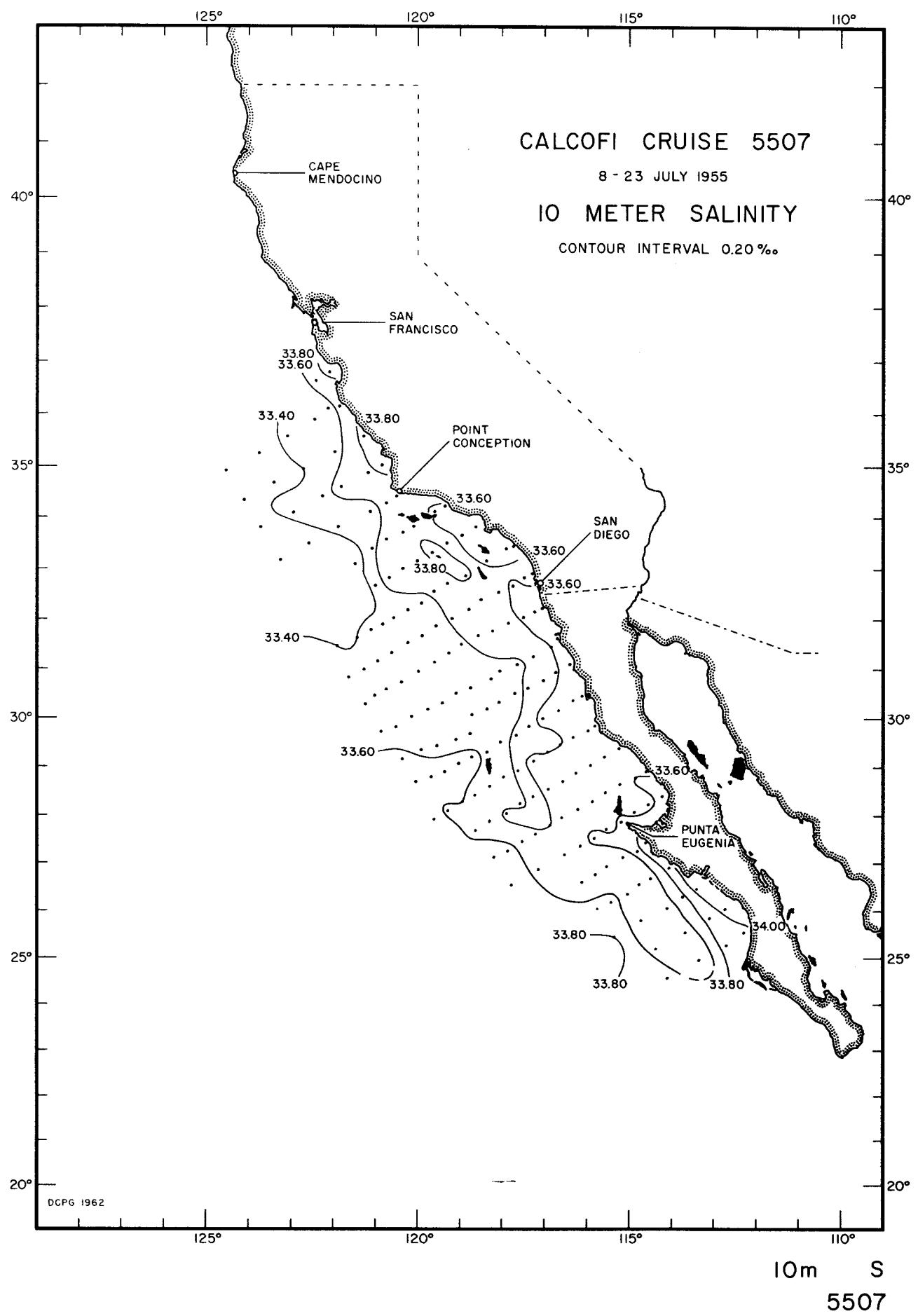


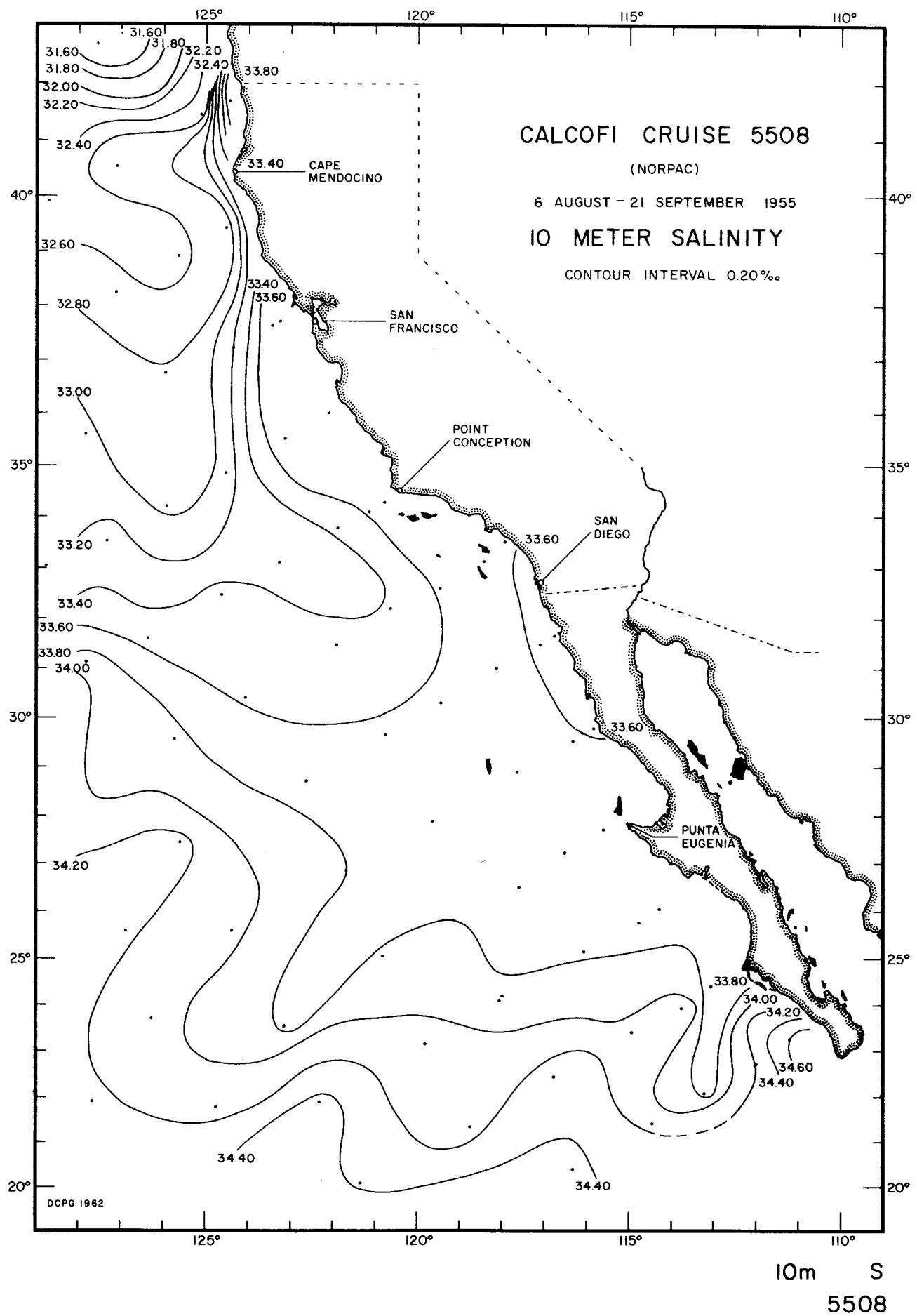












120°

CALCOFI CRUISE 5509

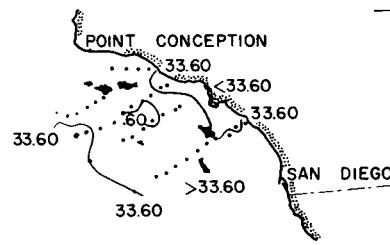
11-24 SEPTEMBER 1955

10 METER SALINITY

CONTOUR INTERVAL 0.20‰

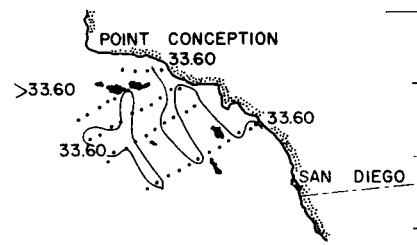
35°

11-17 SEPTEMBER



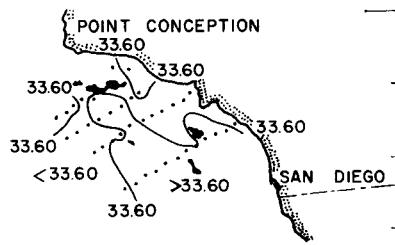
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14-20 SEPTEMBER



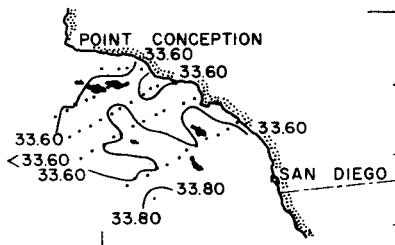
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18-23 SEPTEMBER



35°

21-24 SEPTEMBER



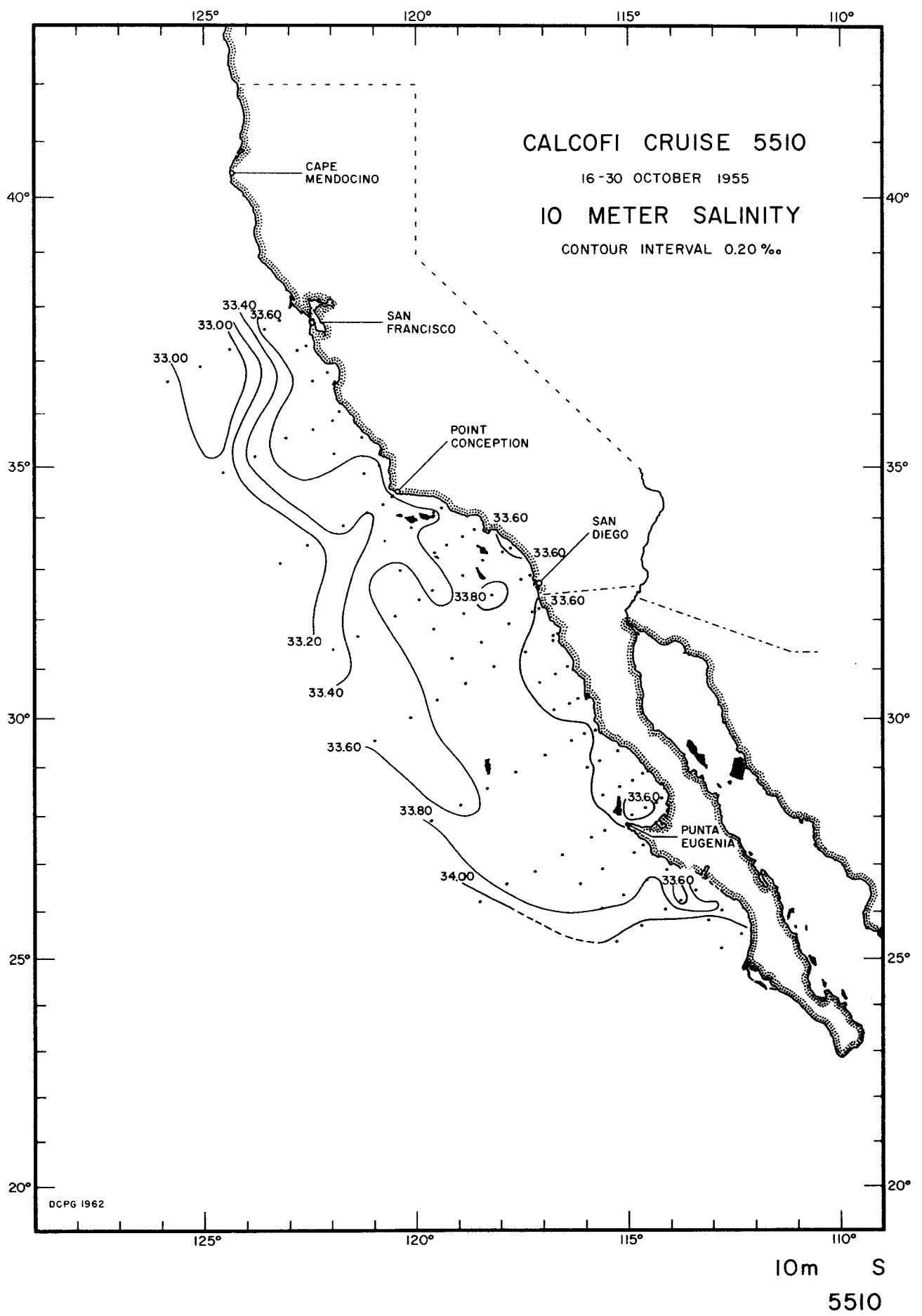
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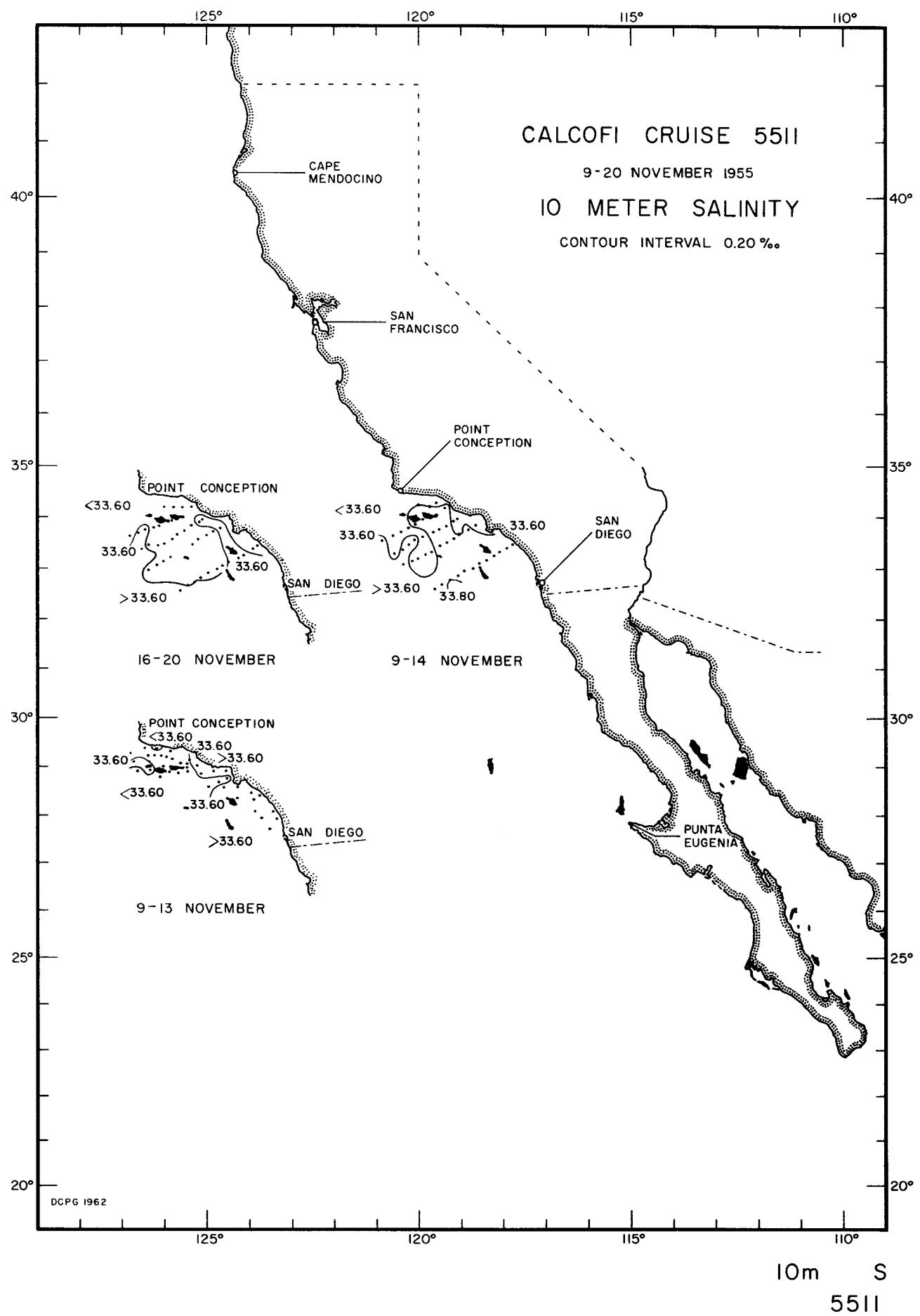
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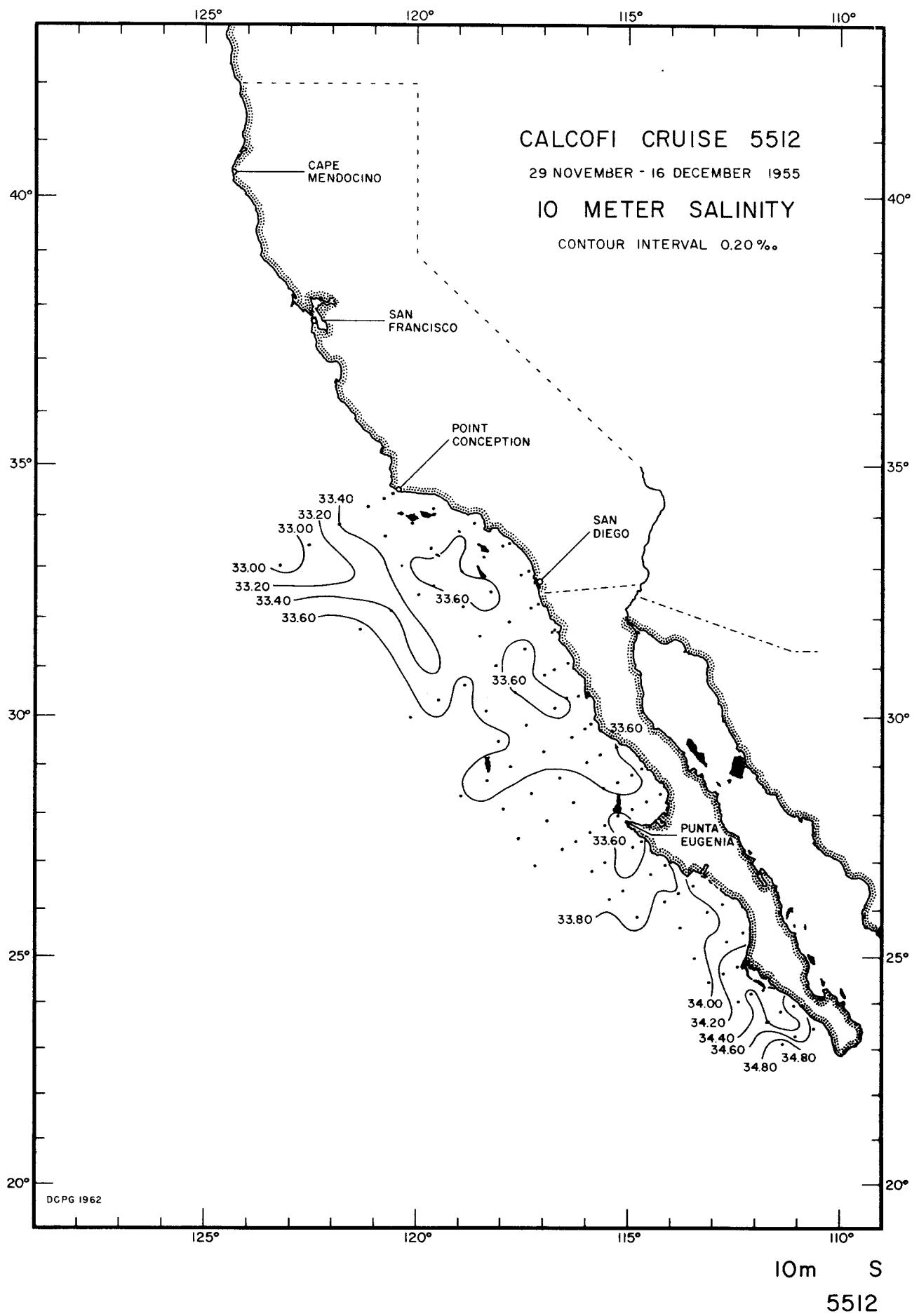
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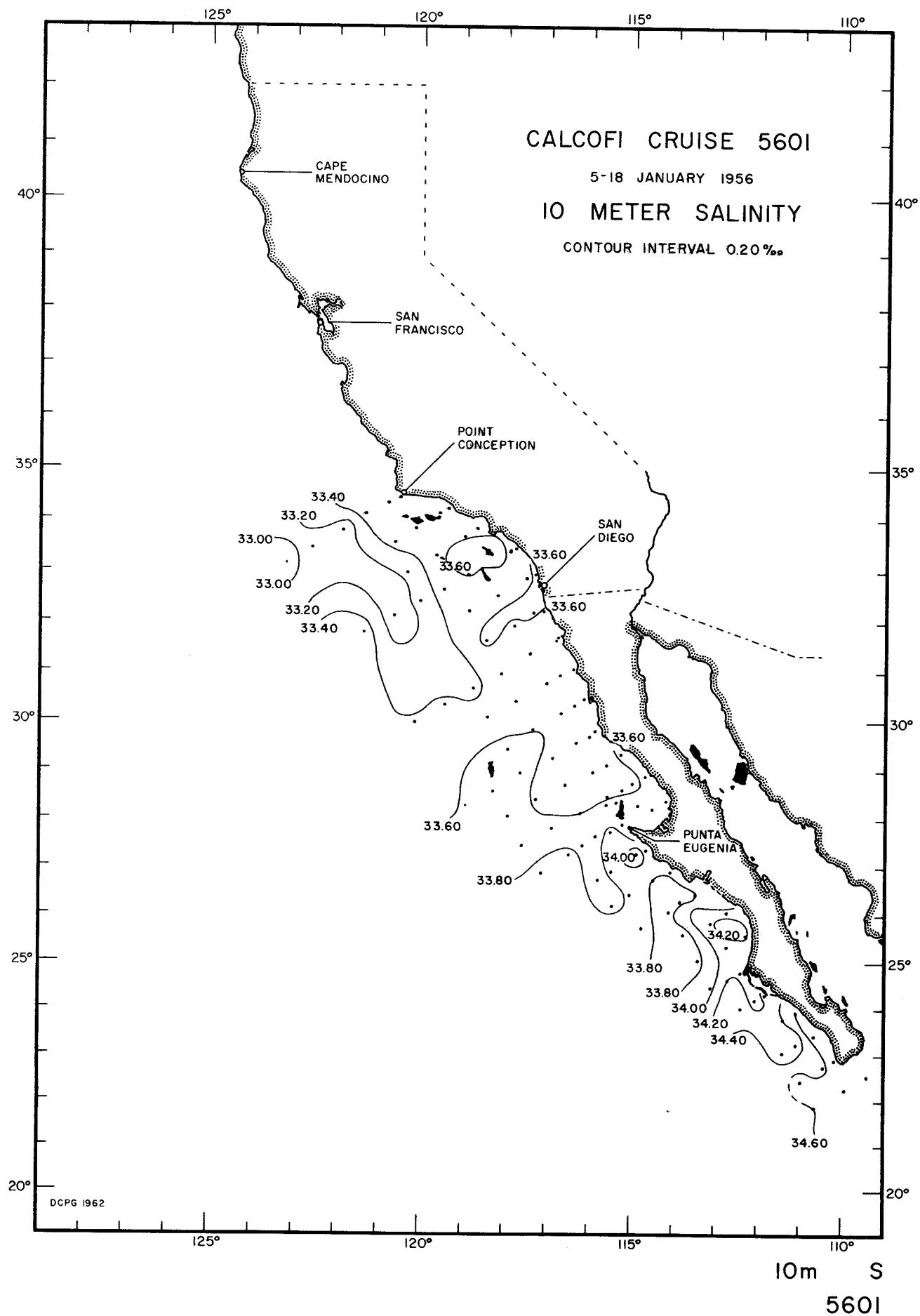
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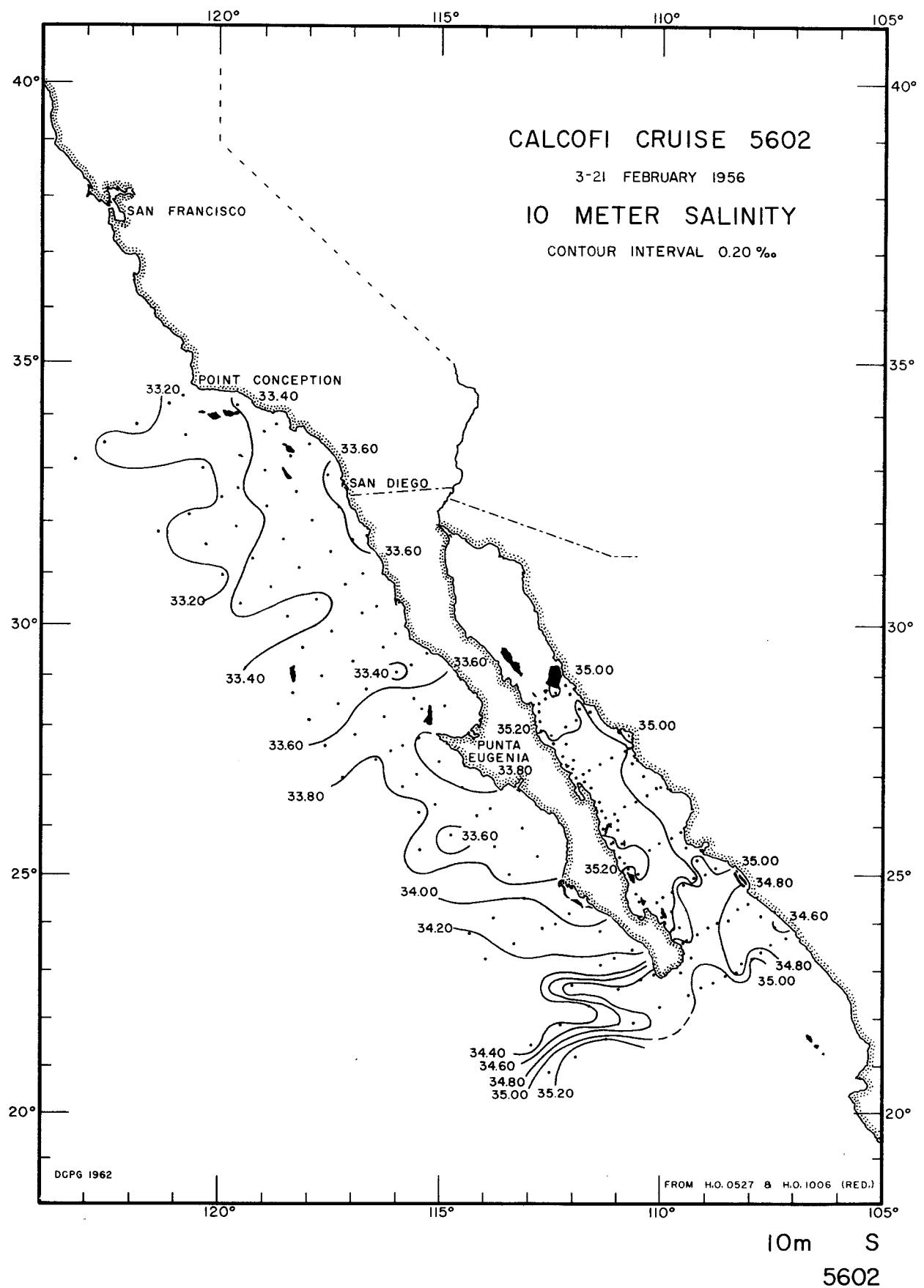
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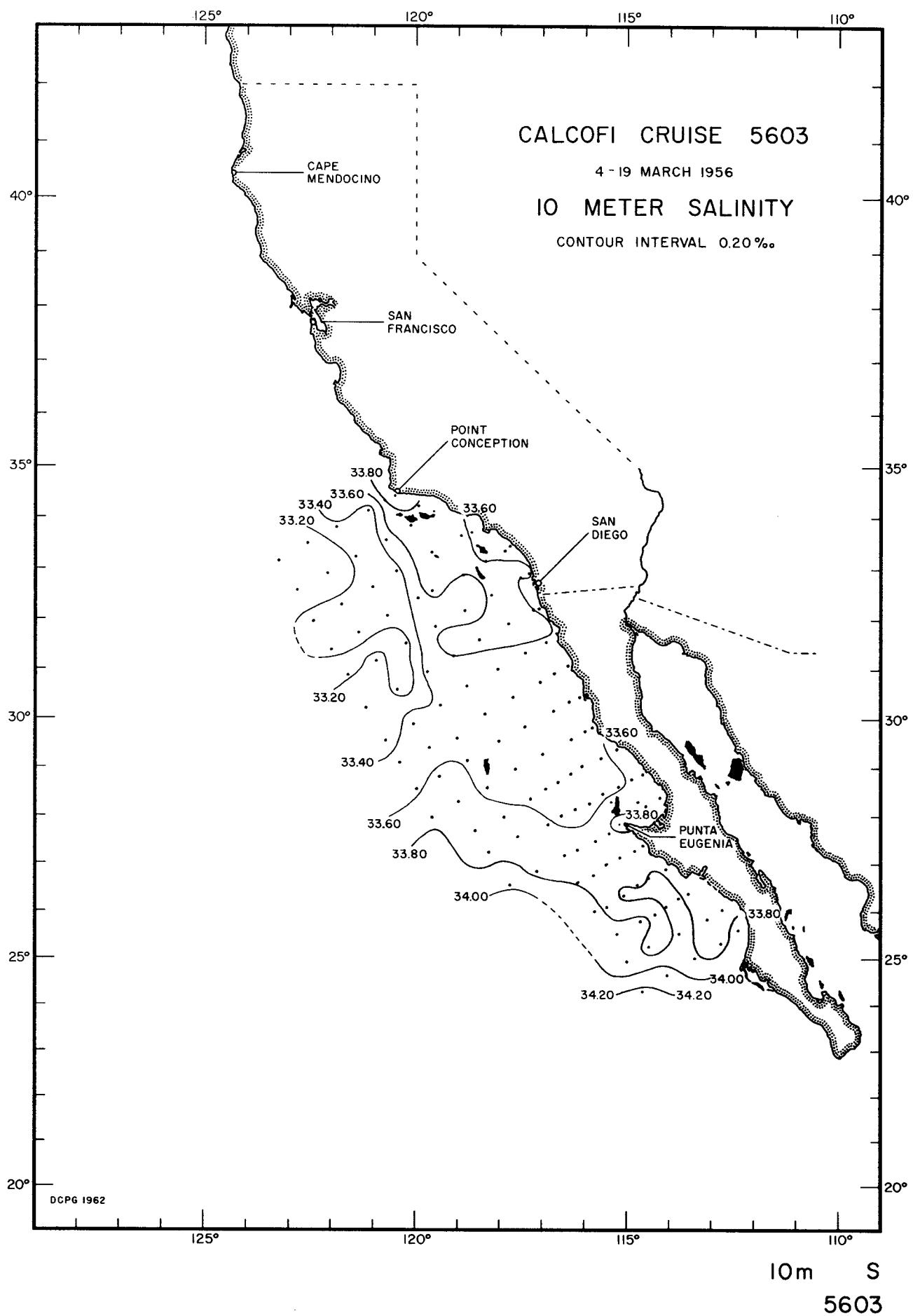


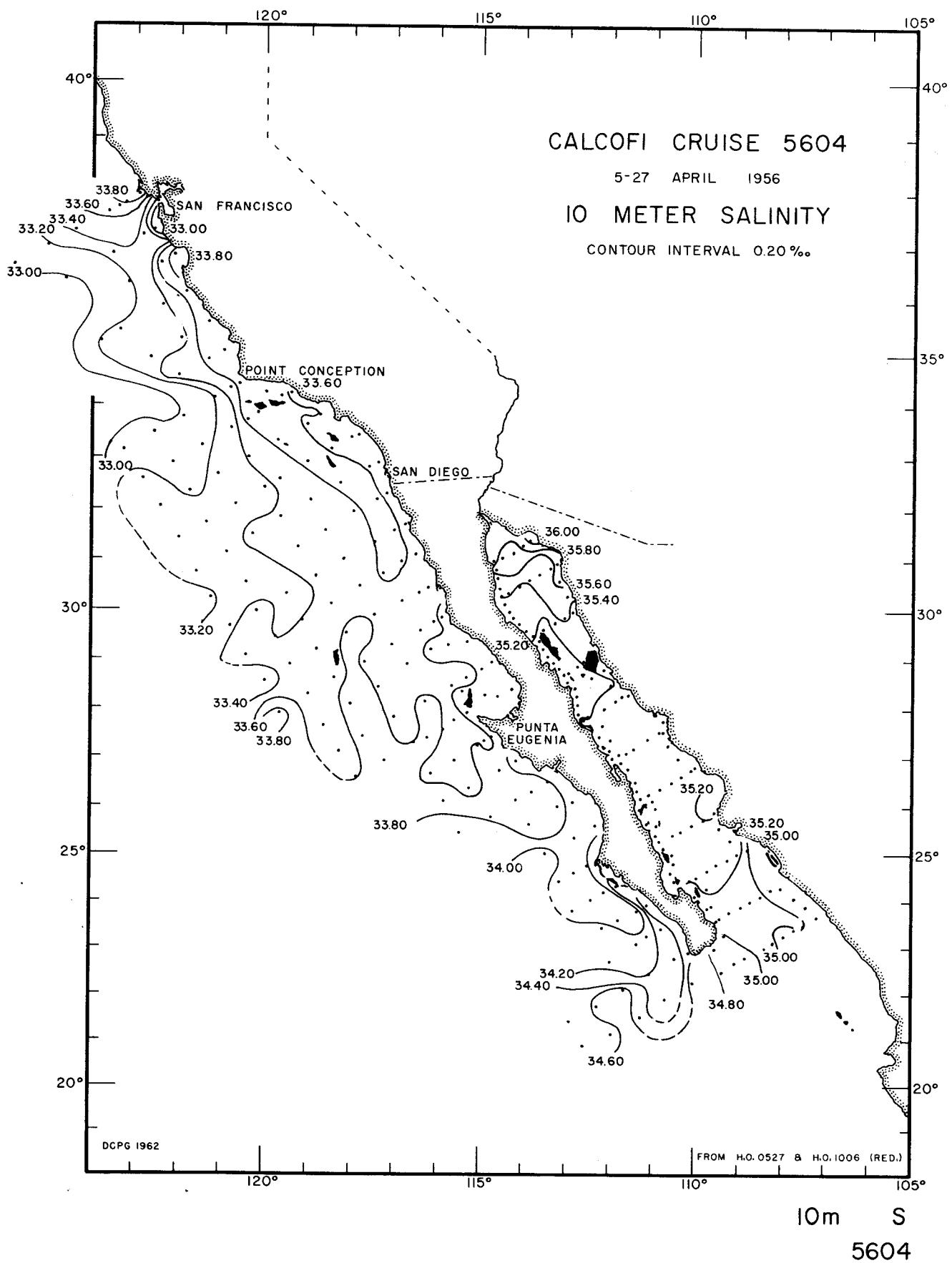


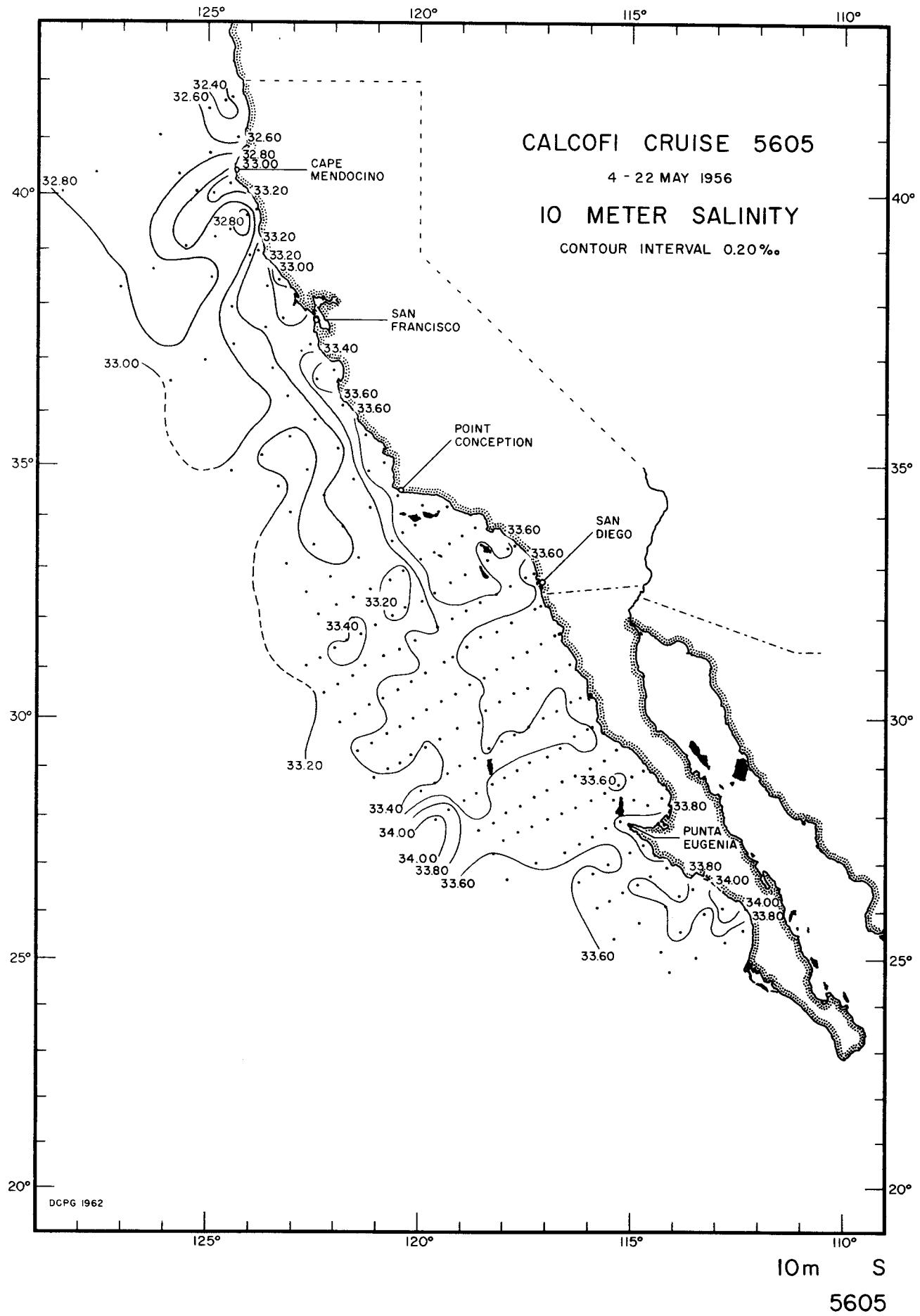


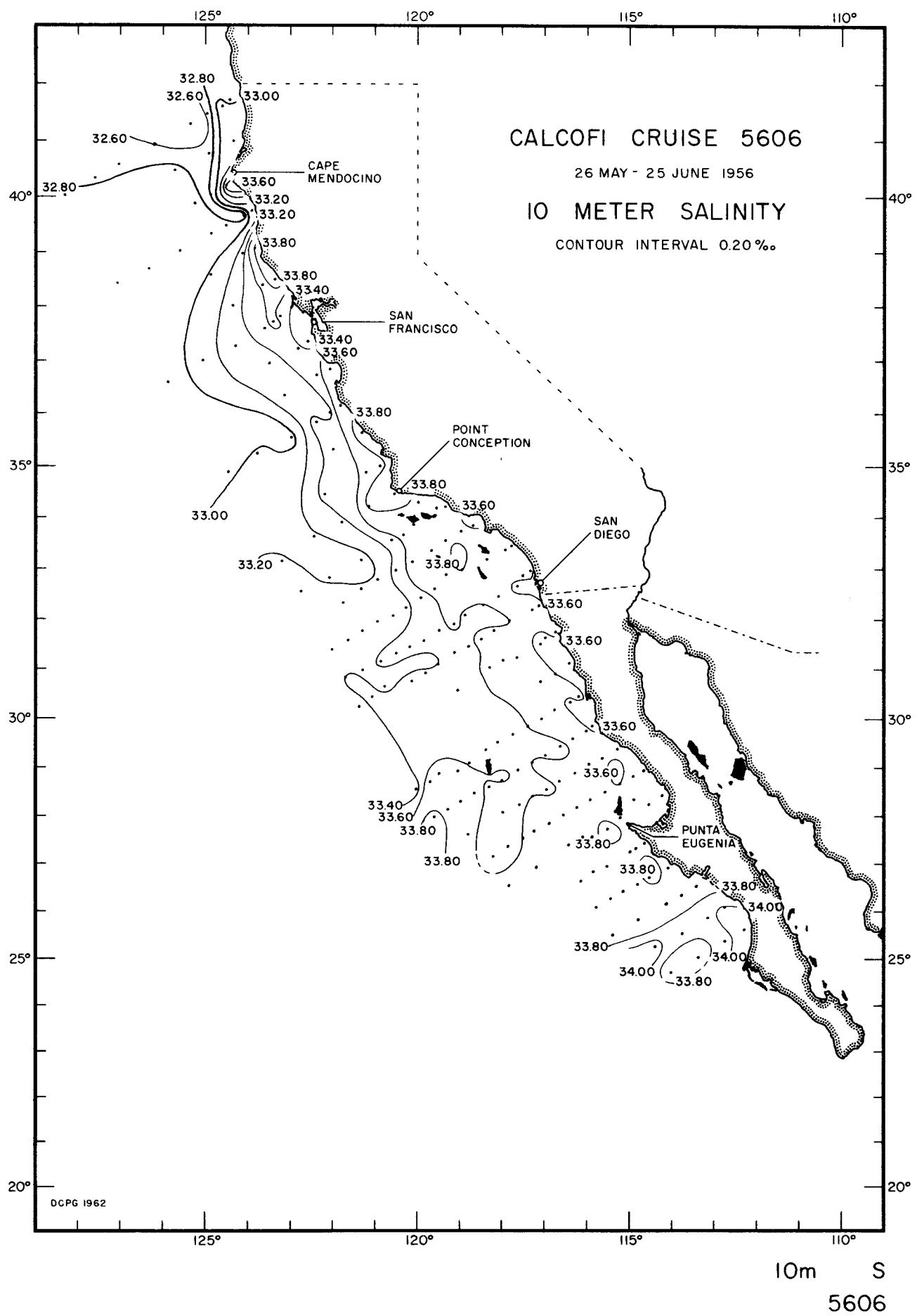


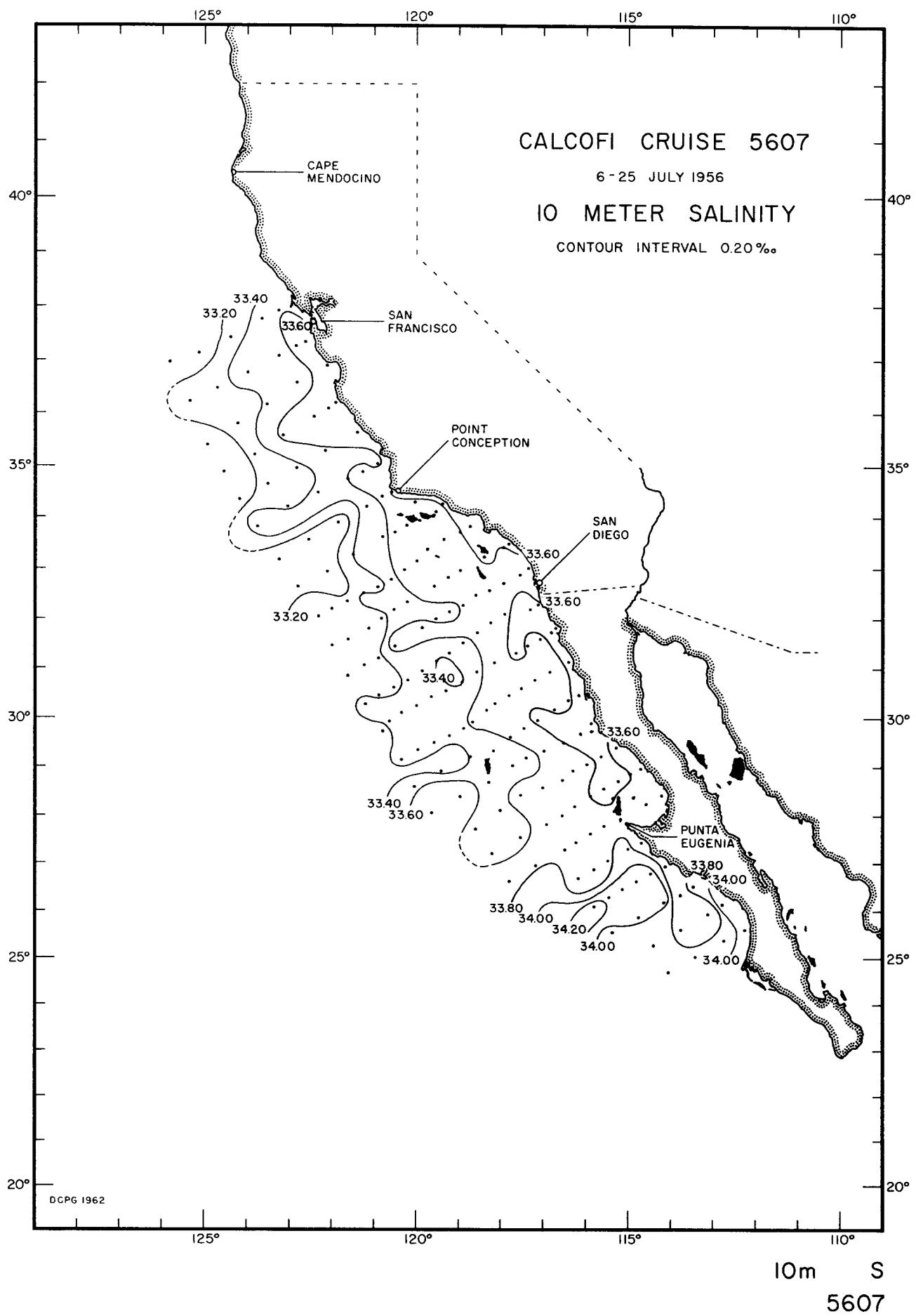


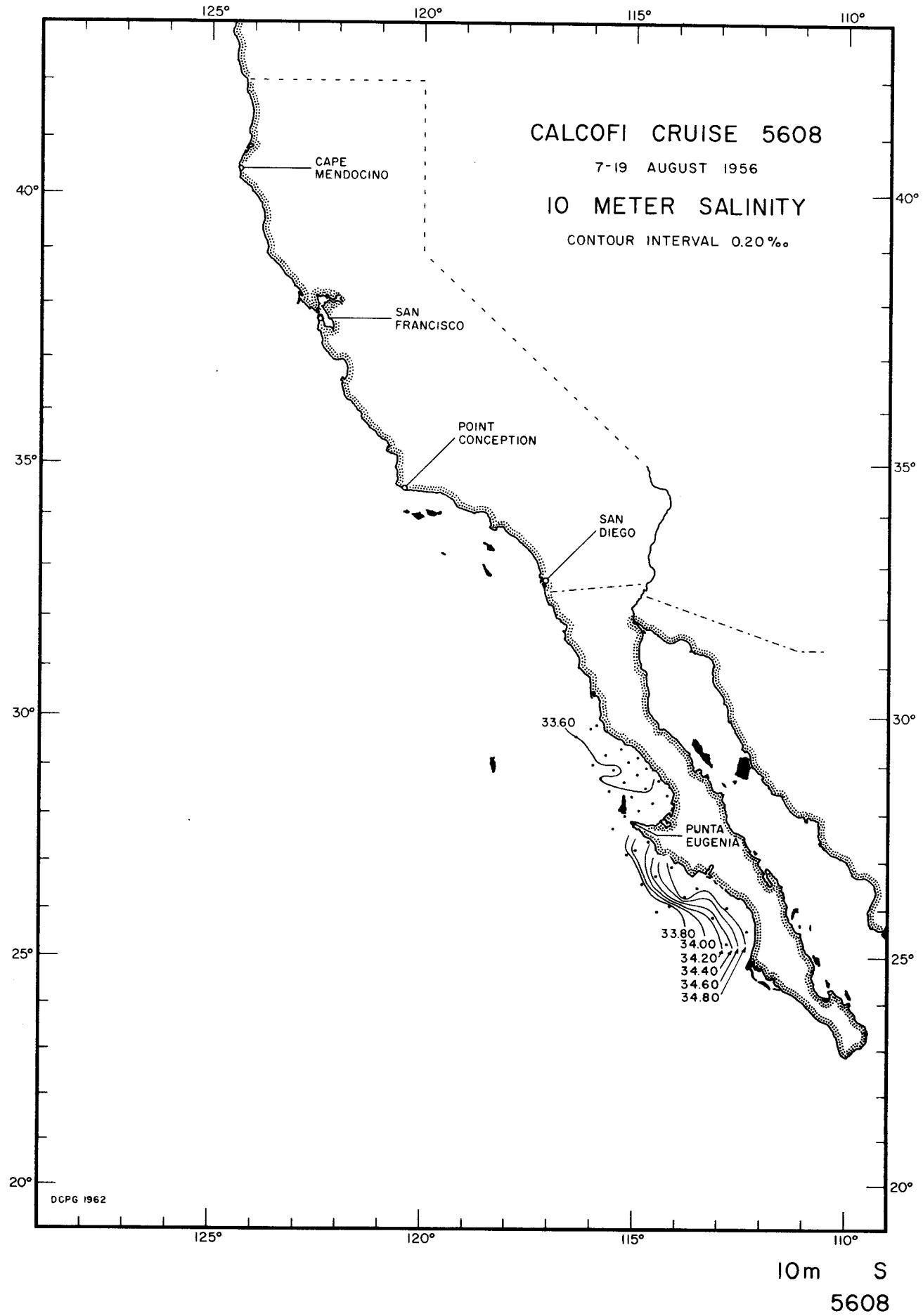


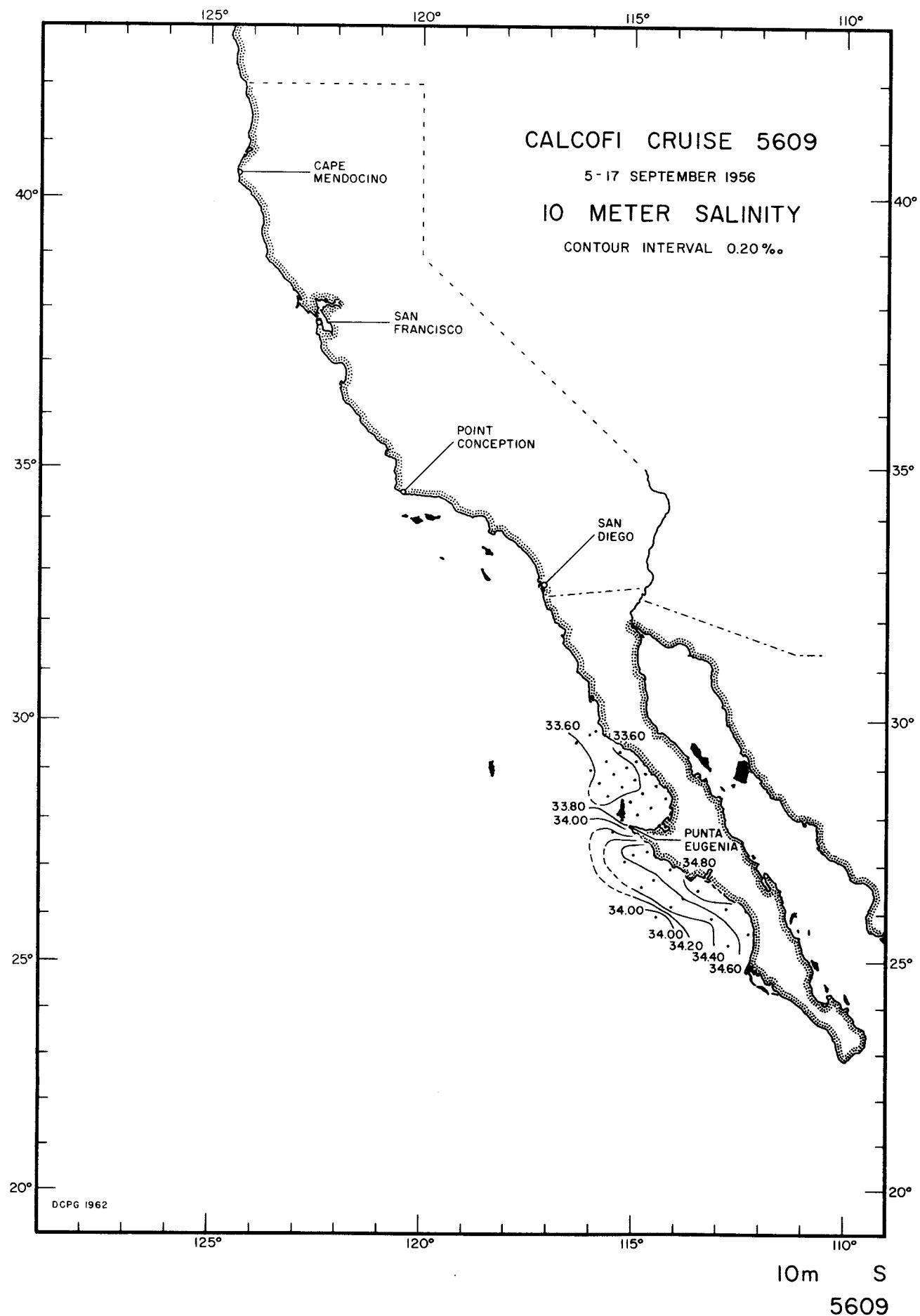


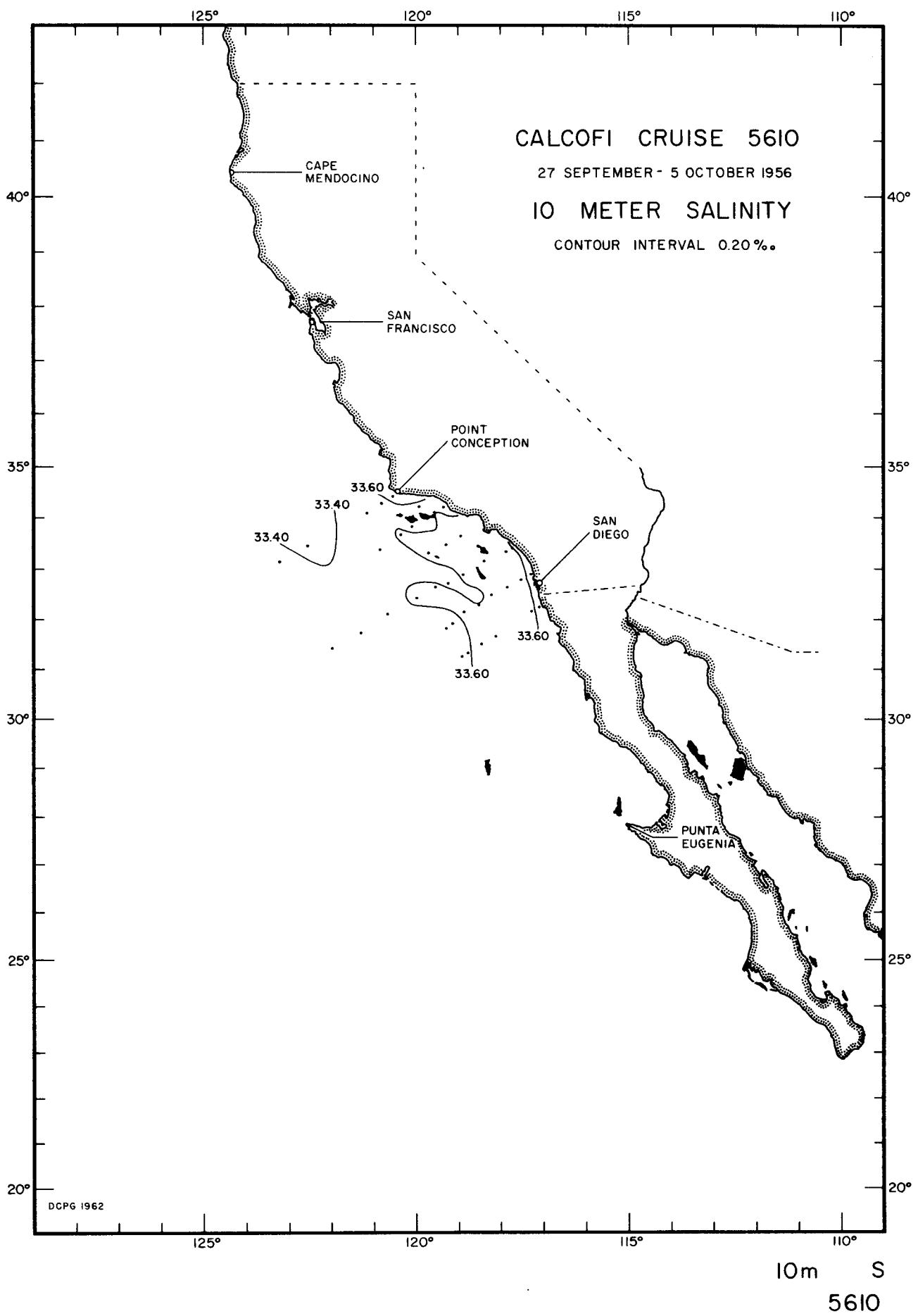


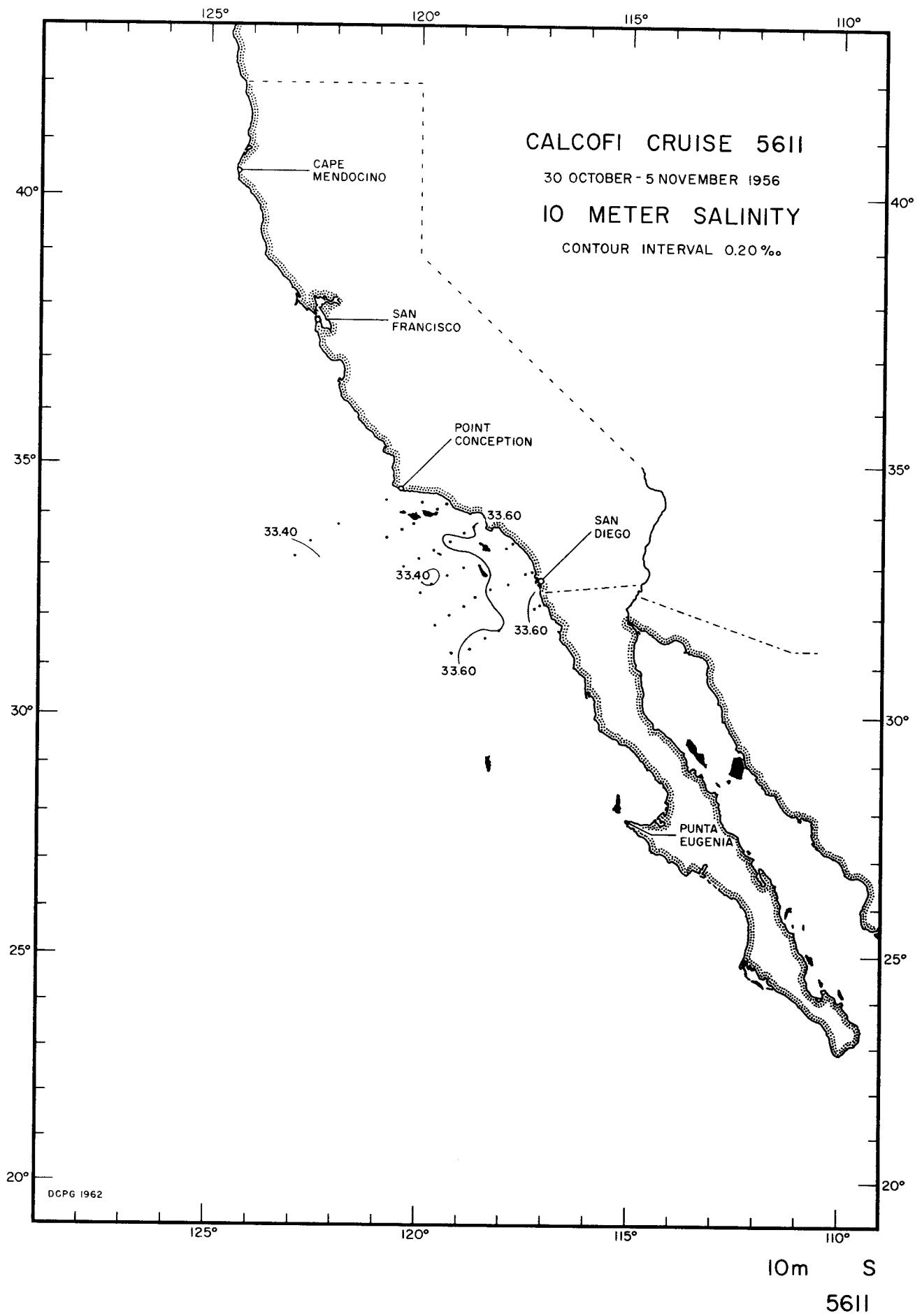




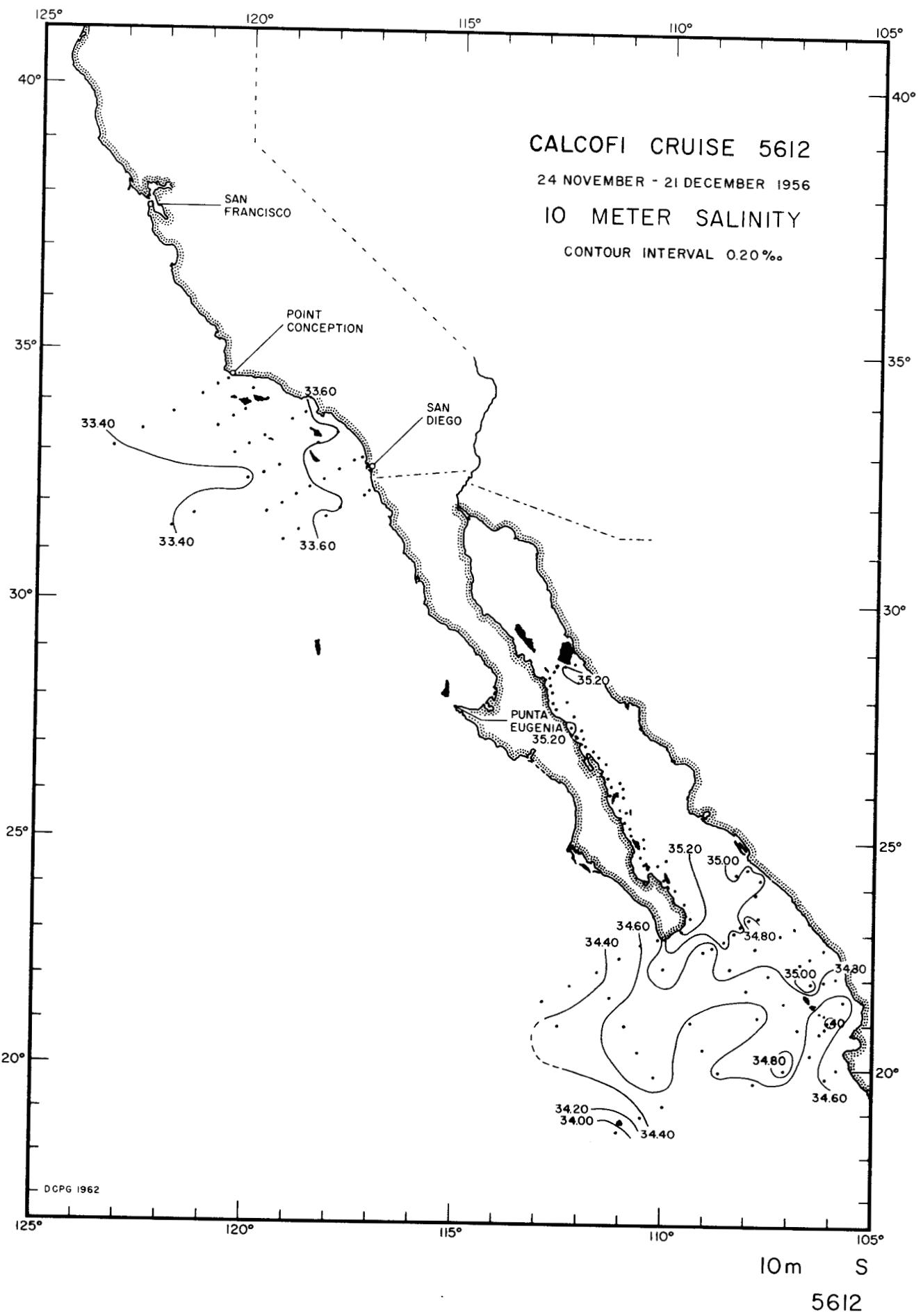


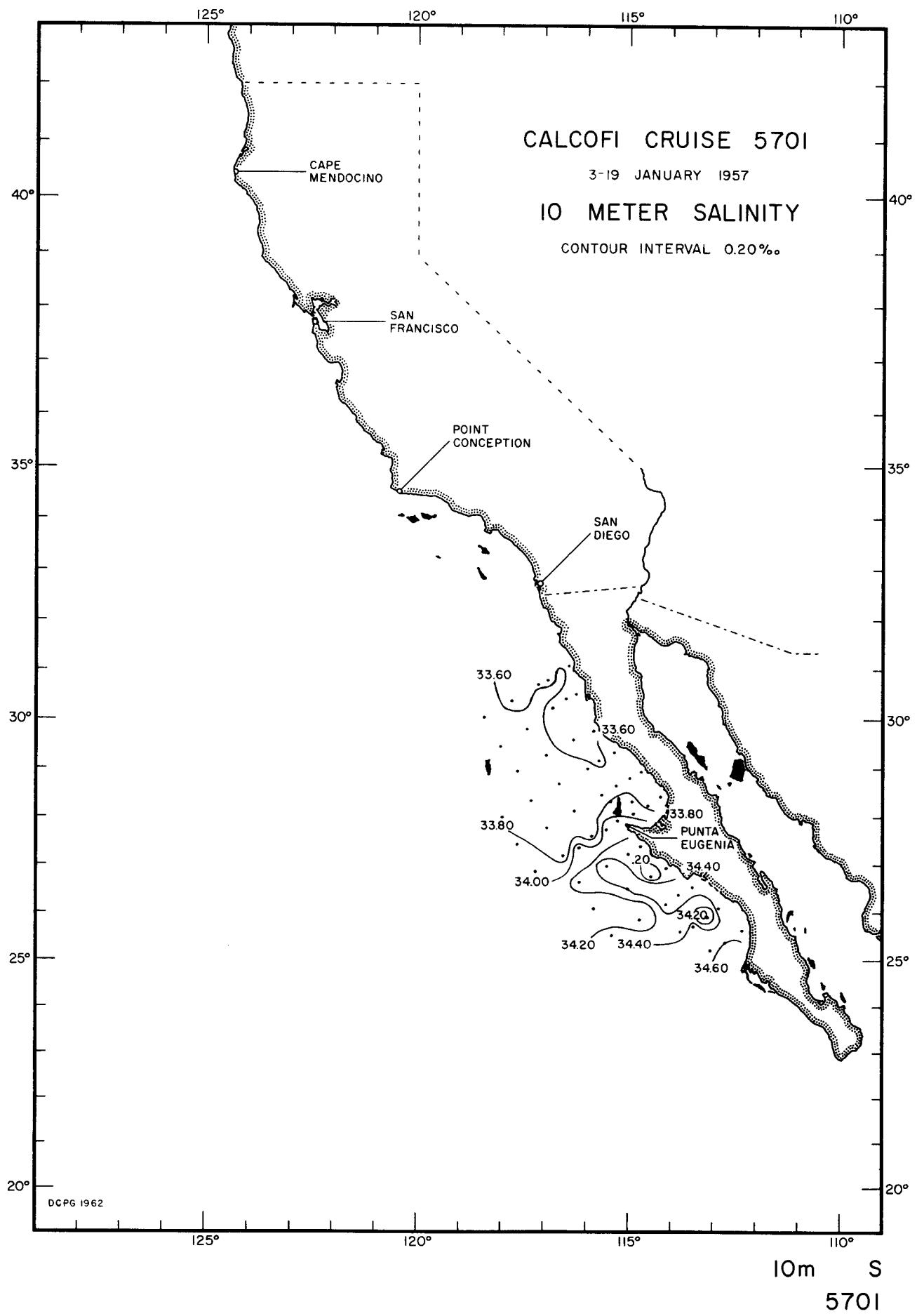


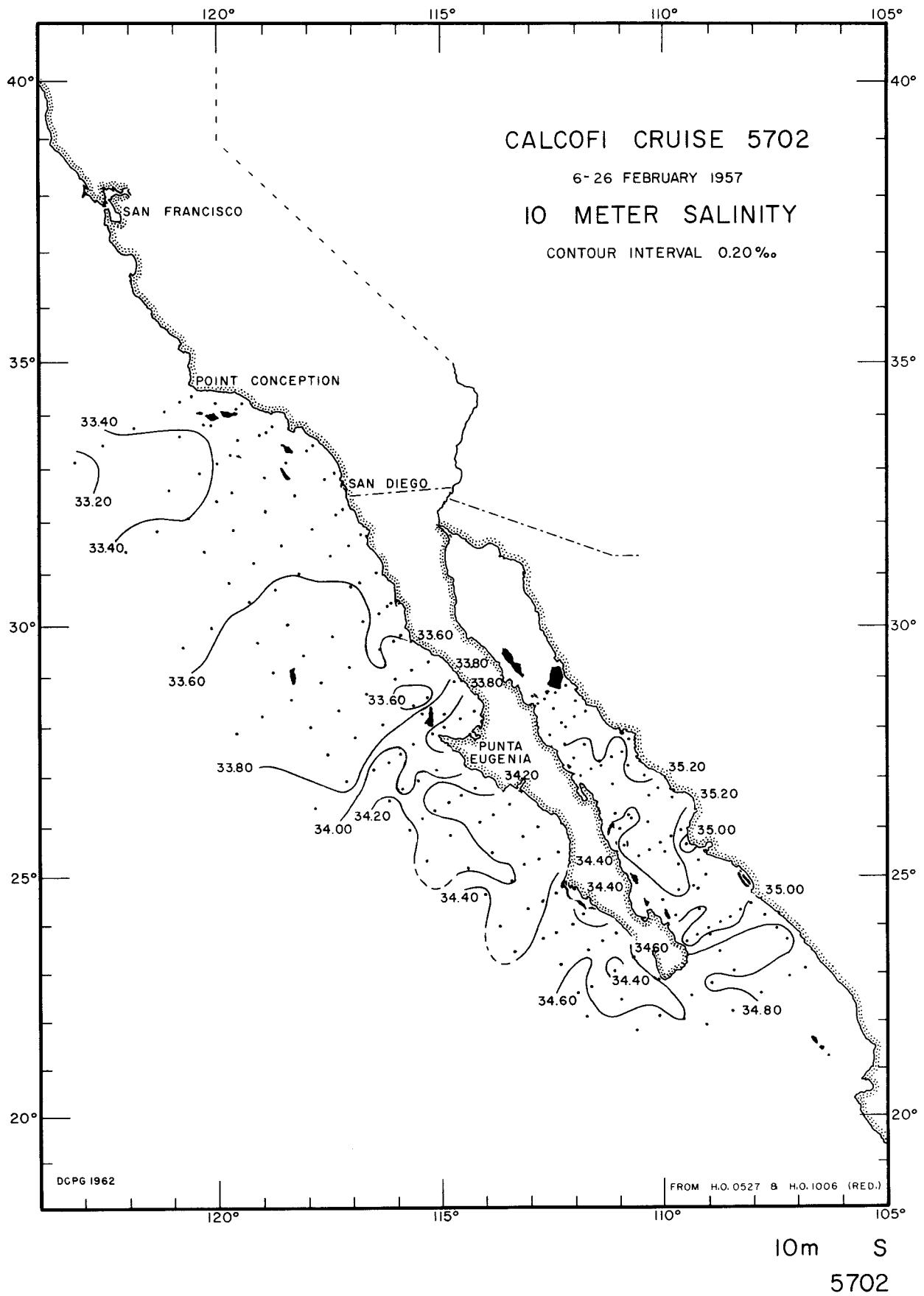


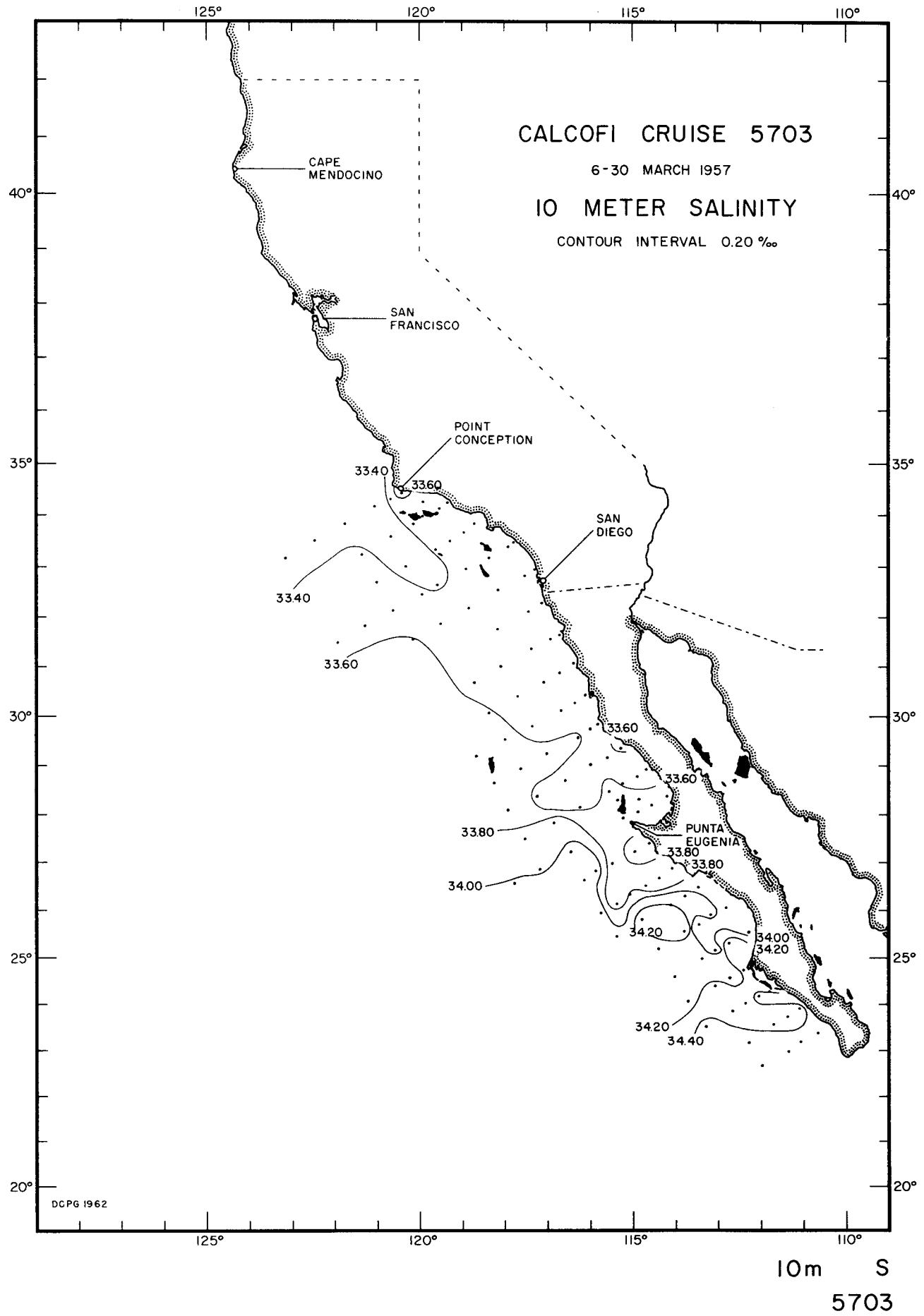


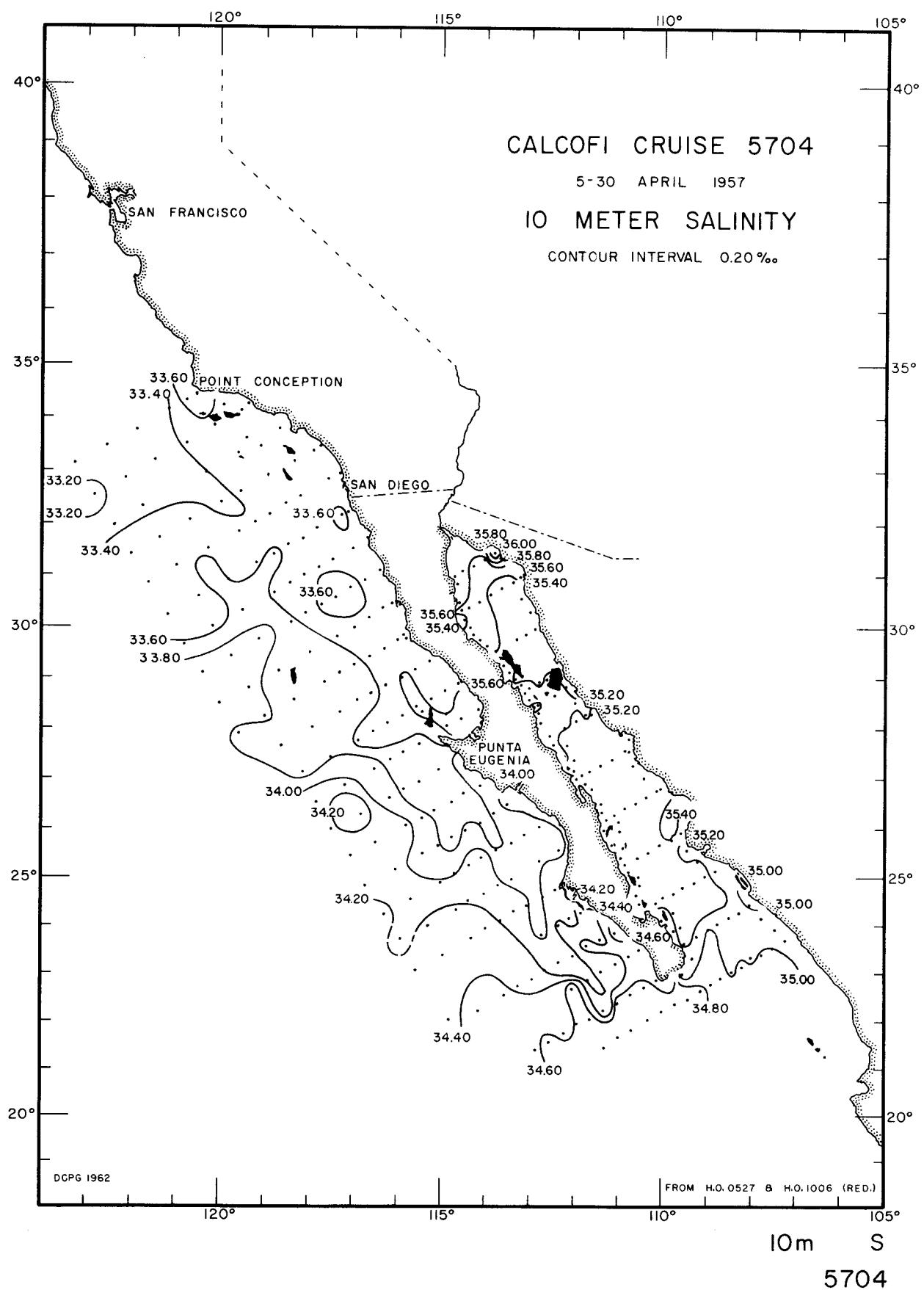
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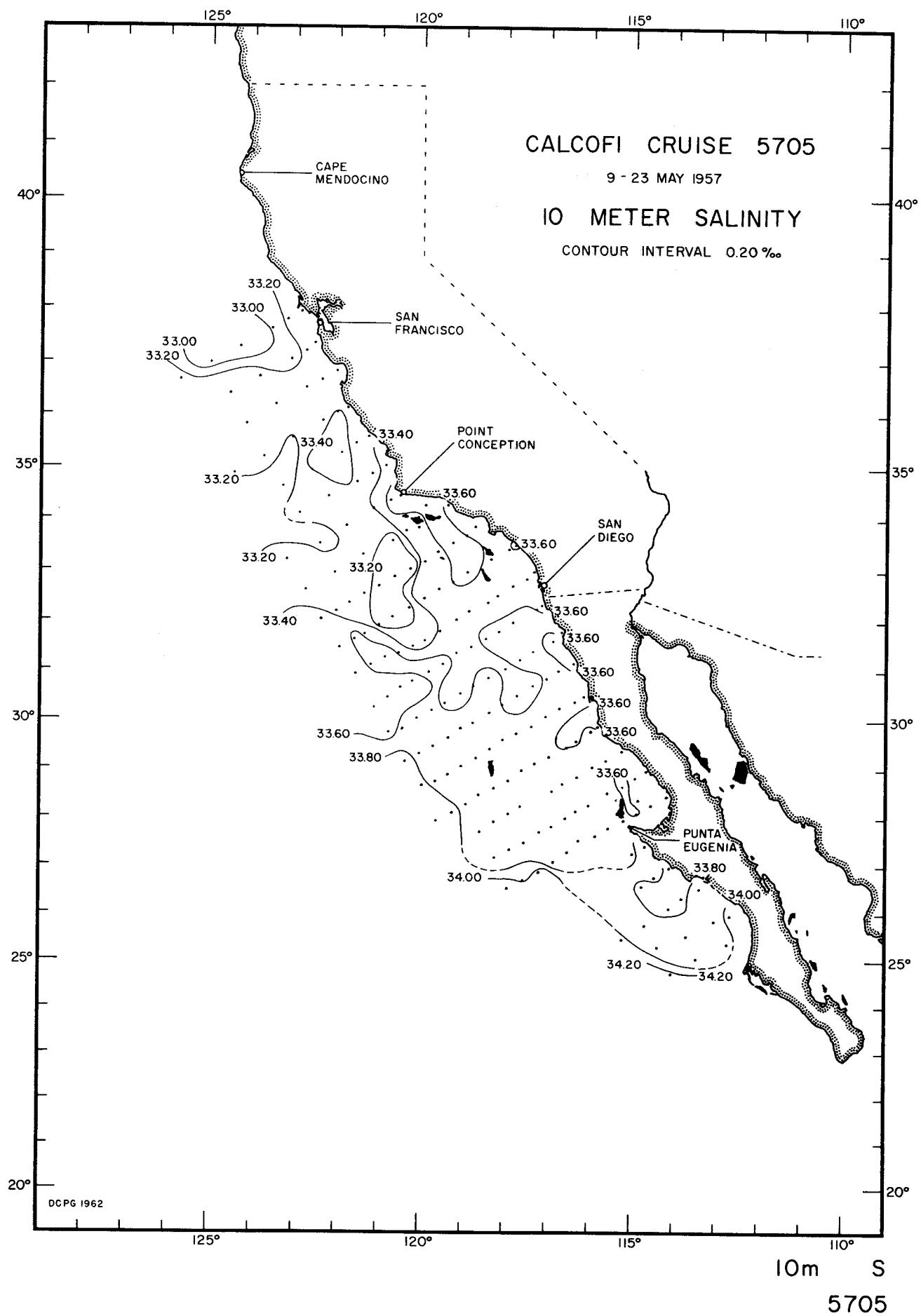


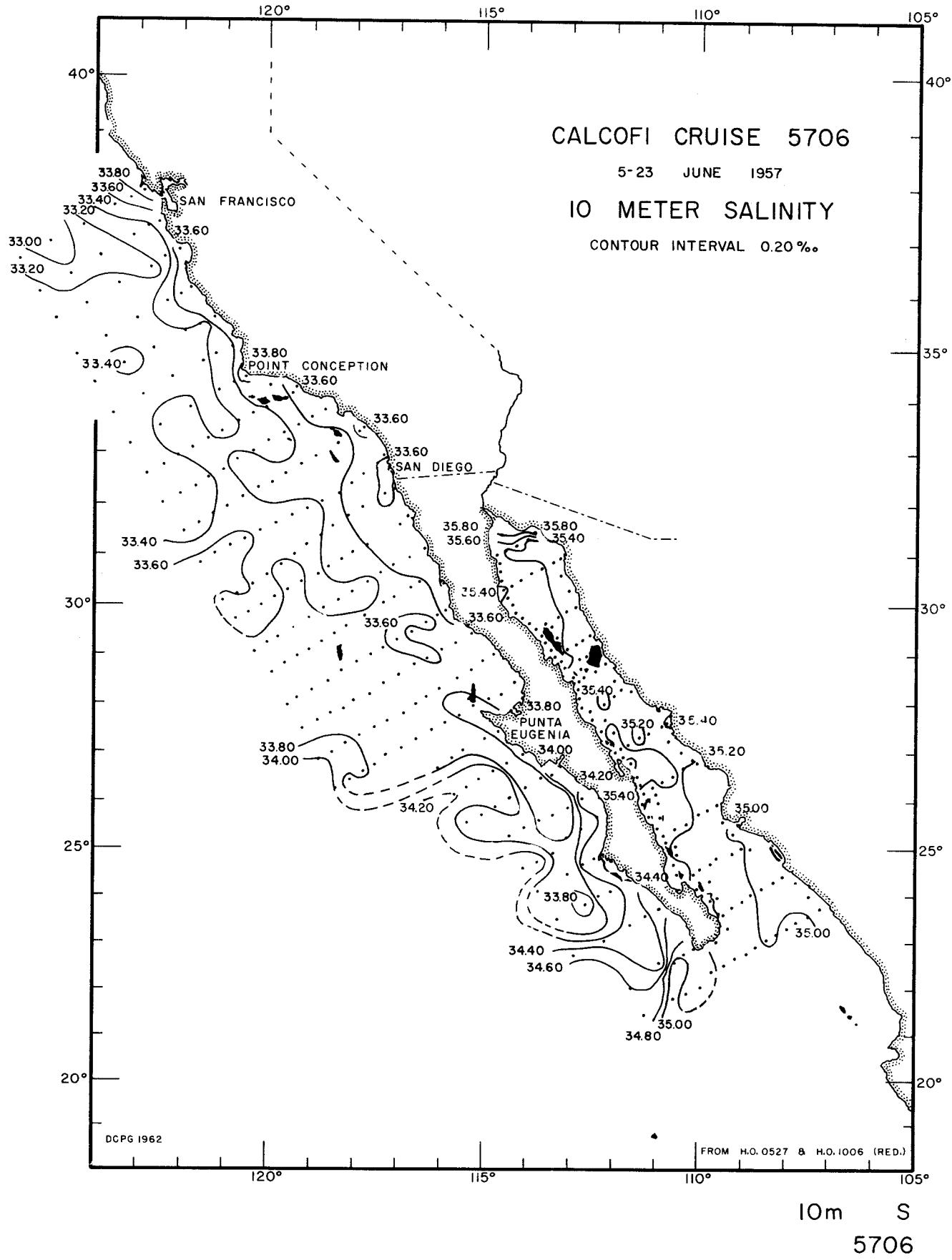








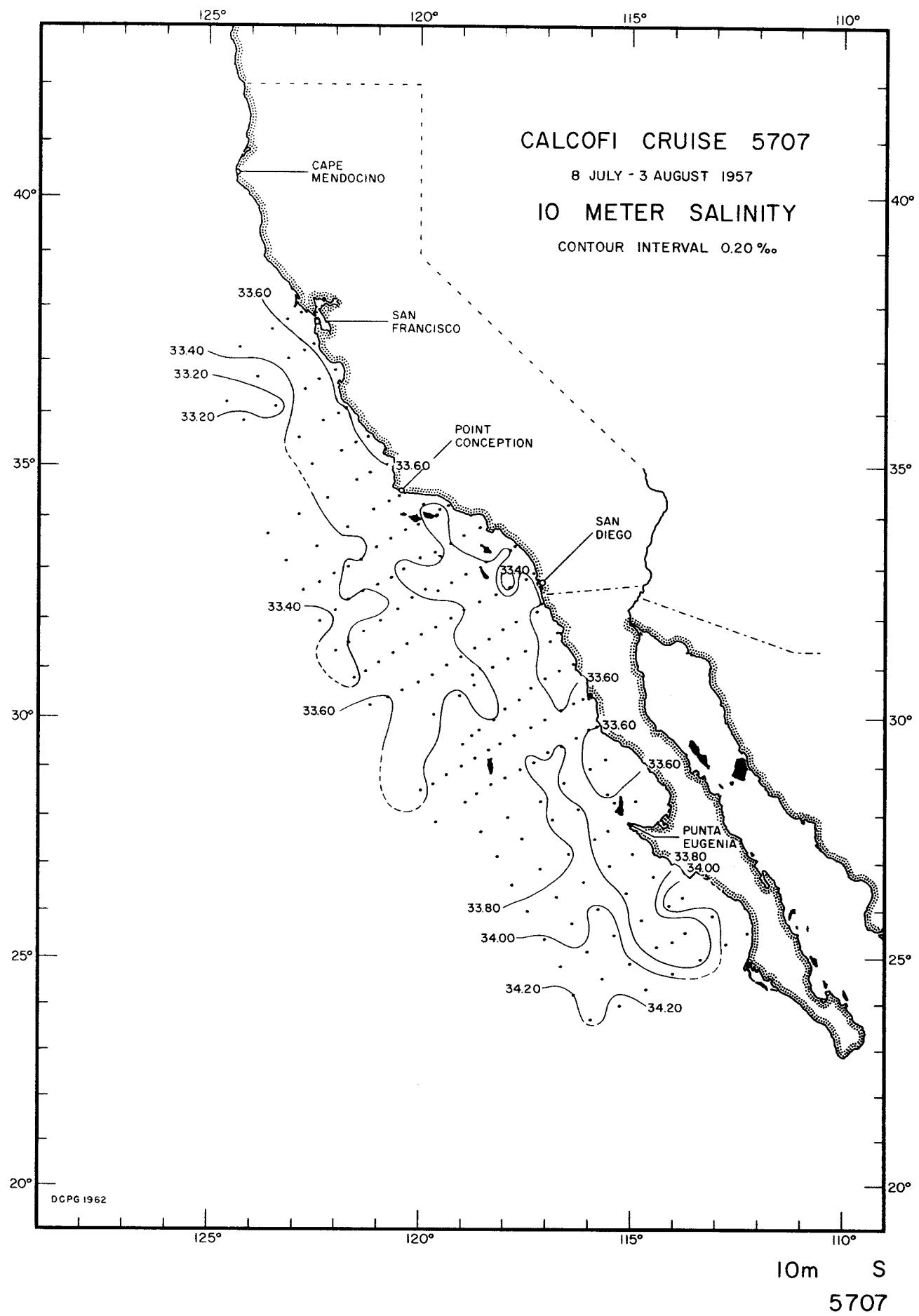


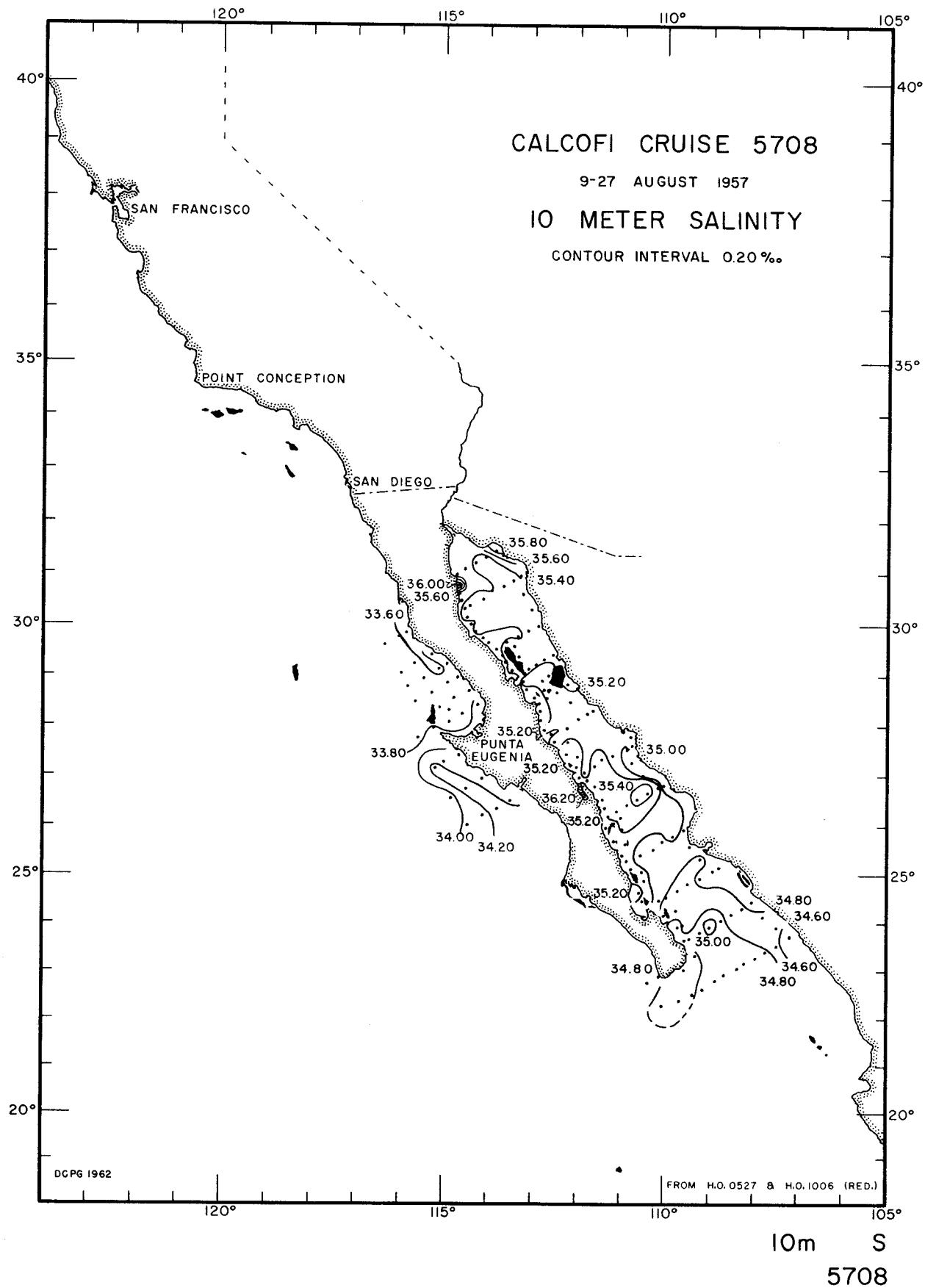


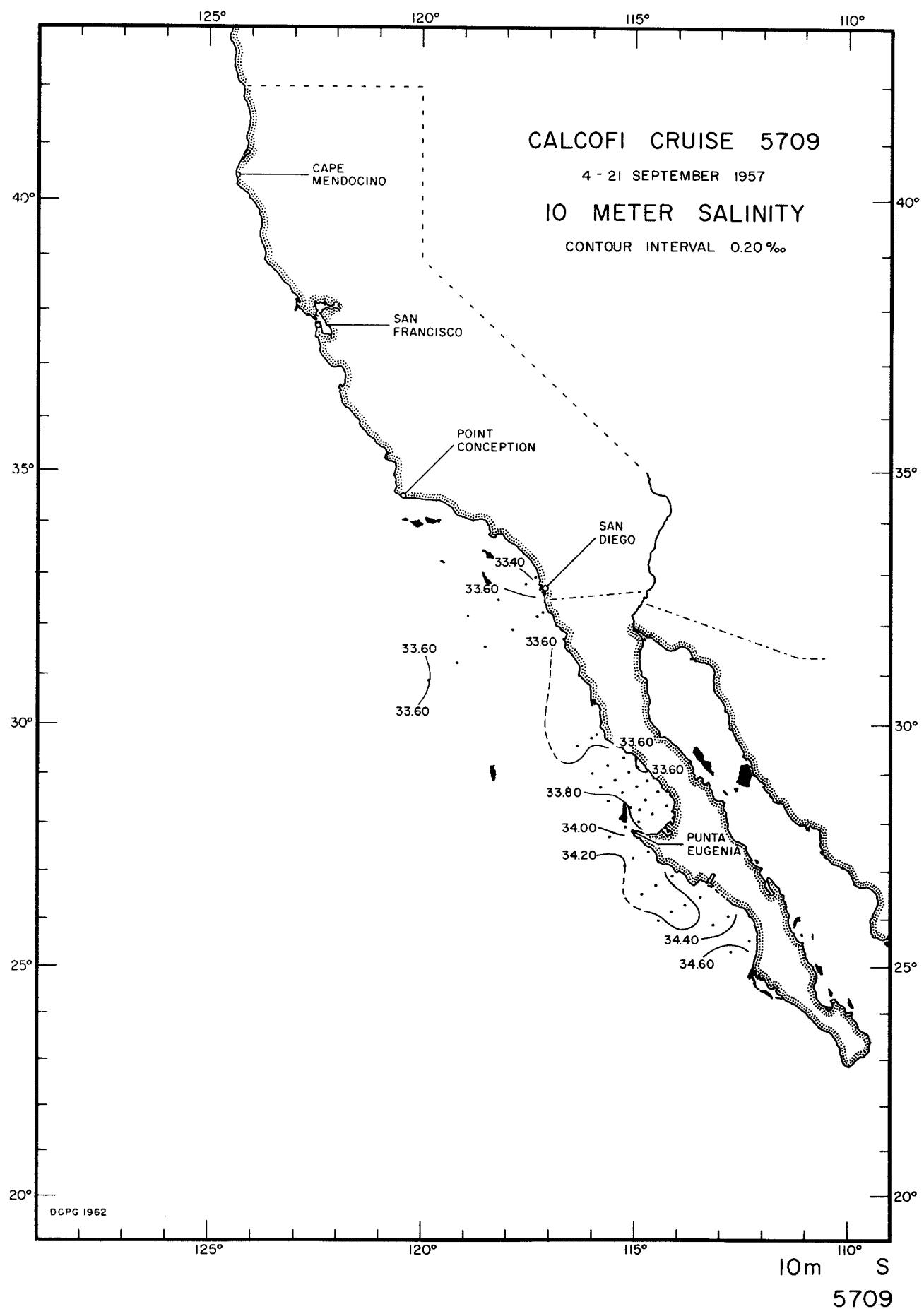
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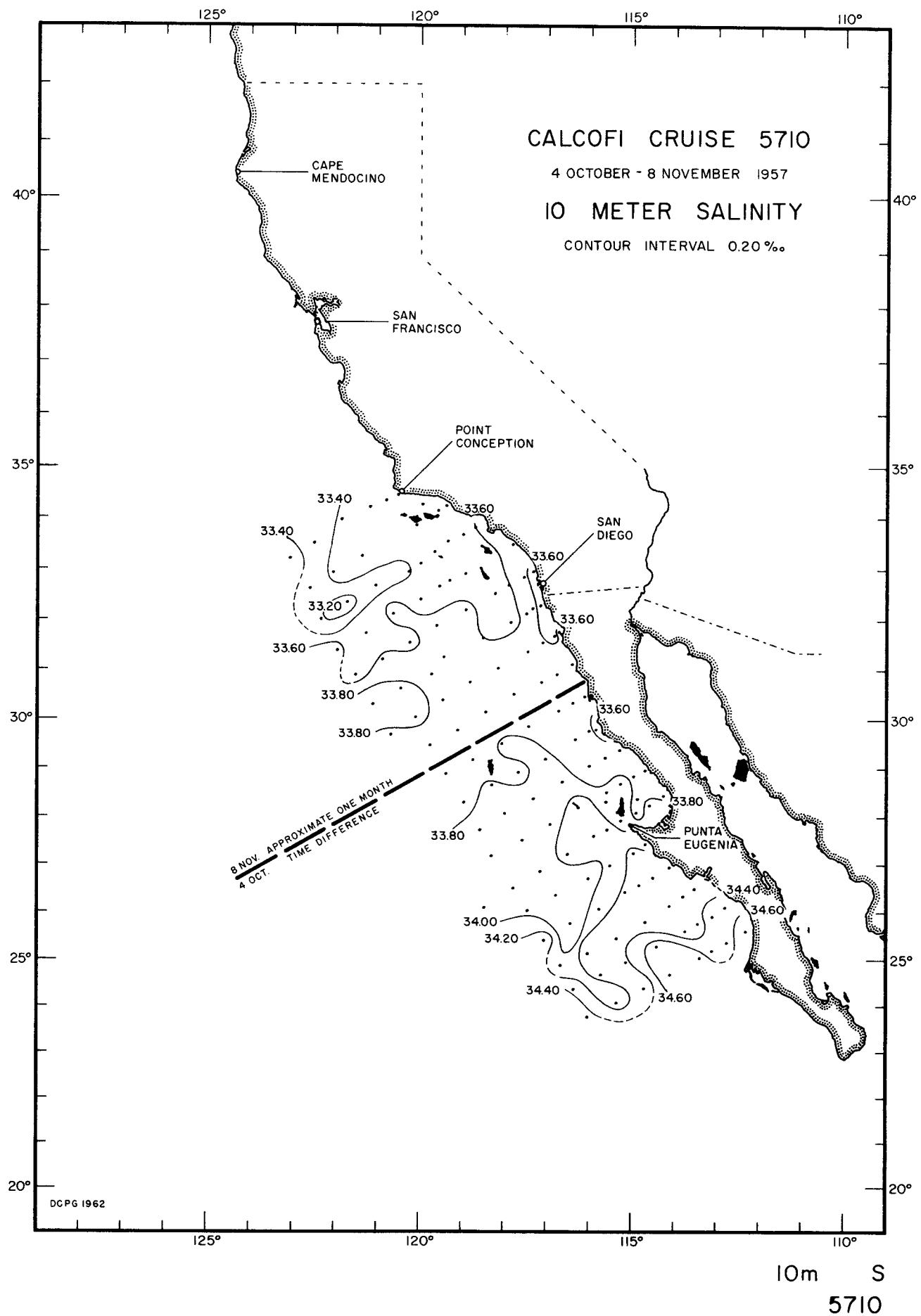
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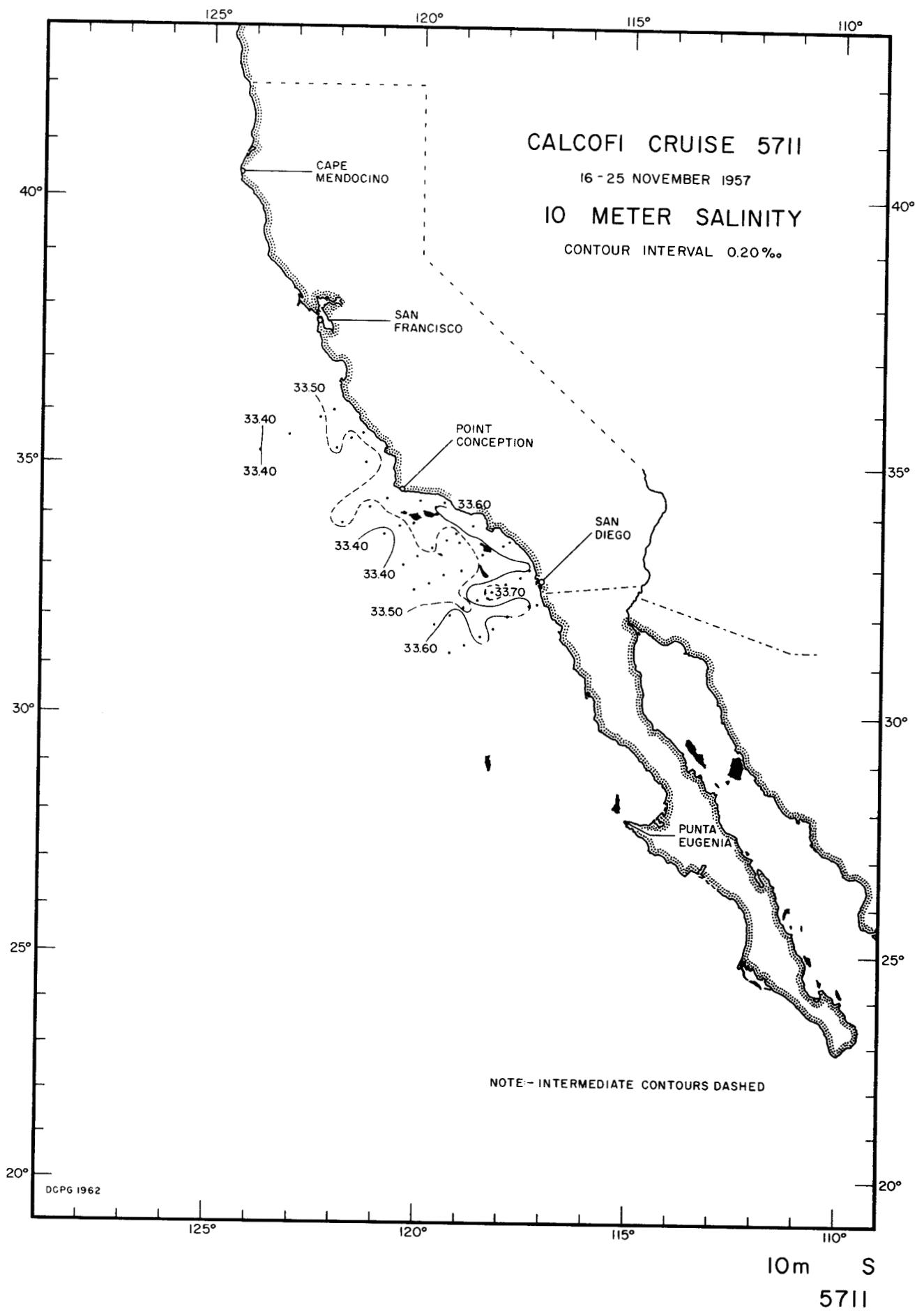
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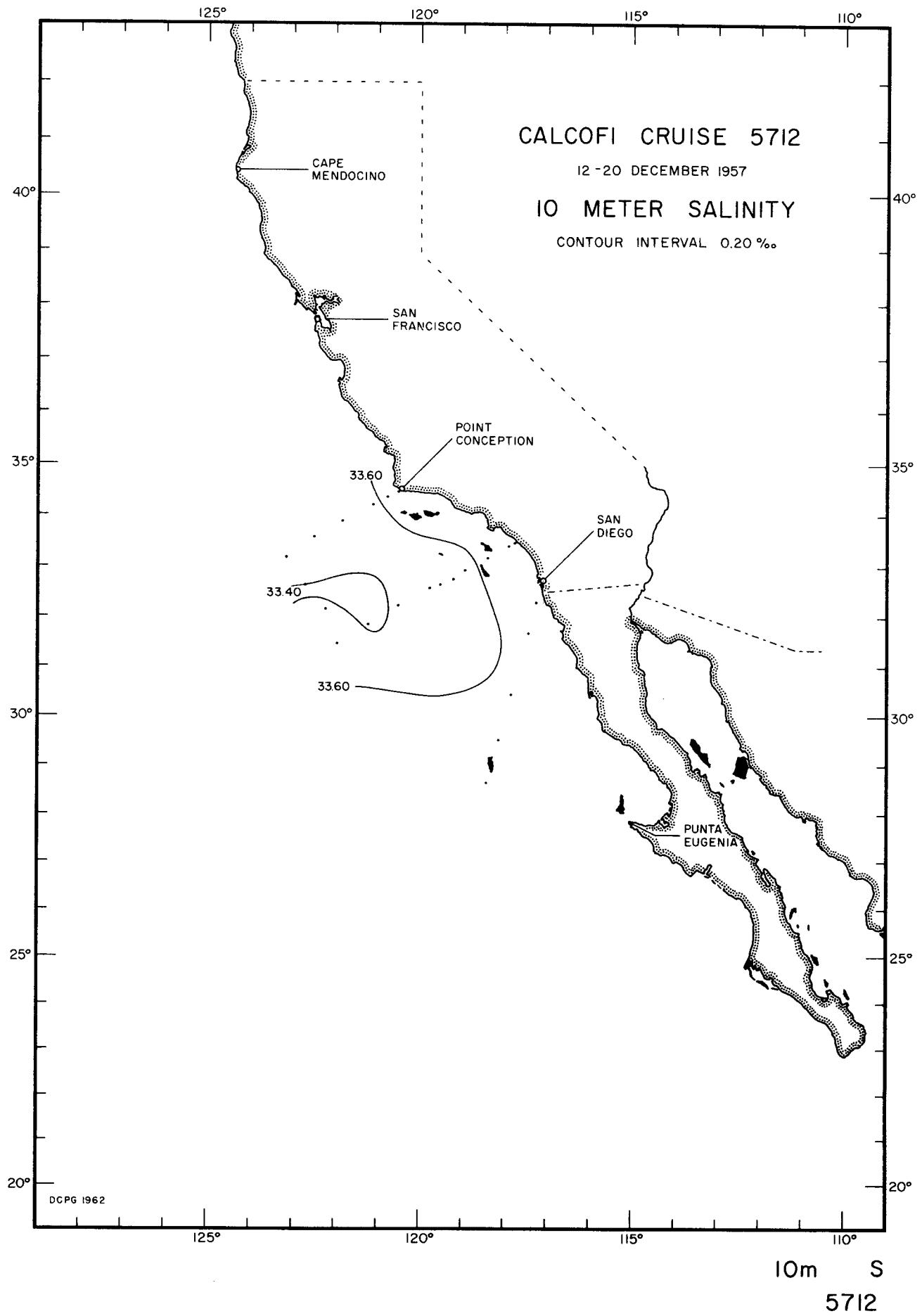


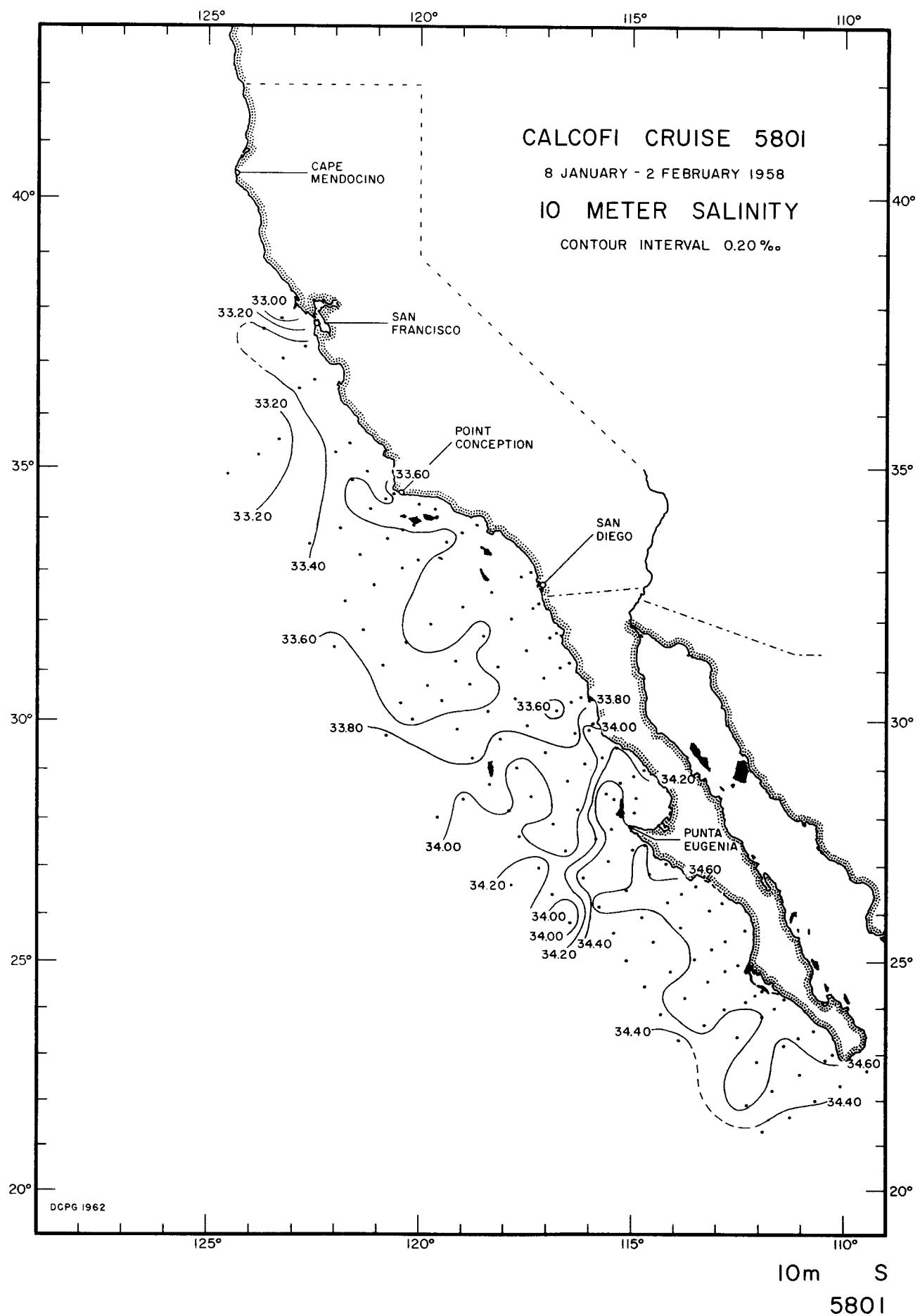


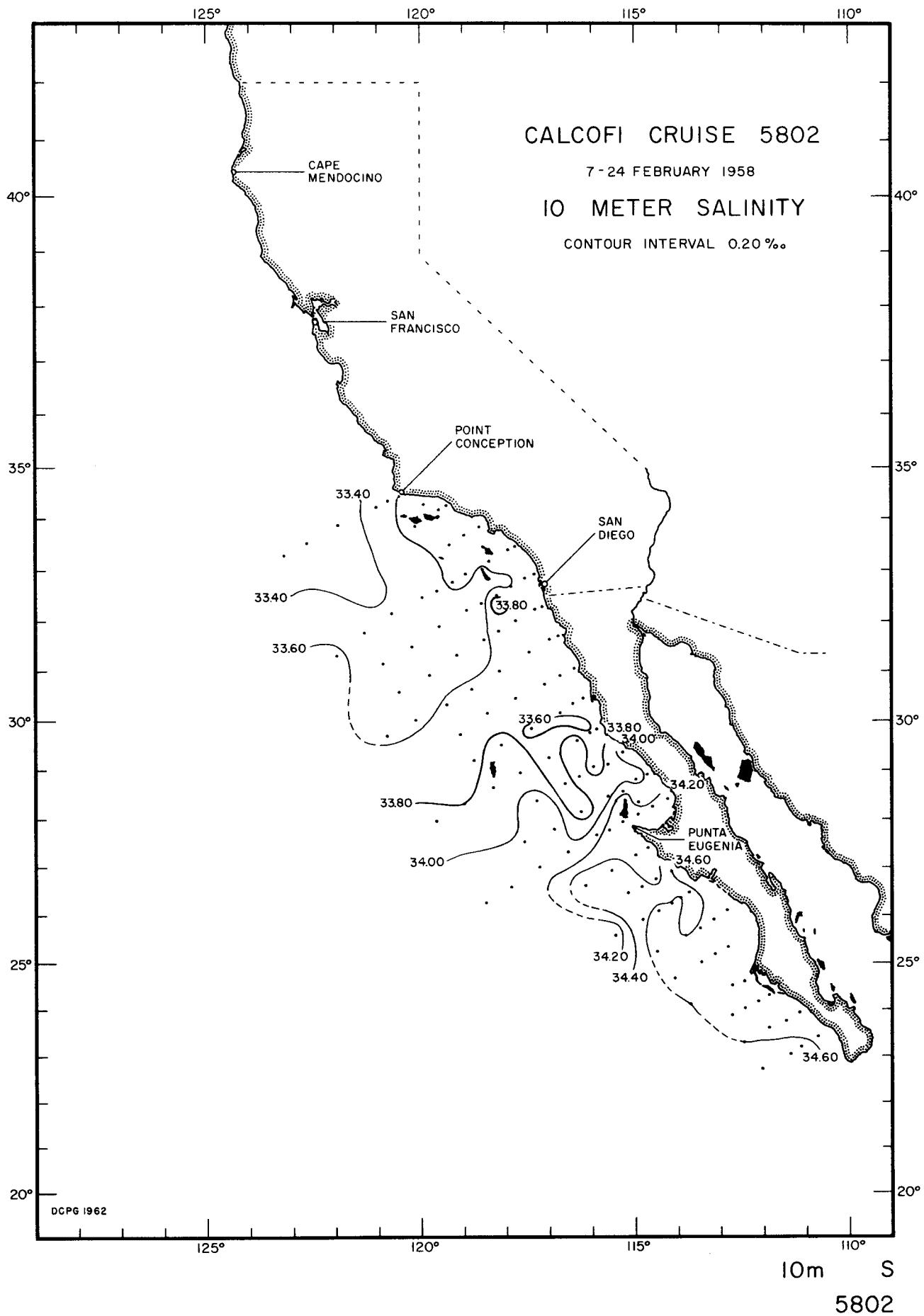


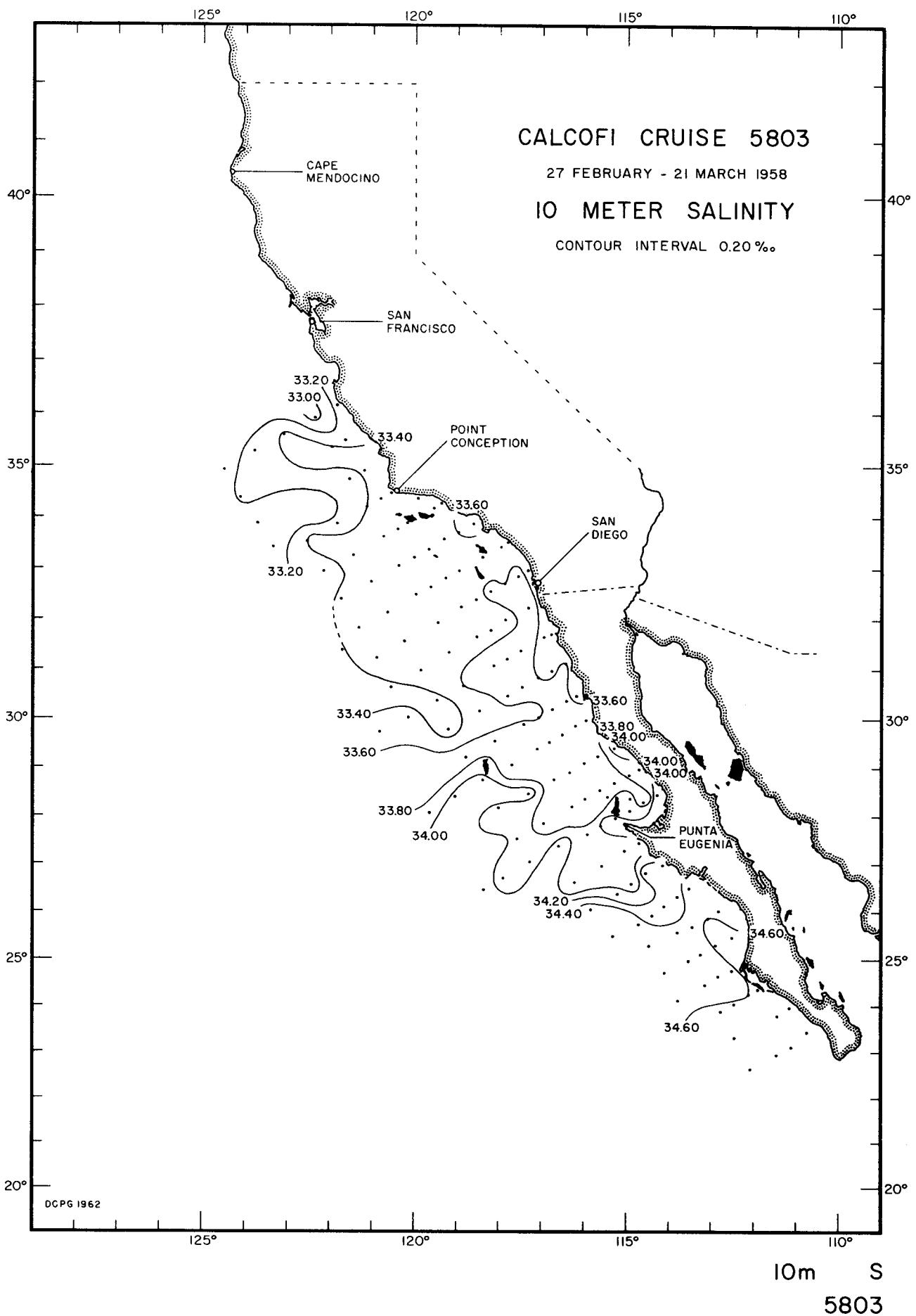


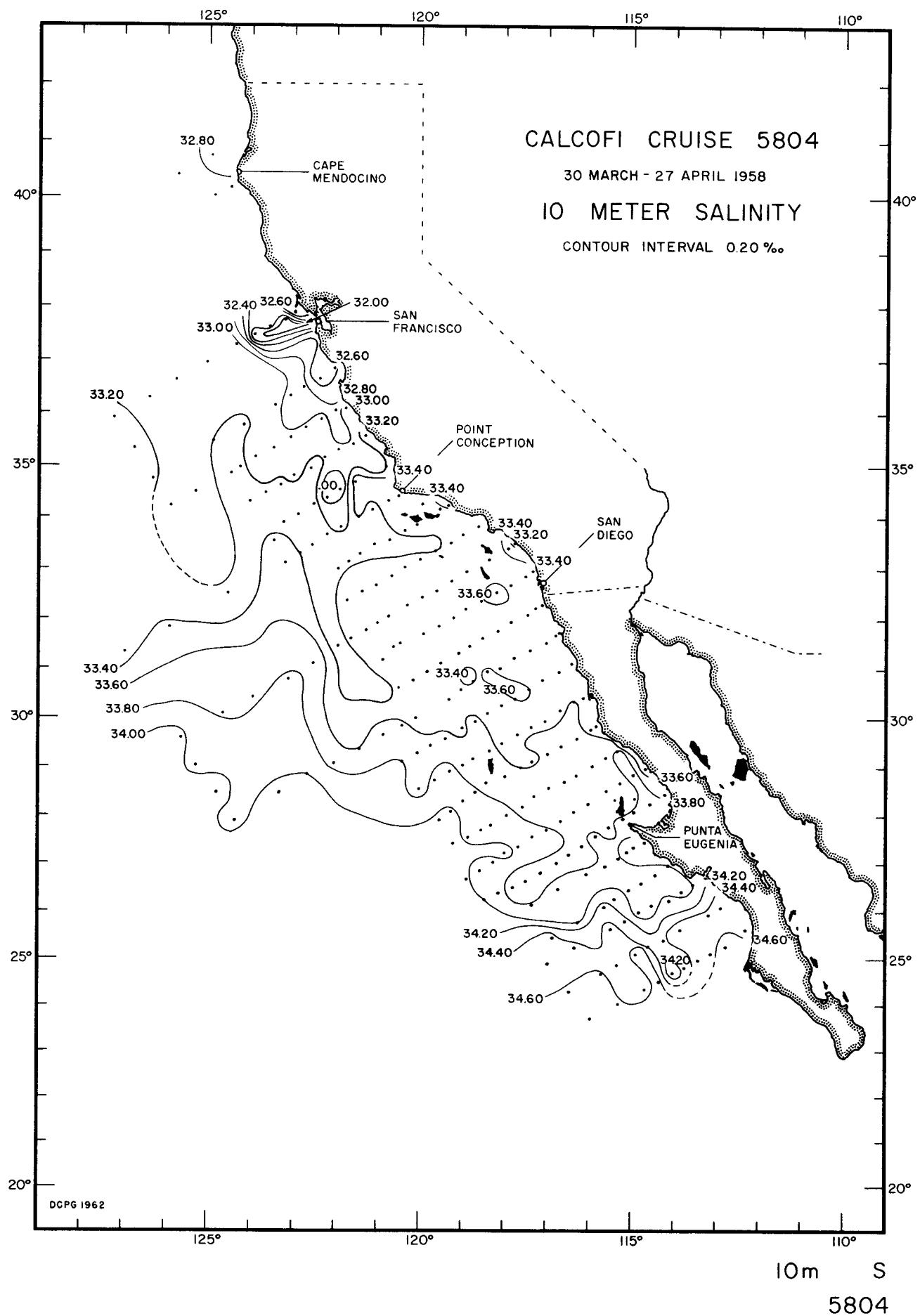


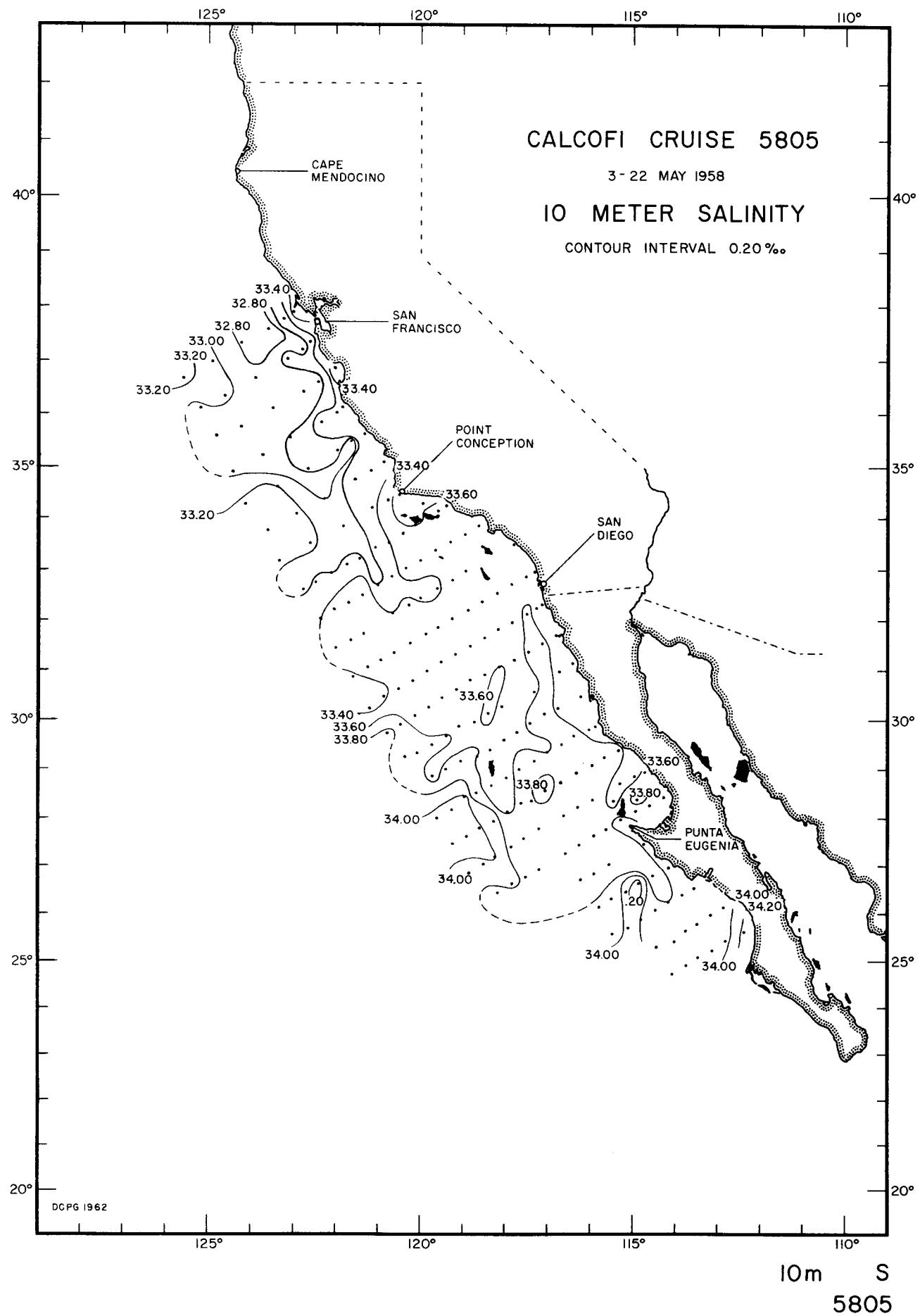


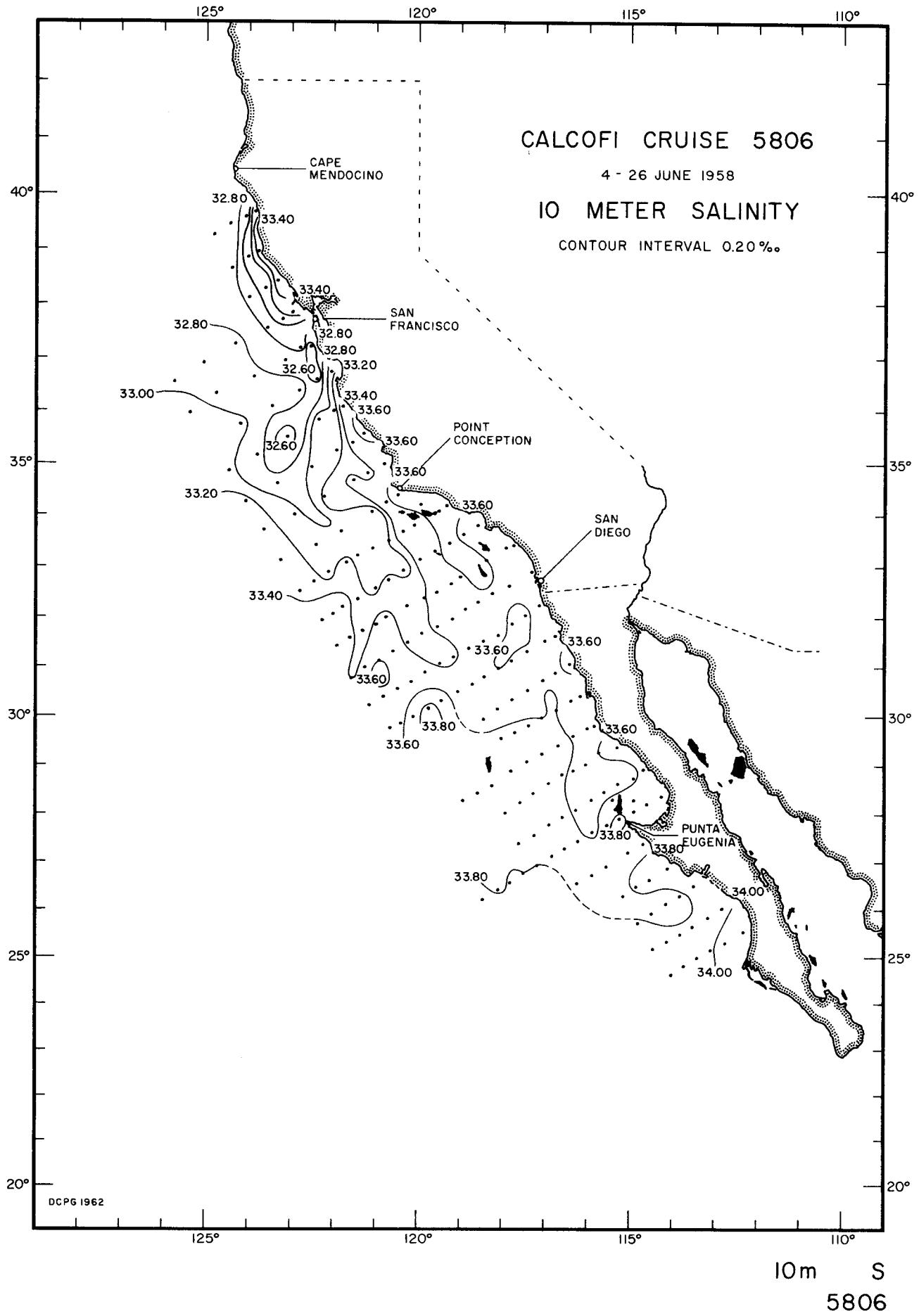


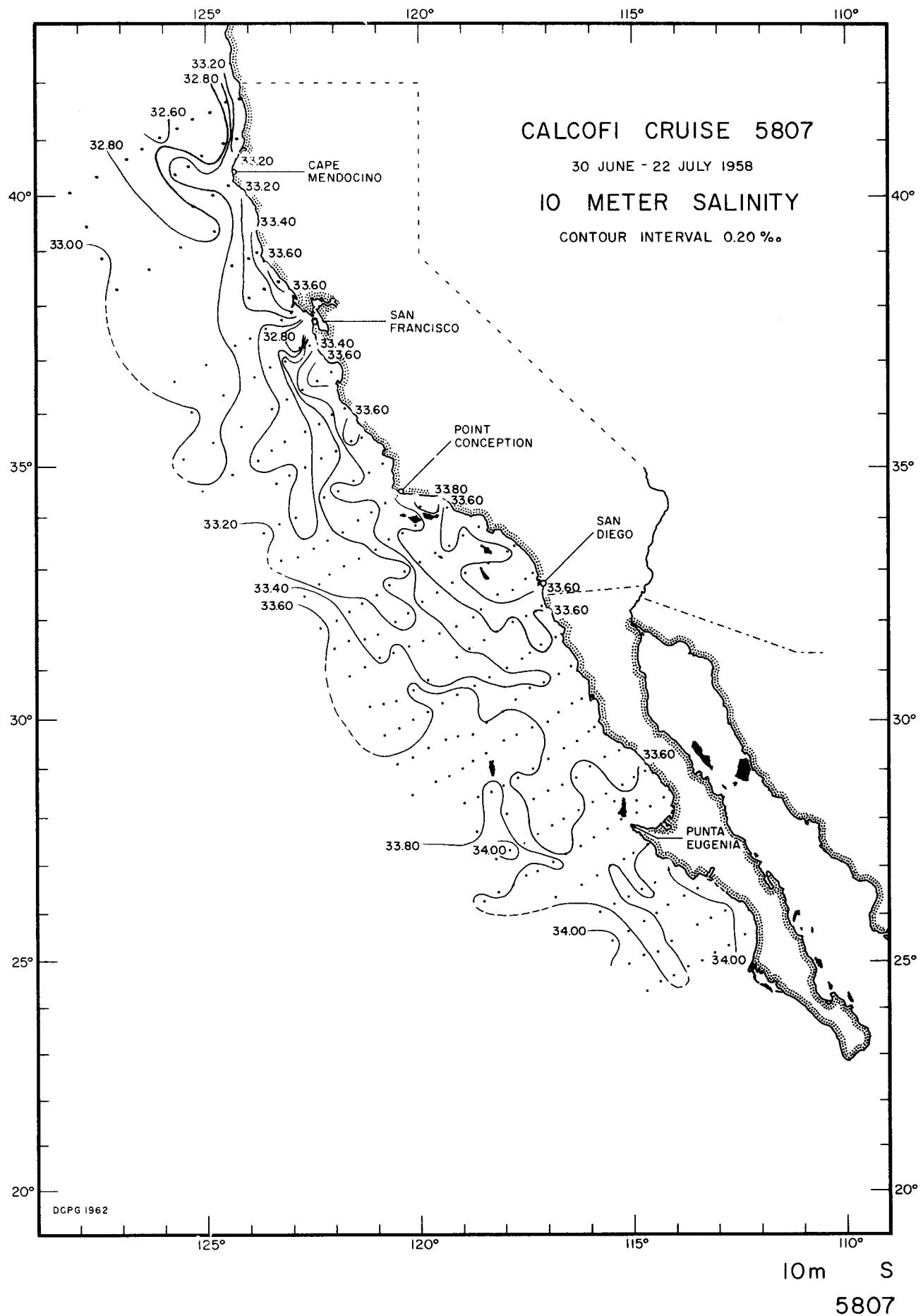


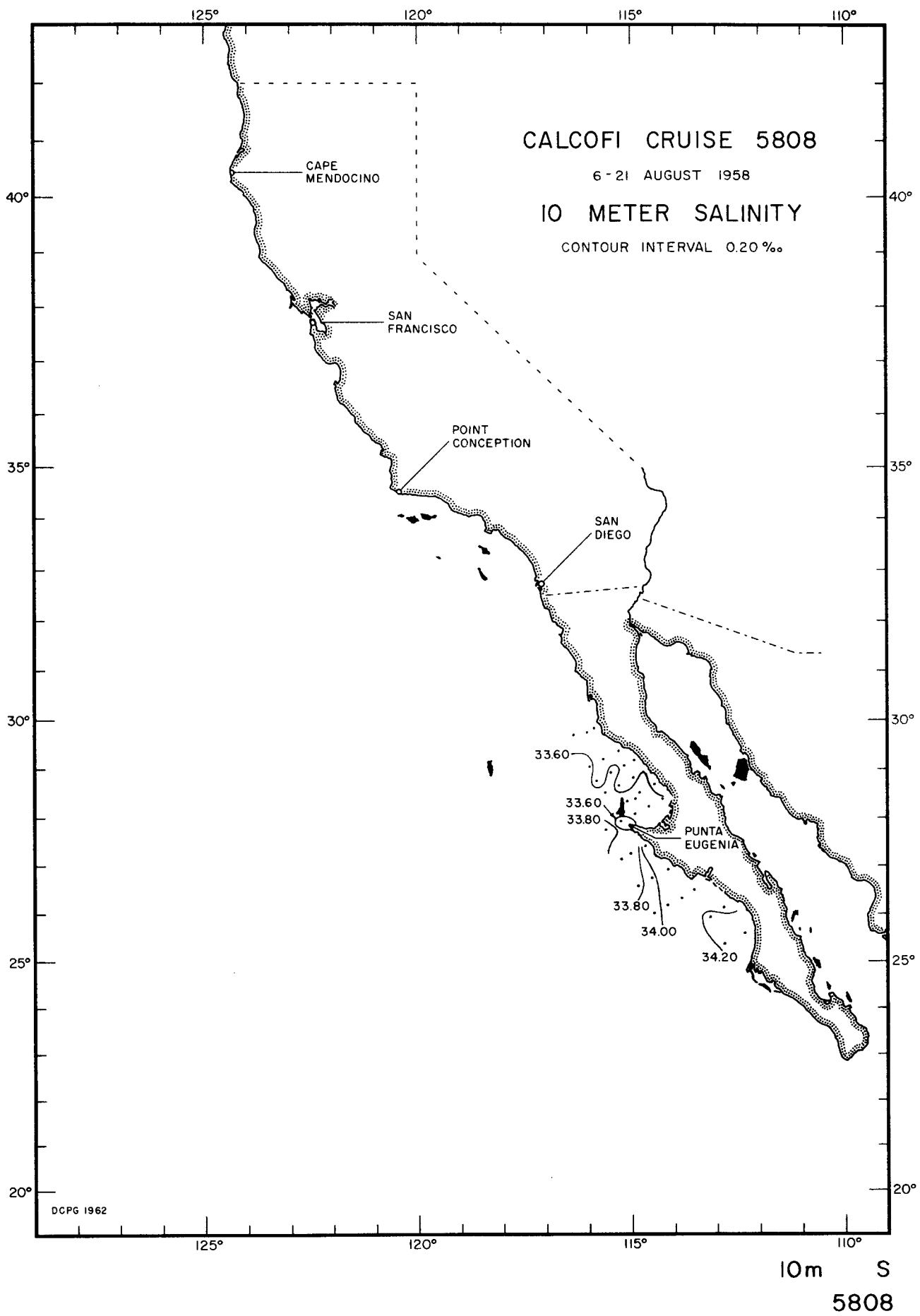


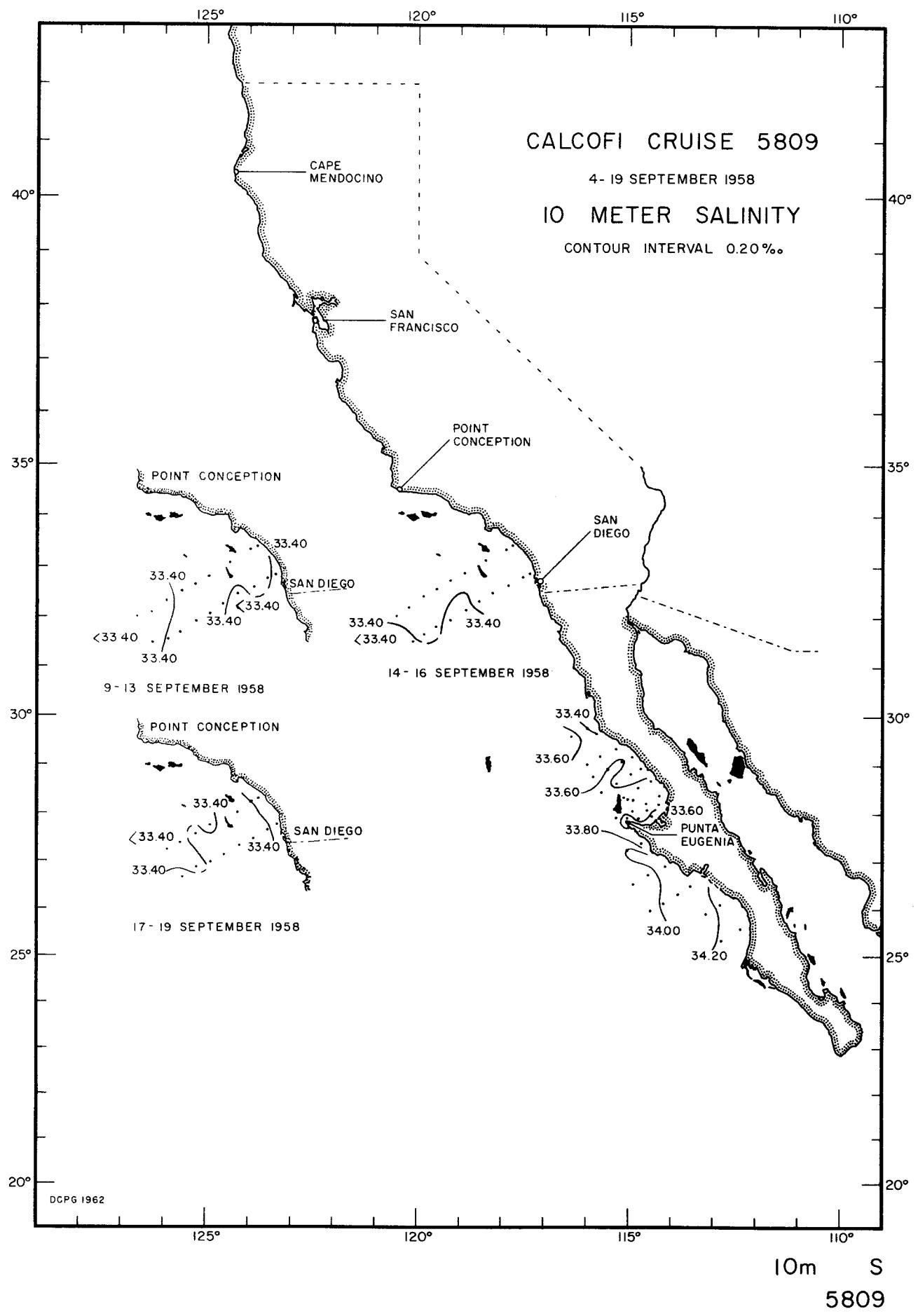


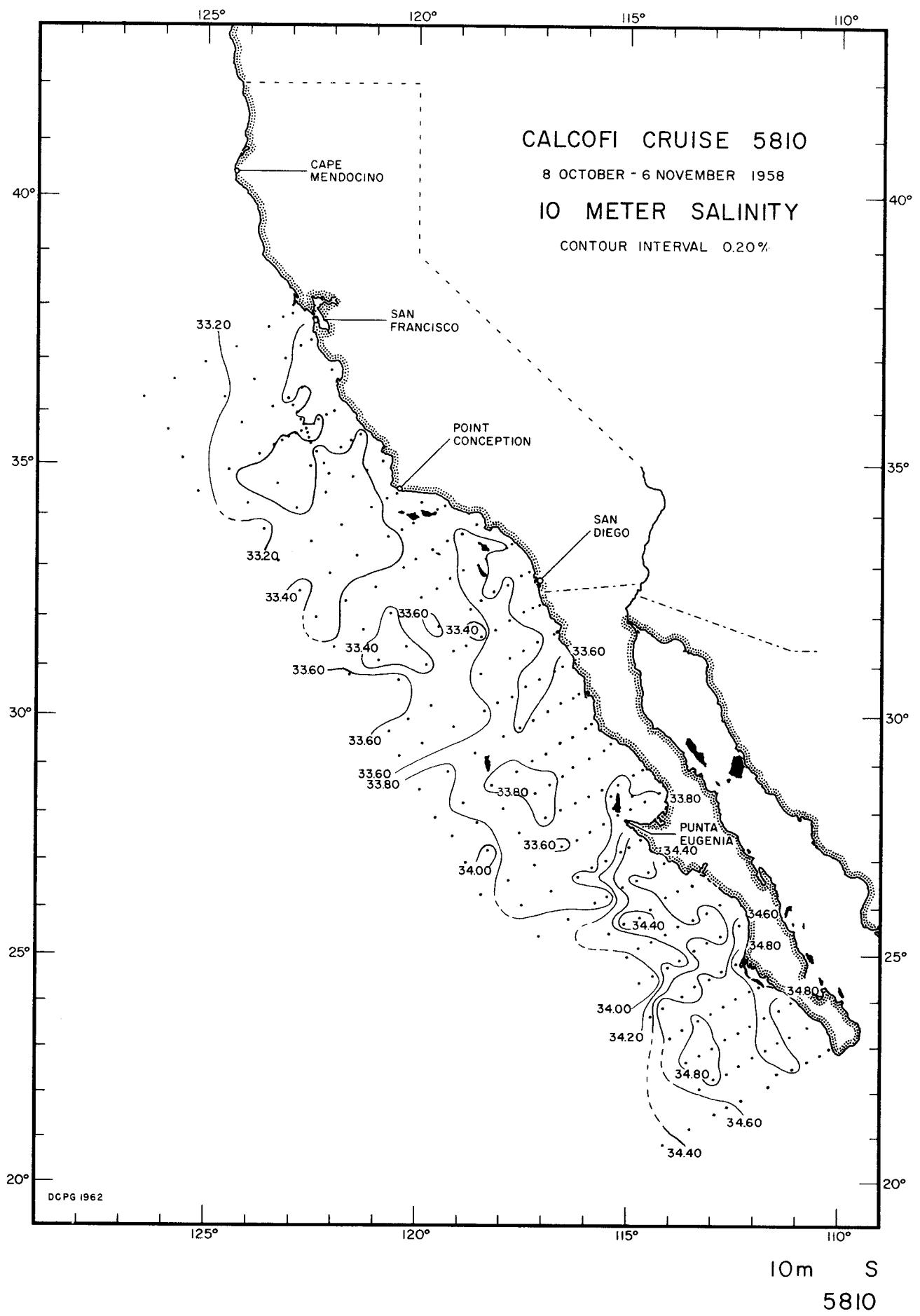


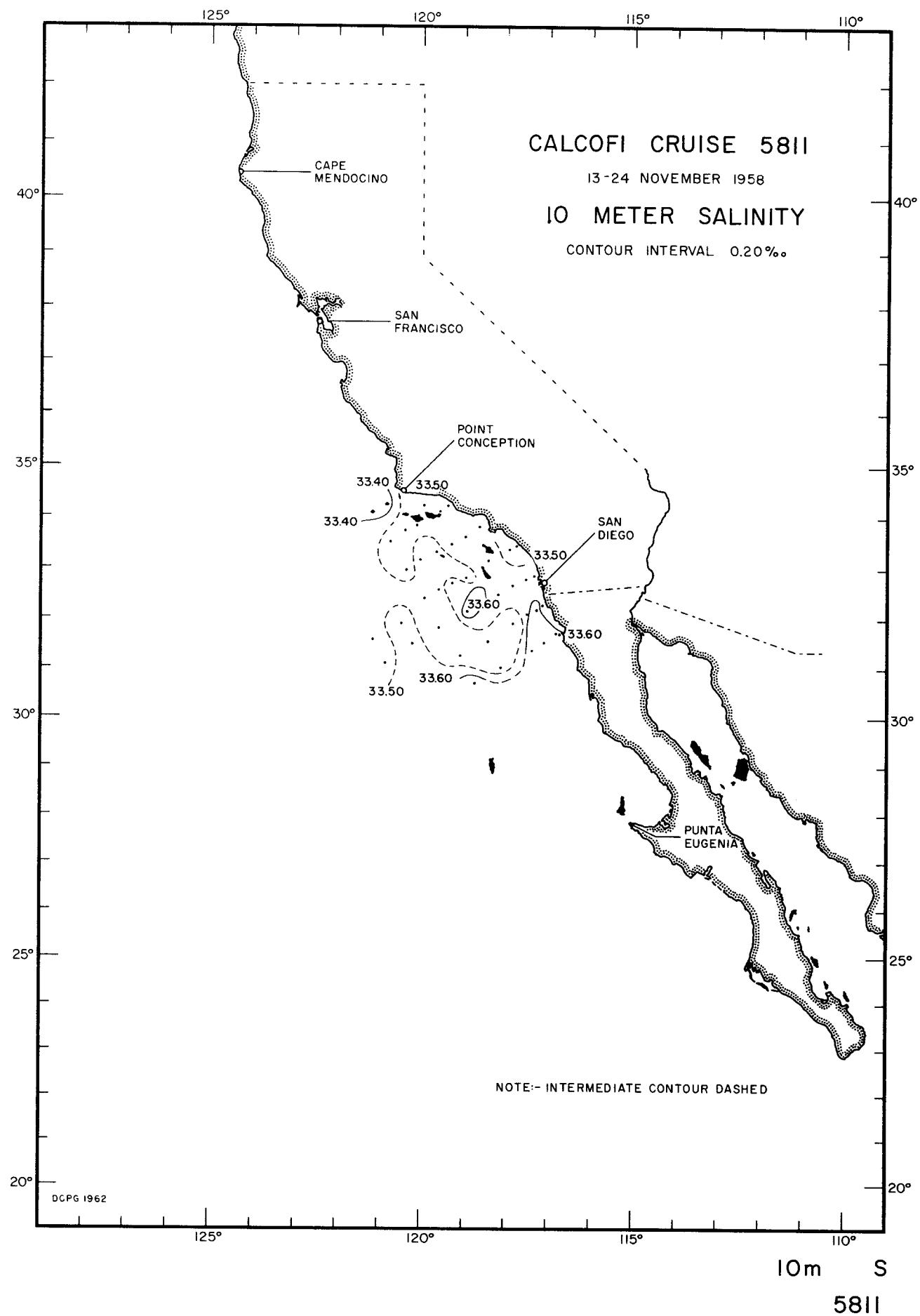


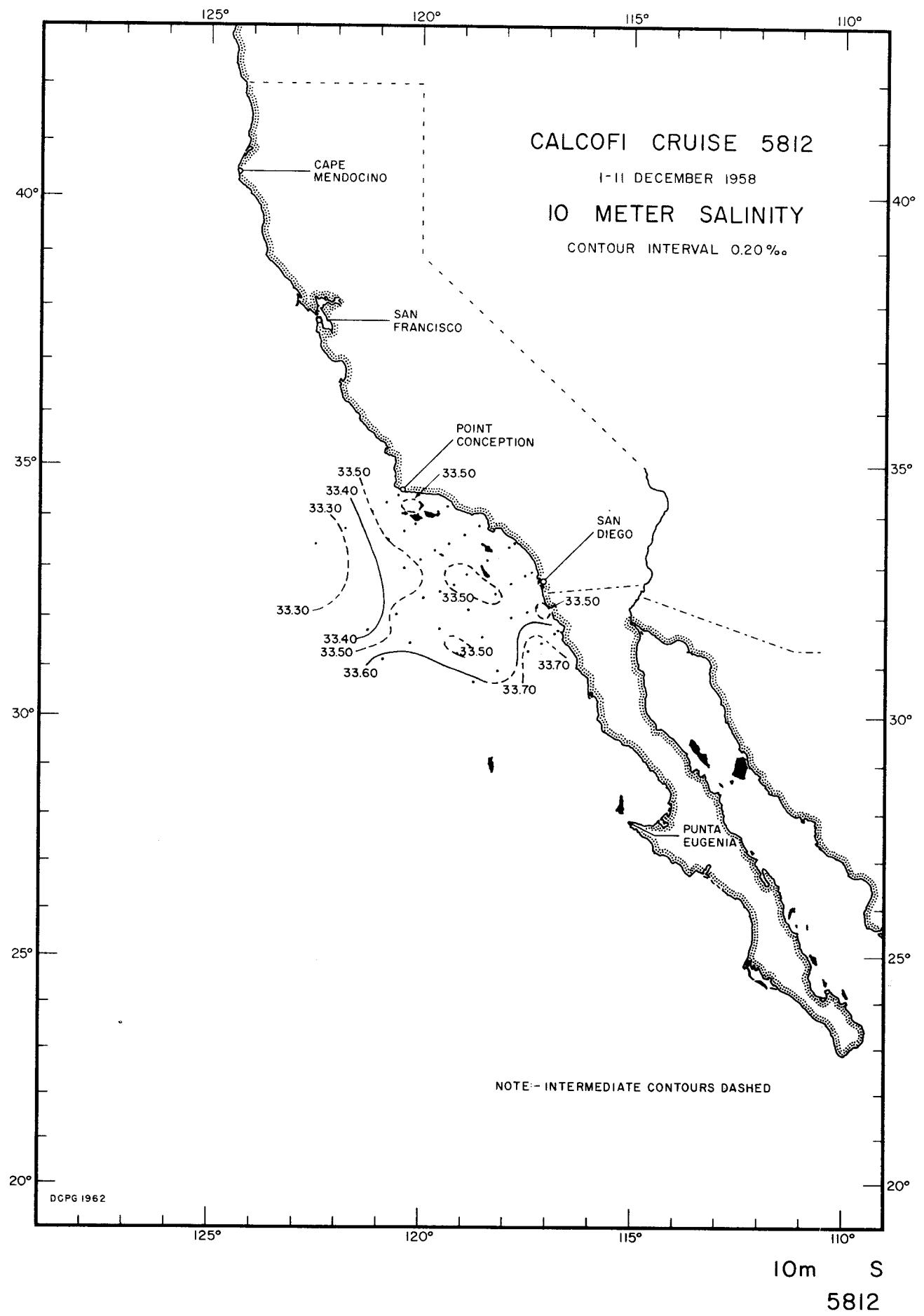


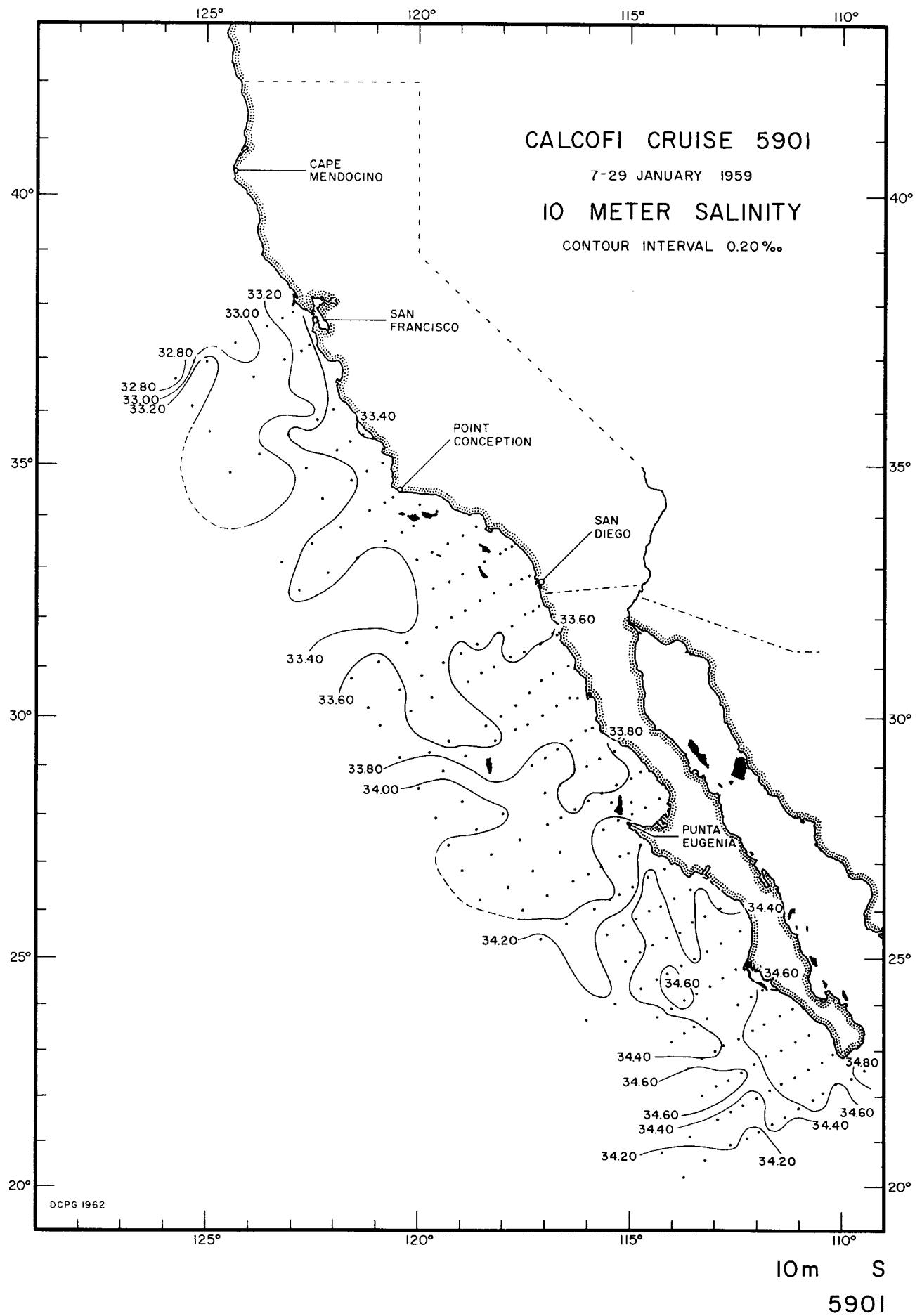


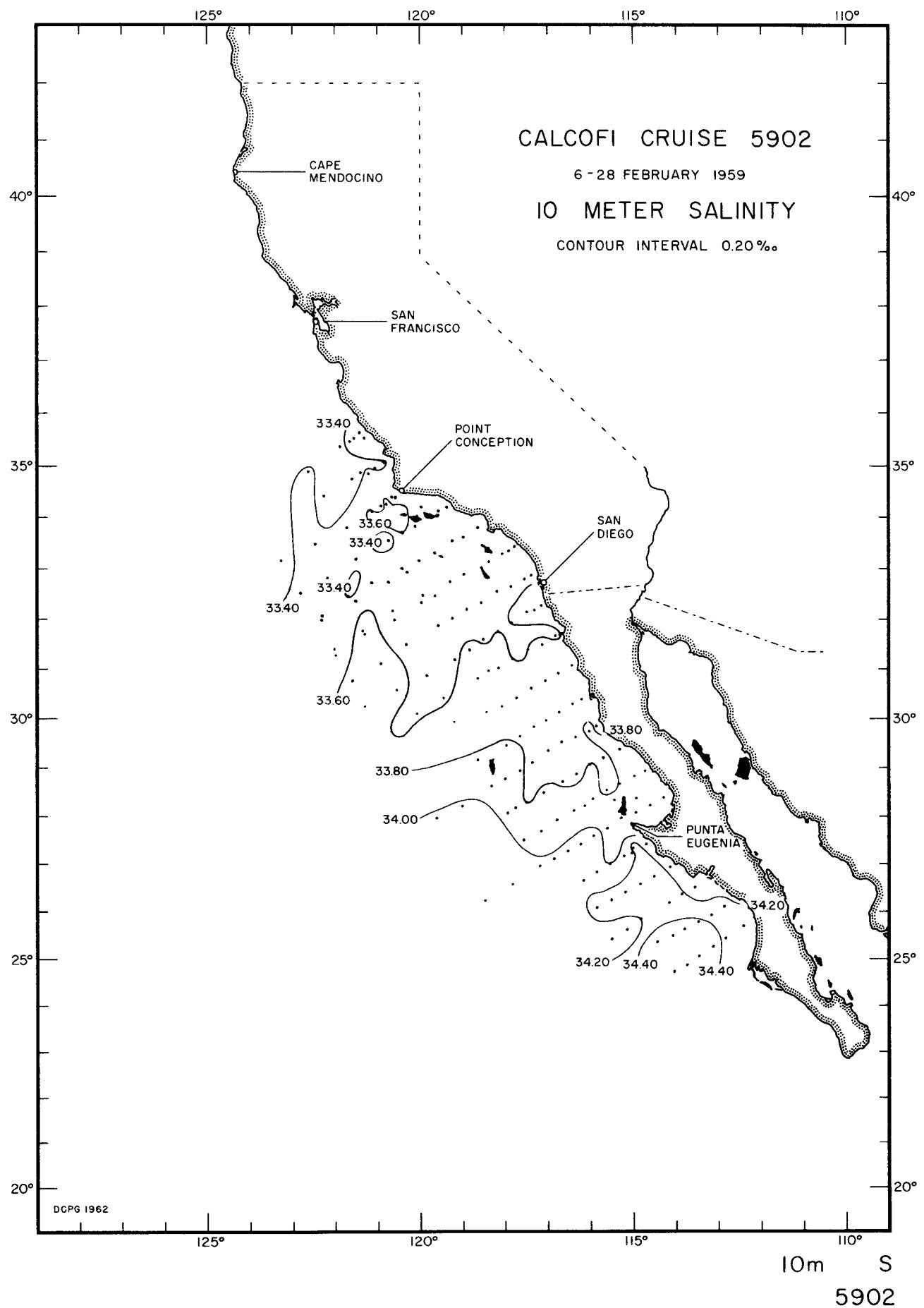


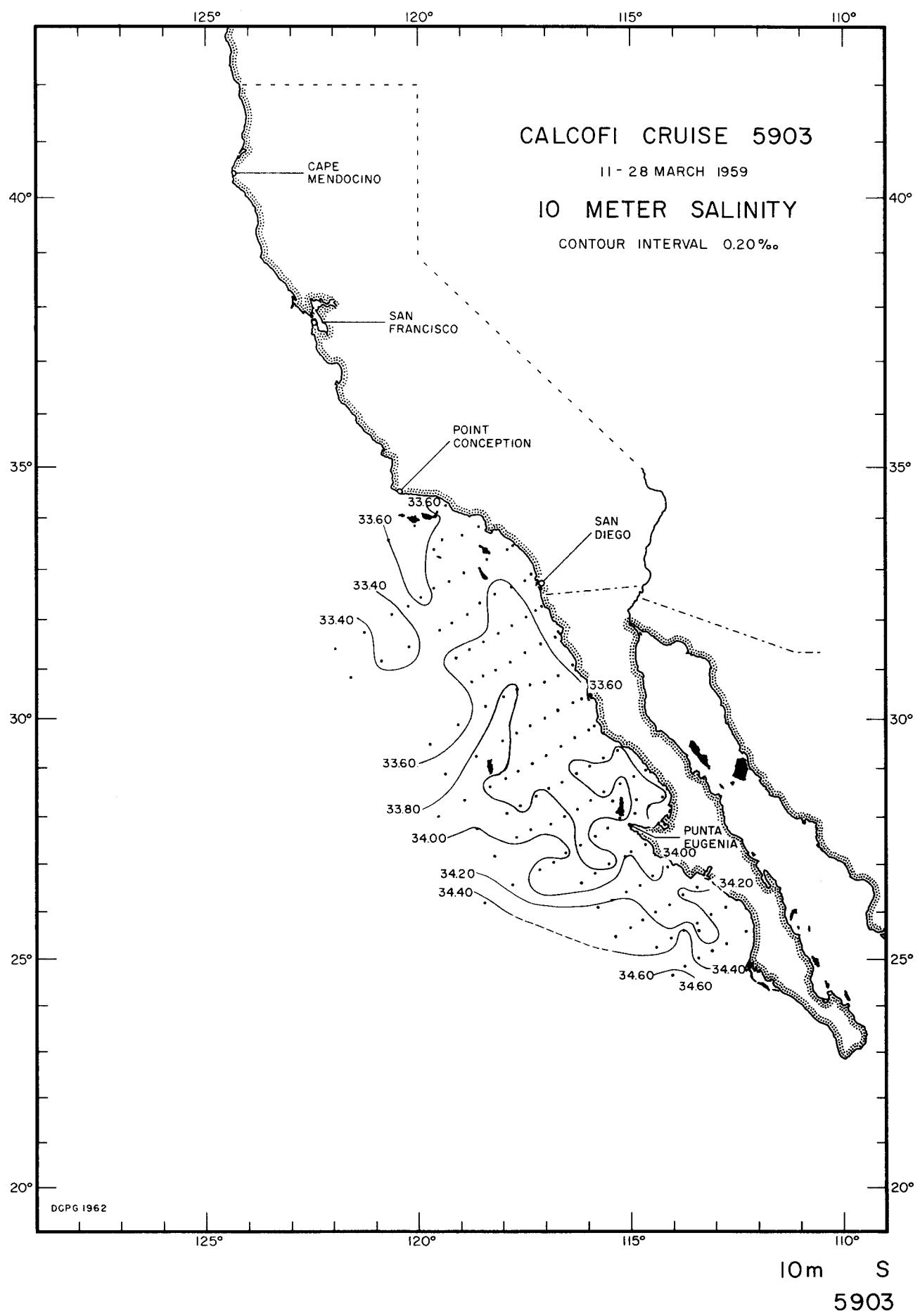


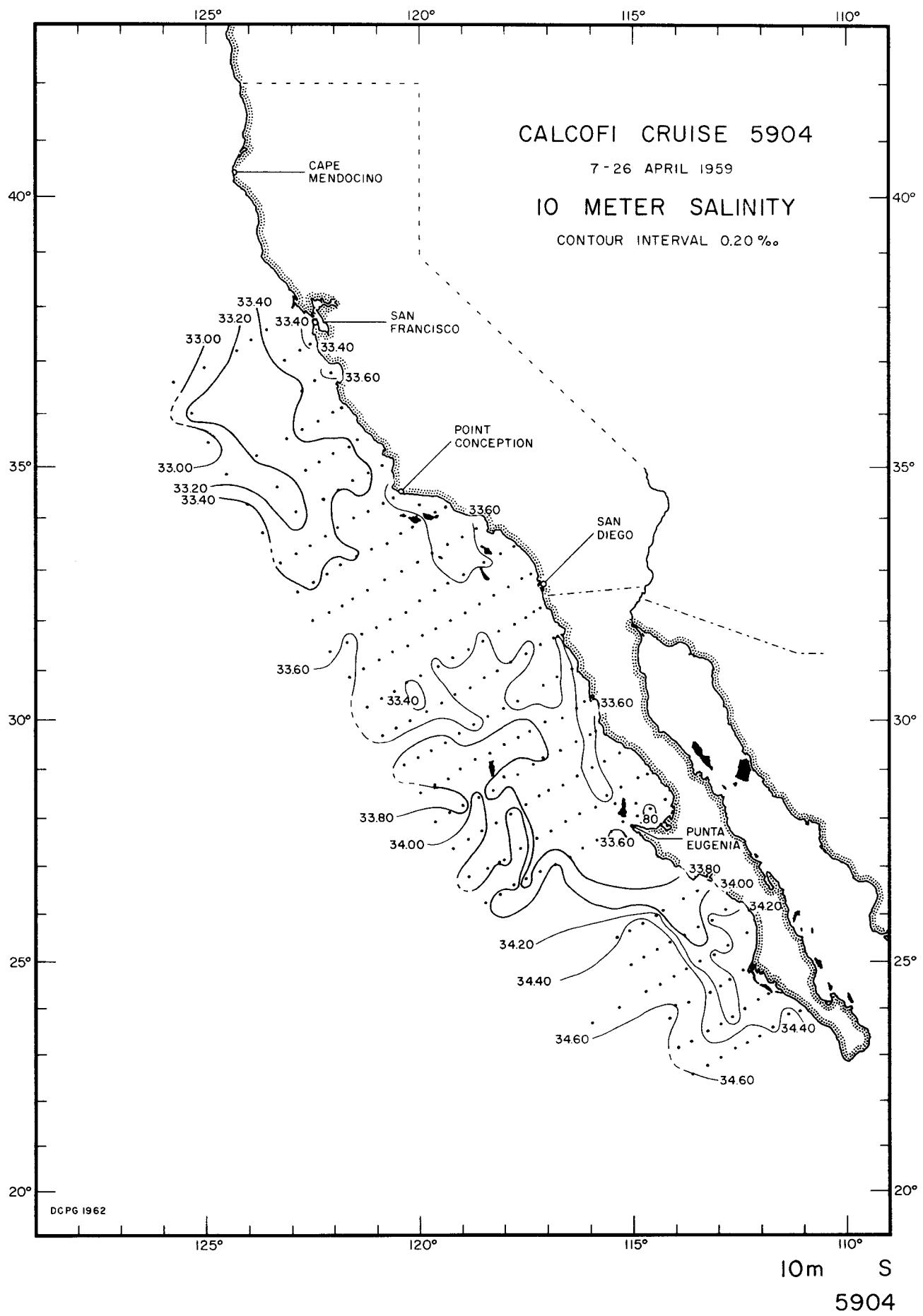


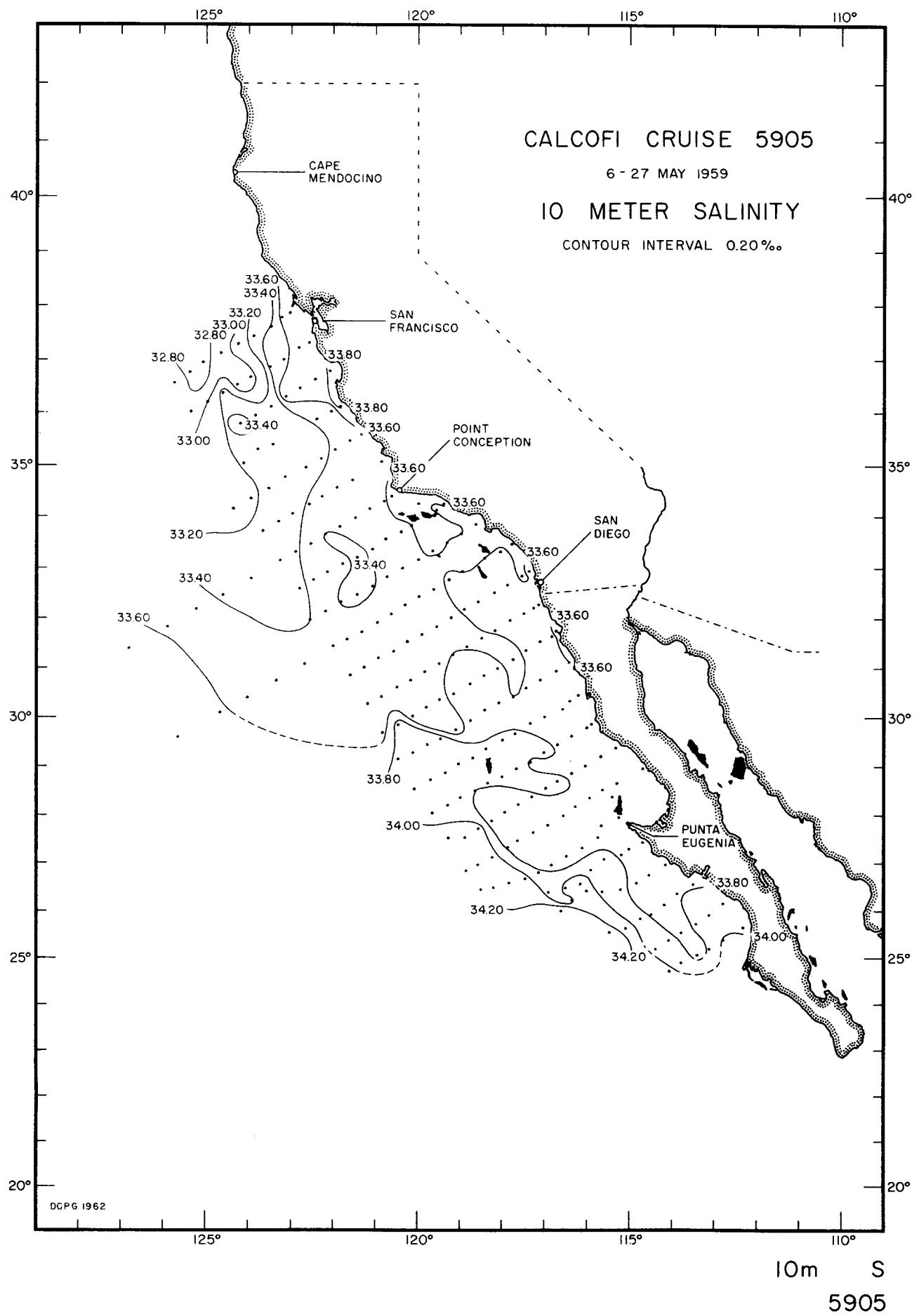


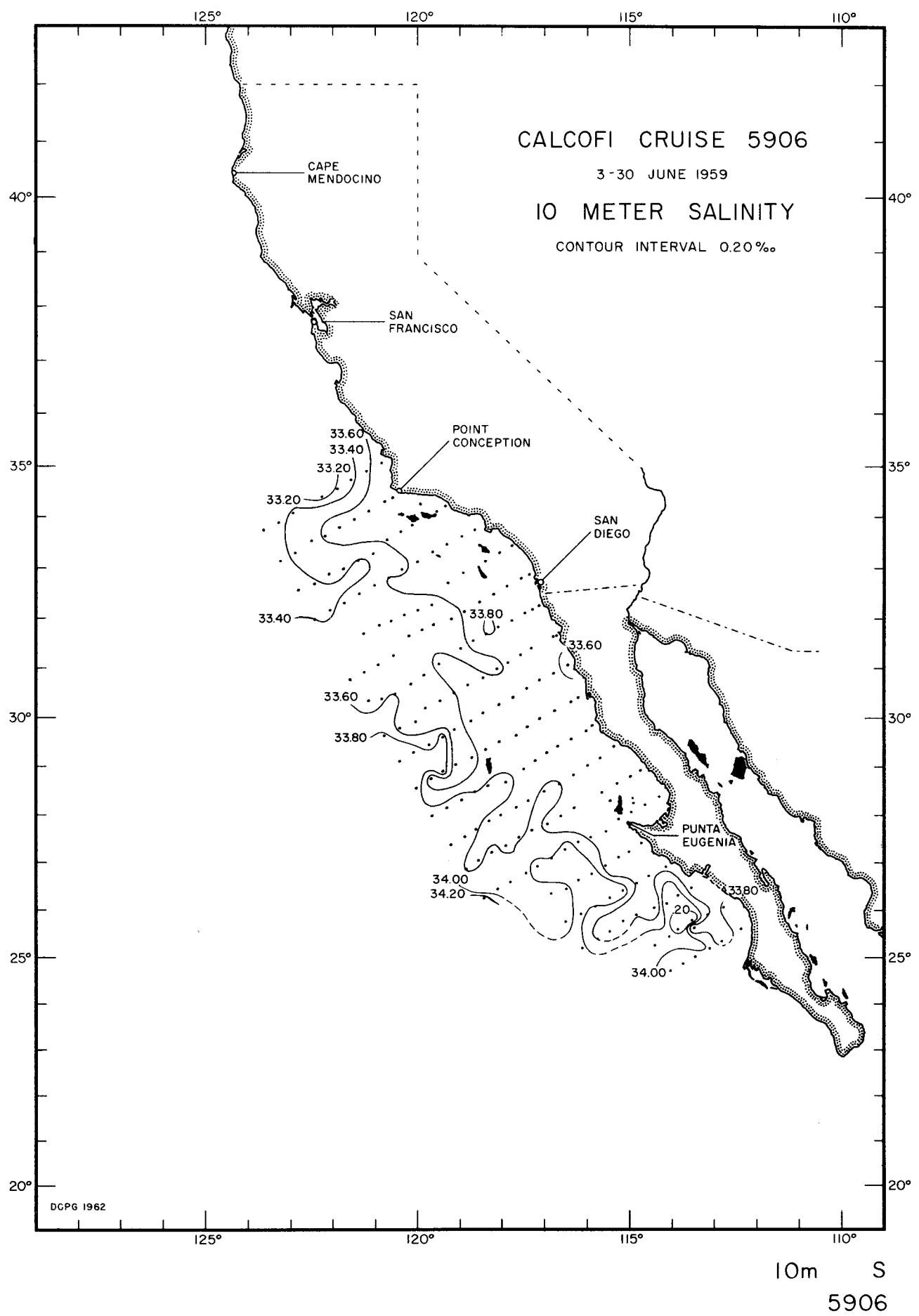


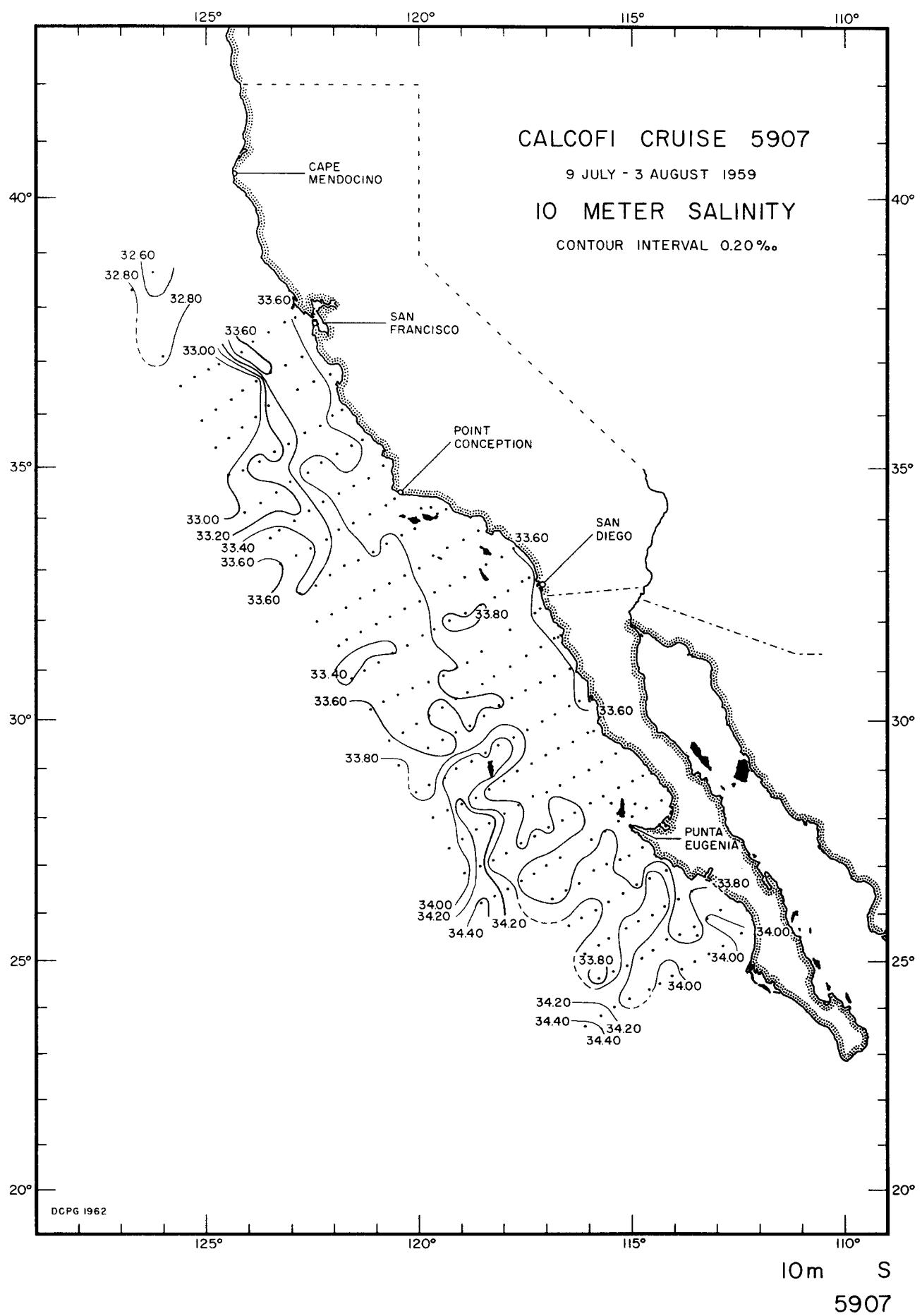


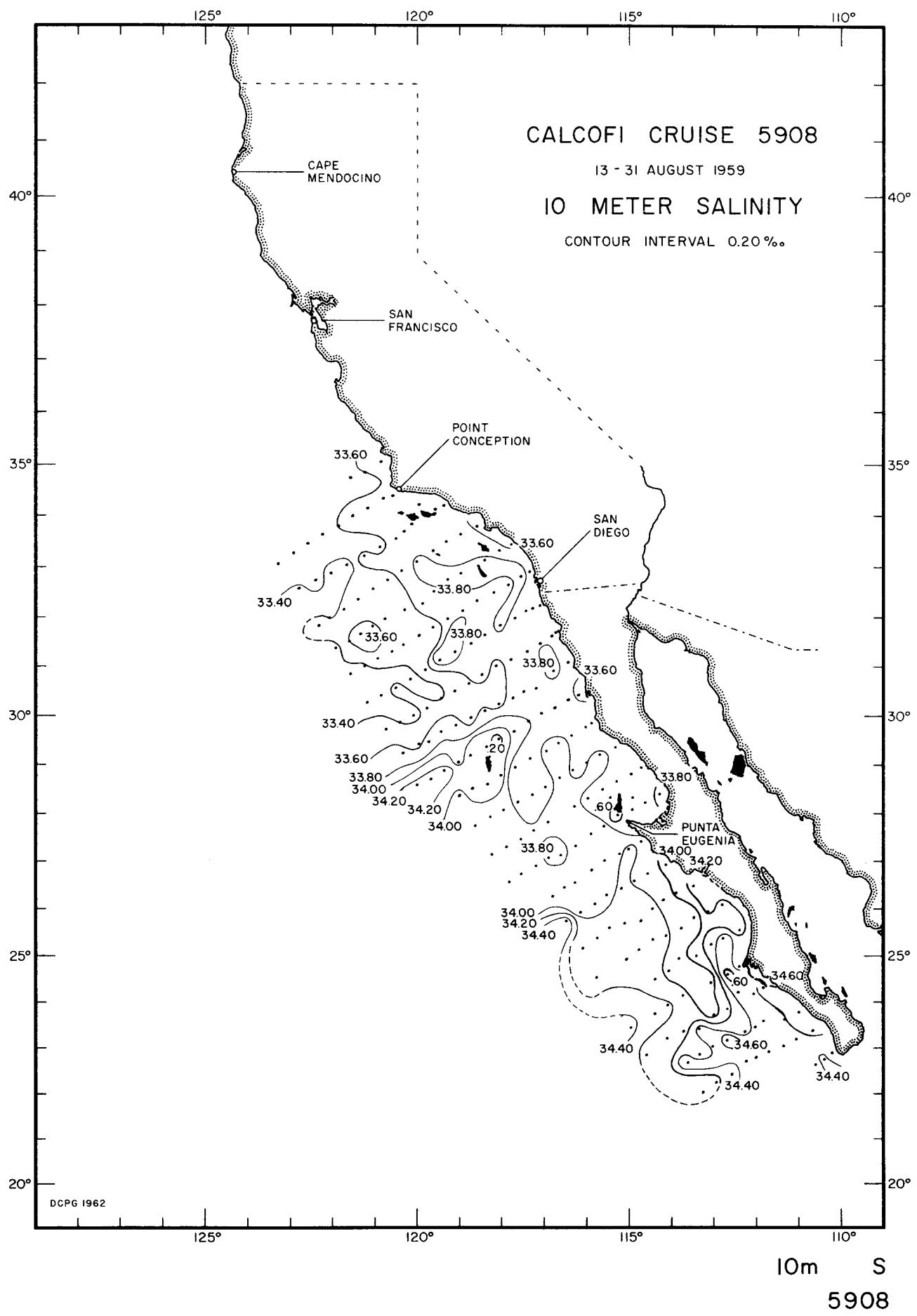


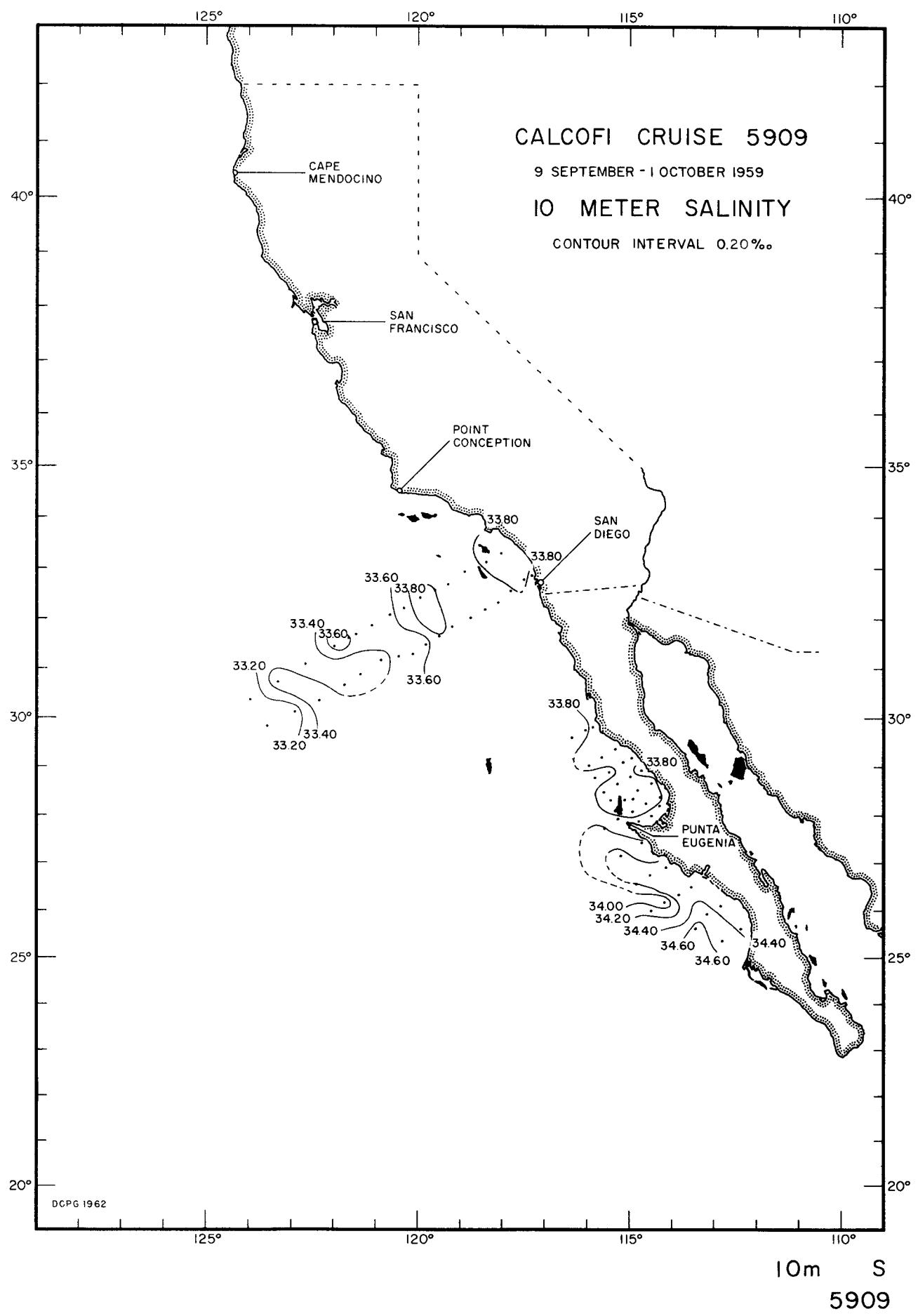


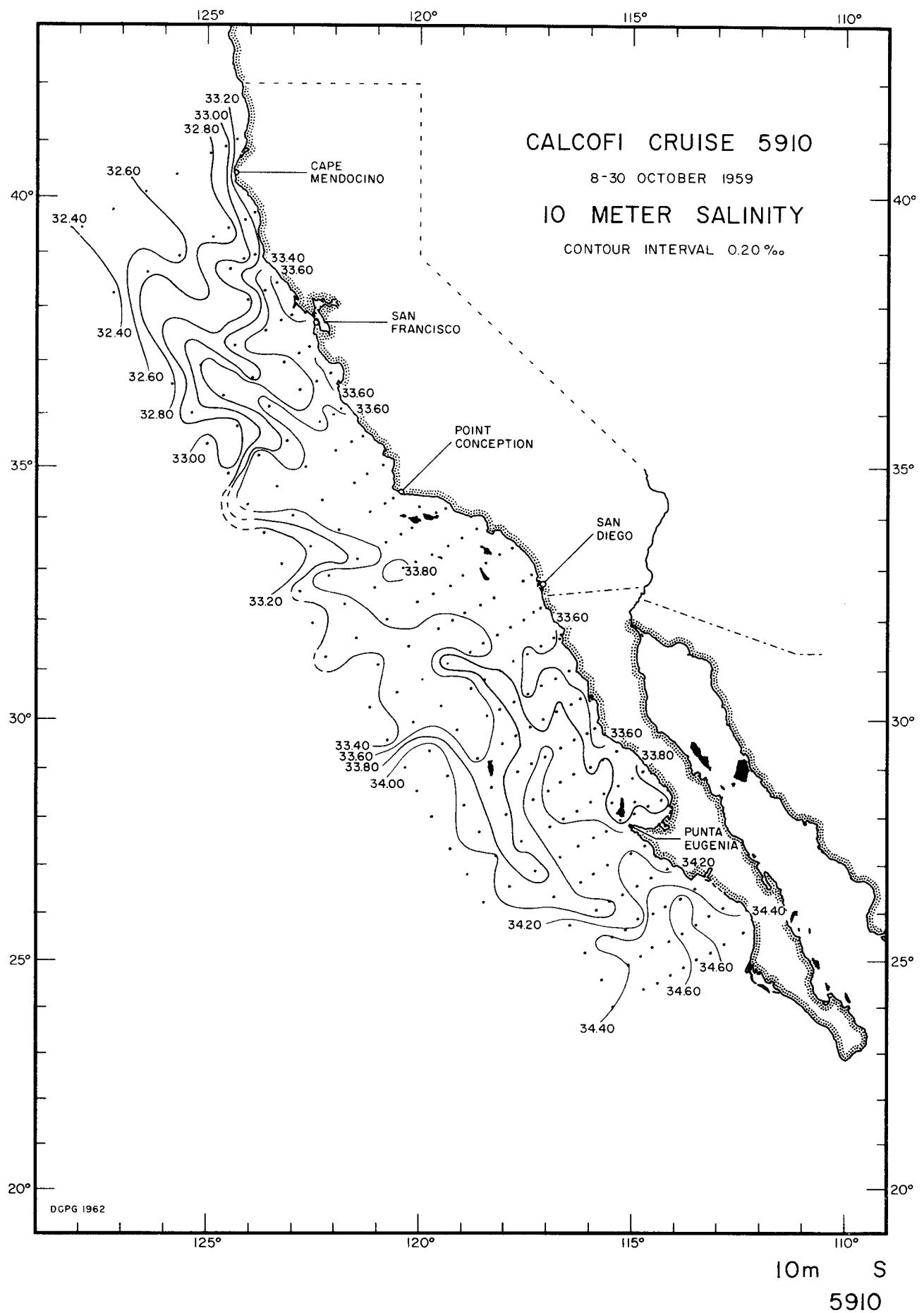


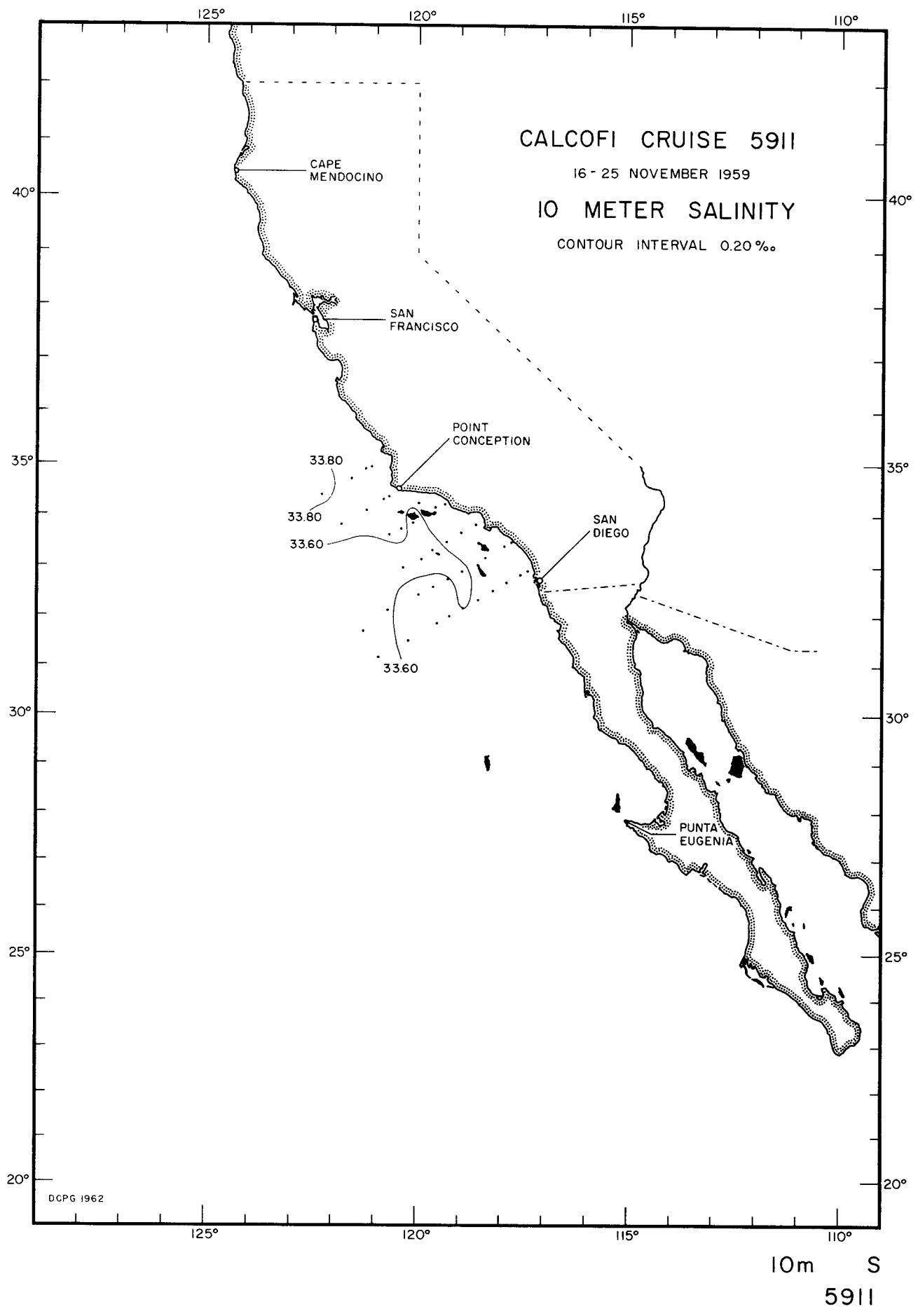


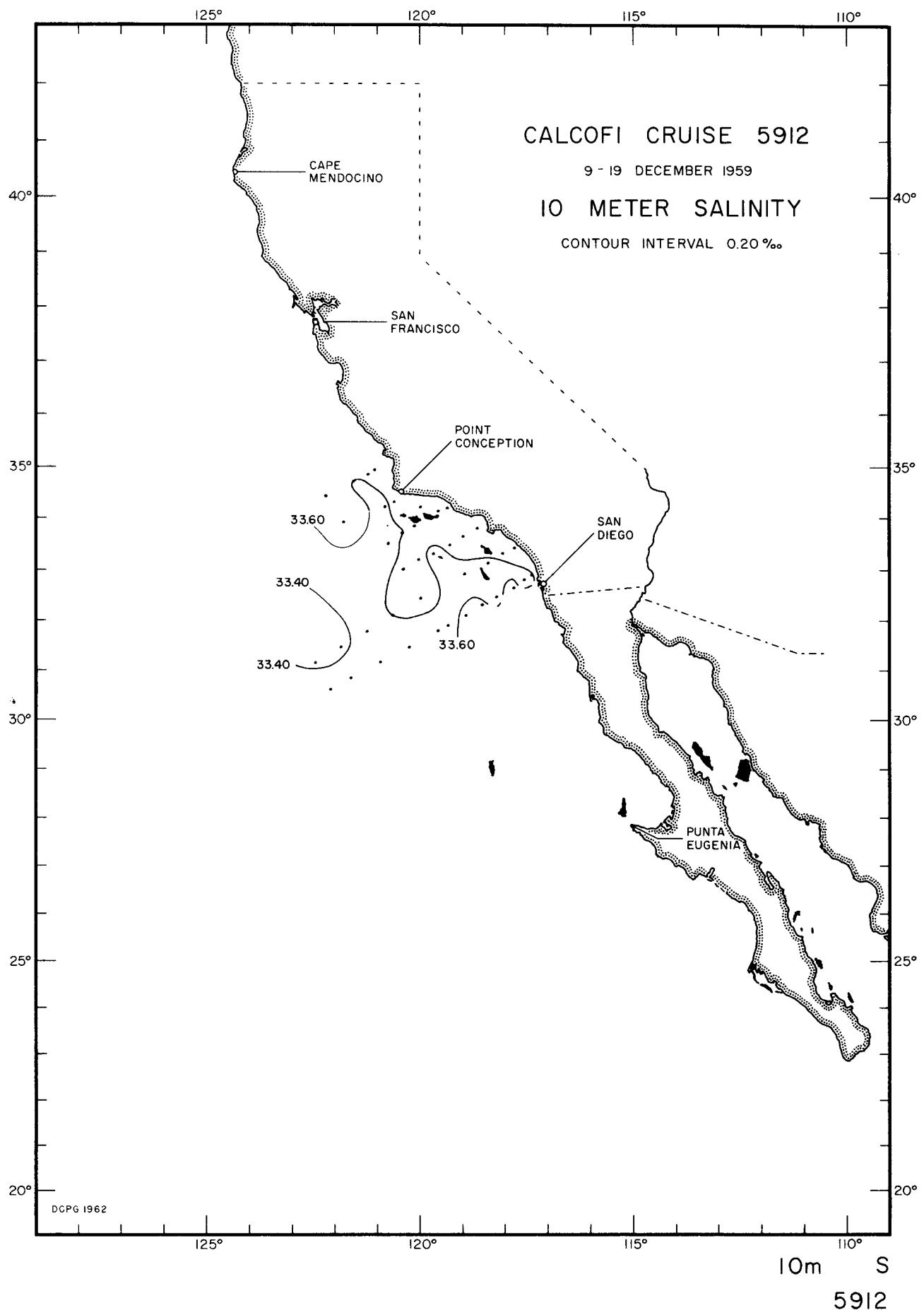




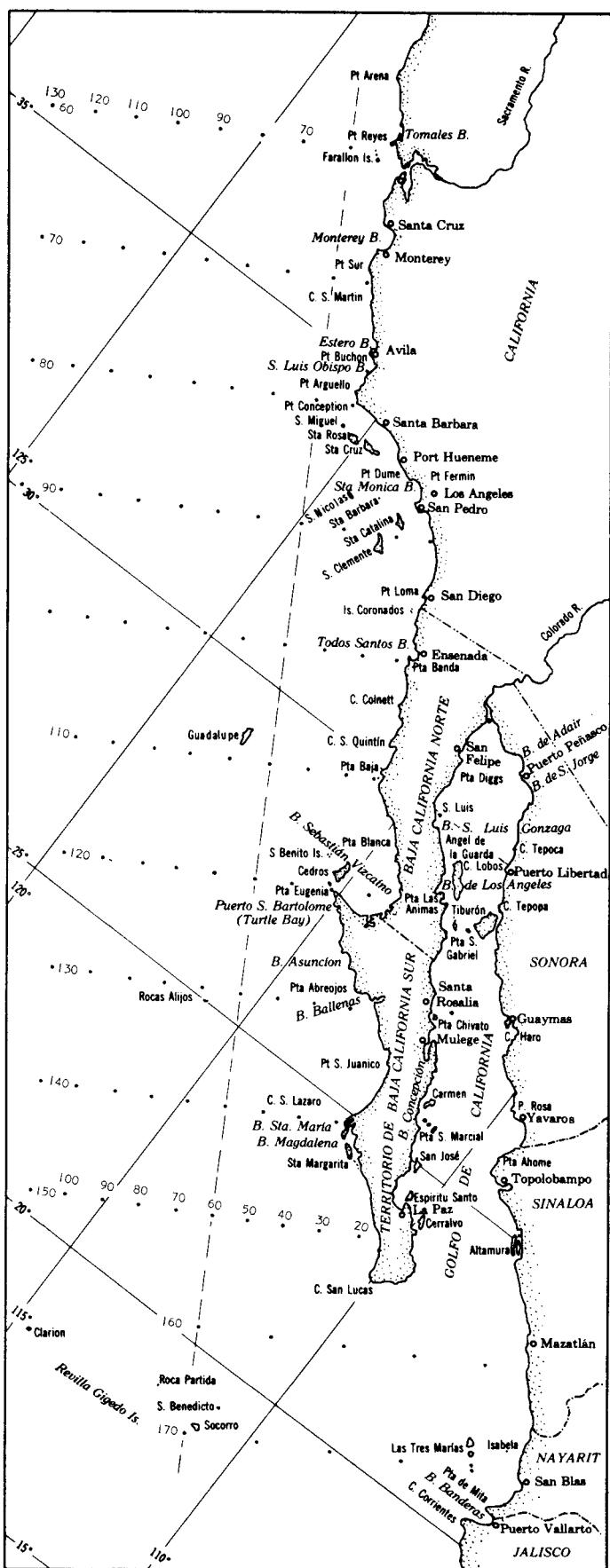
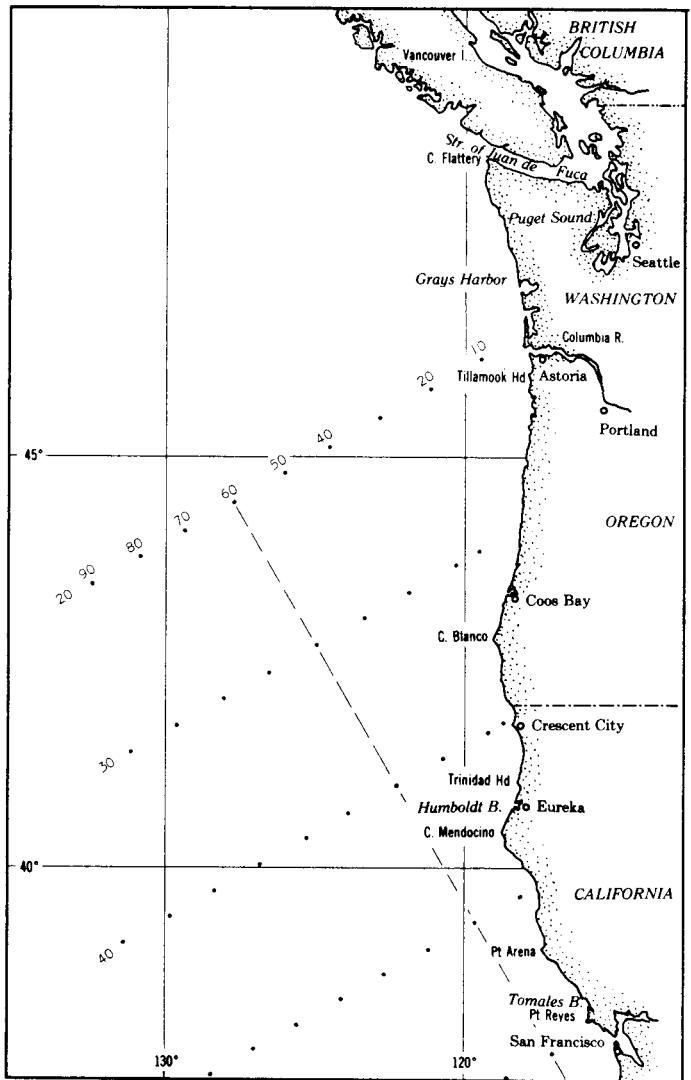












These maps are designed to show essential details of the area most intensively studied by the California Cooperative Oceanic Fisheries Investigations. This is approximately the same area as is shown in color on the front cover. Geographical place names are those most commonly used in the various publications 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 south-west of station 60.

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