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SCRIPPS INSTITUTION OF OCEANOGRAPHY

SURFACE WATER TEMPERATURES AT SHORE STATIONS United States West Coast and Baja California 1960

Including surface salinities from several stations and five-meter temperatures and salinities at Scripps Pier

SIO Reference 61-14

28 April 1961

Approved for distribution:

Roger Revelle

Roger Revelle, Director

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INTRODUCTION

This report presents four groups of data observed at shoreline stations along the west coast of North America from the Strait of Juan de Fuca, Washington, to the tip of Baja California, during 1960.

The first group of data consists of both temperature and salinity monthly means, ranges and standard deviations based on daily observations. The other groups consist of single observations taken once a month.

Various agencies and volunteers have participated in the collection of these data. The agencies are: Hopkins Marine Station, U. S. Coast and Geodetic Survey, U. S. Coast Guard, the California State Park System, California County Park System, the University of California, Los Angeles, and the University of California, Scripps Institution of Oceanography.

We are indebted to all volunteer observers and to Scripps' staff members who have tabulated the data and computed the statistics.

Dr. Carl L. and Mrs. Laura C. Hubbs, of Scripps Institution, pioneered the once-a-month Baja California temperature observations. At their instigation the Hopkins Marine Station began a similar program between Monterey and Morro Bay.

Each month the U. S. Coast and Geodetic Survey sends to Scripps Institution daily temperature and density values from four tide stations which are located at Neah Bay, Washington, and at Crescent City, Avila and Santa Monica, California. The density values are obtained by hydrometer and are converted at Scripps to salinity values listed in tenths of a part per thousand. The temperatures for this group have been converted from Fahrenheit to centigrade for inclusion in this report.

All stations, including U. S. Coast Guard stations, are maintained in cooperation with the Scripps Institution. Temperatures are taken using special high-grade thermometers supplied and calibrated by Scripps.

Temperatures are taken by obtaining a sample of water in a container, then measuring the temperature of the sample in a specially constructed "bucket" in which the thermometer is mounted. Temperatures have been listed as reported with no attempt to screen or eliminate observers' errors. Some readings are in tenths, others in hundredths of a degree centigrade. Temperatures recorded on pages 40 to 43 were in part taken with a surf-casting thermometer.

Salinities are obtained from sea-water samples sealed in special salinity bottles supplied by Scripps. Water samples are forwarded to Scripps once a month for titration. Salinities determined by titration are listed in hundredths of a part per thousand.

Temperature readings and water samples are obtained from surf and sandy beaches, off rocky cliffs and ledges, over the sides of lightships and off piers, depending on the station locations.

A new group of stations has been established by Oregon State College to collect daily surf temperatures along the Oregon coast at the following locations:

Arch Cape
Seaside Aquarium
Netarts
Otter Rock
Yachats
Heceta Beach
Coos Bay
Bandon
Brookings

The data obtained at these stations will be published by Oregon State College. Contact Dr. Wayne V. Burt, Department of Oceanography, School of Science, Oregon State College, Corvallis, Oregon, for additional information.

SURFACE-TEMPERATURE STATIONS
IN GEOGRAPHICAL ORDER

Station Name	Position	Location	Sta. No.	Page
Washington				
Neah Bay	48°22.0'N, 124°37.0'W	USCGS Tide Gauge Strait of Juan de Fuca		22
Clallam Bay	48°15.8'N, 124°15.0'W	Slip Point Light Station U. S. Coast Guard		22, 46, 47
Oregon				
Columbia River Lightship	46°11.0'N, 124°11.0'W	Mouth of Columbia River Astoria		22
Coos Head	43°20.5'N, 124°22.0'W	South Shore Coos Bay entrance		46, 47
California				
Crescent City	41°45.0'N, 124°12.0'W	USCGS Tide Gauge Crescent City		23
Trinidad Head	41°03.0'N, 124°07.0'W	College Cove		46, 47
Blunts Reef Lightship	40°26.0'N, 124°30.0'W	Off Cape Mendocino		23
Mendocino	39°18.2'N, 123°48.2'W	Russian Gulch State Park near Mendocino		24
Fort Ross	38°30.7'N, 123°14.5'W	Fort Ross Historical Monument Sonoma County		24
Bodega Bay: NW of	38°25.0'N, 123°06.0'W	Shell Beach, between Duncan's Landing and Gull Rock		46, 47
Bodega Bay: north of	38°22.7'N, 123°04.9'W	Sonoma Coast State Park Sonoma County		24
Farallon Islands	37°42.0'N, 123°00.0'W	SE Farallon Island Light Station off San Francisco		25
Pillar Point	37°29.7'N, 122°29.6'W	Half Moon Bay		46, 47
Half Moon Bay	37°28.0'N, 122°26.7'W	San Mateo Beaches State Park Half Moon Bay		25
Santa Cruz	37°57.0'N, 122°03.0'W	Natural Bridges Beach State Park Santa Cruz		25
Pacific Grove	36°37.2'N, 121°54.2'W	Hopkins Marine Station Pacific Grove		26
Monterey Pier II	36°36.5'N, 121°53.6'W	Monterey	1	36, 37
Mussel Point	36°37.2'N, 121°54.2'W	Hopkins Marine Station Pacific Grove	2	36, 37
Moss Beach	36°36.5'N, 121°57.2'W	Monterey Peninsula Monterey County	3	36, 37
Stillwater Cove	36°33.9'N, 121°56.5'W	Carmel Bay, Carmel	4	36, 37
San Jose Creek	36°31.5'N, 121°55.6'W	Carmel Bay, Carmel	5	36, 37
Point Lobos: north side	36°31.3'N, 121°56.3'W	Point Lobos Reserve State Park Whalers Cove	6	26, 36, 37

Station Name	Position	Location	Sta. No.	Page
California (cont.)				
Point Lobos: south side	36°30.8'N, 121°56.6'W	Point Lobos Reserve State Park Carmel	7	26, 36, 37
Yankee Point: north of	36°29.7'N, 121°56.6'W	Monterey County	8	36, 37
Yankee Point: south of	36°29.4'N, 121°56.6'W	Monterey County	9	36, 37
Yankee Point: SE of	36°28.8'N, 121°56.3'W	Cove just south of Malpaso Creek		46, 47
Soberanes Point	36°27.3'N, 121°55.5'W	Monterey County	10	36, 37
Garrapata Creek	36°25.2'N, 121°55.0'W	Monterey County	11	36, 37
Rocky Creek	36°22.9'N, 121°54.2'W	Monterey County	12	36, 37
Little Sur	36°20.2'N, 121°53.5'W	Monterey County	13	36, 37
Point Sur: north side	36°18.6'N, 121°53.8'W	Monterey County	14	36, 37
Point Sur: south side	36°18.3'N, 121°53.7'W	Monterey County	15	36, 37
Hot Springs Creek	36°07.5'N, 121°38.4'W	Monterey County	17	36, 37
Gamboa Point: north of	36°03.3'N, 121°35.3'W	Monterey County	18	36, 37
Gorda Cove	35°56.9'N, 121°28.7'W	Monterey County	19	36, 37
Point Piedras Blancas: north of	35°40.5'N, 121°17.0'W	Near San Simeon	20	36, 37
Point Piedras Blancas: east of	35°39.9'N, 121°15.6'W	Near San Simeon	21	36, 37
San Simeon Bay	35°38.6'N, 121°11.1'W	San Simeon	22	36, 37
Santa Rosa Creek	35°34.2'N, 121°06.5'W	Near Cambria	23	36, 37
Cayucos	35°26.8'N, 120°54.3'W	Cayucos	24	36, 37
Morro Rock	35°22.2'N, 120°51.8'W	Morro Bay	25	36, 37
Morro Bay	35°22.1'N, 120°51.7'W	Morro Bay	26	36, 37
Los Osos Creek	35°20.4'N, 120°49.5'W	Morro Bay	27A	36, 37
Gaviota	34°28.2'N, 120°13.7'W	Gaviota Beach State Park Gaviota		27
Goleta Point	34°24.1'N, 119°50.6'W	At about three fathoms Goleta		46, 47
Santa Barbara	34°24.3'N, 119°41.5'W	Harbor Department Santa Barbara		27
Ventura	34°16.5'N, 119°17.5'W	San Buenaventura Beach State Park Ventura		27
Point Hueneme	34°09.0'N, 119°12.0'W	Point Hueneme Light Station Port Hueneme		28
Anacapa Island	34°00.9'N, 119°21.5'W	Anacapa Island Light Station Anacapa Island		28
Point Dume: west of	34°01.4'N, 118°50.0'W	Zuma Beach County Park near Malibu		28

Station Name	Position	Location	Sta. No.	Page
California (cont.)				
Malibu Creek	34°02.0'N, 118°40.6'W	At mouth of creek		46, 47
Santa Monica	34°00.0'N, 118°30.0'W	USCGS Tide Gauge Station Santa Monica		29
Flat Rock	33°47.8'N, 118°24.4'W	Palos Verdes		46, 47
Point Vicente	33°44.6'N, 118°24.2'W	Marineland of the Pacific Palos Verdes		29
Portuguese Bend	33°44.2'N, 118°24.3'W	Palos Verdes		46, 47
Huntington Beach	33°38.2'N, 117°58.3'W	Huntington Beach State Park		29
Balboa	33°36'N, 117°54'W	Newport Beach Pier Newport Beach		30
Balboa Breakwater	33°35.6'N, 117°32.8'W	Channel side northern breakwater		46, 47
Corona del Mar	33°35.8'N, 117°52.7'W	100 yards north of Kerckhoff Marine Station		46, 47
Dana Point: east of	33°27.7'N, 117°41.1'W	Doheny Beach State Park Dana Point		30
Oceanside	33°11.6'N, 117°23.1'W	Oceanside Pier Oceanside		30
La Jolla: end Scripps Pier	32°52.0'N, 117°15.3'W	Scripps Institution of Oceanography La Jolla		31, 40, 41
La Jolla: base Scripps Pier	32°52.0'N, 117°15.2'W	Scripps Institution of Oceanography La Jolla	1	31, 40, 41
San Diego: Pacific Beach	32°47.8'N, 117°15.4'W	Grand Avenue, Pacific Beach	2	40, 41
San Diego: Mission Bay	36°46.2'N, 117°15.1'W	Bonita Cove, Mission Bay	2A	40, 41
San Diego: Mission Beach	32°45.5'N, 117°14.9'W	San Luis Rey Place Mission Beach	3	40, 41
Coronado	32°41.2'N, 117°11.4'W	North end of Coronado	4	40, 41
South San Diego Bay	32°40.3'N, 117°09.8'W	Bay side, Silver Strand	4A	40, 41
Silver Strand	32°40.2'N, 117°09.8'W	Ocean side Silver Strand State Park	5	40, 41
Imperial Beach	32°35.0'N, 117°07.9'W	Palm Avenue Imperial Beach	6	31, 40, 41
Baja California				
Rosarita Beach: north of	32°20.5'N, 117°03.7'W	Opposite Abraham Lincoln School	7	40, 41
Rosarita Beach: south of	32°18.0'N, 117°03.4'W	3.5 miles south of south end of beach		46, 47
Punta Descanso: north of	32°16.7'N, 117°02.2'W	Rancho Cuevas 0.8 mile north of point	8	40, 41
Punta Descanso: east of	32°16.2'N, 117°00.8'W	0.9 mile east of point	9	40, 41
Arroyo Médano	32°13.5'N, 116°55.5'W	Just south of lagoon	10	40, 41

Station Name	Position	Location	Sta. No.	Page
Baja California (cont.)				
Halfway House	32°10.4'N, 116°54.7'W	About 2 miles south of Arroyo Descanso	11	40, 41
Playa La Misión	32°06.0'N, 116°53.0'W	Beach north of mouth Arroyo San Miguel	12	40, 41
El Sauzal: west of	31°54.2'N, 116°43.7'W	About 1 mile WNW of Pta. Saucedal	13	40, 41
El Morro Light: NW of	31°52.1'N, 116°40.5'W	About 3 miles west of Ensenada	14	40, 41
Ensenada	31°51.6'N, 116°37.6'W	Inside of Ensenada harbor	15A	40, 41
Estero Beach	31°47.1'N, 116°37.4'W	In beach surf	16	40, 41
Estero: entrance	31°46.8'N, 116°37.4'W	Estero de Punta Banda	16A	40, 41
Estero de Punta Banda	31°42.0'N, 116°38.2'W	West shore on south arm	16B	40, 41
Punta Banda Beach (1)	31°43.2'N, 116°39.9'W	South end, Bahía de Todos Santos	16C	40, 41
Punta Banda: Tres Hermanas	31°44.2'N, 116°42.4'W	Northeast shore of point		32, 46, 47
Punta Banda: Papalote	31°43.0'N, 116°43.6'W	Near Middle of SW side of point	16D	46, 47
Punta Banda: Arbolitos (1)	31°42.1'N, 116°41.3'W	Nuevo Arbolitos near tip of point	16F	40, 41
Punta Banda: Arbolitos (2)	31°42.2'N, 116°41.3'W	Nuevo Arbolitos head of cove	16E	33, 40, 41
Puerto Santo Tomás: point (1)	31°32.3'N, 116°41.0'W	In cove	21A	40, 41
Puerto Santo Tomás: point (2)	31°32.3'N, 116°41.0'W	On south side of lava rock	21B	40, 41
Puerto Santo Tomás: camp	31°32.4'N, 116°41.0'W	Boat landing in cove at fish camp	21	40, 41
Bahía Santo Tomás (1)	31°33.2'N, 116°40.1'W	Near middle of shore of bay	22	40, 41
Bahía Santo Tomás (2)	31°32.7'N, 116°40.1'W	Half mile NW of stream mouth	23	40, 41
Boca Santo Tomás	31°32.3'N, 116°40.0'W	At stream mouth	24	32, 40, 41
Punta Clara	31°31.9'N, 116°39.7'W	First point south of Boca Santo Tomás	20	40, 41
Punta China: point NW of	31°31.6'N, 116°39.5'W	Between Pta. Clara and Pta. China	19	40, 41
Punta China: north face	31°31.3'N, 116°39.2'W	Near middle of north face	18	42, 43
Punta China: cove at tip	31°31.2'N, 116°39.1'W	Near new cement plant	17	42, 43

Station Name	Position	Location	Sta. No.	Page
Baja California (cont.)				
Punta Calavera: south of	31°21.3'N, 116°28.5'W	Between Pta. Calavera and Pta. Cabras	24A	42, 43
Punta Cabras: north of	31°20.5'N, 116°27.3'W	North end of beach north of Pta. Cabras	24B	42, 43
Punta Cabras: south side	31°20.0'N, 116°27.2'W	North end of cove south of Pta. Cabras	25	42, 43
Punta Cabras: SE of	31°18.6'N, 116°25.8'W	Between Pta. Cabras and Pta. San Isidro	26	42, 43
Punta San Isidro: north side	31°17.7'N, 116°25.2'W	On north face of point	28	42, 43
Punta San Isidro: south side	31°17.6'N, 116°25.2'W	In cove at tip of point	27	42, 43
Arroyo San Isidro: north of	31°16.8'N, 116°23.5'W	Shore inside of reef	29	42, 43
Arroyo San Isidro: south of	31°15.5'N, 116°22.4'W	About 1 mile north of Pta. Frailes	29A'	42, 43
Punta Frailes	31°13.0'N, 116°21.3'W	First main point south of Arroyo San Isidro	29A	42, 43
Offshore rock: shore NE of	31°12.0'N, 116°20.2'W	By lagoon where road turns inland	29B	42, 43
San Antonio del Mar	31°05.8'N, 116°18.8'W	At south end of valley	29C	42, 43
Bahía Colnett (1)	30°58.0'N, 116°17.0'W	At south end of cape	31A	32
Bahía Colnett (2)	30°57.8'N, 116°16.0'W	East of Cabo Colnett	31	42, 43
Boca San Telmo	30°56.2'N, 116°14.8'W	At mouth of Arroyo San Telmo	30	42, 43
Punta San Telmo: SE of	30°55.0'N, 116°13.2'W	About 2 miles south of Pta. San Telmo	32	42, 43
Punta San Jacinto: NW of	30°51.6'N, 116°10.6'W	About 6 miles south of Pta. San Telmo	33	42, 43
Punta Camalú: NW of	30°49.2'N, 116°06.4'W	About 1 mile NW of the point	34	42, 43
Punta Camalú: east of	30°49.2'N, 116°05.6'W	About 1 mile east of the point	35	42, 43
Arroyo Santo Domingo	30°42.6'N, 116°02.7'W	Bahía San Ramón	36	42, 43
Bahía San Quintín: old pier	30°28.3'N, 115°57.7'W	1.5 miles SE of old mill	37	42, 43
Playa Santa María	30°24.0'N, 115°55.1'W	Santa María Sky Ranch	38	42, 43
Rancho Socorro	30°19.3'N, 115°49.7'W	Just south of Arroyo Socorro	39	42, 43
Rancho Socorro: south of	30°18.0'N, 115°48.8'W	About 5 miles south of Rancho Socorro	40	42, 43

Station Name	Position	Location	Sta. No.	Page
Baja California (cont.)				
Cañon Amargo	30°13.5'N, 115°48.0'W	About 10 miles south of Rancho Socorro	41	42, 43
Cañon Rosario	30°09.8'N, 115°48.2'W	At mouth of canyon	42	42, 43
Cañon Rosario: south of	30°07.5'N, 115°48.9'W	About 2 miles south at Cañon Rosario	43A	42, 43
Punta Baja: west side	29°57.0'N, 115°48.8'W	Near middle of point	44	42, 43
Punta Baja: east side	29°57.0'N, 115°48.7'W	Near middle of point	45	42, 43
Punta Baja: east of	29°57.0'N, 115°46.4'W	About 2 miles east of Pta. Baja	46	42, 43
Guadalupe Island	28°52.9'N, 118°17.7'W	South end at weather station		33
San Benitos Island	28°19.0'N, 115°36.0'W	Near lighthouse		33
Cedros Island	28°06.5'N, 115°11.0'W	Cedros Village		33

ALPHABETICAL LIST OF
SURFACE-TEMPERATURE STATIONS

Station Name	Type of Data Collected	Agency	Page
	1960		
Anacapa Island	T[1] d[2]	USCG	28
Arroyo Médano	T m[3]	SIO	40, 41
Arroyo San Isidro: north of	T m	SIO	42, 43
Arroyo San Isidro: south of	T m	SIO	42, 43
Arroyo Santo Domingo	T m	SIO	42, 43
Bahía Colnett (1)	T d	SIO	32
Bahía Colnett (2)	T m	SIO	42, 43
Bahía San Quintín: old pier	T m	SIO	42, 43
Bahía Santo Tomás (1)	T m	SIO	40, 41
Bahía Santo Tomás (2)	T m	SIO	40, 41
Balboa	TS[4] d	SIO	30
Balboa Breakwater	T m	UCLA	46, 47
Blunts Reef Lightship	TS d	USCG	23
Boca San Telmo	T m	SIO	42, 43
Boca Santo Tomás	T dm	SIO	32, 40, 41
Bodega Bay: north of	T d	SIO	24
Bodega Bay: NW of	T m	UCLA	46, 47
Cañon Amargo	T m	SIO	42, 43
Cañon Rosario	T m	SIO	42, 43
Cañon Rosario: south of	T m	SIO	42, 43
Cayucos	T m	HMS	36, 37
Cedros Island	T d	SIO	33
Clallam Bay	T dm	UCLA	22, 46, 47
Columbia River Lightship	T d	USCG	22
Coos Head	T m	UCLA	46, 47
Corona del Mar	T m	UCLA	46, 47
Coronado	T m	SIO	40, 41
Crescent City	TS d	USCGS	23
Dana Point: east of	T d	SIO	30

[1] T: Surface temperature [2] d: Values taken daily [3] m: Values taken once a month

[4] S: Surface salinities

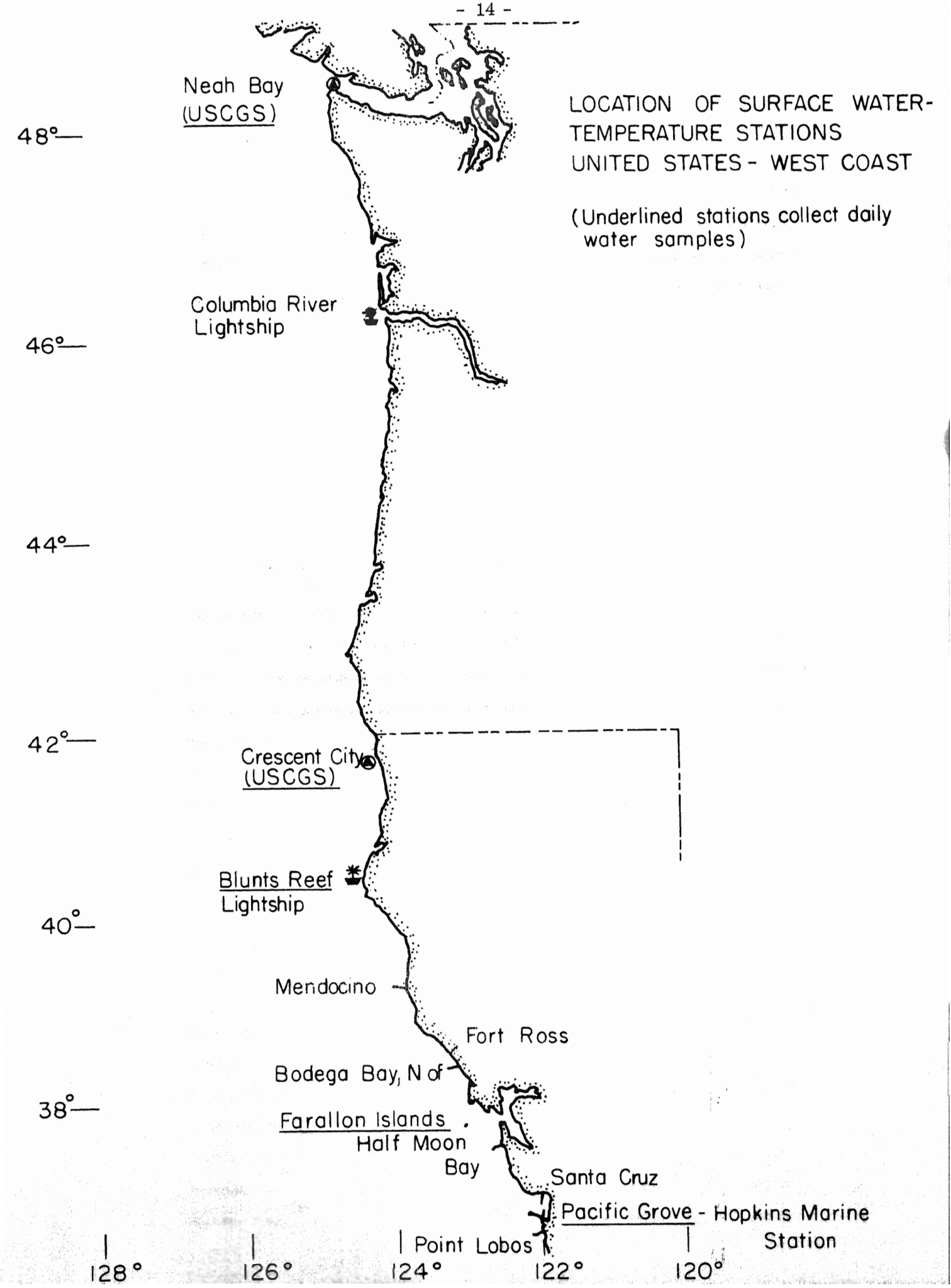
Station Name	Type of Data Collected		Agency	Page
	1960			
El Morro Light: NW of	T	m	SIO	40, 41
El Sauzal: west of	T	m	SIO	40, 41
Ensenada	T	m	SIO	40, 41
Estero Beach	T	m	SIO	40, 41
Estero de Punta Banda	T	m	SIO	40, 41
Estero: entrance	T	m	SIO	40, 41
Farallon Islands	TS	d	USCG	25
Flat Rock	T	m	UCLA	46, 47
Fort Ross	T	d	SIO	24
Gamboa Point: north of	T	m	HMS	36, 37
Garrapata Creek	T	m	HMS	36, 37
Gaviota	T	d	SIO	27
Goleta Point	T	m	UCLA	46, 47
Gorda Cove	T	m	HMS	36, 37
Guadalupe Island	T	d	SIO	33
Half Moon Bay	T	d	SIO	25
Halfway House	T	m	SIO	40, 41
Hot Springs Creek	T	m	SIO	36, 37
Huntington Beach	T	d	SIO	29
Imperial Beach	T	m	SIO	31, 40, 41
La Jolla: base Scripps Pier	T	m	SIO	31, 40, 41
La Jolla: end Scripps Pier	TS	d	SIO	31, 40, 41
Little Sur	T	m	HMS	36, 37
Los Osos Creek	T	m	HMS	36, 37
Malibu Creek	T	m	UCLA	46, 47
Mendocino	T	d	SIO	24
Monterey Pier II	T	m	HMS	36, 37
Morro Bay	T	m	HMS	36, 37
Morro Rock	T	m	HMS	36, 37
Moss Beach	T	m	HMS	36, 37
Mussel Point	T	m	HMS	36, 37
Neah Bay	TS	d	USCGS	22

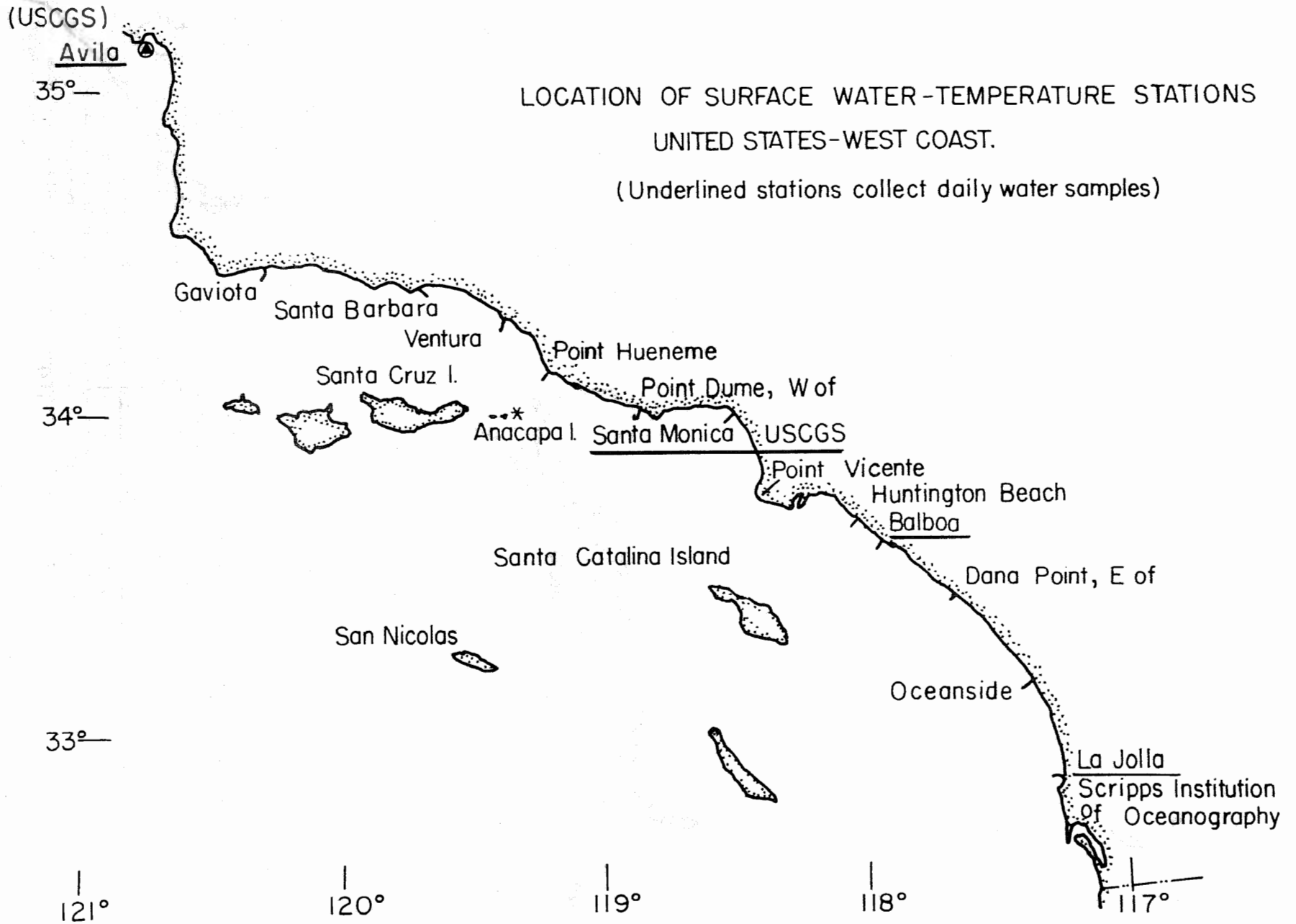
Station Name	Type of Data Collected		Agency	Page
	1960			
Oceanside	T	d	SIO	30
Offshore rock: shore NE of	T	m	SIO	42, 43
Pacific Grove	TS	d	HMS	26
Pillar Point	T	m	UCLA	46, 47
Playa La Misión	T	m	SIO	40, 41
Playa Santa María	T	m	SIO	42, 43
Point Dume: west of	T	d	SIO	28
Point Hueneme	TS	d	USCG	28
Point Lobos: north side	T	dm	HMS SIO	26, 36, 37
Point Lobos: south side	T	dm	HMS SIO	26, 36, 37
Point Piedras Blancas: east of	T	m	HMS	36, 37
Point Piedras Blancas: north of	T	m	HMS	36, 37
Point Sur: north side	T	m	HMS	36, 37
Point Sur: south side	T	m	HMS	36, 37
Point Vicente	T	d	SIO	29
Portuguese Bend	T	m	UCLA	46, 47
Puerto Santo Tomás: camp	T	m	SIO	40, 41
Puerto Santo Tomás: point (1)	T	m	SIO	40, 41
Puerto Santo Tomás: point (2)	T	m	SIO	40, 41
Punta Baja: east side	T	m	SIO	42, 43
Punta Baja: east of	T	m	SIO	42, 43
Punta Baja: west side	T	m	SIO	42, 43
Punta Banda: Arbolitos (1)	T	m	SIO	40, 41
Punta Banda: Arbolitos (2)	T	dm	SIO	33, 40, 41
Punta Banda Beach (1)	T	m	SIO	40, 41
Punta Banda: Papalote	T	m	UCLA	46, 47
Punta Banda: Tres Hermanas	T	d	UCLA	32, 46, 47
Punta Cabras: north of	T	m	SIO	42, 43
Punta Cabras: south side	T	m	SIO	42, 43
Punta Cabras: SE of	T	m	SIO	42, 43
Punta Calavera: south of	T	m	SIO	42, 43
Punta Camalú: east of	T	m	SIO	42, 43

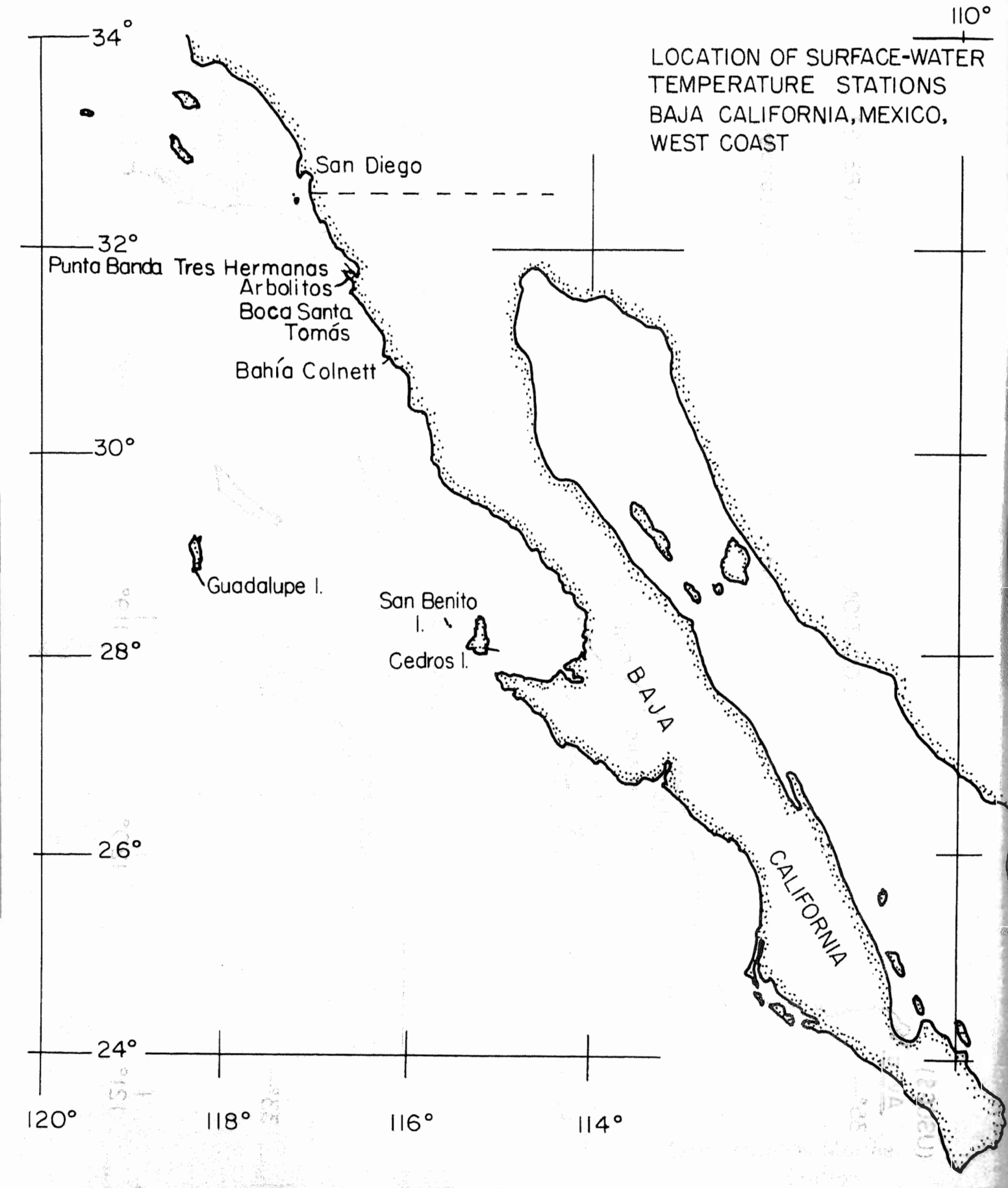
Station Name	Type of Data Collected		Agency	Page
	1960			
Punta Camalú: NW of	T	m	SIO	42, 43
Punta China: cove at tip	T	m	SIO	42, 43
Punta China: north face	T	m	SIO	42, 43
Punta China: point NW of	T	m	SIO	40, 41
Punta Clara	T	m	SIO	40, 41
Punta Descanso: east of	T	m	SIO	40, 41
Punta Descanso: north of	T	m	SIO	40, 41
Punta Frailes	T	m	SIO	42, 43
Punta San Isidro: north side	T	m	SIO	42, 43
Punta San Isidro: south side	T	m	SIO	42, 43
Punta San Jacinto: NW of	T	m	SIO	42, 43
Punta San Telmo: SE of	T	m	SIO	42, 43
Rancho Socorro	T	m	SIO	42, 43
Rancho Socorro: south of	T	m	SIO	42, 43
Rocky Creek	T	m	HMS	36, 37
Rosarita Beach: north of	T	m	SIO	40, 41
Rosarita Beach: south of	T	m	UCLA	46, 47
San Antonio del Mar	T	m	SIO	42, 43
San Benitos Island	T	d	SIO	33
San Diego: Mission Bay	T	m	SIO	40, 41
San Diego: Mission Beach	T	m	SIO	40, 41
San Diego: Pacific Beach	T	m	SIO	40, 41
San Jose Creek	T	m	HMS	36, 37
San Simeon Bay	T	m	HMS	36, 37
Santa Barbara	T	d	SIO	27
Santa Cruz	T	d	SIO	25
Santa Monica	TS	d	USCGS	29
Santa Rosa Creek	T	m	HMS	36, 37
Silver Strand	T	m	SIO	40, 41
Soberanes Point	T	m	HMS	36, 37
South San Diego Bay	T	m	SIO	40, 41
Stillwater Cove	T	m	HMS	36, 37
Trinidad Head	T	m	UCLA	46, 47

Station Name	Type of Data Collected		Agency	Page
	1960			
Ventura	T	d	SIO	27
Yankee Point: north of	T	m	HMS	36, 37
Yankee Point: south of	T	m	HMS	36, 37
Yankee Point: SE of	T	m	UCLA	46, 47

SIO	University of California, Scripps Institution of Oceanography, La Jolla, California
HMS	Hopkins Marine Station, Pacific Grove, California
USCG	United States Coast Guard Service
USCGS	United States Coast and Geodetic Survey
UCLA	University of California at Los Angeles


LOCATION OF SURFACE WATER-TEMPERATURE STATIONS UNITED STATES - WEST COAST
(Underlined stations collect daily water samples)
Neah Bay (USCGS)
Columbia River Lightship
Crescent City (USCGS)
Blunts Reef Lightship
Mendocino
Fort Ross
Bodega Bay, N of
Farallon Islands
Half Moon Bay
Santa Cruz
Pacific Grove - Hopkins Marine Station
Point Lobos
48°
46°
44°
42°
40°
38°
128°
126°
124°
122°
120°


LOCATION OF SURFACE WATER-TEMPERATURE STATIONS
UNITED STATES-WEST COAST.
(Underlined stations collect daily water samples)
(USCGS)
Avila
35°
Gaviota
Santa Barbara
Ventura
Point Hueneme
Santa Cruz I.
Point Dume, W of
34°
Anacapa I.
Santa Monica USCGS
Point Vicente
Huntington Beach
Balboa
Santa Catalina Island
Dana Point, E of
San Nicolas
Oceanside
33°
La Jolla
Scripps Institution
of Oceanography
121°
120°
119°
118°
117°


LOCATION OF SURFACE-WATER TEMPERATURE STATIONS BAJA CALIFORNIA, MEXICO, WEST COAST
110°
34°
32°
30°
28°
26°
24°
120°
118°
116°
114°
San Diego
Punta Banda
Tres Hermanas
Arbolitos
Boca Santa Tomás
Bahía Colnett
Guadalupe I.
San Benito I.
Cedros I.
BAJA CALIFORNIA
Cape San Lucas

SHORELINE SURFACE WATER-TEMPERATURE DATA BETWEEN

NEAH BAY, WASHINGTON, AND CAPE SAN LUCAS, BAJA CALIFORNIA

For the daily stations, the data presented show the monthly means, ranges, and standard deviations. A code designates the number of observations from which the averages were computed. This code is as follows:

No Designation	25 or more observations in a month, or 23 or more in February.
S Scattered	Minimum of 5 observations per month with at least one in any 7-day period.
A-B-C	Minimum of 6 or more observations in any group during a 10-day period. These periods are: A, 1 to 10; B, 11 to 20; C, 21 to 30 or 31.

Means, maxima, minima, ranges and standard deviations are included for those months marked "S" but the values are listed in parenthesis.

For values designed "A," "B," "C," or any combination of these letters, means, maxima and minima are listed in parenthesis. Ranges and standard deviations are omitted.

METHOD OF COMPUTING STANDARD DEVIATIONS

The 1955 data for the shore stations which were active at that time were published in the data report, Surface Water Temperatures at Shore Stations, United States West Coast and Baja California, 1955 (SIO Ref. 57-28, 5 July 1957). In that report the published standard deviations were computed using the following formula:

$$\sigma = \sqrt{\frac{\varepsilon x^2}{N} - \bar{x}^2} \qquad (1)$$

The calculations of σ by use of formula (1) is time consuming even with automatic calculators, particularly for a group of data as large as the one presented here. Therefore, a study was made of two methods of estimating the standard deviation. These approximate methods are based on the relationships of the standard deviation to the range in a unit-normal-frequency distribution.

R. A. Fisher and F. Yates in Statistical Tables for Biological, Agricultural and Medical Records, 4th edition, 1953, page 26 and Table XX, describe the two methods and tabulate the appropriate factors necessary for the calculations in terms of unit standard deviations for both methods.

The first method which will be referred to as the standard deviation estimated from the range, or σ_{range}, is based on the following formula:

$$\sigma_{range} \doteq \frac{(x_n - x_1)}{2\,\mu_1} \qquad (2)$$

The second method, which will be referred to as the standard deviation estimated from the rank, or σ_{rank}, is calculated from the following formula:

$$\sigma_{rank} \doteq \frac{\frac{(x_n + x_{n-1}) - (x_2 + x_1)}{2} \quad \frac{2}{2}}{2\,\frac{(\mu_1 + \mu_2)}{2}} \qquad (3)$$

where $x_1, x_2 \ldots x_{n-1}, x_n$ are values placed in ascending order from smallest to largest, and μ_1 and μ_2 are the mean deviations for unit normal distributions of the first and second largest members of appropriate sample sizes, taken from Table XX, Fisher and Yates.

The standard deviations were calculated for 1955 temperature and salinity data, using the three methods. Table IA shows the frequency distribution of the deviations ($\sigma - \sigma_{range}$) and Table IB is the frequency distribution of the deviations ($\sigma - \sigma_{rank}$) for the temperature values. Table IIA and B present the frequency distribution of the deviations for the salinity data. The deviations in Table II are tabulated in units of hundredths while those of Table I are in tenths. Table III summarizes the deviations in terms of percentages for both temperature and salinity data.

These tables show that standard deviations estimated from formula (3) are in better agreement with the results computed from the standard formula (1) than are the values obtained using formula (2). Formula (3) minimizes the effect of single extreme values. However, both methods appear to give sufficiently accurate estimates of variability for many general uses, particularly since the daily values are available to those persons who feel the need for the standard values based on formula (1). Therefore, standard deviations in this publication have been estimated, using formula (3) based on rank.

TABLE I

FREQUENCY DISTRIBUTION

A. ($\sigma - \sigma_{range}$)

Temperature °C		Total
+0.51-0.60	//	2
+0.41-0.50		
+0.31-0.40	///	3
+0.21-0.30	卌 //	7
+0.11-0.20	卌 卌 卌 卌 卌 卌 卌 ///	38
+ 0-0.10	卌 //	102
- 0-0.10	卌 /	101
-0.11-0.20	卌 卌 卌 卌 卌 /	26
-0.21-0.30	卌 /	6
-0.31-0.40	/	1
-0.41-0.50	//	2
-0.51-0.60	/	1
		289

B. ($\sigma - \sigma_{rank}$)

+0.31-0.40	//	2
+0.21-0.30	////	4
+0.11-0.20	卌 卌 卌 卌 /	21
+ 0-0.10	卌 /	121
- 0-0.10	卌 ////	119
-0.11-0.20	卌 卌 卌 ///	18
-0.21-0.30	///	3
-0.31-0.40		
		288

TABLE II

FREQUENCY DISTRIBUTION

A. $(\sigma - \sigma_{range})$

Salinity ‰		Total
+0.07	/	1
+0.02	//	2
+0.01	𝍸 ////	9
0	𝍸 𝍸 𝍸 𝍸 𝍸	25
-0.01	𝍸 𝍸 /	11
-0.02	/	1
-0.03	/	1
-0.04	/	1
-0.05	//	2
-0.07	/	1
-0.14	/	1
-0.16	/	1
		56

B. $(\sigma - \sigma_{rank})$

+0.02		
+0.01	𝍸 𝍸	9
0	𝍸 𝍸 𝍸 𝍸 𝍸 ////	29
-0.01	𝍸 𝍸	10
-0.02	//	2
-0.03	///	3
-0.04	/	1
-0.05		
-0.06		
-0.07	//	2
		56

TABLE III

TEMPERATURE

°C	($\sigma_{computed} - \sigma_{range}$) %
±0.1	70
±0.2	91
±0.3	96
±0.4	98
±0.5	99
±0.6	100

°C	($\sigma_{computed} - \sigma_{rank}$) %
±0.1	83
±0.2	96
±0.3	99
±0.4	100

SALINITY

‰	($\sigma_{computed} - \sigma_{range}$) %
±0.01	80
±0.02	85
±0.04	89
±0.07	96
±0.08 to -0.16	100

‰	($\sigma_{computed} - \sigma_{rank}$) %
±0.01	85
±0.02	89
±0.04	96
±0.07	100

T AND S DATA NEAH BAY

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(6.75)	7.79	(7.43)	(9.30)	(11.21)	11.35	11.79	(11.26)	(10.82)	(10.27)	9.69	8.16	9.65		
Max.		(8.35)	8.35	(8.90)	(10.00)	(13.30)	13.35	14.45	(13.30)	(12.80)	(11.10)	11.10	8.90		14.45	
Min.	T	(5.55)	7.20	(4.45)	(8.60)	(10.00)	9.70	9.45	(10.00)	(9.75)	(9.40)	8.35	6.70			4.45
Range		(2.80)	1.15	(4.45)	(1.40)	(3.30)	3.65	5.00	(3.30)	(3.05)	(1.70)	2.75	2.20			
Std. Dev.		(0.74)	0.33	(1.30)	(0.37)	(0.96)	1.04	1.27	(0.97)	(0.80)	(0.51)	0.64	0.63			
No. Obs.		23S	24	23S	22S	24S	26	25	23S	24S	21S	25	26			
Mean	1960	(30.89)	29.89	(30.63)	29.20	(29.56)	30.74	(32.32)	(32.34)	(32.47)	(31.56)	30.69	30.14	30.87		
Max.		(31.80)	31.1	(31.6)	30.3	(30.60)	32.80	(33.40)	(33.20)	(33.10)	(33.20)	31.90	31.00		33.40	
Min.	S	(29.80)	29.0	(29.3)	27.4	(26.50)	26.40	(31.80)	(31.20)	(31.50)	(30.20)	29.30	28.50			26.40
Range		(2.00)	2.1	(2.3)	2.9	(4.10)	6.40	(1.60)	(2.00)	(1.60)	(3.00)	2.60	2.50			
Std. Dev.		(0.53)	0.55	(0.64)	-	(1.10)	1.82	(0.38)	(0.50)	(0.43)	(0.85)	0.62	0.71			
No. Obs.		23S	24	23S	14AB	24S	25	24S	23S	22S	22S	25	26			

T DATA CLALLAM BAY

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	8.7	8.9	9.2	10.6	11.3	12.5	13.6	12.6	12.1	12.1	11.9	11.6	11.3		
Max.		9.0	9.2	10.3	11.3	11.9	13.3	14.5	13.4	12.5	12.5	12.2	11.9		14.5	
Min.		8.1	8.5	8.5	9.8	10.9	11.9	12.5	12.0	11.5	11.8	11.4	11.3			8.1
Range		0.9	0.7	1.8	1.5	1.0	1.4	2.0	1.4	1.0	0.7	0.8	0.6			
Std. Dev.		0.22	0.18	0.46	0.37	0.24	0.34	0.45	0.37	0.22	0.15	0.19	0.15			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			

T DATA COLUMBIA RIVER LIGHTSHIP

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	7.8	8.6	8.1	9.8	11.5	11.8	12.5	13.9	13.0	12.1	12.0	10.1	10.9		
Max.		9.0	9.6	8.9	10.9	12.3	12.8	13.9	15.9	14.6	13.0	13.5	11.5		15.9	
Min.		7.1	7.1	7.2	8.8	10.5	11.2	11.1	12.1	11.0	9.5	10.0	8.4			7.1
Range		1.9	2.5	1.7	2.1	1.8	1.6	2.8	3.8	3.6	3.5	3.5	3.1			
Std. Dev.		0.40	0.64	0.46	0.58	0.48	0.40	0.74	0.94	0.92	0.72	0.81	0.76			
No. Obs.		31	29	30	30	30	30	28	31	30	31	30	31			

T AND S DATA CRESCENT CITY

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	9.41	(10.66)	(10.86)	(12.16)	(13.20)	(12.39)	(14.77)	(13.29)	(12.35)	(12.40)	(10.60)	(10.48)	11.88		
Max.		12.20	(11.65)	(12.50)	(13.35)	(15.60)	(16.10)	(16.70)	(15.00)	(14.40)	(13.30)	(12.20)	(11.35)		16.70	
Min.	T	7.50	(9.15)	(8.90)	(10.55)	(11.10)	(10.60)	(12.80)	(10.00)	(10.60)	(11.10)	(9.40)	(9.40)			7.50
Range		4.70	2.50	3.60	2.80	4.50	5.50	3.90	5.00	3.80	2.20	2.80	1.95			
Std. Dev.		1.15	0.79	0.98	0.90	-	1.56	1.26	1.61	0.96	0.60	0.69	0.56			
No. Obs.		25	18S	17S	17S	9B	10S	11S	9S	17S	24S	20S	20S			
Mean	1960	31.50	(29.0)	(26.3)	(27.03)	(28.79)	(30.60)	(31.66)	(32.81)			(30.13)	(28.98)	29.68		
Max.		32.80	(32.8)	(32.5)	(31.5)	(32.10)	(33.80)	(32.70)	(34.10)			(33.10)	(32.30)		34.10	
Min.	S	29.30	(22.5)	(18.3)	(13.6)	(24.70)	(27.80)	(30.40)	(31.60)			(23.50)	(26.90)			13.60
Range		3.50	(10.3)	(14.2)	(17.9)	(7.40)	(6.00)	(2.30)	(2.50)			(9.60)	(5.40)			
Std. Dev.		0.99	(3.09)	(4.44)	(3.97)	-	(2.22)	(0.64)	(0.81)			(2.80)	(1.37)			
No. Obs.		25	18S	17S	17S	9B	10S	11S	9S			20S	20S			

T AND S DATA BLUNTS REEF LIGHTSHIP

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	10.41	10.28	9.88	9.43	10.44	9.91	10.17	(9.80)	10.00	10.82	10.96	11.46	10.30		
Max.		11.7	11.5	11.2	11.5	11.50	14.20	10.60	(11.10)	11.10	11.70	12.20	11.70		14.20	
Min.	T	9.9	9.1	9.1	8.9	9.60	9.00	9.80	(8.90)	9.40	9.40	9.40	10.60			8.90
Range		1.8	2.4	2.1	2.6	1.90	5.20	0.80	(2.20)	1.70	2.30	2.80	1.10			
Std. Dev.		0.43	0.61	0.56	0.63	0.47	1.02	0.21	(0.64)	0.40	0.55	0.77	0.31			
No. Obs.		31	29	31	29	31	29	29	24S	30	30	29	26			
Mean	1960	33.20	32.73	32.80	32.40	32.98	33.76	33.92	33.88	33.71	33.51	33.46	33.14	33.29		
Max.		33.62	33.67	33.68	33.15	33.65	34.04	34.77	34.21	33.93	33.88	33.86	33.55		34.77	
Min.	S	32.85	30.47	32.00	31.73	31.37	32.86	33.68	33.73	33.51	33.25	32.76	32.39			30.47
Range		0.77	3.20	1.68	1.42	2.28	1.18	1.09	0.48	0.42	0.63	1.10	1.16			
Std. Dev.		0.19	0.75	0.45	0.37	0.49	0.30	0.20	0.12	0.10	0.14	0.27	0.28			
No. Obs.		31	28	31	29	30	29	30	29	30	30	27	25			

T DATA MENDOCINO

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	10.9	10.6	9.7	(10.1)	10.0	9.9	10.1	10.0	10.7	11.6	11.2	11.6	10.5		
Max.		12.2	12.5	10.6	(11.5)	12.1	12.3	10.6	11.3	12.5	13.6	12.1	12.3		13.6	
Min.		9.5	8.6	9.1	8.8	8.8	8.7	9.5	9.6	10.1	10.6	9.4	10.8			8.6
Range		2.7	3.9	1.5	-	3.3	3.6	1.1	1.7	2.4	3.0	2.7	1.5			
Std. Dev.		0.66	1.06	0.40	-	0.84	0.88	0.28	0.42	0.54	0.78	0.70	0.37			
No. Obs.		31	29	27	21AB	30	30	31	29	30	31	30	31			

T DATA FT. ROSS

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	11.1	11.1	10.4	9.4	8.7	11.3	10.6	10.6	11.3	11.9	11.0	11.6	10.7		
Max.		12.4	12.5	11.2	11.2	9.6	13.1	12.8	13.0	12.8	13.7	11.9	12.0		13.7	
Min.		10.3	9.8	9.4	8.0	7.4	8.7	9.0	9.0	9.6	9.9	10.0	10.0			7.4
Range		2.1	2.7	1.8	3.2	2.2	4.4	3.8	4.0	3.2	3.8	1.9	2.0			
Std. Dev.		0.48	0.76	0.46	0.86	0.58	1.12	1.02	1.04	0.84	0.98	0.50	0.57			
No. Obs.		30	26	31	30	31	30	31	31	30	31	29	26			

T DATA BODEGA BAY: north of

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(11.6)	11.9	(10.8)	10.2	9.5	12.0	11.5	11.4	12.4	12.4	(11.7)	11.9	11.4		
Max.		(12.2)	12.7	(11.8)	12.9	10.7	13.9	13.4	13.9	13.8	14.5	(12.5)	12.4		14.5	
Min.		(10.7)	10.1	(10.0)	8.8	7.9	8.4	9.9	10.0	10.8	11.0	(11.2)	11.3			7.9
Range		-	2.6	-	4.1	2.8	5.5	3.5	3.9	3.0	3.5	(1.3)	1.1			
Std. Dev.		-	0.74	-	1.08	0.74	1.54	0.90	0.98	0.74	0.82	-	0.28			
No. Obs.		17BC	24	24AC	30	29	28	30	31	30	29	22BC	25			

T AND S DATA FARALLON ISLANDS

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	11.82	11.72	10.21	10.02	10.68	11.38	12.06	11.96	12.60	12.83	11.70	12.05	11.59		
Max.		12.50	12.52	11.70	12.20	11.80	12.80	13.70	13.50	13.60	14.10	12.60	13.80		14.10	
Min.	T	11.20	10.40	8.60	7.55	9.20	10.20	11.00	11.30	11.70	11.60	11.00	11.10			7.55
Range		1.30	2.12	3.10	4.65	2.60	2.60	2.70	2.20	1.90	2.50	1.60	2.70			
Std. Dev.		0.34	0.55	0.84	1.03	0.68	0.70	0.70	0.53	0.48	0.61	0.40	0.53			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.53	33.27	33.27	33.40	33.72	33.76	33.70	33.79	33.80	33.67	33.71	33.59	33.60		
Max.		33.84	33.53	33.74	33.93	34.10	34.12	33.93	33.91	33.95	33.93	34.49	34.53		34.53	
Min.	S	33.21	32.89	32.68	32.74	33.27	33.46	33.40	33.71	33.65	33.55	33.45	33.17			32.68
Range		0.63	0.64	1.06	1.19	0.83	0.66	0.53	0.20	0.30	0.38	1.04	1.36			
Std. Dev.		0.15	0.17	0.26	0.26	0.21	0.17	0.14	0.05	0.08	0.09	0.26	0.36			
No. Obs.		31	29	31	30	31	30	29	29	30	31	30	31			

T DATA HALF MOON BAY

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	11.5	12.0	11.5	11.3	10.7	13.5	12.8	13.0	13.3	13.3	11.9	(11.9)	12.2		
Max.		12.9	12.8	12.6	13.6	12.2	15.4	14.7	14.4	14.9	15.0	12.5	(12.9)		15.4	
Min.		9.6	10.8	10.4	9.8	9.7	10.0	10.8	11.5	11.8	11.2	11.1	(10.8)			9.6
Range		3.3	2.0	2.2	3.8	2.5	5.4	3.9	2.9	3.1	3.8	1.4	(2.1)			
Std. Dev.		0.84	0.46	0.52	1.00	0.64	1.10	0.98	0.76	0.80	1.00	0.37	-			
No. Obs.		30	29	31	30	30	30	31	31	30	31	29	23AB			

T DATA SANTA CRUZ

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	11.4	11.8	11.9	12.2	11.8	14.3	14.4	14.3	14.3	14.1	12.7	12.0	12.9		
Max.		12.5	12.8	12.9	13.8	13.6	15.5	15.6	15.1	14.9	15.2	13.7	12.6		15.6	
Min.		10.1	10.3	10.4	9.5	9.6	13.0	13.6	13.6	13.6	12.4	11.2	10.9			9.5
Range		2.4	2.5	2.5	4.3	4.0	2.5	2.0	1.5	1.3	2.8	2.5	1.7			
Std. Dev.		0.62	0.60	0.62	1.08	1.04	0.64	0.46	0.38	0.36	0.64	0.55	0.43			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			

T AND S DATA PACIFIC GROVE

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	12.43	12.59	12.32	12.89	12.19	14.42	14.10	13.51	13.44	14.22	12.75	12.50	13.11		
Max.		13.00	13.30	13.10	14.40	13.40	15.40	15.20	14.70	14.20	15.90	13.40	13.80		15.90	
Min.	T	11.40	11.80	11.20	10.50	10.70	12.10	13.00	12.30	12.30	12.40	11.70	11.80			10.50
Range		1.60	1.50	1.90	3.90	2.70	3.30	2.20	2.40	1.90	3.50	1.70	2.00			
Std. Dev.		0.39	0.40	0.45	1.04	0.72	0.71	0.57	0.61	0.05	0.93	0.42	0.47			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.59	33.46	33.48	33.57	33.65	33.51	33.62	33.75	33.73	33.56	33.63	33.63	33.60		
Max.		33.76	33.89	33.77	33.86	34.07	33.91	33.86	34.01	33.82	33.72	33.71	33.82		34.07	
Min.	S	33.04	33.15	33.27	33.22	33.51	33.17	32.59	33.63	33.62	33.31	33.35	33.57			32.59
Range		0.72	0.74	0.50	0.64	0.56	0.74	1.27	0.38	0.20	0.41	0.36	0.25			
Std. Dev.		0.13	0.15	0.10	0.16	0.14	0.20	0.30	0.07	0.05	0.10	0.07	0.05			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			

T DATA PT. LOBOS: north side

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	12.3	11.5	11.6	11.1	11.2	13.5	13.3	13.2	13.7	13.5	12.9	12.5	12.5		
Max.		13.2	13.1	12.6	13.6	13.6	14.5	14.8	15.3	14.8	16.5	14.0	14.1		16.5	
Min.		11.0	10.0	10.0	9.0	10.2	11.7	11.2	11.3	12.0	11.6	11.4	10.5			9.0
Range		2.2	3.1	2.6	4.6	3.4	2.8	3.6	4.0	2.8	4.9	2.6	3.6			
Std. Dev.		0.54	0.86	0.62	1.16	0.74	0.66	0.90	0.94	0.74	1.32	0.69	0.77			
No. Obs.		30	29	31	30	31	29	31	31	27	30	29	29			

T DATA PT. LOBOS: south side

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	12.2	11.3	11.4	10.3	10.0	12.7	12.0	12.6	12.9	13.0	12.5	12.7	12.0		
Max.		13.1	13.1	12.3	12.2	11.6	14.3	13.7	14.1	13.9	15.9	13.8	13.8		15.9	
Min.		10.6	9.6	10.0	8.5	8.9	11.4	10.3	10.8	12.2	10.9	11.2	11.4			8.5
Range		2.5	3.5	2.3	3.7	2.7	2.9	3.4	3.3	1.7	5.0	2.6	2.4			
Std. Dev.		0.64	0.96	0.60	0.92	0.70	0.78	0.90	0.86	0.42	1.34	0.69	0.62			
No. Obs.		30	29	31	30	31	29	31	30	28	30	29	29			

T DATA GAVIOTA

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	13.2	14.0	15.0	14.3	14.6	(15.4)	16.1	16.0	16.2	14.8	14.5	14.3	14.9		
Max.		14.0	15.1	15.1	15.1	15.1	(16.1)	18.0	17.1	17.0	16.0	15.1	15.0		18.0	
Min.		12.0	13.0	14.1	14.0	14.0	15.0	13.1	15.0	14.0	14.0	14.0	14.0			12.0
Range		2.0	2.1	1.0	1.1	1.1	-	4.0	2.1	3.0	2.0	1.1	1.0			
Std. Dev.		0.52	0.58	0.28	0.28	0.30	-	1.22	0.54	0.68	0.54	0.31	0.27			
No. Obs.		31	29	31	30	31	19AB	29	31	30	30	30	31			

T DATA SANTA BARBARA

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960			14.2	14.8	(16.7)	16.4	16.5	16.7	16.7	17.0	15.8	14.0			
Max.				15.4	17.4	(19.2)	18.1	18.6	19.7	19.8	18.2	16.8	14.9			
Min.				12.3	13.0	(14.5)	15.0	14.9	14.3	14.9	16.0	14.5	12.8			
Range				3.1	4.4	(4.7)	3.1	-	5.4	4.9	-	2.3	2.1			
Std. Dev.				0.86	1.10	(1.22)	0.88	-	1.18	1.22	-	0.58	0.53			
No. Obs.				26	27	20S	19S	21AB	31	26	17AB	27	27			

T DATA VENTURA

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	13.0	12.1	13.4	13.4	14.3	15.5	15.4	16.2	16.4	16.2	15.6		13.4		
Max.		13.7	13.7	14.4	14.4	15.6	16.5	19.3	18.8	18.2	19.0	16.7			19.3	
Min.		12.2	10.4	12.2	11.5	13.1	14.0	12.5	13.4	14.8	14.8	13.6				10.4
Range		1.5	3.3	2.2	2.9	2.5	2.5	6.8	5.4	3.4	4.2	3.1				
Std. Dev.		0.40	0.86	0.58	0.66	0.66	0.68	1.70	1.40	0.88	1.02	0.79				
No. Obs.		31	29	31	30	31	30	31	31	30	31	30				

T AND S DATA POINT HUENEME

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	12.61	12.10	13.20	13.24	13.50	15.06	14.74	14.72	14.94	14.98	15.00	13.37	13.96		
Max.		14.2	14.2	14.0	14.3	15.40	16.50	16.00	16.30	16.40	16.90	16.60	14.40		16.90	
Min.	T	11.2	10.6	11.8	11.0	11.90	13.90	13.00	12.80	11.30	11.40	13.00	11.60			10.60
Range		3.0	3.6	2.2	3.3	3.50	2.60	3.00	3.50	5.10	5.50	3.60	2.80			
Std. Dev.		0.72	0.96	0.56	0.82	0.88	0.66	0.76	0.91	1.37	1.42	0.92	0.70			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.53	33.59	33.67	33.68	33.79	33.66	33.74	33.68	33.62	33.65	33.53	33.70	33.65		
Max.		33.80	33.91	33.83	33.96	34.14	33.86	33.92	33.87	33.87	33.99	33.85	33.94		34.14	
Min.	S	32.81	33.13	33.47	30.59	33.68	33.48	33.62	33.53	33.51	33.48	31.46	33.31			31.46
Range		0.99	0.78	0.36	3.37	0.46	0.38	0.30	0.34	0.36	0.51	2.39	0.63			
Std. Dev.		0.27	0.22	0.09	0.53	0.11	0.10	0.07	0.09	0.09	0.13	0.44	0.13			
No. Obs.		31	27	31	30	31	30	31	31	30	31	29	31			

T DATA ANACAPA ISLAND

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(13.6)	(13.1)	13.7	13.6	14.6	16.0	16.6	17.3	18.2	17.5	16.7	14.8	15.5		
Max.		14.0	15.1	14.5	15.1	17.1	17.1	18.4	18.3	20.5	18.3	17.8	16.3		14.0	
Min.		13.0	12.1	12.5	12.2	13.1	14.4	14.8	16.6	16.8	16.8	15.6	10.6			12.1
Range		-	-	2.0	2.9	4.0	2.7	3.6	1.7	3.7	1.5	2.2	5.7			
Std. Dev.		-	-	0.48	0.72	0.84	0.66	0.88	0.44	0.96	0.36	0.55	1.15			
No. Obs.		14BC	21AC	31	30	31	30	31	31	30	31	30	31			

T DATA POINT DUME: west of

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960		(11.8)	13.5	13.7	14.8	(16.2)	(16.3)			16.9	16.5	13.9			
Max.			(13.2)	13.9	14.8	16.4	(16.7)	(16.7)			19.4	17.9	15.0			
Min.			(11.2)	13.1	11.9	12.8	(15.7)	(15.8)			15.1	15.0	11.7			
Range			-	0.8	2.9	3.6	-	-			4.3	2.9	3.3			
Std. Dev.			-	0.18	0.72	0.88	-	-			1.20	0.73	0.89			
No. Obs.			14AC	31	30	29	9B	8A			25	29	31			

T AND S DATA SANTA MONICA

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	13.67	13.21	14.06	14.78	16.52	17.70	18.13	20.07	19.64	17.28	16.37	14.19	16.30		
Max.		14.45	14.70	15.00	16.10	20.65	18.90	21.65	22.20	21.70	18.95	17.75	15.45		22.20	
Min.	T	12.20	12.20	12.90	12.90	13.90	16.80	15.00	17.80	18.40	15.60	15.00	12.80			12.20
Range		2.25	2.50	2.10	3.20	6.75	2.10	6.65	4.40	3.30	3.35	2.75	2.65			
Std. Dev.		0.53	0.66	0.50	0.81	1.40	0.55	1.57	0.99	0.80	0.87	0.68	0.66			
No. Obs.		31	29	30	30	31	30	31	31	30	31	30	31			
Mean	1960	33.54	33.50	33.43	33.74	34.11	33.94	33.63	33.80	33.65	33.59	33.77	34.00	33.73		
Max.		34.20	34.00	33.80	34.10	34.80	34.60	34.60	34.20	34.10	34.60	34.40	34.50		34.80	
Min.		33.20	33.00	32.50	33.20	33.60	33.40	33.00	33.50	33.20	32.90	32.80	33.60			32.50
Range		1.00	1.00	1.30	0.90	1.20	1.20	1.60	0.70	0.90	1.70	1.60	0.90			
Std. Dev.		0.22	0.21	0.25	0.22	0.28	0.31	0.38	0.19	0.23	0.42	0.37	0.23			
No. Obs.		31	29	30	30	31	30	31	31	29	31	30	31			

T DATA POINT VICENTE

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960						(15.6)	(15.2)	(16.7)	(17.7)	(16.9)	(16.5)	(14.6)			
Max.							(17.1)	(18.7)	(19.0)	(19.7)	(18.3)	(17.4)	(15.2)			
Min.							(13.9)	(12.0)	(13.0)	(14.5)	(14.3)	(14.0)	(14.3)			
Range							(3.2)	(6.7)	(6.0)	(5.2)	(4.0)	(3.4)	(0.9)			
Std. Dev.							(0.86)	(1.92)	(1.50)	(1.44)	(0.96)	(0.86)	(0.25)			
No. Obs.							22S	21S	23S	22S	21S	22S	22S			

T DATA HUNTINGTON BEACH

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960					(17.9)	18.4	17.6	18.3	(18.9)			(14.3)			
Max.						(19.0)	20.2	21.8	20.5	(22.6)			(15.6)			
Min.						(16.6)	16.5	13.9	16.5	(15.6)			(13.7)			
Range						-	(3.7)	7.9	4.0	(7.0)			(1.9)			
Std. Dev.						-	(1.00)	2.10	0.54	(1.98)			(0.45)			
No. Obs.						7C	29	30	30	21S			22S			

T AND S DATA BALBOA

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	14.42	13.44	14.16	15.52	17.27	17.47	17.21	18.56	18.43	17.15	16.59	14.34	16.21		
Max.		14.90	14.83	15.45	17.33	18.83	18.50	21.89	20.11	21.39	18.00	17.83	15.05		21.89	
Min.	T	14.11	11.61	13.22	13.11	16.11	14.80	13.33	17.06	16.30	16.11	15.00	13.33			11.61
Range		0.79	3.22	2.23	4.22	2.72	3.70	8.56	3.05	5.09	1.89	2.83	1.72			
Std. Dev.		0.19	0.87	0.52	1.09	0.69	0.86	2.31	0.75	1.30	0.51	0.76	0.37			
No. Obs.		31	28	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.53	33.53	33.53	33.60	33.61	33.67	33.68	33.68	33.63	33.57	33.62	33.64	33.61		
Max.		33.64	33.86	33.61	33.75	33.78	33.89	33.74	33.78	33.75	33.75	34.02	33.88		34.02	
Min.	S	33.33	33.15	33.42	33.46	33.44	33.53	33.64	33.58	33.49	33.49	33.50	33.51			33.15
Range		0.31	0.71	0.19	0.29	0.34	0.36	0.10	0.20	0.26	0.26	0.52	0.37			
Std. Dev.		0.08	0.17	0.04	0.07	0.08	0.07	0.03	0.04	0.07	0.05	0.10	0.09			
No. Obs.		31	29	30	29	31	30	31	31	30	30	30	30			

T DATA DANA POINT: east of

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	13.5	12.8	14.4	16.0	17.8	18.0	18.2	18.9	18.8	17.4	15.9	13.1	16.2		
Max.		14.7	14.4	15.6	17.2	19.1	19.9	23.1	21.6	21.9	18.5	17.8	14.5		23.1	
Min.		11.3	10.6	13.1	14.4	16.2	16.3	14.4	15.4	16.8	15.3	13.2	9.9			9.9
Range		3.4	3.8	2.5	2.8	2.9	3.6	8.7	6.2	5.1	3.2	4.6	4.6			
Std. Dev.		0.74	0.90	0.64	0.70	0.76	0.90	2.28	1.54	1.36	0.72	1.17	1.17			
No. Obs.		29	29	31	29	30	30	31	30	30	31	30	31			

T DATA OCEANSIDE

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(14.2)	13.3	14.4	16.3	18.1	17.7				16.5	16.3	14.2			
Max.		(15.4)	14.9	15.4	17.2	19.4	19.2				17.8	18.4	15.4			
Min.		(13.3)	11.8	12.9	14.8	16.0	15.5				15.6	14.9	13.1			
Range		-	3.1	2.5	2.4	3.4	3.7				2.2	3.5	2.3			
Std. Dev.		-	0.82	0.68	0.60	0.88	1.00				0.46	0.83	0.56			
No. Obs.		20BC	29	31	30	31	25				29	30	31			

T AND S DATA LA JOLLA: Scripps Pier, surface

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	14.28	13.50	14.34	16.15	17.82	17.47	18.76	19.51	19.11	17.75	16.37	14.24	16.61		
Max.		14.85	14.85	15.40	17.52	19.65	19.58	23.90	22.25	21.40	18.40	17.70	15.10		23.90	
Min.	T	13.50	11.92	13.25	14.35	15.00	13.48	14.88	16.20	16.18	16.28	14.65	13.70			11.92
Range		1.35	2.93	2.15	3.17	4.65	6.10	9.02	6.05	5.22	2.12	3.05	1.40			
Std. Dev.		0.34	0.76	0.56	0.73	1.09	1.58	2.37	1.58	1.26	0.54	0.77	0.36			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.56	33.57	33.61	33.65	33.70	33.76	33.72	33.73	33.66	33.67	33.65	33.60	33.66		
Max.		33.66	33.62	33.68	33.73	33.82	33.83	33.78	33.84	33.78	33.77	33.73	33.67		33.84	
Min.	S	33.40	33.49	33.55	33.58	33.64	33.66	33.68	33.64	33.60	33.57	33.58	33.54			33.40
Range		0.26	0.13	0.13	0.15	0.18	0.17	0.10	0.20	0.18	0.20	0.15	0.13			
Std. Dev.		0.07	0.04	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.05	0.04	0.03			
No. Obs.		31	29	31	30	31	30	31	31	30	31	30	30			

T AND S DATA LA JOLLA: Scripps Pier, 5-meter bottom

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	14.18	13.41	14.16	15.93	17.48	15.92	16.83	17.08	17.21	17.09	16.15	14.17	15.80		
Max.		14.80	14.85	15.28	17.22	19.65	19.50	22.80	21.28	20.55	18.28	17.20	14.95		22.80	
Min.	T	13.40	11.68	13.00	14.22	13.90	12.90	13.20	13.60	14.70	13.82	14.80	13.70			11.68
Range		1.40	3.17	2.28	3.00	5.75	6.60	9.60	7.68	5.85	4.46	2.40	1.25			
Std. Dev.		0.37	0.82	0.56	0.67	1.39	1.78	2.54	1.98	1.44	1.15	0.65	0.30			
No. Obs.		31	27	31	30	31	30	31	31	30	31	30	31			
Mean	1960	33.57	33.57	33.61	33.65	33.71	33.74	33.71	33.71	33.64	33.67	33.64	33.60	33.65		
Max.		33.66	33.68	33.71	33.80	33.84	33.83	33.78	33.86	33.77	33.84	33.69	33.67		33.86	
Min.	S	33.39	33.49	33.58	33.59	33.65	33.68	33.65	33.62	33.57	33.55	33.57	33.56			33.39
Range		0.27	0.19	0.13	0.21	0.19	0.15	0.13	0.24	0.20	0.29	0.12	0.11			
Std. Dev.		0.07	0.04	0.03	0.05	0.05	0.04	0.03	0.06	0.05	0.07	0.03	0.03			
No. Obs.		31	27	31	30	31	30	31	31	30	31	30	30			

T DATA PUNTA BANDA: TRES HERMANAS

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	15.6	14.5	15.6	16.5	17.9	(19.2)				(17.4)	16.6	(14.3)			
Max.		17.6	15.6	19.0	18.3	22.6	(20.1)				(19.0)	17.7	(15.0)			
Min.		14.0	13.4	14.0	15.0	13.6	(17.4)				(16.6)	15.0	(13.0)			
Range		3.6	2.2	5.0	3.3	9.0	-				-	2.7	-			
Std. Dev.		0.91	0.61	0.14	0.81	1.92	-				-	0.69	-			
No. Obs.		31	29	31	29	31	15AB				22BC	29	16AB			

T DATA BOCA SANTO TOMÁS

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(14.0)	(13.9)		(12.3)		(14.1)	(14.5)								
Max.		(15.2)	(14.9)		(14.1)		(15.9)	(16.5)								
Min.		(13.4)	(13.4)		(11.0)		(12.0)	(13.5)								
Range		(1.8)	(1.5)		(3.1)		-	(3.0)								
Std. Dev.		(0.48)	(0.45)		(1.11)		-	(0.82)								
No. Obs.		17S	11S		9S		16BC	20S								

T DATA BAHÍA COLNETT (1)

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	13.9	(11.9)	12.7	13.4	13.4	14.2	(14.6)	(14.3)	(15.1)						
Max.		15.2	(13.4)	15.2	15.5	16.4	15.9	(16.7)	(15.3)	(16.1)						
Min.		13.0	(11.1)	11.3	11.2	11.7	12.0	(13.5)	(13.6)	(13.6)						
Range		2.2	-	3.9	4.3	4.7	3.9	-	-	-						
Std. Dev.		0.60	-	0.98	1.06	1.24	1.00	-	-	-						
No. Obs.		28	8C	31	30	31	30	19AB	16BC	5A						

T DATA PUNTA BANDA: ARBOLITOS (2)

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	(14.3)						(16.1)	15.3	(14.1)						
Max.		(15.0)						(17.3)	19.0	(19.6)						
Min.		(13.4)						(15.0)	13.0	(14.0)						
Range		-						-	6.0	-						
Std. Dev.		-						-	1.62	-						
No. Obs.		23AB						15BC	31	21AB						

T DATA GUADALUPE ISLAND

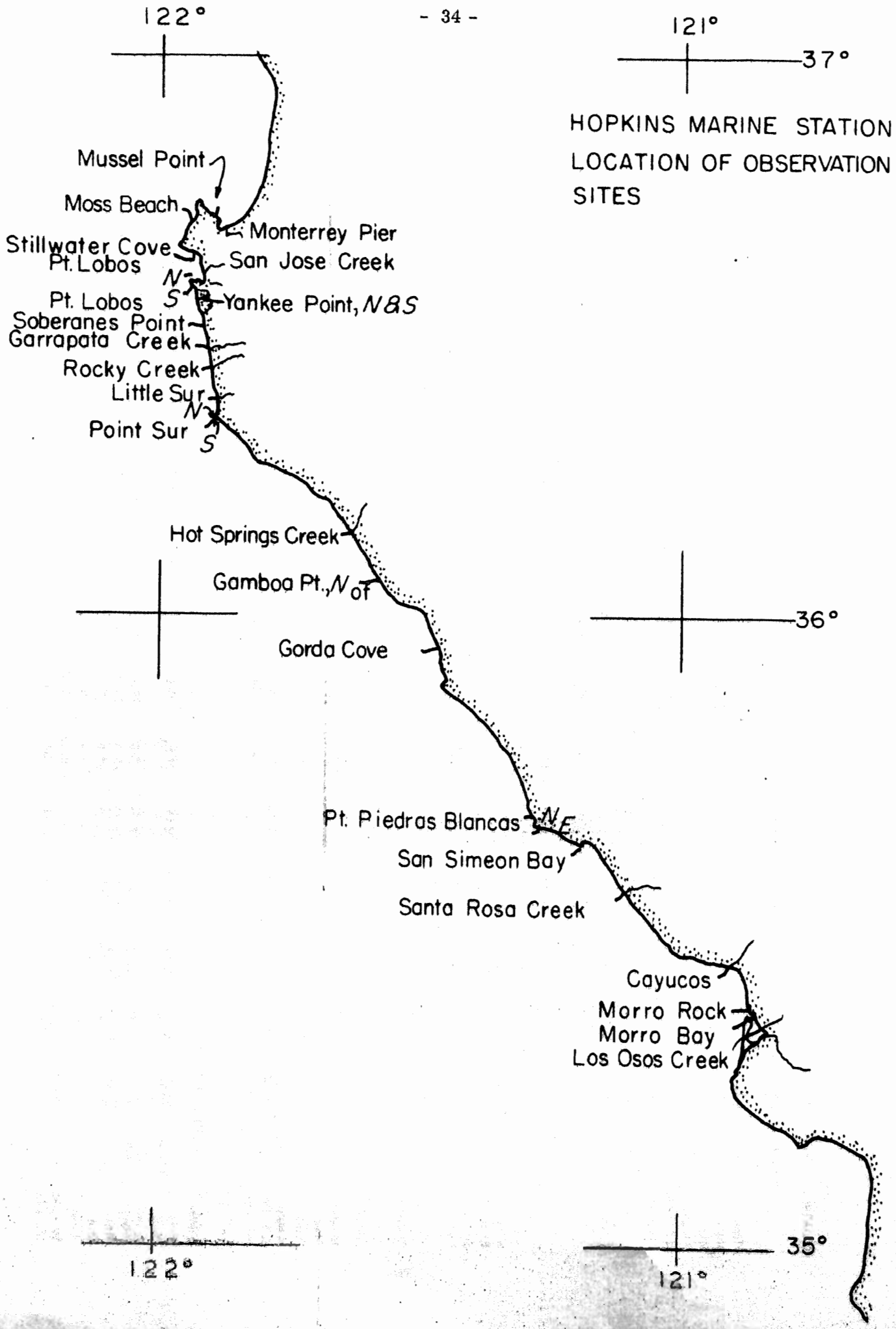
	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	16.8	16.2	16.0	16.7	17.2	(17.1)		20.0	21.9	(21.2)					
Max.		17.5	16.5	16.5	17.3	19.1	(17.6)		21.4	22.9	(21.6)					
Min.		16.1	15.7	15.6	16.2	16.8	(16.9)		18.9	21.1	(20.9)					
Range		1.4	0.8	0.9	1.1	2.3	-		2.5	1.8	-					
Std. Dev.		0.38	0.20	0.22	0.24	0.48	-		0.66	0.46	-					
No. Obs.		31	24	31	30	31	23AB		31	30	11A					

T DATA SAN BENITOS ISLAND

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	9.8	(9.3)	15.1	21.6	25.2	17.1	9.7	18.3	24.6	22.5	18.4	18.7	17.5		
Max.		11	(11)	19	24	27	20	11	22	26	27	21	20		27.0	
Min.		8	(6)	9	19	21	14	8	15	22	18	17	17			6.0
Range		3	-	10	5	6	6	3	7	4	9	4	3			
Std. Dev.		0.82	-	2.72	1.22	1.48	1.64	0.68	1.90	1.10	2.44	0.96	0.81			
No. Obs.		31	21AB	31	30	31	30	30	31	30	31	30	31			

T DATA CEDROS ISLAND

	YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN	MAX.	MIN.
Mean	1960	16.6	(15.9)	(16.2)	16.1	(16.8)	17.6	19.0	21.8	22.0	21.0	18.7	16.6	16.8		
Max.		17.5	(17.5)	(18.3)	17.0	(18.0)	19.3	23.0	24	24.8	23.2	20.2	18.8		24.8	
Min.		16.0	(14.1)	(15.0)	15.0	(16.0)	17.0	17.0	20	20.0	19.6	16.8	16.0			14.1
Range		1.5	-	-	2.0	-	2.3	6.0	4	4.8	3.6	3.4	2.8			
Std. Dev.		0.40	-	-	0.50	-	0.52	1.36	0.94	1.30	0.85	0.86	0.65			
No. Obs.		30	18AB	18BC	30	16AB	30	30	31	29	31	30	31			


122°
121°
37°
HOPKINS MARINE STATION
LOCATION OF OBSERVATION SITES
Mussel Point
Moss Beach
Monterrey Pier
Stillwater Cove
Pt. Lobos
San Jose Creek
N
Pt. Lobos S
Yankee Point, NBS
Soberanes Point
Garrapata Creek
Rocky Creek
Little Sur
N
Point Sur
S
Hot Springs Creek
Gamboa Pt., N of
36°
Gorda Cove
Pt. Piedras Blancas NE
San Simeon Bay
Santa Rosa Creek
Cayucos
Morro Rock
Morro Bay
Los Osos Creek
35°
122°
121°

SHORELINE SURFACE WATER-TEMPERATURE DATA BETWEEN MONTEREY, CALIFORNIA, AND POINT BUCHON, CALIFORNIA

(Taken by Hopkins Marine Station of Stanford University)

Once a month temperature measurements were made at selected sites along the California coast from Monterey to Morro Bay by personnel from the Hopkins Marine Station at Pacific Grove, California.

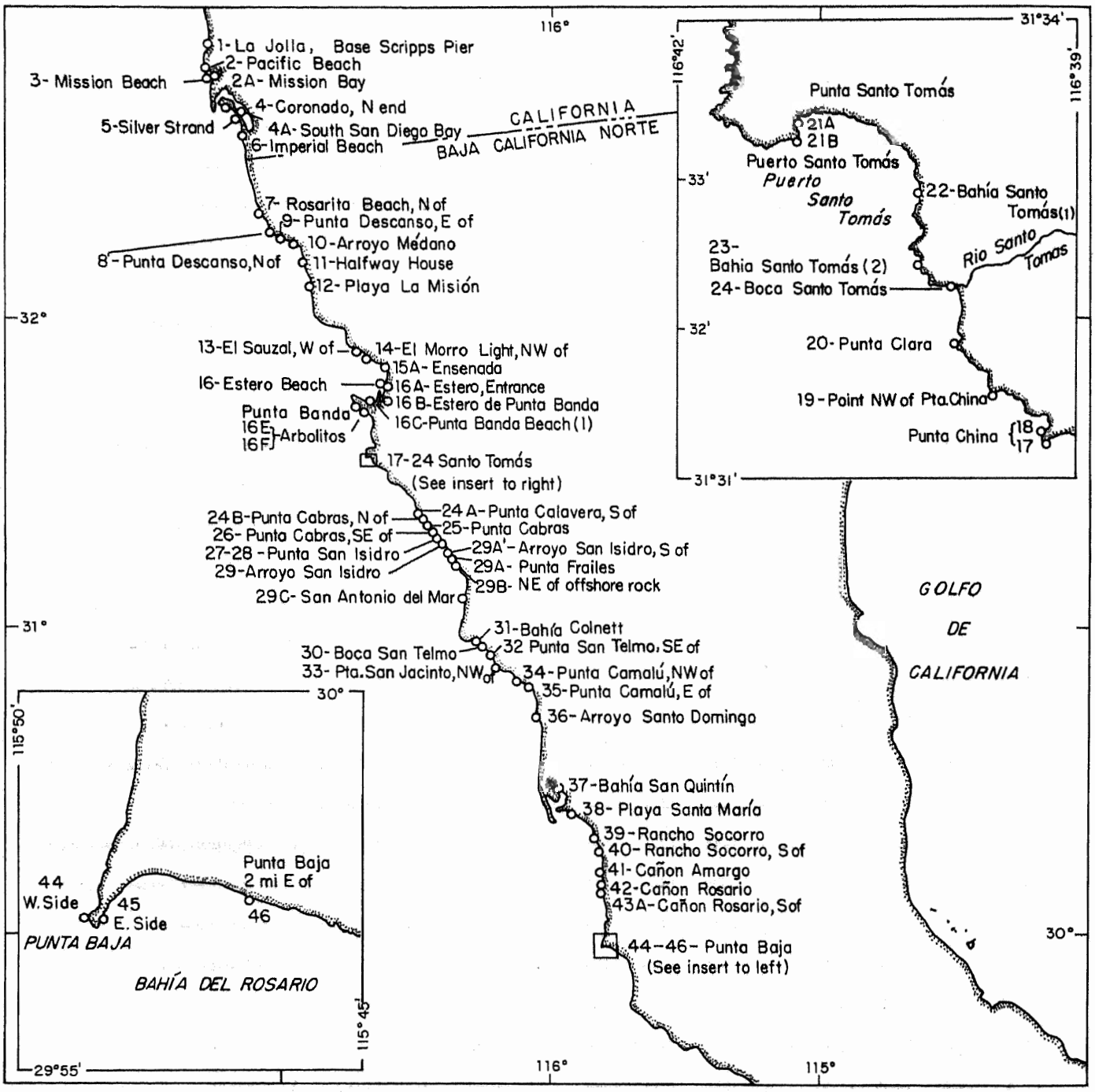
These temperature values were measured with high-grade bucket thermometers in the surf zone at most locations, and were made during a one- or two-day trip by car along the coast highway once each month when weather permitted.

These data are presented in a different form than in the preceding section to show the date, time and temperature at each of the locations for each month.

T DATA BY MONTHS

		JAN 16		FEB 17		MAR 14		APRIL 12		MAY 12		JUNE 16	
	STATION	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME
1	Monterey Pier II	10.9	0552	12.00	0630	11.6	0640	12.8	0654	14.0	0600	14.5	0642
2	Mussel Point	11.6	0603	11.90	0640	11.8	0650	11.9	0703	12.8	0610	15.6	0650
3	Moss Beach	11.4	0625	11.00	0700	10.7	0710	10.1	0715	11.9	0625	14.3	0700
4	Stillwater Cove	10.9	0820	9.00	0725	10.5	0738	9.8	0735	11.9	0700	13.5	0715
5	San Jose Creek	11.5	0835	9.10	0745	9.8	0800	9.9	0754	10.5	0721	13.3	0730
6	Point Lobos: north side	11.9	0843	10.15	0755	9.9	0807	9.9	0803	10.6	0735	13.7	0745
7	Point Lobos: south side	11.7	0845	10.05	0805	9.6	0812	9.7	0812	10.3	0741	13.9	0750
8	Yankee Point: north of	11.7	0850	9.80	0815	9.8	0822	9.0	0825	10.1	0800	12.7	0810
9	Yankee Point: south of	11.8	0852	9.95	0822	9.7	0830	10.1	0832	11.1	0810	13.6	0820
10	Soberanes Point	11.4	0900	10.10	0834	9.8	0845	9.3	0843	10.9	0840	12.3	0835
11	Garrapata Creek	11.7	0907	10.60	0855	10.8	0852	8.9	0855	10.0	0900	11.7	0847
12	Rocky Creek	11.9	0915	10.80	0925	10.1	0930	9.2	0925	10.3	0940	12.2	0925
13	Little Sur	11.8	0935	10.90	0940	10.3	0953	9.0	0945	10.5	0952	12.9	0955
14	Point Sur: north side	11.8	0953	11.00	0948	10.3	1010	9.5	1000	10.4	1018	12.1	1000
15	Point Sur: south side	11.6	0957	11.30	0950	10.5	1015	9.8	1050	11.2	1030	12.3	1015
17	Hot Springs Creek	12.1	1105	11.20	1050	11.2	1125	10.5	1100	13.0	1124	13.9	1105
18	Gamboa Point: north of	12.0	1132	11.50	1107	11.2	1156	10.8	1130	13.6	1150	14.1	1135
19	Gorda Cove	10.8	1220	10.35	1145	11.4	1229	11.5	1203	13.8	1220	14.3	1220
20	Point Piedras Blancas: north of	12.3	1252	11.55	1230	12.3	1320	10.9	1245	11.2	1330	13.8	1308
21	Point Piedras Blancas: east of	12.1	1300	12.15	1241	12.2	1345	11.4	1310	12.5	1341	14.2	1322
22	San Simeon Bay	12.2	1318	12.80	1255	13.5	1400	12.45	1325	12.7	1355	15.4	1338
23	Santa Rosa Creek	12.3	1325	12.70	1310	13.1	1418	12.2	1340	12.4	1405	16.3	1400
24	Cayucos	12.3	1350	11.75	1344	14.2	1451	13.5	1408	14.2	1530	15.8	1430
25	Morro Rock	12.2	1400	12.10	1400	12.8	1505	12.4	1423	13.5	1536	14.9	1445
26	Morro Bay	12.4	1415	11.05	1415	13.5	1520	11.9	1437	12.6	1554	15.1	1455
27A	Los Osos Creek	12.1	1450	11.20	1450	13.3	1545	12.6	1510	13.2	1631	15.3	1530

JULY 17		AUG 27		SEPT 24		OCT 25		NOV 20		DEC 29			
T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME		STATION
14.0	0750	14.0	0650	14.8	0720	14.0	0715	11.5	0735	11.5	0810	1	Monterey Pier II
13.4	0755	12.4	0659	13.8	0727	13.8	0725	12.9	0745	11.9	0815	2	Mussel Point
13.0	0807	12.5	0718	13.2	0745	12.1	0735	12.0	0800	11.6	0840	3	Moss Beach
12.8	0855	15.3	0847	13.8	0815	12.5	0800	11.6	0855	11.0	0920	4	Stillwater Cove
10.5	0913	11.9	0805	13.1	0840	12.0	0825	11.6	0915	11.4	0940	5	San Jose Creek
12.5	0920	12.3	0812	13.8	0850	12.4	0835	11.5	0920	11.6	0950	6	Point Lobos: north side
12.3	0930	12.5	0825	13.2	0905	11.1	0840	11.5	0930	11.9	1000	7	Point Lobos: south side
10.2	0950	12.3	0842	12.4	0925	11.7	0855	11.5	0945	11.9	1015	8	Yankee Point: north of
10.9	0958	13.6	0854	13.6	0930	11.7	0900	11.5	0955	11.8	1025	9	Yankee Point: south of
10.8	1012	12.5	0920	12.8	0950	11.5	0920	11.6	1010	12.5	1045	10	Soberanes Point
11.3	1035	12.4	0936	12.7	1010	12.1	0935	11.6	1030	12.4	1225	11	Garrapata Creek
11.5	1049	12.7	1008	12.5	1030	12.2	0950	11.6	1045	12.5	1145	12	Rocky Creek
12.1	1125	13.6	1035	13.1	1100	12.4	1015	11.6	1110	12.6	1205	13	Little Sur
11.9	1140	13.0	1054	13.0	1125	12.1	1035	12.0	1125	12.9	1230	14	Point Sur: north side
12.1	1150	13.2	1105	13.7	1130	12.3	1040	12.0	1130	13.0	1240	15	Point Sur: south side
12.5	1225	13.9	1206	14.2	1245	12.9	1130	13.7	1230	13.2	1350	17	Hot Springs Creek
12.9	1258	13.5	1239	13.8	1310	13.0	1210	13.8	1255	13.2	1420	18	Gamboa Point: north of
13.0	1335	13.4	1308	14.1	1400	12.7	1245	13.1	1340	11.9	1500	19	Gorda Cove
12.8	1415	15.2	1350	15.4	1445	13.5	1335	13.5	1425	12.9	1545	20	Point Piedras Blancas: north of
13.2	1420	14.7	1400	14.8	1500	13.0	1345	13.9	1430	13.0	1555	21	Point Piedras Blancas: east of
13.7	1439	16.2	1415	14.8	1520	14.0	1355	14.3	1445	13.1	1610	22	San Simeon Bay
14.6	1504	14.7	1430	15.0	1530	13.8	1410	13.7	1510	12.9	1620	23	Santa Rosa Creek
14.3	1540	15.7	1500	16.5	1600	13.8	1440	13.8	1545	11.7	1700	24	Cayucos
14.0	1558	15.1	1510	16.4	1620	13.7	1450	13.2	1600	12.7	1710	25	Morro Rock
14.4	1608	13.9	1620	16.5	1630	13.1	1500	13.7	1620	10.3	1725	26	Morro Bay
14.5	1642	13.2	1700	14.1	1715	12.8	1540	13.1	1700	12.4	1800	27	Los Osos Creek



SURFACE WATER-TEMPERATURE STATIONS BETWEEN LA JOLLA, CALIFORNIA, AND PUNTA BAJA, BAJA CALIFORNIA.

SHORELINE SURFACE WATER-TEMPERATURE DATA BETWEEN LA JOLLA, CALIFORNIA, AND PUNTA BAJA, BAJA CALIFORNIA

By Carl L. Hubbs and Laura C. Hubbs

Since August, 1948, surface temperatures have been taken at a series of stations, currently numbering 61, along the coast of San Diego, California, and southward along the northwestern shore of Baja California. The southern limit was increased as the survey continued, but since June, 1950, it has been at Punta Baja, near 30°N latitude.

The objective has been to determine, in detail, for each season of the year, the temperature profile of the water along shore, particularly in the areas of coastal upwelling. These data are being correlated with the coastwise and vertical distribution and abundance of the coastal organisms, and with changes in distribution and abundance during warm and cool periods. The findings are also being used in the analysis of geographical variations that are related to temperature--such as the meristic characters of fishes. The physiographic and meteorological causes of the temperature differences and fluctuations are being sought.

The data and interpretations of present conditions are being used to help understand the past fluctuations which have greatly affected the distribution of organisms along the coast and have alternatingly rendered the coast propitious and inhospitable for human occupation. By paleotemperature determinations the coastwise temperature survey is being projected into the dimension of past time.

It is becoming increasingly evident that the regional and temporal differences in the temperature and other conditions of the water have a pronounced effect not only on the littoral organisms but also on the sublittoral and shore-pelagic forms; also, that shore determinations are a rather reliable index of offshore conditions. For these reasons the shore studies assume a greater significance.

On the monthly runs, made by special car, the temperatures are carefully taken with precision instruments. When the observer wades out on a sandy beach, a bucket thermometer is usually employed. When the temperature is taken off rocks, piers and steep cobbly beaches, a battery-operated casting thermometer with a well-protected thermister element is used. The two types of instrument are cross-checked on each trip. The policy is to make the reading on the insurge of water, at a depth of two feet or more.

Most of the temperature runs are now being made by a faithful and capable assistant, Allan J. Stover, Jr.

To supplement the data obtained on the monthly temperature runs and to expand the data being gathered at numerous stations in the United States, we have established a number of stations along the Baja California coast (including one on Guadalupe Island) where daily temperatures are taken. The resulting data are tallied in a preceding section of this report. The station locations are given in the general list.

T DATA BY MONTHS

		JAN 14-18		FEB 17-20		APR 3-MAR 31		MAY 16-13		JUNE 16-13		JULY 17-13	
	STATION	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME	T°C	TIME
1	La Jolla: base Scripps Pier	13.81	0745	12.59	0715	16.20	1650	18.89	1800	17.5	1000	17.70	1420
2	San Diego: Pacific Beach	13.70	0810	12.45	0755	16.66	1610	18.90	1740	16.15	2255	17.06	1325
3	San Diego: Mission Beach	13.93	0825	12.66	0820	16.38	1545	18.71	1715	16.0	2235	17.19	1310
2A	San Diego: Mission Bay	13.22	0835	13.23	0830	16.90	1520	18.78	1655	17.1	2220	19.67	1250
4	Coronado	13.56	1000	12.68	1020	16.38	1430	18.29	1535	17.6	2145	18.74	1110
4A	South San Diego Bay	13.60	1010	15.13	1030	19.29	1405	21.44	1520	21.8	2130	22.31	1100
5	Silver Strand	13.70	1030	12.00	1045	15.75	1330	18.91	1510	17.8	2125	17.74	1050
6	Imperial Beach	13.89	1045	11.43	1055	15.38	1305	18.60	1450	18.0	2110	17.66	1035
7	Rosarita Beach: north of	13.95	1130	12.11	1145	14.74	1215	18.92	1355	17.25	2015	17.60	0950
8	Punta Descanso: north of	14.50	1145	12.44	1205	14.96	1200	18.45	1335	17.3	2000	16.67	0935
9	Punta Descanso: east of	14.53	1155	12.50	1215	14.75	1140	17.97	1320	17.0	1930	16.12	0920
10	Arroyo Médano	14.55	1210	13.10	1230	15.12	1120	18.49	1300	16.35	1855	15.65	0905
11	Halfway House	14.92	1230	12.56	1245	15.30	1110	18.00	1245	15.9	1845	14.69	0855
12	Playa La Misión	14.90	1300	12.49	1335	15.30	1050	17.96	1200	17.2	1830	14.91	0830
13	El Sauzal: west of	14.28	1345	15.28	1425	16.87	1005	17.40	1115	17.9	1755	19.29	2145
14	El Morro Light: NW of	14.60	1400	14.65	1440	16.48	0945	17.07	1050	18.7	1740	19.55	2130
15A	Ensenada	14.65	1455	14.80	1510	15.25	0910	17.52	0925	19.6	1725	21.30	2050
16	Estero Beach	13.77	1615	15.16	1640	14.47	0830	18.01	0845	19.85	1700	21.28	1805
16A	Estero: entrance	13.76	1600	14.81	1630	17.81	0810	18.68	0825	20.2	1705	21.51	1755
16B	Estero de Punta Banda	13.47	1715	14.60	1730	24.67	1740	21.02	1515	24.7	1500	26.03	1715
16C	Punta Banda Beach (1)	14.05	1730	16.08	1745	16.63	1815	16.45	1535	20.2	1510	22.80	1655
16F	Punta Banda: Arbolitos (1)	14.50	1825	12.89	1840	14.03	1920	14.30	1610	15.0	1605	13.76	1555
16E	Punta Banda: Arbolitos (2)	14.52	1805	12.80	1835	13.69	1910	14.49	1600	14.8	1600	14.25	1545
21A	Puerto Santo Tomás: point (1)	14.74	1145	12.92	1125	13.80	1320	14.94	1015	14.0	1130	14.30	1140
21B	Puerto Santo Tomás: point (2)	14.68	1150	12.28	1130	13.10	1325	15.02	1025	13.4	1135	13.64	1145
21	Puerto Santo Tomás: camp	14.80	1200	13.10	1145	15.22	1345	15.70	1045	13.55	1140	14.73	1130
22	Bahía Santo Tomás (1)	14.46	1225	12.59	1200	13.61	1410	15.88	1100	14.05	1150	13.95	1110
23	Bahía Santo Tomás (2)	14.52	1240	12.55	1210	13.38	1420	15.11	1115	14.45	1210	13.14	1055
24	Boca Santo Tomás	14.70	1250	13.15	1225	14.05	1430	15.68	1130	14.5	1230	14.16	1040
20	Punta Clara	14.44	1410	13.38	1045	13.54	1555	15.91	1305	13.6	1055	14.65	1015
19	Punta China: point NW of	14.32	1345	12.70	1035	13.75	1540	15.90	1250	13.4	1050	13.72	1000

AUG 17-14		SEPT 22-25		
T°C	TIME	T°C	TIME	STATION
18.9	2335	18.73	0645	1 La Jolla: base Scripps Pier
17.2	2230	18.62	0720	2 San Diego: Pacific Beach
18.2	2215	18.70	0740	3 San Diego: Mission Beach
20.3	2200	19.35	0800	2A San Diego: Mission Bay
14.6	2110	18.50	0910	4 Coronado
23.6	2100	23.93	0925	4A South San Diego Bay
18.0	2045	18.19	0940	5 Silver Strand
19.3	2030	17.95	1000	6 Imperial Beach
15.0	1845	19.14	1120	7 Rosarita Beach: north of
15.5	1825	18.21	1140	8 Punta Descanso: north of
14.4	1815	16.30	1225	9 Punta Descanso: east of
19.1	1745	17.17	1245	10 Arroyo Médano
16.9	1735	17.79	1300	11 Halfway House
15.4	1725	18.28	1325	12 Playa La Misión
19.2	1640	18.81	1415	13 El Sauzal: west of
21.2	1625	20.18	1435	14 El Morro Light: NW of
22.8	1530	21.40	1450	15A Ensenada
23.5	1455	22.63	1600	16 Estero Beach
23.8	1505	22.95	1545	16A Estero: entrance
26.9	1355	22.60	0820	16B Estero de Punta Banda
24.0	1230	20.99	0800	16C Punta Banda Beach (1)
-	-	14.72	1830	16F Punta Banda: Arbolitos (1)
15.0	1150	15.30	1810	16E Punta Banda: Arbolitos (2)
14.7	1745	13.62	1100	21A Puerto Santo Tomás: point (1)
14.2	1750	12.90	1110	21B Puerto Santo Tomás: point (2)
14.8	1800	14.16	1125	21 Puerto Santo Tomás: camp
16.1	1815	14.44	1135	22 Bahía Santo Tomás (1)
15.0	1835	14.18	1215	23 Bahía Santo Tomás (2)
16.0	1850	14.60	1230	24 Boca Santo Tomás
14.9*	2255	14.90	1355	20 Punta Clara
14.5*	0845			
14.8*	0930	15.20	1335	19 Punta China: point NW of

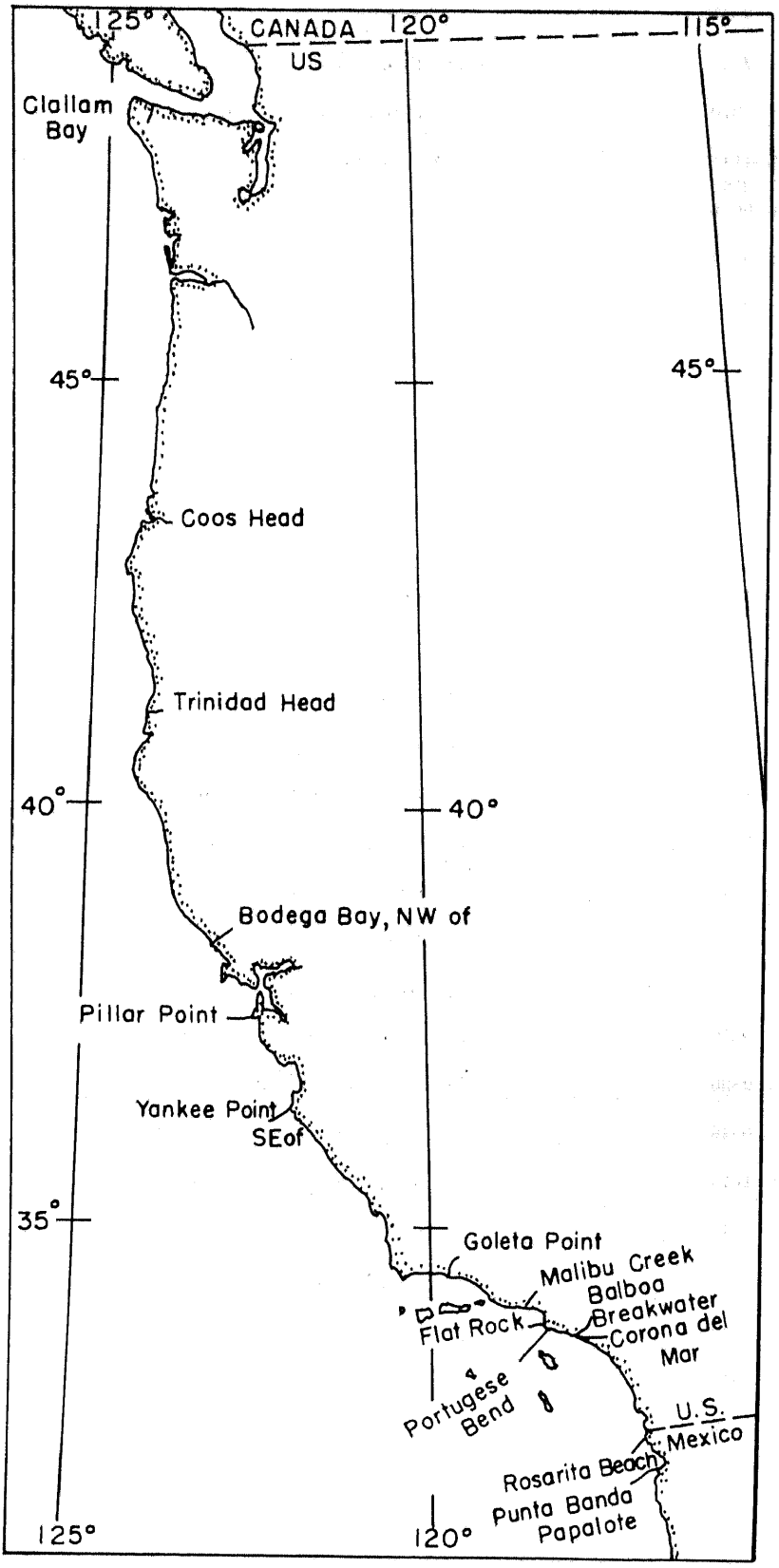
*Temperature possibly inaccurate due to extraordinary congestion of plants and inaccessibility of outside current; temperature taken off reef at farthest accessible point toward current.

T DATA BY MONTHS (cont.)

	STATION	JAN 14-18	FEB 17-20	APR 3-MAR 31	MAY 16-13	JUNE 16-13	JULY 17-13
18	Punta China: north face	14.25 1330	12.77 1015	13.55 1520	15.89 1235	12.7 1035	13.80 0940
17	Punta China: cove at tip	14.21 1325	13.01 1005	13.59 1515	15.47 1230	13.6 1030	14.39 0930
24A	Punta Calavera: south of	14.62 1040	12.50 1735	11.80 1915	15.26 1655	13.9 1800	13.60 0615
24B	Punta Cabras: north of	14.60 1100	12.71 1755	12.77 1900	16.39 1645	14.85 1750	13.46 0530
25	Punta Cabras: south side	14.89 1125	13.12 1825	12.55 1835	16.31 1620	15.1 1720	14.77 2000
26	Punta Cabras: SE of	14.62 1140	13.60 1850	12.39 1815	16.77 1550	15.65 1710	15.35 1740
28	Punta San Isidro: north side	14.64 1205	12.68 0945	13.20 1735	16.93 1520	15.45 1700	16.04 1650
27	Punta San Isidro: south side	14.60 1200	12.92 0950	12.53 1745	16.63 1525	15.45 1655	15.37 1645
29	Arroyo San Isidro: north of	14.45 1230	13.34 1000	14.30 1715	16.89 1450	17.9 1630	17.90 1625
29A'	Arroyo San Isidro: south of	14.27 1315	13.18 1025	14.52 1645	17.00 1405	17.2 1610	14.47 1540
29A	Punta Frailes	14.53 1325	13.23 1205	13.12 1630	16.40 1350	16.7 1555	15.48 1520
29B	Offshore rock: shore NE of	14.60 1350	13.48 1215	13.60 1600	16.74 1330	16.6 1510	14.59 1455
29C	San Antonio del Mar	- -	13.60 1630	12.90 1415	15.37 1140	16.95 1310	16.08 1330
31	Bahía Colnett (2)	14.59 1735	13.35 1815	12.58 1145	15.68 1025	13.7 1100	13.99 1140
30	Boca San Telmo	14.33 1710	13.60 1835	13.01 1125	15.60 0950	15.2 1030	14.58 1110
32	Punta San Telmo: SE of	14.50 1650	13.85 1855	14.32 1100	15.95 0920	14.4 1010	15.70 1010
33	Punta San Jacinto: NW of	14.49 1625	13.34 1915	13.80 1045	15.62 0900	16.85 0955	16.02 0935
34	Punta Camalú: NW of	14.78 1515	13.94 1940	12.85 1000	15.94 0825	13.1 0930	12.45 0905
35	Punta Camalú: east of	14.55 1450	13.82 2000	13.69 0940	16.40 0745	16.25 1930	14.57 0840
36	Arroyo Santo Domingo	13.35 0830	13.65 2040	13.07 0625	15.99 0545	16.5 1855	14.95 1840
37	Bahía San Quintín: old pier	15.72 1300	13.17 0710 14.41 0945	19.63 1550	21.50 1525	22.1 1540	14.46 1605
38	Playa Santa María	14.98 1415	13.28 1045	12.32 1500	17.18 1445	19.6 1600 14.6 1500	15.74 1525
39	Rancho Socorro	15.00 1530	15.51 1125	14.71 1405	16.63 1350	16.9 1400	15.52 1410
40A	Rancho Socorro: south of	15.29 1555	14.59 1145	13.95 1330	16.55 1325	17.0 1320	14.95 1330
41	Cañon Amargo	14.89 1635	13.77 1210	13.06 1300	15.09 1255	15.3 1255	13.66 1240
42	Cañon Rosario	14.70 1705	13.90 1225	12.88 1230	15.00 1230	15.3 1240	14.22 1150
43A	Cañon Rosario: south of	- -	14.15 1255	13.28 1120	14.74 1155	15.3 1100	14.28 1105
44	Punta Baja: west side	14.57 2200	13.75 1615	12.33 0845	13.90 0835	14.4 0800	15.03 1755
45	Punta Baja: east side	14.35 2145	13.78 1600	12.30 0830	14.36 0820	12.3 0820	12.41 1740
46	Punta Baja: east of	13.51 2110	15.29 1520	11.55 0745	14.93 0735	14.4 0850	17.00 1600

AUG 17-14		SEPT 22-25		
T°C	TIME	T°C	TIME	STATION
14.8	0910	15.14	1315	18 Punta China: north face
14.8	0905	15.19	1310	17 Punta China: cove at tip
15.1	1535	15.65	1815	24A Punta Calavera: south of
		14.77	0555	
15.3	1555	14.90	0630	24B Punta Cabras: north of
16.0	1235	15.25	0720	25 Punta Cabras: south side
16.5	1215	15.53	0745	26 Punta Cabras: SE of
16.0	1155	15.74	0820	28 Punta San Isidro: north side
16.2	1150	15.71	0815	27 Punta San Isidro: south side
18.7	1130	18.10	0850	29 Arroyo San Isidro: north of
16.2	1040	15.92	0930	29A' Arroyo San Isidro: south of
15.5	1030	15.70	0945	29A Punta Frailes
15.9	0925	16.27	1005	29B Offshore rock: shore NE of
17.5	1755			
16.2	0810	16.35	1140	29C San Antonio del Mar
17.7	1550	17.72	1345	31 Bahía Colnett (2)
19.1	1530	17.85	1415	30 Boca San Telmo
17.4	1515	18.00	1435	32 Punta San Telmo: SE of
19.0	1435	19.09	1510	33 Punta San Jacinto: NW of
14.7	1400	17.27	1545	34 Punta Camalú: NW of
16.7	1335	18.70	1610	35 Punta Camalú; east of
16.0	1200	17.88	1740	36 Arroyo Santo Domingo
21.3	0945	20.35	0550	37 Bahía San Quintín: old pier
22.7	1015			
14.6	1930	14.82	0830	38 Playa Santa María
16.7	1820	16.14	0940	39 Rancho Socorro
17.4	1805	17.35	1015	40A Rancho Socorro: south of
15.6	1720	16.00	1045	41 Cañon Amargo
16.0	1700	15.89	1110	42 Cañon Rosario
15.6	1600	16.02	1145	43A Cañon Rosario: south of
14.4	1005	15.52	1430	44 Punta Baja: west side
12.9	0950	14.79	1420	45 Punta Baja: east side
15.8	1050	18.06	1350	46 Punta Baja: east of

LOCATION OF SURFACE WATER-TEMPERATURE OBSERVATION SITES



SHORELINE SURFACE WATER-TEMPERATURE DATA BETWEEN CLALLAM BAY, WASHINGTON, AND PUNTA BANDA, BAJA CALIFORNIA, FOR THE YEAR 1960[1/]

by

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Temperature and light might exercise an important control over growth and reproductive patterns of organisms. It was of considerable interest to see if these environmental factors influence reproductive activity of the sea urchin, Strongylocentrotus purpuratus.

A determination of the reproductive cycle of this organism is being made by analyses of sea urchins collected monthly at various sites within the distribution range of the species. In order to gain information on the variation of reproductive activity, including duration, intensity and time of spawning, monthly samples of thirty living specimens of assorted sizes are currently being received from each collecting station (shipped by air from the more distant stations). Temperature at the time of collecting is also recorded, monthly in some cases and daily in others. From the data accumulated at these sites it should be possible to determine the degree of correlation between local temperature and gonadal growth. The findings are also being used in the analysis of geographical variations that are related with temperature--such as the meristic characters of sea urchins. Most of the sea urchin collections and temperature measurements have been made by competent assistants at various institutions distributed throughout the Pacific Coast.

Another investigation was designed to study the influence of temperature on reproductive activity of S. purpuratus under natural conditions. Two sea urchin populations which occupy the same latitude and yet live in waters of different temperatures near Punta Banda, Baja California, were selected for the study. Owing to oceanographic conditions at this particular site, local temperature differences as great as 10°C exist in adjacent water masses. Data obtained thus far indicate that a significant difference in the rate of gonadal growth and gametogenesis exists between the two populations. Since light conditions are the same and an abundant supply of food exists in both areas, it appears most probable that temperature has a major influence on the rate of gonadal growth and gametogenesis.

The temperature records obtained thus far at the various collecting sites are not given in any standard publication and they are, therefore, presented here to interested investigators desiring to learn more about the temperature profile of the water along the Pacific Coast.

[1/] Supported by funds made available by National Science Foundation. These stations will be discontinued in 1961.

T DATA

STATION	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
1960	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time
Clallam Bay	8.1	3/0100	9.2	23/1600	9.6	23/1600	11.1	25/1000	11.5	24/1215	12.7	22/1030
Coos Head	7.0	3/0930	15.5	12/1600	11.5	20/1230	11.0	29/0900	12.0	28/0700	9.0	25/0820
Trinidad Head	9.1	1/2100	10.7	12/1930	10.6	22/1445	10.9	29/1050	11.3	29/1030	11.0	14/1200
Bodega Bay: NW of	12.0	10/1600	13.0	11/1640	12.0	23/1345	9.5	29/0715	11.0	29/0730	12.0	25/0734
Pillar Point	10.8	3/2000	14.0	11/1630	13.5	22/1300	10.0	16/0730	10.0	16/0730	13.0	25/0700
Yankee Point: SE of	12.0	13/1700	13.0	11/1730	11.4	20/0900	11.6	25/0730	10.1	25/0545	10.5	21/0515
Goleta Point	14.5	7/1500	14.5	14/1530	16.0	24/1630	16.3	20/1330	17.8	26/1630	19.2	29/0500
Malibu Creek (1)	15.4	8/1700	13.1	10/1700	15.8	24/1450	13.0	24/0915	15.8	29/1700	17.0	23/0500
Malibu Creek (2)	15.2	2/0800	13.0	10/1630	15.8	24/1500	13.0	25/0800	17.5	29/0930	17.0	23/0600
Flat Rock	14.2	1/1430	13.4	10/1700	15.4	24/1700	15.2	25/0515	15.2	24/1700	20.0	22/0400
Portuguese Bend	14.5	4/1800	13.0	10/1700	15.6	24/1700	13.0	25/0430	13.0	24/1700	16.0	22/0500
Balboa Breakwater	15.0	1/1130	15.0	6/1200	16.7	25/1430	17.6	1/1030	16.3	22/1400	18.8	26/0715
Corona Del Mar	14.6	2/1030	14.9	7/1100	15.5	26/1230	18.6	2/1255	20.7	21/1200	18.6	27/0615
Rosarita Beach: south of	15.2	6/1300	15.0	11/1500	19.0	27/1600	16.0	28/1530	16.0	29/0900	19.0	24/1600
Punta Banda: Papalote	15.2	7/1230	13.4	13/1350	12.2	11/1245	13.6	16/0850	11.6	27/0615	12.0	25/0635
Punta Banda: Tres Hermanas	15.7	6/1330	14.2	13/1400	15.2	11/1425	15.4	16/0730	19.0	28/0510	16.8	25/0507

STATION	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
1960	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time	T°C	Date/Time
Clallam Bay	12.5	22/0600	12.6	18/0530	11.5	27/0100	12.0	23/1345	11.7	22/0015	11.8	16/1800
Coos Head	14.5	30/1130	10.9	25/0800	14.9	29/1610	13.3	28/1330	10.9	20/1800	11.4	18/1500
Trinidad Head	12.9	26/0830	12.1	21/0715	12.4	29/1730	11.6	23/1720	11.8	19/1718	11.0	17/1600
Bodega Bay: NW of	12.5	25/0700	10.5	22/0630	13.0	23/1910	13.5	22/1700	12.0	20/1740	11.8	30/1600
Pillar Point	-	-	-	-	-	-	-	-	-	-	-	-
Yankee Point: SE of	11.5	24/0600	12.2	22/0540	10.3	24/0651	11.2	30/1800	13.2	18/1600	13.2	15/1430
Goleta Point	-	-	-	-	-	-	-	-	-	-	-	-
Malibu Creek (1)	16.8	24/1700	17.3	30/0245	17.4	29/1700	17.8	28/1000	15.6	18/1345	16.0	16/1700
Malibu Creek (2)	-	-	-	-	-	-	-	-	-	-	-	-
Flat Rock	20.0	21/1700	17.0	30/0045	16.1	29/1700	17.0	30/1515	16.6	18/1530	15.0	16/1700
Portuguese Bend	17.2	27/1700	17.0	29/0700	15.8	29/1700	17.4	27/1700	16.1	18/1630	15.5	16/1700
Balboa Breakwater	22.6	25/0700	21.1	24/0745	19.2	23/1700	18.0	21/1630	17.0	17/1515	14.5	15/1345
Corona Del Mar	22.1	21/1500	20.1	25/0700	20.4	30/1615	19.6	22/1615	19.8	18/1420	17.0	16/1300
Rosarita Beach: south of	17.8	25/0730	21.1	23/1630	17.8	23/1700	15.0	27/2200	17.0	21/1630	15.5	16/1330
Punta Banda: Papalote	18.6	24/0610	14.2	21/1400	14.9	29/1615	16.1	21/1500	16.0	18/1445	14.9	16/1420
Punta Banda: Tres Hermanas	21.0	24/0515	20.0	21/1600	18.0	29/1700	18.8	21/1600	16.8	18/1545	14.9	16/1500