

CLIMATE NARRATIVE, March 2019 and as noted

WEST COAST OF UNITED STATES AND NORTH PACIFIC

During the final days of March, positive **Sea Surface Temperature** (SST) anomaly ($\leq 2.5^{\circ}\text{C}$) occurred in a 50-150 km wide band along the coast from Point Conception (34.4°N) to Cape Blanco (42.8°N) and off Southern California and northern Mexico. Negative SST anomaly ($> -1.5^{\circ}\text{C}$) was seen 500–1000 km off the central and northern California coast and positive anomaly was found continuously to this distance off southern California. An area ($> 10,000 \text{ km}^2$) of negative anomaly ($\geq -2^{\circ}\text{C}$) extended from 10°N , 170°W to the north east and coming to within 400-1000 km of the North American coast between 30°N and 50°N . Additional areas of negative anomaly occurred in areas stretching across the North Pacific between 40° - 58°N .

<https://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>

(current) https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html

(archive) <https://coastwatch.pfeg.noaa.gov>

A trans-Pacific zone of negative **sea level height anomaly** (SLA) ($\geq -20 \text{ cm}$) extended from Indonesia northeast to within 200-500 km of the North American coast between 25°N and 50°N . Much of the remainder of the North Pacific had positive SLA ($\leq 10 \text{ cm}$). A band of weakly positive SLA anomaly ($\leq 5 \text{ cm}$) occurred along the coast of California at the end of March.

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif
(current 30°S - 40°N)

Coastal bands of higher **chlorophyll-a** ($\geq 3.0 \text{ mg/m}^3$) occurred, in eight-day composite imagery, off Point Conception and central California. Off Washington state these coastal bands increased to more than 100 km width and in the Gulf of Alaska and Bering Sea the high-concentrations occur in extensive alongshore and offshore areas ($> 10,000 \text{ km}^2$).

<https://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowserWW180.jsp#> (current)

At the **Cape San Martine Data Buoy** (46028), off Central California (35.7°N), the long-term average surface temperature (aSST) for March is 12.6° - 12.8°C compared to an average of 13.3°C (range of 12.5 - 15.6°C) for March 2019. At the **St. Georges Data Buoy** (46027), 8 nautical miles NW of Crescent City, California (41.9°N) the aSST and March 2019 surface temperature was 10.7° - 10.9°C and 10.9°C (range of 9.3 - 12.7°C), respectively. At the **Tillamook Data Buoy** (46089), 85 nautical miles WNW of Tillamook, Oregon (46°N), the aSST and March 2019 surface temperature was between 10.1° - 10.3°C and 9.9°C (9.1 - 11.3°C), respectively.

https://www.ndbc.noaa.gov/station_page.php?station=46028

Shore station water temperature measured at depth below the lowest tide at tide stations had March 2019 monthly averages of 15.4 , 15.0 , 13.7 , 12.0 and 8.2°C at 32.9 , 34 , 36.6 , 38.9 and 48.4°N , respectively.

<https://tidesandcurrents.noaa.gov/stations.html?type=Physical+Oceanography>

EQUATORIAL AND SOUTH PACIFIC (late March)

During March, El Niño SST conditions persisted across the central and eastern equatorial Pacific and El Niño atmospheric convection patterns persisted. Eastern equatorial ocean

upper 300-meter (m) heat content anomaly increased through February, reached a second maximum in March and then subsided precipitously. Much of the South Pacific had neutral to weakly positive SST anomalies, but negative SST anomaly ($>-2^{\circ}\text{C}$) was found in areas ($\geq 5,000\text{ km}^2$) along the coast of southern Chile and near 30°S , 138°W . West of 100°W positive SLA, generally less than 20 cm, was typical between 0° - 20°S . This area was continuous off the east coast of Australia.

<http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif
(current)

The **NOAA OCEANIC EL NIÑO INDEX (ONI)** was 0.8 for both December-February (DJF) and JFM completing five consecutive ONI values ≥ 0.5 , making this warming event an “El Niño.”

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

The **NOAA / NCEI PACIFIC DECADEAL OSCILLATION INDEX (PDO)** series was -0.78, -0.09, -0.20, -0.50 and -0.26 for November through March.

<https://www.ncdc.noaa.gov/teleconnections/pdo/>

The **PACIFIC / NORTH AMERICAN Teleconnection Index (PNA)**, became strongly negative for February 2019 (-3.49), put positive again in March (0.75). (also computational alternatives) <https://www.cpc.ncep.noaa.gov/data/teledoc/pna.shtml>

March Upwelling Indices (UI) suggest, by the low magnitude values from 30°N to 60°N , alternate passage of Low and High Atmospheric Pressure systems across the North American coast during March. UI was negative poleward of 45°N and positive from 36°N equatorward. UI anomaly was negative or neutral between 30°N and 45°N indicating March conditions that were not generally favorable to average seasonal upwelling conditions. <https://upwell.pfeg.noaa.gov/products/PFELData/upwell/monthly/table.1903>

PRECIPITATION and RUNOFF (Late March 2019)

Much of California was at or above average rainfall (range, 3.7-54.3 inches) at the end of March. Snowpack water reserves were greater than 140% of normal throughout California. Snowpack was 80-90% of average in the upper Columbia Basin and approximately 120% of average in the Snake River Basin. Northern Washington and northwestern Oregon have below average precipitation in March and for the season.

<https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?west>

The **Fraser River**, measured at Hope, B.C. was flowing at about 50,479 cubic feet per second (cfs) [median, 33,535 cfs]. <https://wateroffice.ec.gc.ca> The **Skagit River** near Mount Vernon, Washington was flowing at 10,700 [13,700 cfs]. The **Columbia River** was transporting 202,000 [176,000 cfs] at Vancouver Washington. The **Rogue River** in Oregon was flowing at 5,500 [7,250 cfs] at Agnees. The **Umpqua River** was transporting 7,350 [9,900 cfs] at Elkton. In California, the **Klamath River** near Klamath was 28,050 [24,000 cfs]. The **Sacramento River** was transporting 65,100 [30,100 cfs] at Freeport. **San Joaquin River** flow was 13,200 [3,100 cfs] at Vernalis. Runoff is important to nearshore physical and biological ocean dynamics.

<https://waterdata.usgs.gov/ca/nwis/current/?type=flow>

<https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLL.php=>

NOTES (March 2019)

California **Commercial Market Squid** (*Doryteuthis opalescens*) fishery season ended in March with no March landings reported. The season's total landings were 32,313 metric tons (mt). The previous season's landings were 68,189 mt. Current fixed limit is 107,050 mt. March landings of Anchovy (*Engraulis mordax*) was 2,453 mt.
<https://www.wildlife.ca.gov/Conservation/Marine/Pelagic/Landings>

California has the longest-standing US marine **biotoxin monitoring program**, beginning in 1927 in response to a paralytic shellfish poisoning (PSP) episode that resulted in several deaths and over 100 illnesses, associated with mussel (*Mytilus* sp.) consumption. In the fall of 1991, the natural neurotoxin domoic acid was discovered in several California marine mollusks and crustaceans. However, at the end of March, both biotoxins were below health alert levels in California and Oregon, except in Pacific Razor Clams (*Siliqua patula*) from northern California.

<https://www.cdph.ca.gov/Programs/CEH/DRSEM/Pages/EMB/Shellfish/Marine-Biotoxin-Monitoring-Program.aspx> <https://www.oregon.gov/ODA/programs/FoodSafety/Shellfish/Pages/Default.aspx>

This report is found,

https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html

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