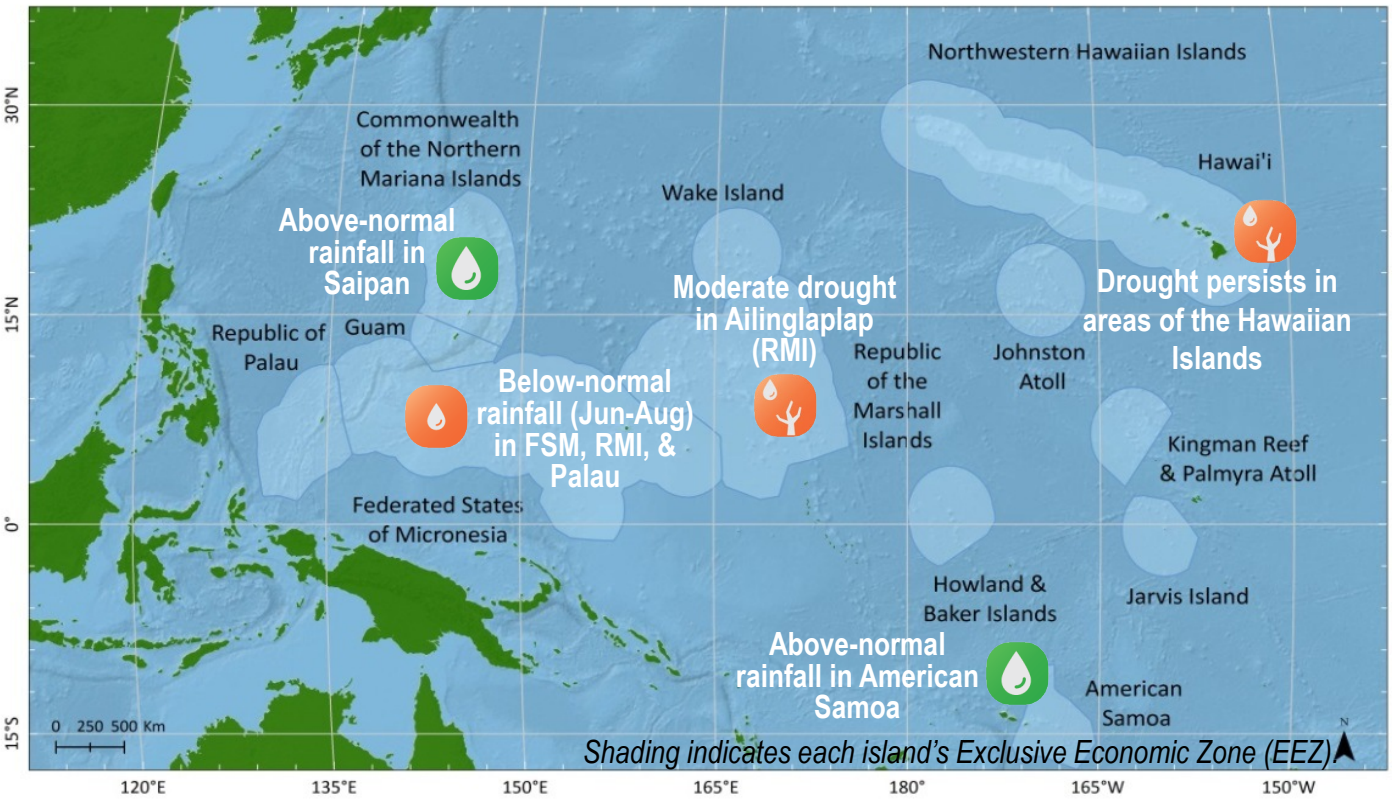
Significant Events – *For June 2021–August 2021*



Highlights for Hawaii and the U.S. Affiliated Pacific Islands

- During the June – August 2021 period, ENSO-neutral conditions persisted with a transition to La Niña conditions expected in the coming months with a 70 – 80% chance of La Niña continuing through the Northern Hemisphere winter 2021 – 2022.
- Areas of the Federated States of Micronesia (FSM) and the Republic of the Marshall Islands (RMI) experiencing persistent drought (Kapingamarangi, Wotje) saw improvement in conditions.
- For the June – August (JJA) period, below-normal rainfall was observed across much of the western tropical Pacific in the Northern Hemisphere. This includes Ailinglaplap and Kwajalein (RMI), which observed their driest August on record as well as their driest and 2nd driest JJA period on record, respectively.
- In the Hawaiian Islands, drier-than-normal conditions prevailed during JJA with 40% of the island chain experiencing drought by the end of August, according to the U.S. Drought Monitor.
- Satellite analysis showed above-normal sea levels occurring in the tropical western Pacific by August while below-normal sea levels were observed across much of the tropical central and eastern Pacific regions.

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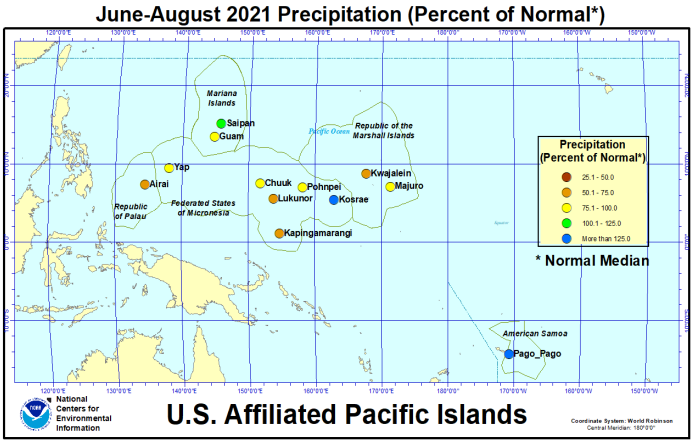
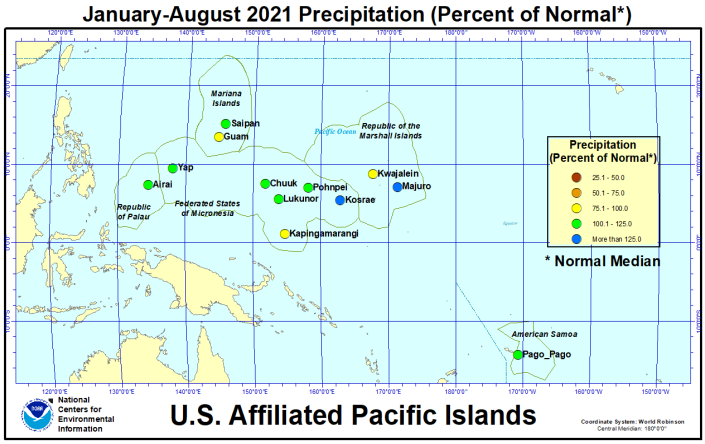
Climate Overview – *For June 2021–August 2021*





USAPI percent of normal precipitation for June-August (left) and January-August (right).
Source: NOAA NCEI. https://www.ncdc.noaa.gov/sotc/drought/202108

Across the central and eastern equatorial Pacific Ocean, sea-surface temperatures (SSTs) were near- to below-normal with ENSO-neutral conditions present. All four Niño regions registered negative SST anomalies on the latest NOAA CPC update (Sept 6): Niño 3.4 region at -0.3ºC; Niño 3 at -0.3ºC; Niño 1+2 at -0.2ºC; and Niño 4 at -0.3ºC.

During JJA, **above-normal sea levels were observed across much of the equatorial western Pacific and in isolated areas of the tropical central Pacific north of the equator.** Satellite analysis in the tropical eastern Pacific revealed sea levels generally ranging from normal to below-normal sea levels during JJA. In the Hawaiian Islands, slightly above-normal sea levels (monthly means) were observed during JJA. Additionally, daily extreme high (highest hourly water level on record for a given day) sea-level records were broken at Honolulu (6/27), Kahului (6/27), and Nawiliwili (6/25, 26). In the western Pacific, monthly mean sea levels were near- to-above normal with daily extreme high sea-level records broken in Guam (6/21, 25, 7/20, 24, 26), Kwajalein (6/27), and in Majuro (6/26), according to the University of Hawaii Sea Level Center.

Drought conditions intensified in areas of the Hawaiian Islands during the JJA period, including development of Extreme (D3) drought in Maui during July 2021. Despite some very dry conditions across areas of the RMI and FSM during July and August, most of the USAPI region was **drought-free** as adequate rainfall was observed to meet most local water needs, except for drought development in Ailinglaplap during August. Median precipitation for the JJA period was generally **below normal across much of the tropical western Pacific.** In the Marianas, Guam observed 29.28 in. (85% of normal) for JJA, while Saipan logged 27.60 in (112% of normal). In the West Caroline Islands, Palau experienced below-normal rainfall during the JJA period with Airai recording 37.08 in. (71% of normal). In the FSM, several stations observed below-normal JJA precipitation including Lukunor (27.7 in., 67% of normal), Kapingamarangi (28.22 in., 74% of normal), Yap (33.32 in., 75% of normal), Chuuk (29.33 in., 76% of normal), and Pohnpei (44.59 in., 96% of normal). Elsewhere in FSM, Kosrae observed **above-normal** rainfall with 62.58 in. (136% of normal). In the RMI, Majuro observed 29.3 in. (86% of normal) for JJA while Kwajalein logged 16.09 in. (59% of normal). Conversely, Pago Pago, American Samoa observed **above-normal** rainfall for JJA with 23.78 in (135% of normal). **Below-normal** rainfall in the Hawaiian islands was observed at Lihue 4.17 in. (71% of normal), Honolulu 0.43 in. (23% of normal), Molokai 1.02 in. (49% of normal), Kahului 0.66 in. (54% of normal), and Hilo 19.12 (69% of normal).

Tropical cyclone (TC) activity has been **near normal in the Northeast Pacific** (east of 180º) with 15 named storms since May and an ACE Index (Accumulated Cyclone Energy) of 82.2 (88.3 normal based on 1981-2010 climatology). **In the Northwest Pacific** (west of 180º), **below-normal** tropical cyclone activity has been observed through early September with 14 named storms and an ACE Index of 118.1 (154.4 normal).

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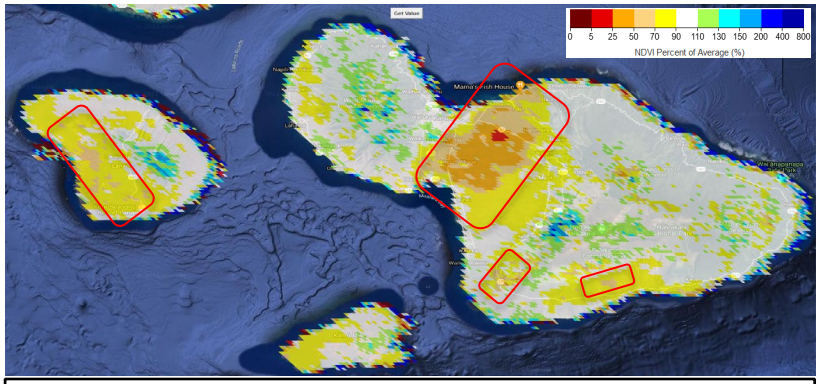
http://apdrc.soest.hawaii.edu/Hawaii_USAPI_Climate_Summary/dashboard

Sectoral Impacts – *For June 2021–August 2021*



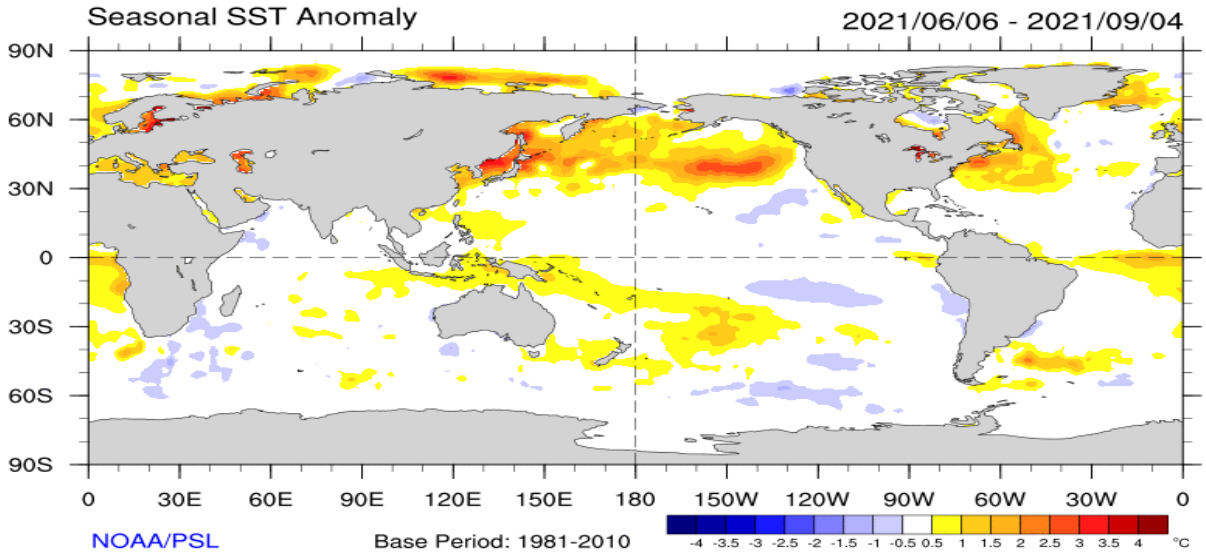
Satellite-based Normalized Difference Vegetation Index (NDVI) showing stressed vegetation (drought) during Jun – Aug 2021 in Maui and Lānaʻi.
Source: Climate Engine, NASA MODIS Terra.

Drought-impacted landscape in South Maui during June 2021.
Photo credit: The Maui News.

Agriculture – On July 15, the U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) designated Hawaii County as a primary natural disaster area. The designation provides access to emergency relief to impacted producers recovering from natural disaster, such as drought. Additionally, the USDA announced expansion of emergency assistance (September 8) through the ELAP program to help cover feed transportation costs for drought-impacted ranchers.

In the Ralik Chain of the RMI, developing drought conditions on Ailinglaplap Atoll were stressing local crops and vegetation in late August due to recent rainfall shortfalls.

Water Resources – On Majuro (RMI), reservoir storage reached 84% of total capacity on August 31, according to the Majuro Water & Sewer Company. In the RMI, water rationing on Ailinglaplap was being reported as most of the island's 1000-gallon water tanks had been emptied since early August. On Kapingamarangi (FSM), private water tanks were down to 10% of capacity and public tanks had about a 2-month supply by late August.



Seasonal (6/6/21 – 9/4/21) satellite-observed sea surface temperature anomalies (ºC).
Source: NOAA/OAR/ESRL PSL, Boulder, Colorado, USA. http://psl.noaa.gov/

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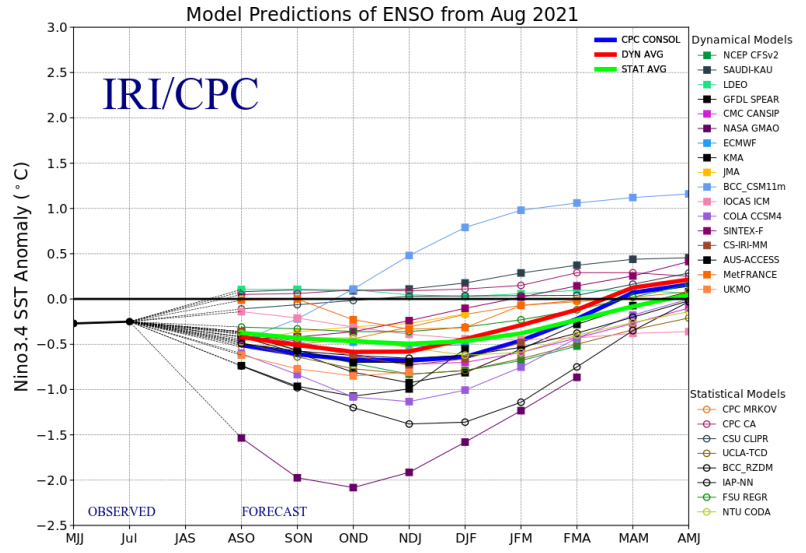
Seasonal Outlook – *For Sept 2021–Nov 2021*



ENSO forecast model predictions – August 2021
Source: IRI/CPC. https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

According to the majority of ENSO prediction models (see IRI/CPC forecast above), **ENSO-neutral** conditions are expected to continue through October while **La Niña** conditions are slightly favored during the OND and NDJ seasons, however, the models are nearly split on whether a transition from ENSO-neutral conditions will occur.

NOAA's Coral Reef Watch four-month (Sep – Dec 2021) coral bleaching heat stress outlook calls for **a high probability (90%) of high heat stress (Alert Level 1** [bleaching likely] & **Level 2** [mortality likely]) developing in the FSM and RMI while a **Warning** (possible bleaching) status is forecasted for Guam. For areas around islands of the Commonwealth of the Northern Mariana Islands (CNMI) and the Hawaiian Islands, a coral bleaching heat stress **Watch** is predicted.

During the period September 2021 through November 2021, **normal to above-normal** precipitation is forecasted for areas of FSM (Yap) and American Samoa, while **above-normal** rainfall is expected in Palau. **Normal** rainfall amounts are forecasted for the Marianas (Guam, CNMI), Chuuk and Pohnpei (FSM), and for Majuro (RMI). **Below-normal** rainfall is expected in Kosrae (FSM), Kwajalein (RMI), and across the Hawaiian Islands, according to the NOAA Pacific ENSO Applications Climate (PEAC) Center.

For the next three months, dynamical models (NOAA CFSv2, ACCESS-S1 [Australia]) suggest **above-normal sea level anomalies** for the western Pacific, especially near the equator in the vicinity of Majuro and Pohnpei. High tide water levels may raise by 10 to 20 cm above tide calendar predictions in these areas.

Regional Partners

NOAA Coral Reef Watch:
https://coralreefwatch.noaa.gov/

NOAA National Centers for Environmental Information:
http://www.ncei.noaa.gov/

NOAA NMFS Pacific Island Fisheries Science Center:
https://www.fisheries.noaa.gov/region/pacific-islands#science

NOAA NWS Weather Forecast Office Honolulu & Guam:
https://www.weather.gov/hfo/
https://www.weather.gov/gum/

NOAA OceanWatch - Central Pacific:
https://oceanwatch.pifsc.noaa.gov/

NPS Pacific Island Inventory & Monitoring Network:
https://www.nps.gov/im/pacn/index.htm

University of Guam - Water and Environmental Research Institute:
https://weri.uog.edu/

University of Hawaii Asia Pacific Data Research Center (APDRC):
http://apdrc.soest.hawaii.edu/index.php

University of Hawaii - Joint Institute of Marine and Atmospheric Research:
https://www.soest.hawaii.edu/jimar/

University of Hawaii Sea Level Center:
https://uhslc.soest.hawaii.edu/

USGS Science Center – Pacific Coastal and Marine Science Center:
https://www.usgs.gov/centers/pcmsc

USGS Pacific Islands Water Science Center:
https://www.usgs.gov/centers/piwsc

Western Regional Climate Center:
https://wrcc.dri.edu/

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