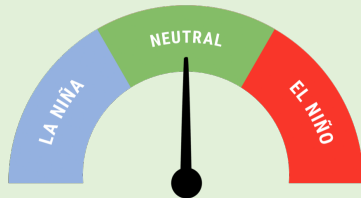


Island Climate Update



ENSO Watch
July 2023

Recent



ENSO-neutral

El Niño Alert criteria was reached during June. The ocean-atmosphere system is expected to progress toward El Niño conditions from July-September.

The Southern Oscillation Index (SOI) was +0.5 in June, on the La Niña side of neutral.

Central Pacific sea surface temperatures (SSTs) exceeded El Niño thresholds during June.

95%

chance for El Niño conditions to develop sometime during July-September 2023.

Chance for El Niño conditions persisting during October-December 2023

90%



El Niño Alert

Forecast

ENSO situation summary

The monthly NINO3.4 Index anomaly (in the central equatorial Pacific) at the end of June was +0.93°C. This is warmer than it was at the same time during the development of strong El Niño events in 1997 and 1982.

The SOI was on the La Niña side of neutral (+0.5) during June. Although changes in the ocean temperature are suggestive of El Niño, the atmosphere has yet to demonstrate a consistent, El Niño-like response to those warming seas.

June trade winds were above normal in the eastern Pacific and near or slightly below normal in the central Pacific during June. July is expected to have enhanced trade winds west of the International Date Line during the first half of the month, then enhanced trades east of the Date Line during the second half of the month with weakening trades to the west.

In the sub-surface equatorial Pacific, the most unusually warm waters were located in the east with localised

anomalies of 4-6°C above average. The western Pacific remained anomalously warm (1-2°C above average), but the warm pool has shown an eastward progression. This shift is expected to continue in the months ahead, leading to an atmospheric response that becomes more El Niño-like over time.

The persistence of warmth in the West Pacific Warm Pool may allow La Niña-like patterns to occur from time-to-time over the next month or so, lengthening the transition window to El Niño.

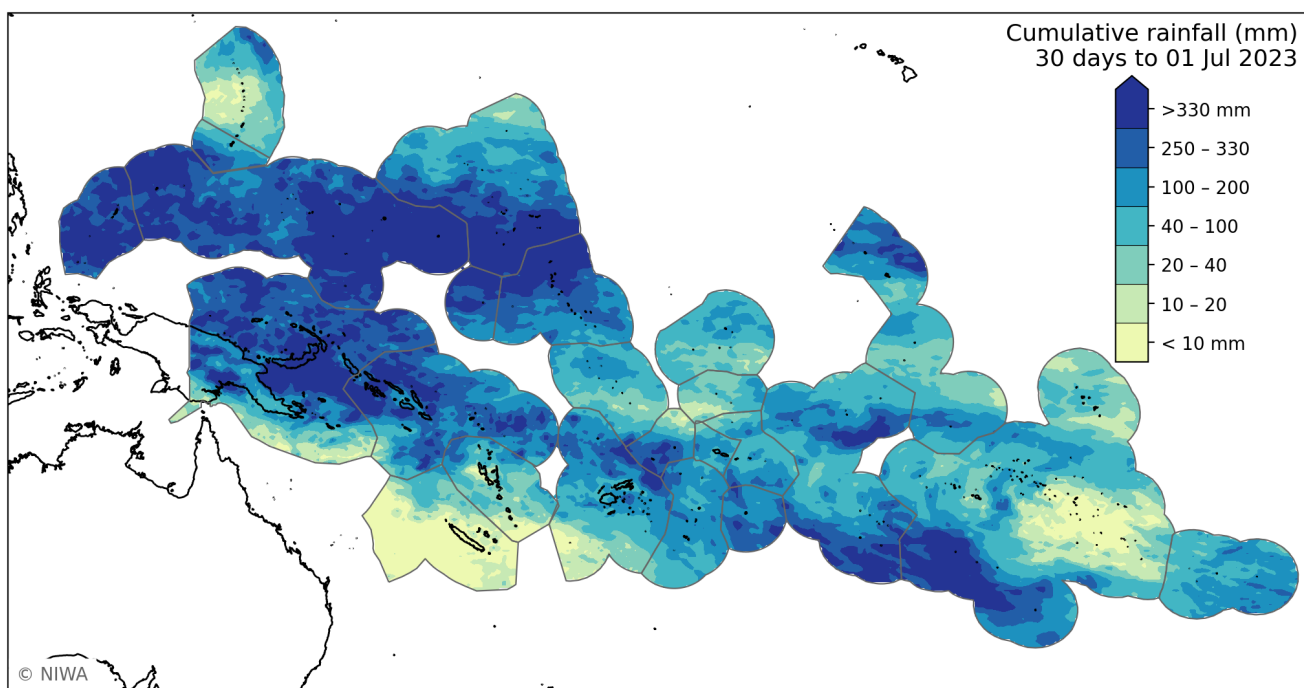
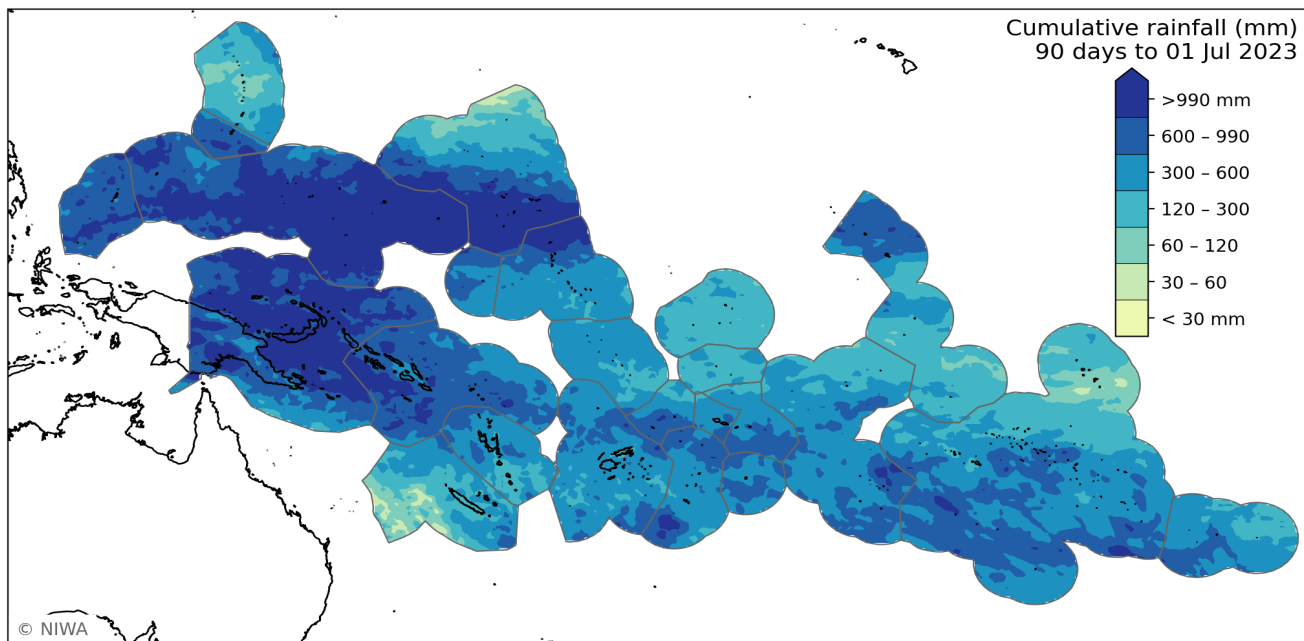
NIWA's analysis indicates that oceanic indicators have reached El Niño thresholds, but atmospheric indicators remain neutral. Because El Niño is a coupled ocean-atmosphere phenomenon, the ocean and the atmosphere need to be working in tandem before an event is classified. NIWA is now at El Niño Alert with an event likely to begin by August or September. Overall, El Niño has a 95% chance of developing by September, with air and sea temperatures, rainfall, and sea level anomalies tending in an El Niño-like direction.

Regional situation summary (1 July 2023)

Satellite-derived rainfall summaries for the last month and three months are shown below.

During April-June (top plot), no island groups received less than 60 mm of rain. Over 990 mm fell across parts of Guam, Palau, Federated States of Micronesia (FSM), southern Marshall Islands, northern Gilbert Islands, Papua New Guinea (PNG), and the Solomon Islands.

During June (bottom plot), less than 40 mm of rain fell in parts of the Northern Marianas, New Caledonia, Vanuatu, southern Tuvalu, Phoenix Islands, Tokelau, Line Islands, Marquesas, Society Islands, and Tuamotu Archipelago. Over 330 mm fell across Palau, FSM, southern Marshall Islands, Nauru, Gilbert Islands, PNG, Solomon Islands, Wallis & Futuna, the Cook Islands, and Austral Islands.

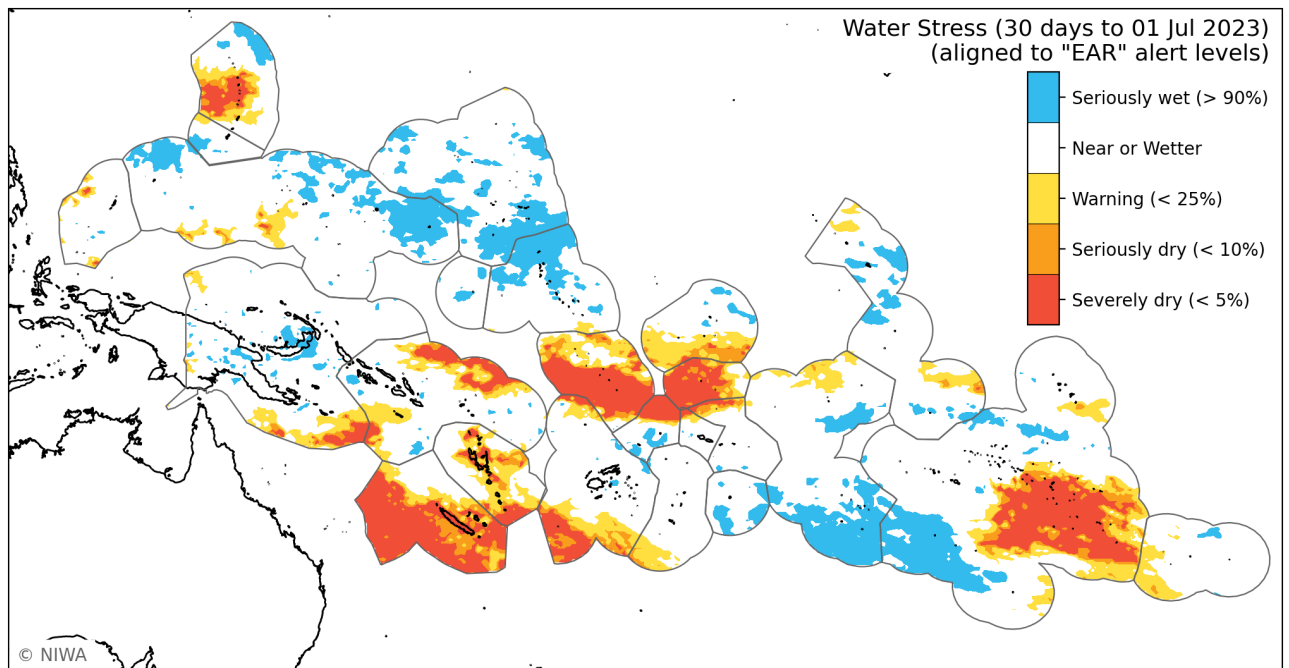
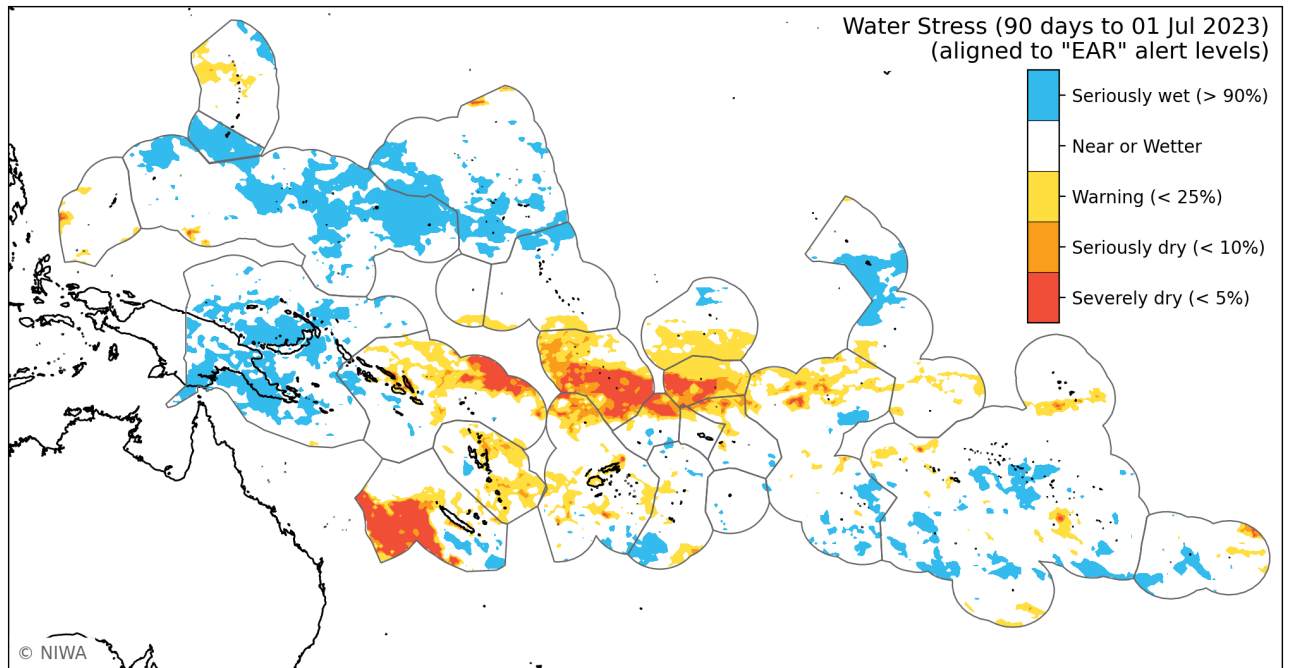


EAR regional situation summary (1 July 2023)

The regional thresholds for cumulative rainfall over the last 90 and 30 days are shown in the plots below.

During April-June (top plot), severely or seriously dry conditions affected parts of the Solomon Islands, Vanuatu, New Caledonia, Fiji, Tuvalu, Tokelau, American Samoa, Northern Cook Islands, and Marquesas.

During June (bottom plot), severely or seriously dry conditions affected parts of the Northern Marianas, Solomon Islands, Vanuatu, New Caledonia, Tuvalu, Phoenix Islands, Tokelau, and Tuamotu Archipelago.

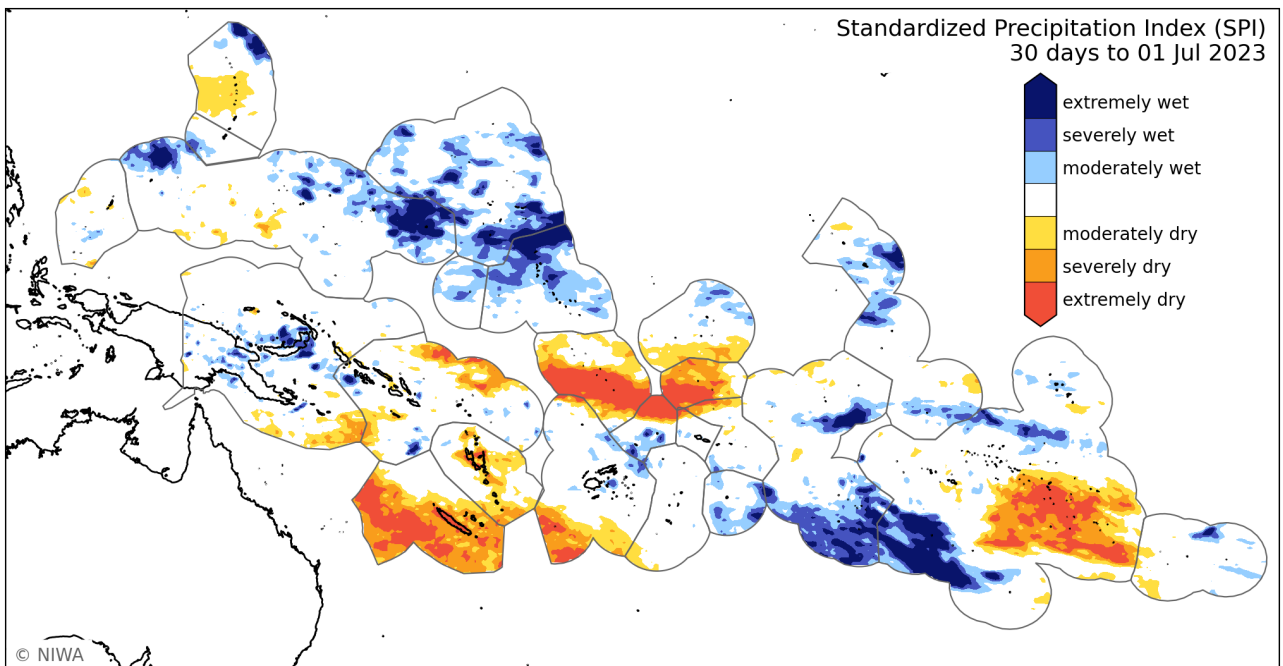
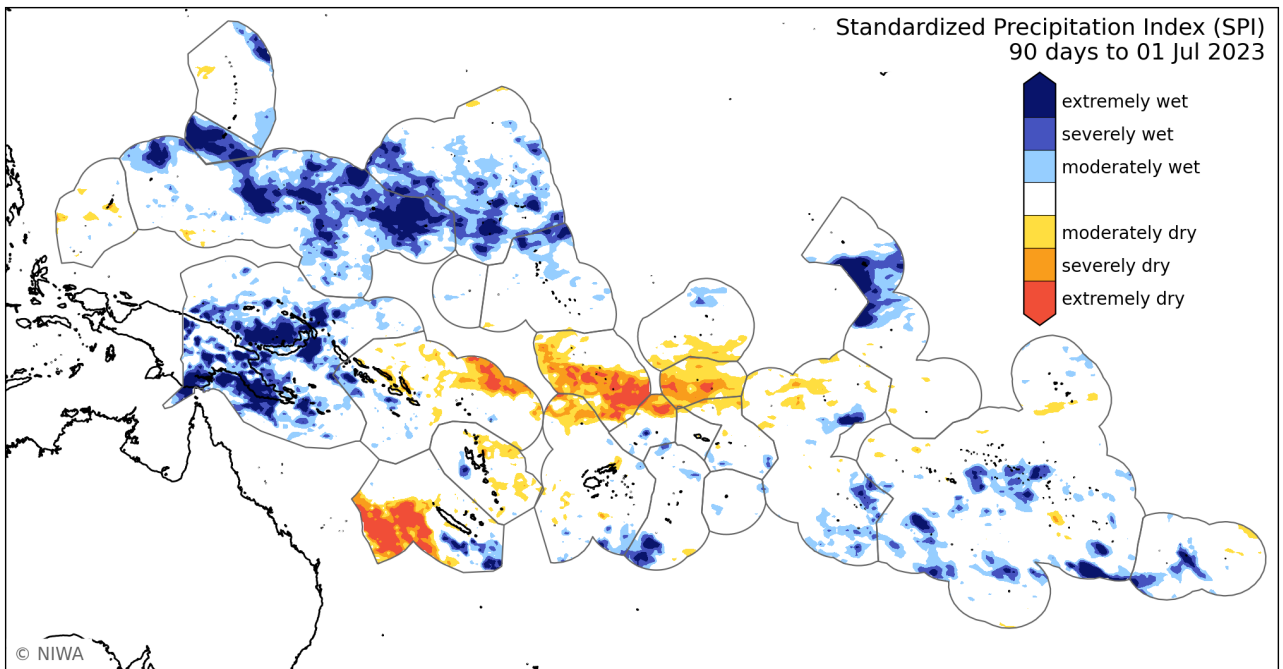


SPI Regional situation summary (1 July 2023)

The Standardized Precipitation Index (SPI) thresholds for cumulative rainfall over the last 90 and 30 days are shown in the plots below.

During April-June (top plot), extremely or severely dry conditions occurred in parts of the Solomon Islands, Vanuatu, Tuvalu, and Tokelau.

During June (bottom plot), extremely or severely dry conditions occurred in parts of the Solomon Islands, Vanuatu, New Caledonia, southern Fiji, Tuvalu, Tokelau, and Tuamotu Archipelago.

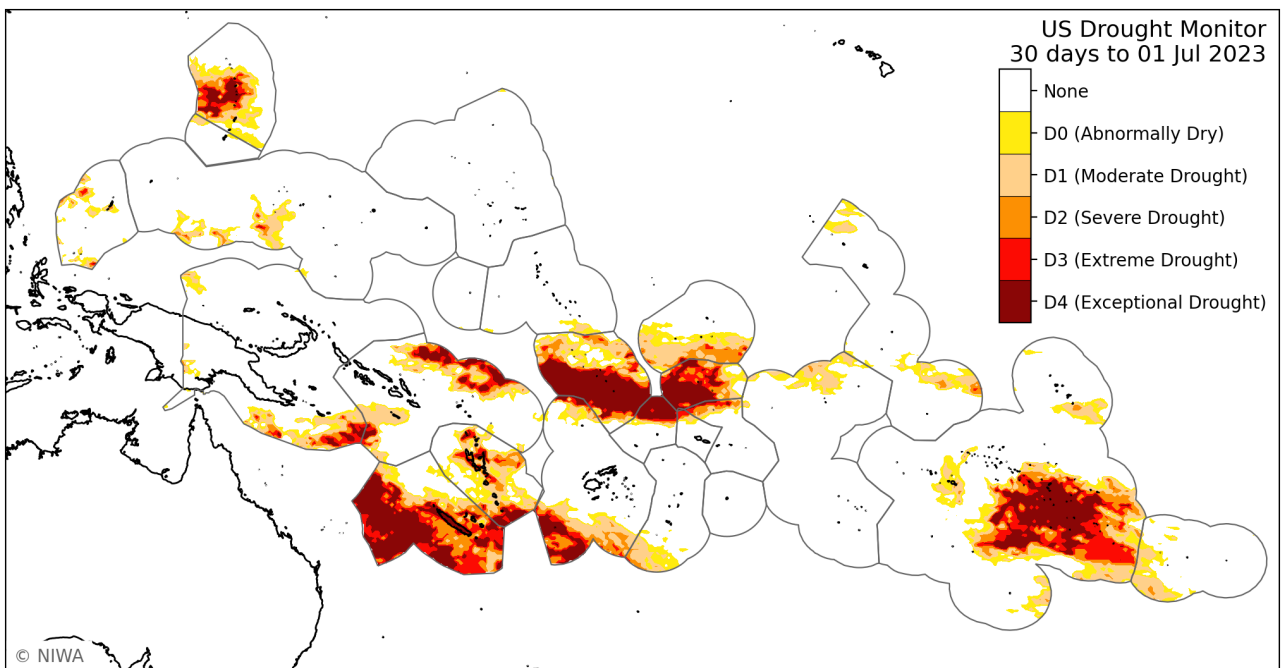
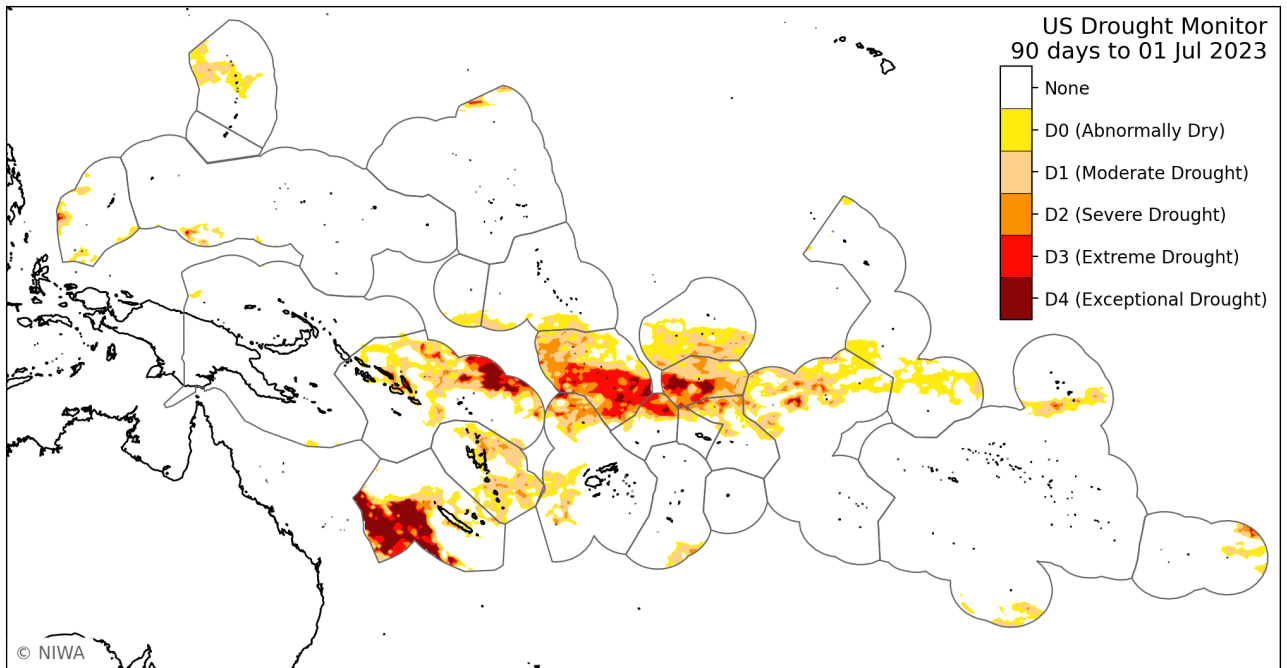


USDM Regional situation summary (1 July 2023)

The US Drought Monitor Index (USDM) levels for cumulative rainfall over the last 90 and 30 days are shown in the plots below.

During April-June (top plot), extreme or exceptional drought occurred in parts of the Solomon Islands, Vanuatu, New Caledonia, northern Fiji, Tuvalu, Tokelau, American Samoa, and Northern Cook Islands.

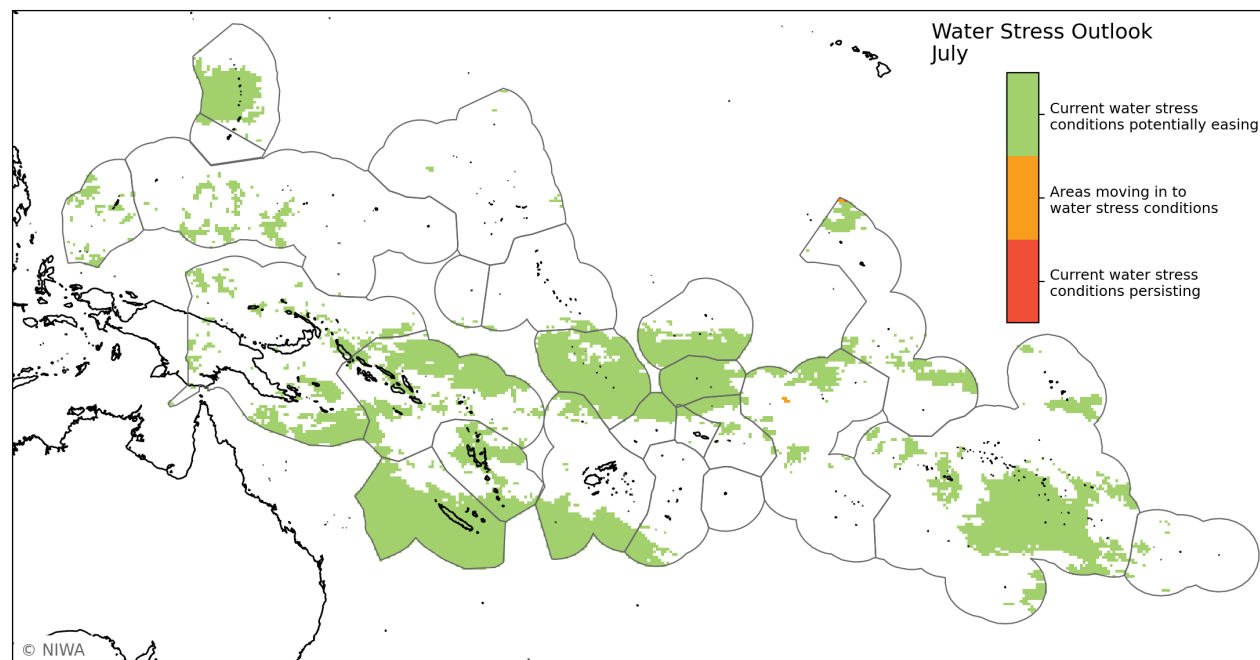
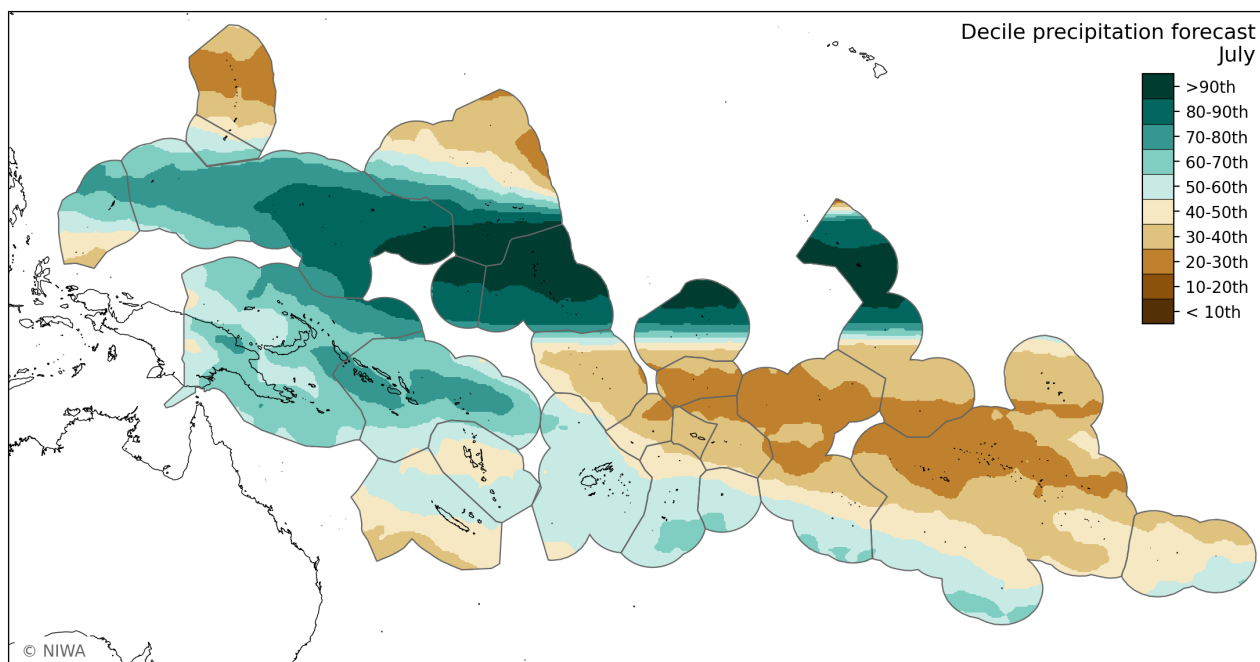
During June (bottom plot), extreme or exceptional drought occurred in parts of the Northern Marianas, Vanuatu, New Caledonia, southern Fiji, Tuvalu, Tokelau, American Samoa, and Tuamotu Archipelago.



July 2023 forecast summary

During July, rainfall is shown to be below or well below normal from Tuvalu to Marquesas and Tuamotu Archipelago, including Tokelau, Wallis & Futuna, Samoa, American Samoa, Northern Cook Islands, Society Islands, and Tuamotu Archipelago. A dry signal also covers the Northern Marianas and northern Marshall Islands.

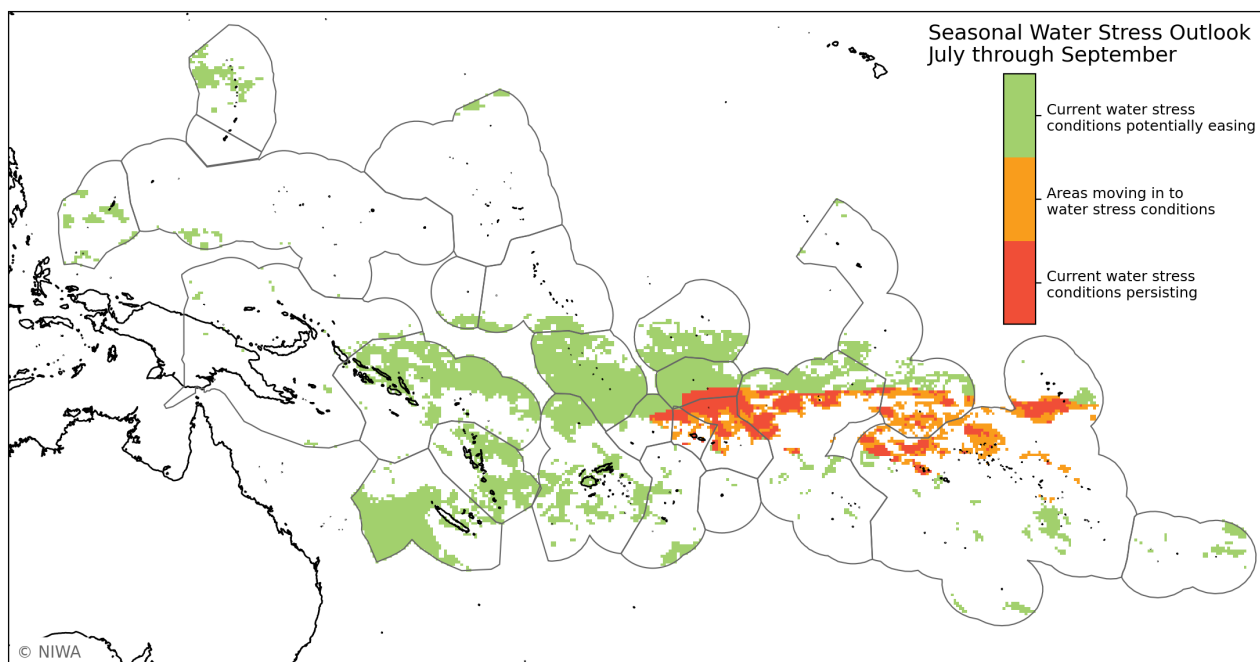
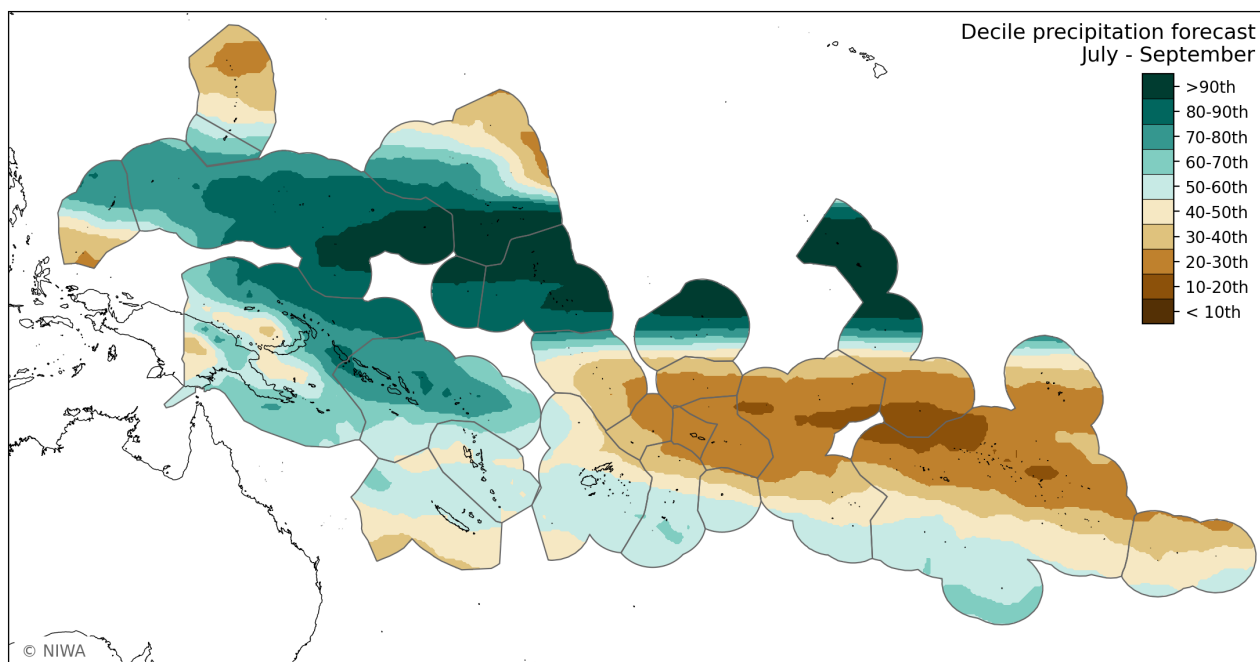
On the other hand, very wet conditions are shown for FSM, southern Marshall Islands, northern PNG, Solomon Islands, Nauru, and Kiribati (Gilbert, Phoenix, and northern Line Islands).



July – September 2023 forecast summary

During July-September, below normal or well below normal rainfall is signaled from Tuvalu to Marquesas, the Tuamotu Archipelago, and Pitcairn Islands, as well as the Northern Marianas and northern Marshall Islands. Rainfall is predicted to be well above normal across FSM, southern Marshall Islands, northern PNG, Solomon Islands, Nauru, and Kiribati (Gilbert, Phoenix, and northern Line Islands).

Water stress conditions may persist or develop in Samoa, American Samoa, Northern Cook Islands, Society Islands, Marquesas, and parts of the Tuamotu Archipelago.

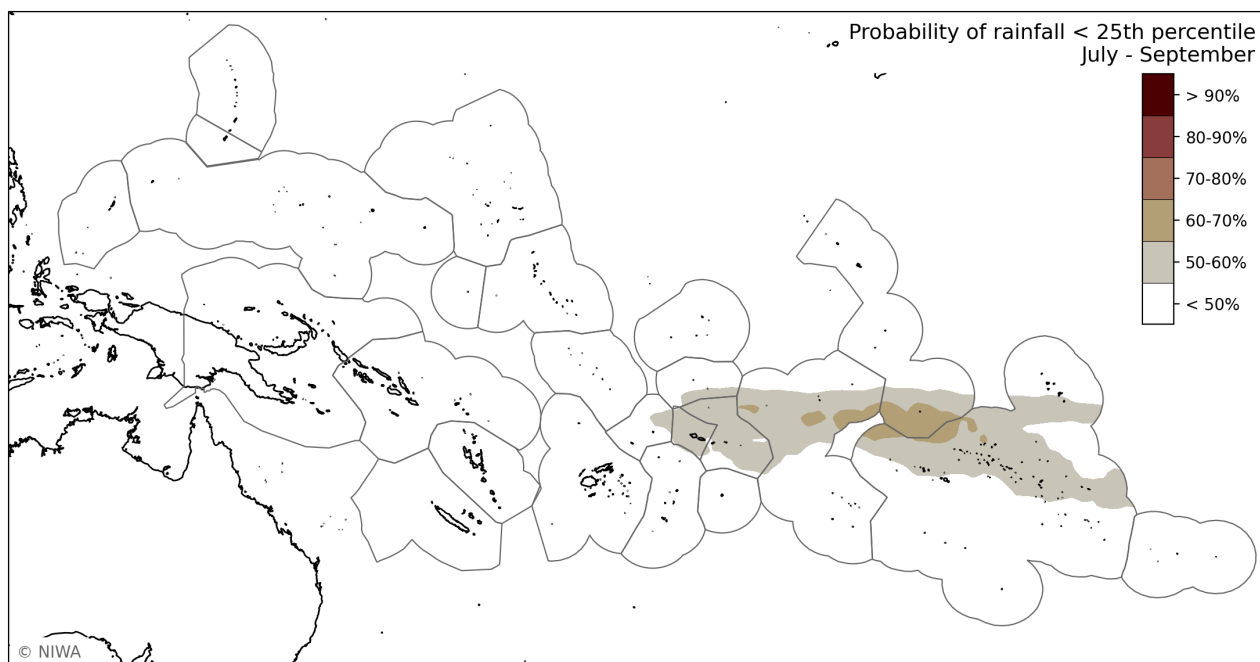
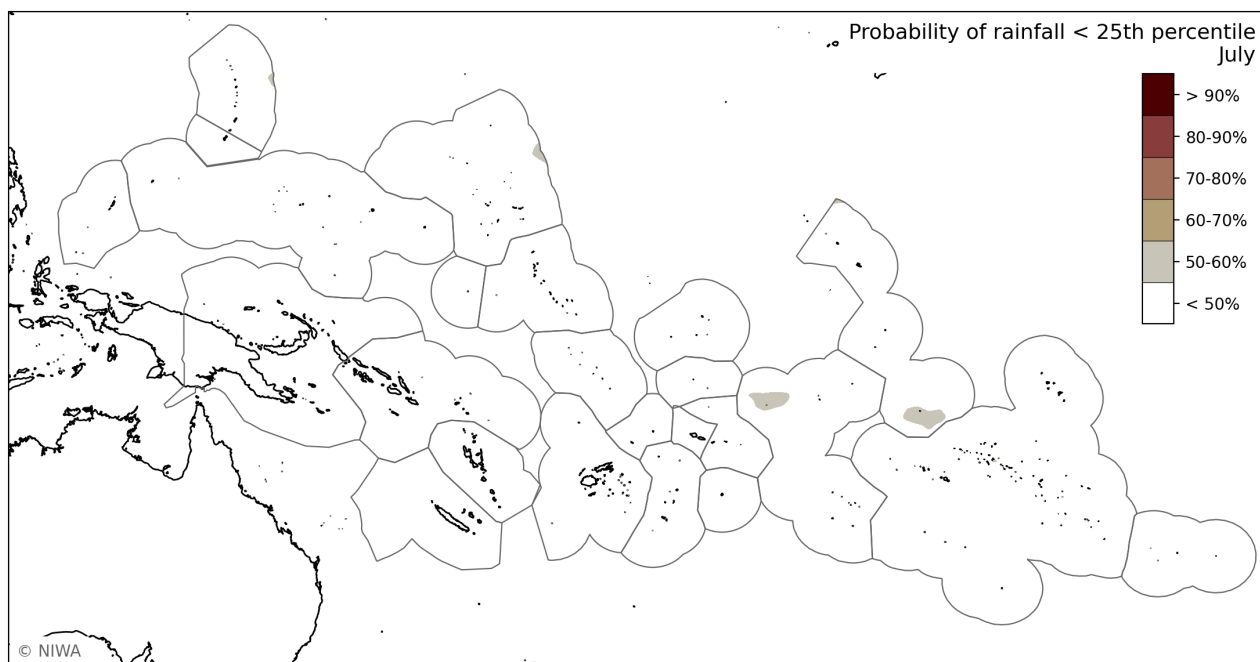


Probabilities of rainfall < 25th percentile

The probability (likelihood) of dry conditions with cumulative rainfall being less than the 25th percentile for July (top plot) and for the season (July-September, bottom plot) are shown.

For July, the highest chances for very dry conditions are confined to a small pocket of the Northern Cook Islands.

For July-September, very dry conditions may affect Samoa, American Samoa, Northern Cook Islands, Society Islands, Marquesas, and Tuamotu Archipelago.



Island Climate Update



About

Understanding the Island Climate Update bulletin

The ICU utilises satellite rainfall data from the [NASA GPM-IMERG](#) and a multi-model ensemble forecast utilising 550+ members derived from nine Global Climate Models available from the [Copernicus Climate Data Store](#).

Bulletin page	Description
Rainfall watch	Rainfall plots are derived from NASA GPM-IMERG satellite rainfall data. Regional rainfall accumulation is shown for the last 30 days (1 month) and 90 days (3 months).
Water stress watch	Plots are derived from NASA GPM-IMERG satellite rainfall data. Different Pacific Island Meteorological Services use different approaches to defining drought and water stress. Hence current regional water stress classifications are shown for the Early Action Rainfall (Page 3), Standard Precipitation Index (Page 4) and US Drought Monitoring (Page 5) alert levels for the last 90 and 30 days of accumulated rainfall.
Water stress outlook	<p>Outlook water stress classifications are based on both the satellite rainfall data and a multi-model ensemble forecast derived from nine Global Climate Models for the next month and three months.</p> <p>The top plots on each page show the rainfall decile band for the next 1 and 3 months for which the cumulative probability derived from the multi-model ensemble forecasts reaches 50%.</p> <p>The bottom plots bring together conditions over the past 3 months and forecast conditions over the next month:</p> <ul style="list-style-type: none"> • Current water stress conditions potentially easing: Past 3 month accumulation less than 25th percentile. 1 month / seasonal accumulation forecast greater than 25th percentile. • Areas moving in to water stress: Past 3 month accumulation between the 40th and 25th percentile. 1 month / seasonal accumulation forecast less than 25th percentile. • Current water stress conditions persisting: Past 3 month accumulation less than 25th percentile. 1 month / seasonal accumulation forecast less than 25th percentile. <p>The final page shows the probability that forecast rainfall over the next 1 or 3 months is within the lowest 25% of cumulative rainfall over the same period (a measure of the confidence in a low rainfall forecast).</p>
<p>Online Resources</p>	<p>Additional regional and country-level resources are available online:</p> <ul style="list-style-type: none"> • Daily updated plots for 30, 60, 90, 180 and 365 day: accumulative rainfall, number of dry days, number of days since last rainfall > 1 mm, EAR, SPI and USDM indices. Click here for the imagery and here for the underlying data. • A range of probabilistic one to five monthly and seasonal forecast plots updated shortly after the 15th of each month. Imagery and data to be made available soon.



NIWA is the Network co-lead for the [WMO RA V Regional Climate Centre Node](#) on Long Range Forecast and consortium member for nodes on Climate Monitoring, Operational Data Services and Training.

WMO

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