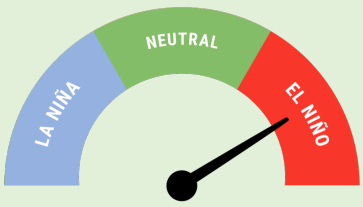
Island Climate Update

NIWA
Taihoro Nukurangi

ENSO Watch
December 2023

Recent



El Niño

El Niño continued during November and will likely remain in place during the next three months.

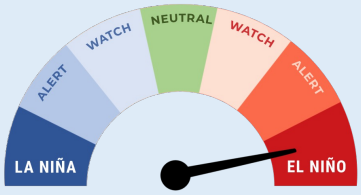
The Southern Oscillation Index (SOI) was -1.0 from September-November, at the El Niño threshold.

Tropical Pacific sea surface temperatures (SSTs) were well within the range of a strong El Niño during November, ranking with the most significant events in recent decades.

Forecast

100% chance for **El Niño** conditions to continue through **February 2024**

Chance for **El Niño** conditions persisting during **March-May 2024** **85%**



El Niño

ENSO situation summary

El Niño continued during November and will likely remain in place during the next three months. El Niño has around a 100% chance of persisting through February 2024.

The monthly NINO3.4 Index anomaly (in the central equatorial Pacific) at the end of November was +1.92˚C, well within the range of a strong El Niño (classified when the NINO3.4 Index is greater than 1.5˚C). The November 2023 NINO3.4 Index is exceeded only by 2015 and 1997, with data back to 1981. From an oceanic perspective, this El Niño continues to rank with the most significant events in recent decades.

The Southern Oscillation Index (SOI) was at the El Niño threshold from September-November (-1.0), and in the El Niño range during November (-1.1).

Trade wind strength was was below normal or well below normal in the Pacific during November, particularly just north of the equator and in the central and west. In parts of the region, this qualified as a Westerly Wind Burst (WWB). This WWB will be responsible for the eastward propagation of warm sea water along the equator through January. Another meaningful reduction or reversal in trade winds is possible during the second half of December.

In the sub-surface central and eastern equatorial Pacific Ocean, anomalies of +3˚C to +6˚C were occurring in the upper 100 metres as of late November. Anomalies intensified at depth around the NINO3.4 region, resulting from a Westerly Wind Burst during the second half of November. Peak oceanic El Niño strength is most likely in January, but sustained peak intensity into February cannot be ruled out.

The associated abnormally warm water sitting near and north of both Vanuatu and Fiji may be a common genesis zone for tropical cyclone activity in the months ahead. A tropical cyclone is currently forming near the Solomon Islands, but it is not expected to impact any other island groups. An active pulse of the Madden-Julian Oscillation in mid-to-late December may generate additional tropical cyclone activity.

Island Climate Update

Rainfall Watch

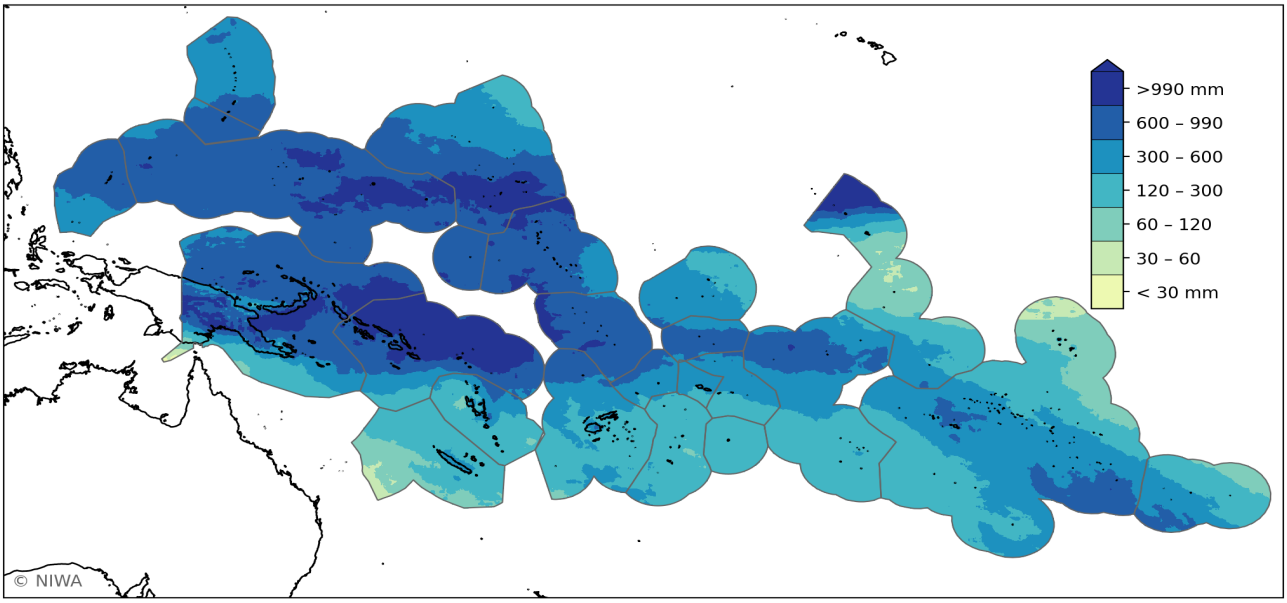
Regional situation summary (1 December 2023)

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

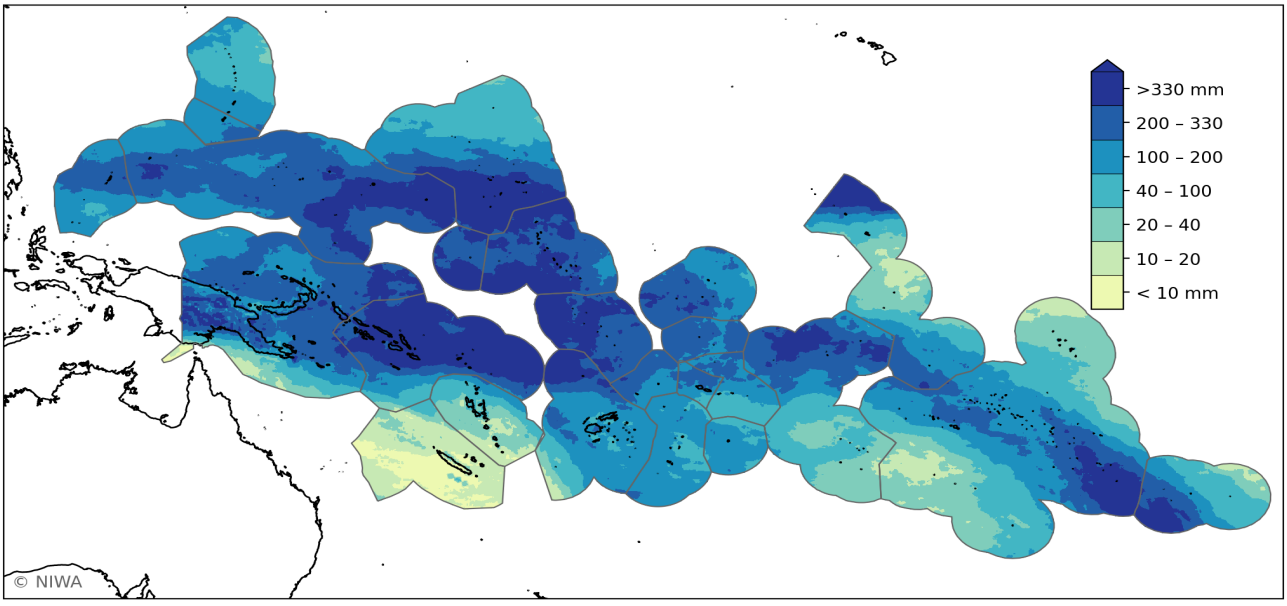
During September-November (top plot), over 990 mm of rain fell across parts of the Federated States of Micronesia (FSM), southern Marshall Islands, parts of Papua New Guinea (PNG), the Solomon Islands, and the northern Line Islands.

During November (bottom plot), over 330 mm of rain fell across parts of FSM, southern Marshall Islands, Gilbert Islands, Solomon Islands, Tuvalu, northern Cook Islands, northern Line Islands, eastern Tuamotu Archipelago, and western Pitcairn Islands. Less than 40 mm of rain fell in New Caledonia, parts of Vanuatu, central Line Islands, southern Cook islands, Austral Islands, and Marquesas Islands.

Cumulative rainfall (mm), source: MSWEP 2.8.0
90 days to 01 Dec 2023



Cumulative rainfall (mm), source: MSWEP 2.8.0
30 days to 01 Dec 2023



Island Climate Update

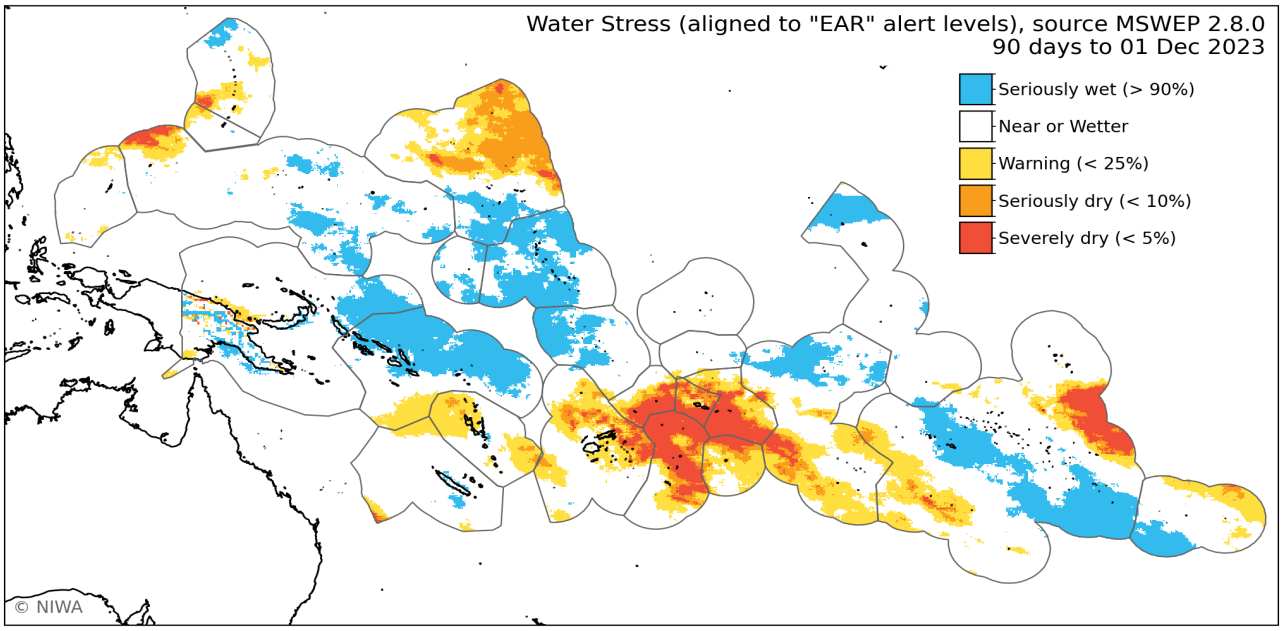
Water Stress Watch

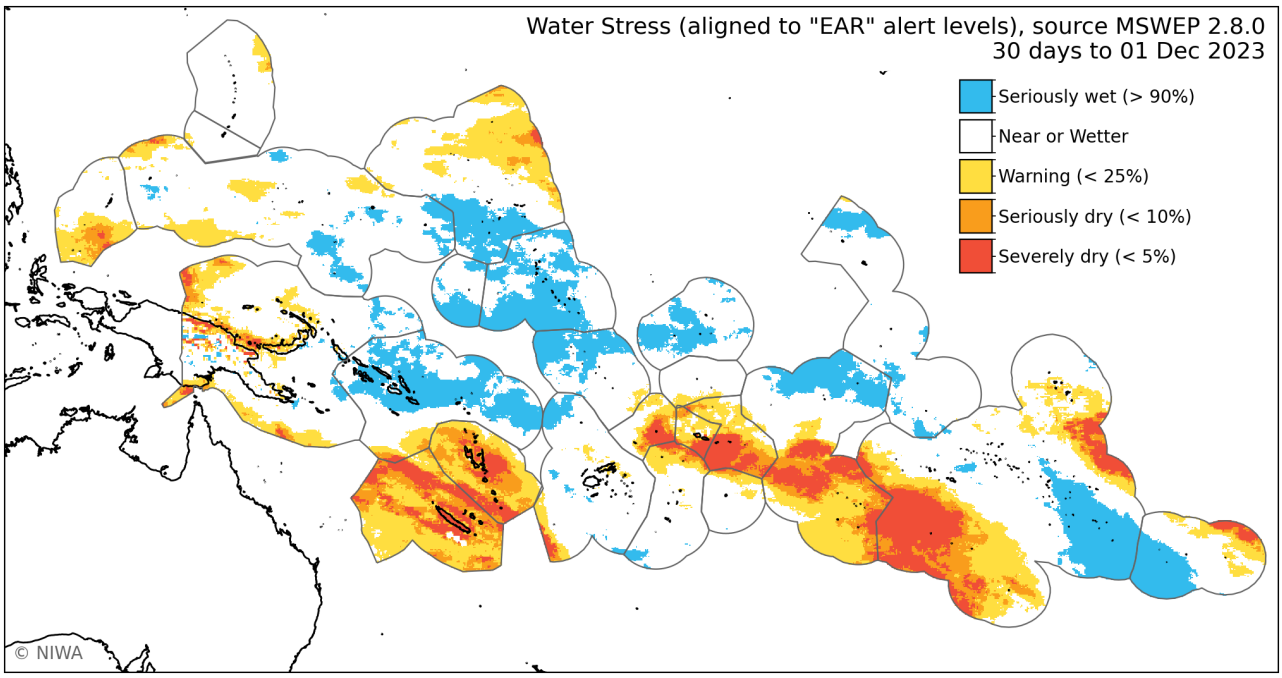
EAR regional situation summary (1 December 2023)

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

During September-November (top plot), severely or seriously dry conditions affected parts of the Marshall Islands, Fiji, Tonga, Wallis & Futuna, Samoa, American Samoa, Austral Islands, and northern Tuamotu Archipelago.

During November (bottom plot), severely or seriously dry conditions affected parts of PNG, New Caledonia, Vanuatu, northern Tonga, Wallis & Futuna, Samoa, American Samoa, southern Cook Islands, and Austral Islands.





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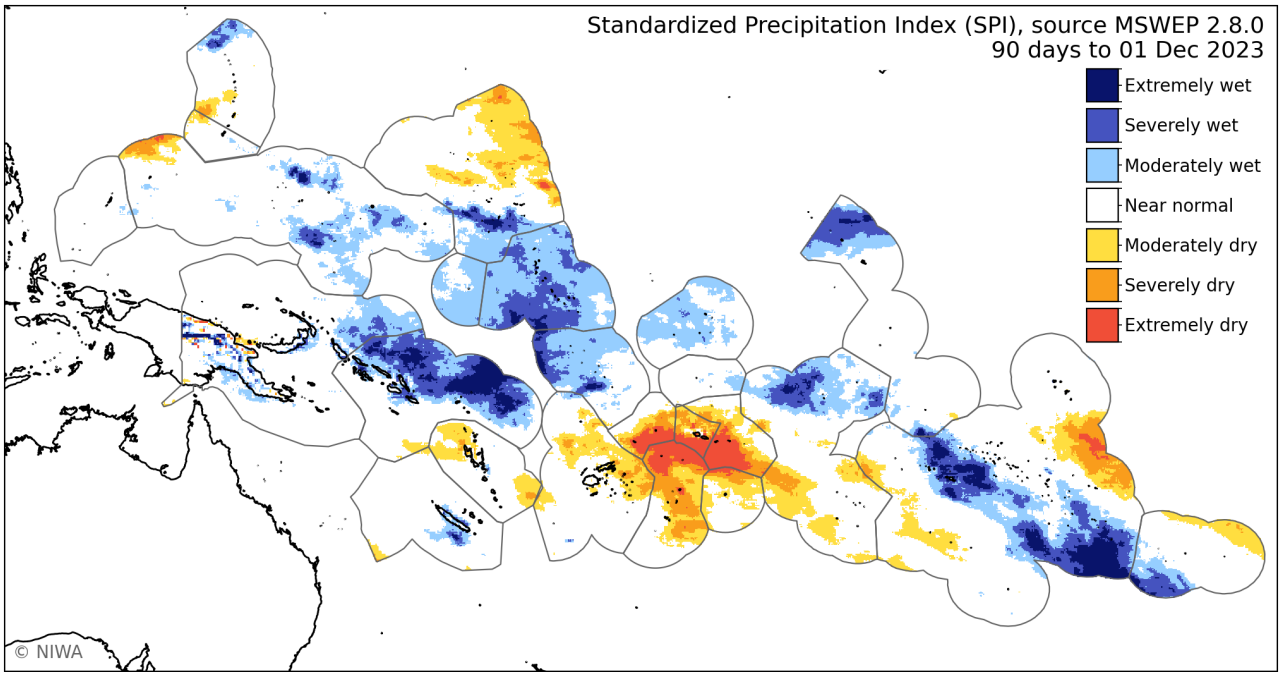
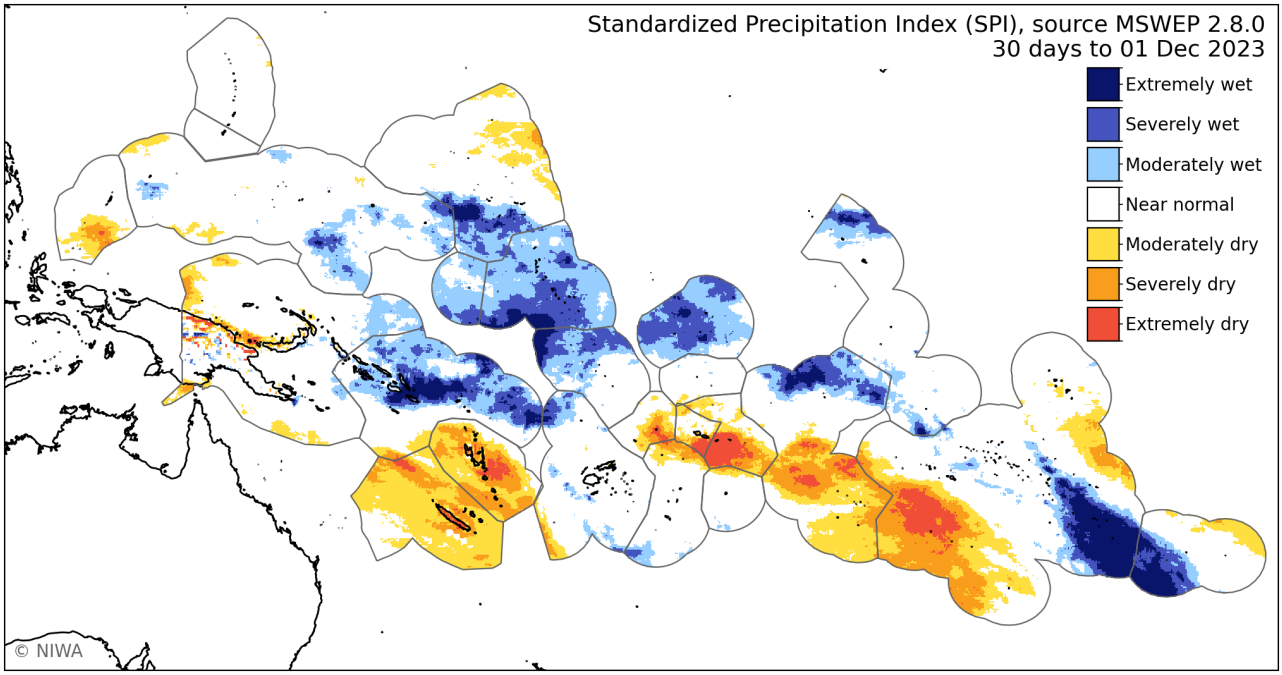
SPI Regional situation summary (1 December 2023)

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

During September-November (top plot), extremely or severely dry conditions occurred in parts of the Marshall Islands, northern Vanuatu, eastern Fiji, Tonga, Wallis & Futuna, Samoa, and American Samoa.

During November (bottom plot), extremely or severely dry conditions occurred in parts of western PNG, New Caledonia, Vanuatu, northern Tonga, Wallis & Futuna, Samoa, American Samoa, southern Cook Islands, and Austral Islands.





Island Climate Update

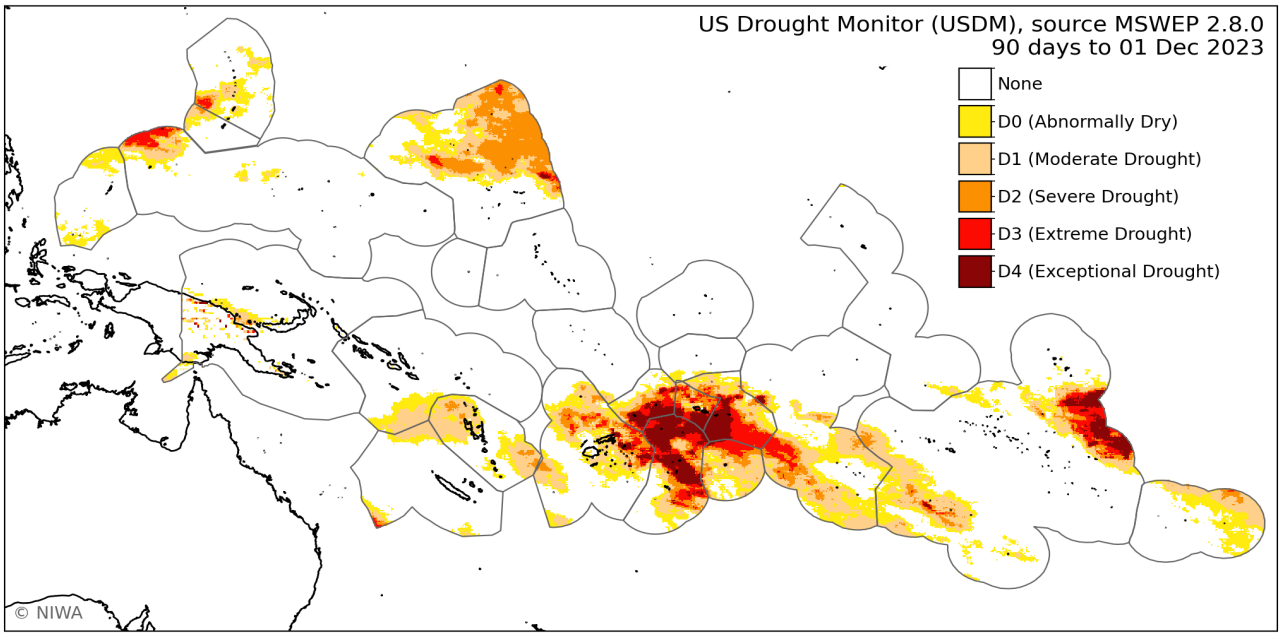
Water Stress Watch

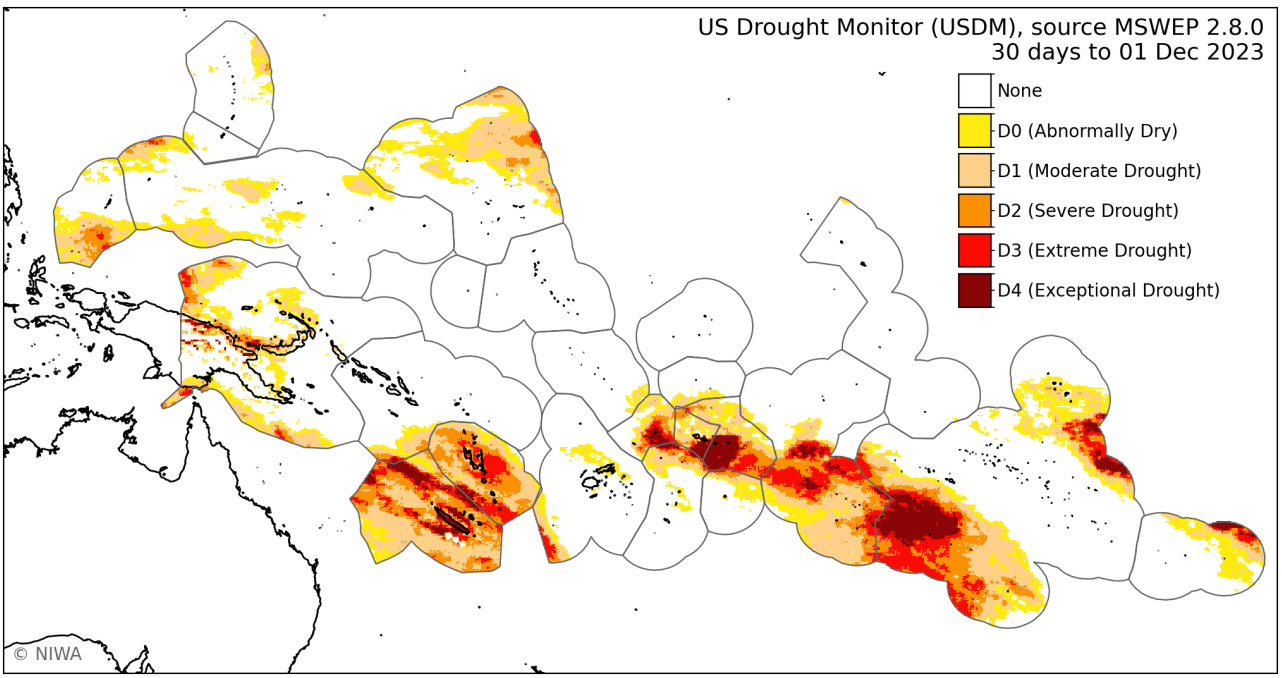
USDM Regional situation summary (1 December 2023)

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

During September-November (top plot), extreme or exceptional drought occurred in parts of the Marshall Islands, eastern Fiji, Tonga, Wallis & Futuna, Samoa, American Samoa, Austral Islands, and northern Tuamotu Archipelago.

During November (bottom plot), extreme or exceptional drought occurred in parts of PNG, New Caledonia, Vanuatu, Wallis & Futuna, northern Tonga, Samoa, American Samoa, southern Cook Islands, Austral Islands, and northern Tuamotu Archipelago.





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Water Stress Outlook

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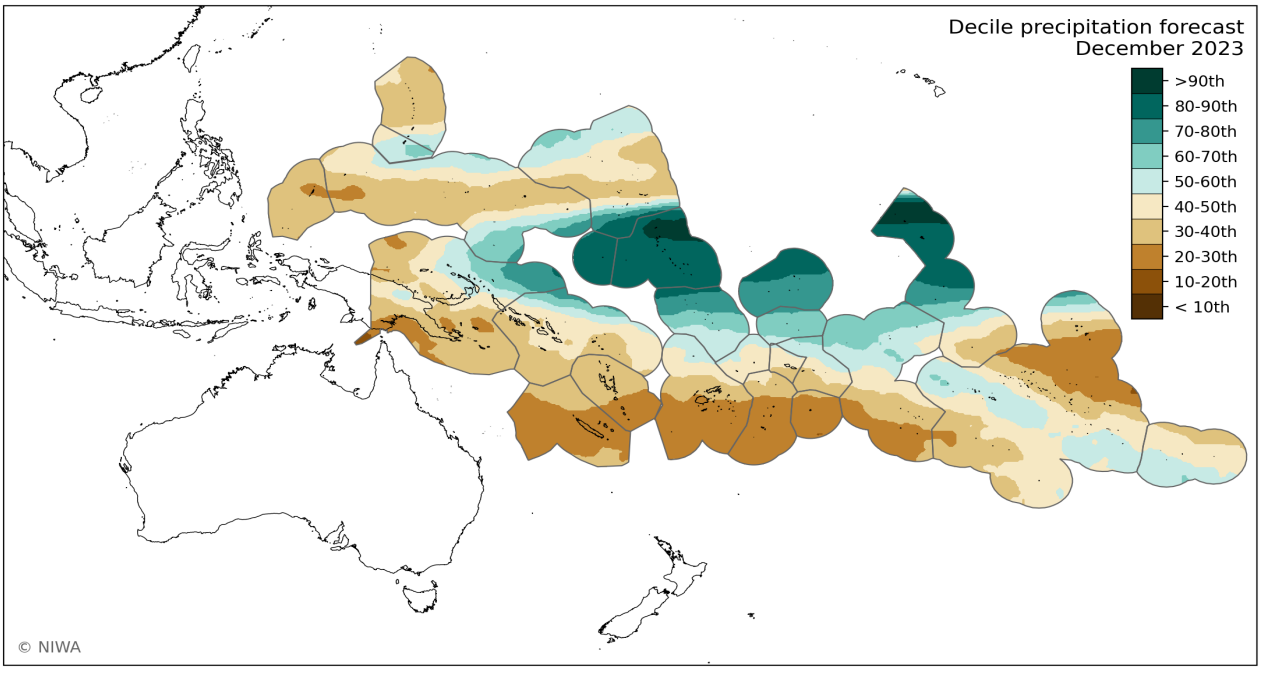
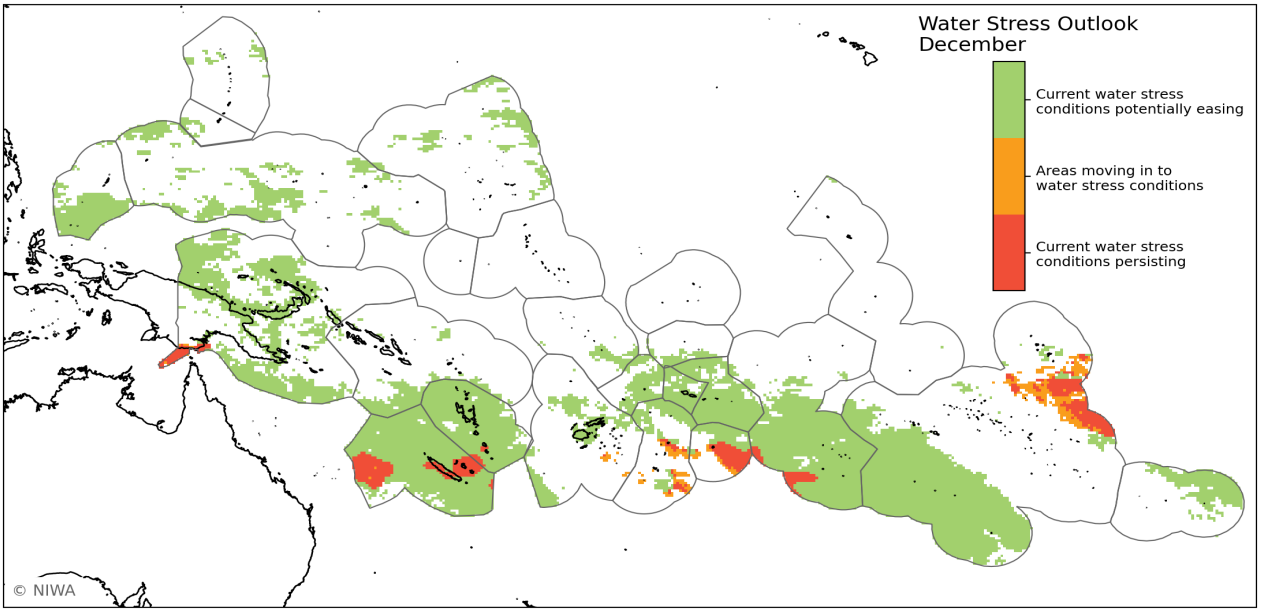
December 2023 forecast summary

During December, below normal rainfall is favoured in Northern Marianas, Palau, FSM, parts of Marshall Islands, PNG, Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, Wallis & Futuna, Samoa, American Samoa, Southern Cook Islands, Austral Islands, Tuamotu Archipelago, Marquesas, and Pitcairn Islands.

Above normal rainfall is favoured in Guam, southern FSM, southern Marshall Islands, northeastern PNG, Nauru, most of Kiribati, Tuvalu, Tokelau, northern Cook Islands, and Society Islands.

Water stress conditions may persist or develop in parts of New Caledonia, Tonga, Niue, and northern Tuamotu Archipelago.





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Water Stress Outlook

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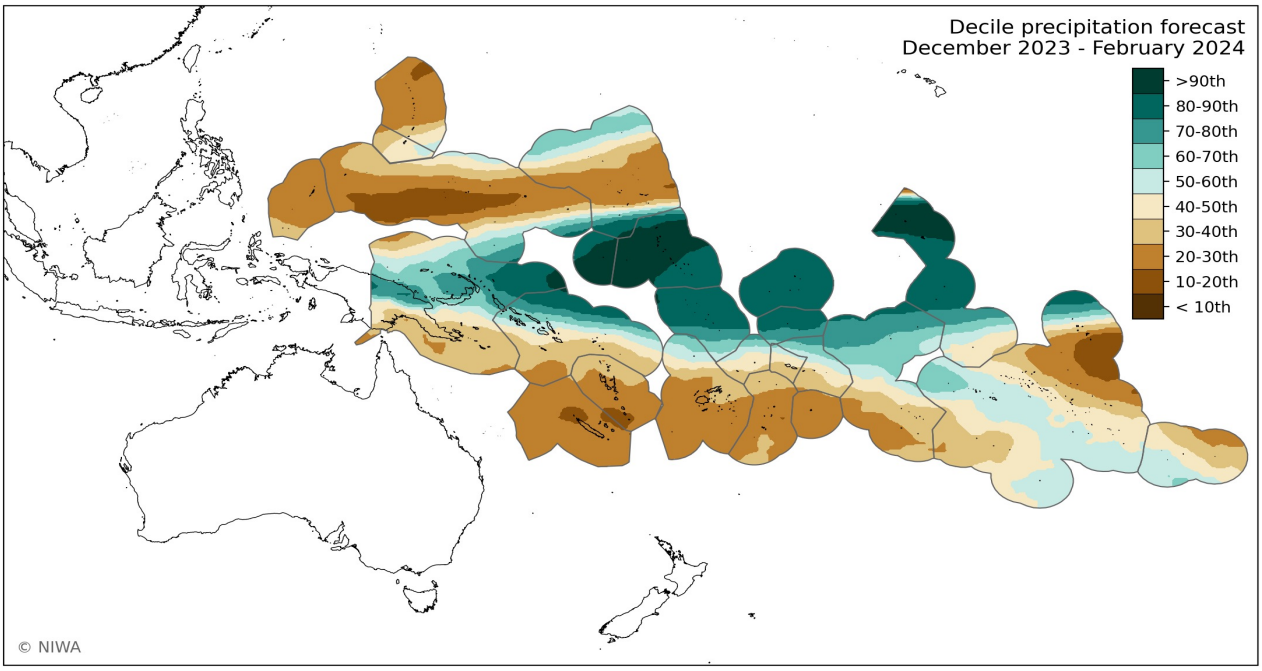
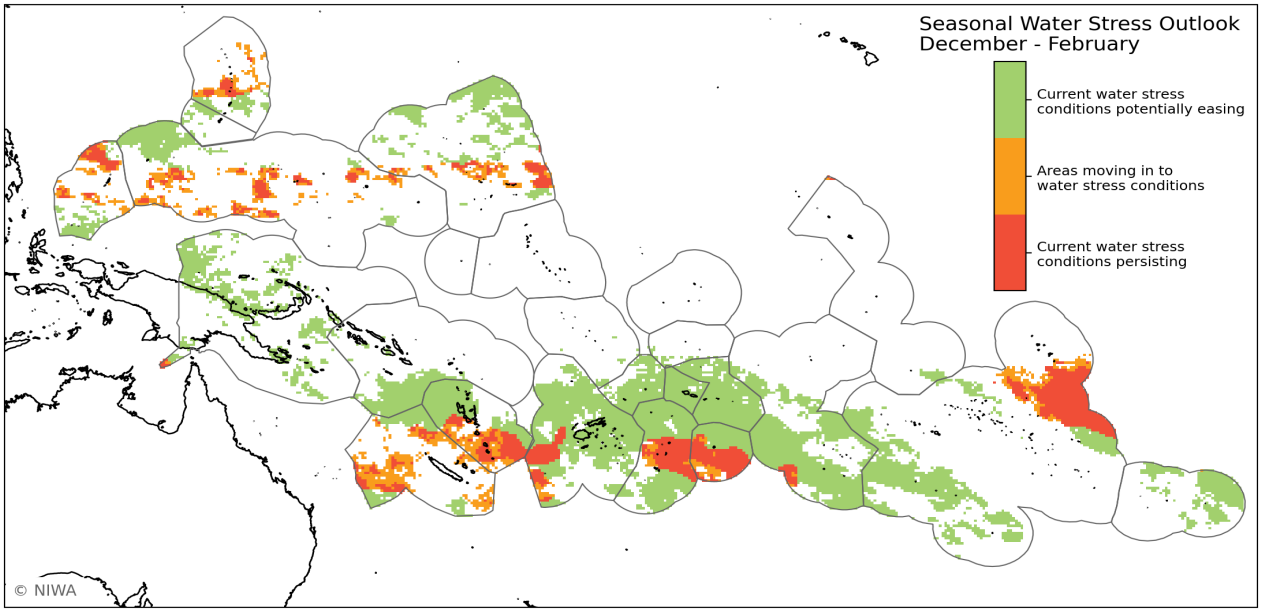
December 2023-February 2024 forecast summary

During December-February, below normal rainfall is favoured across Northern Marianas, Guam, Palau, most of FSM, Marshall Islands, southern PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Niue, Wallis & Futuna, Samoa, American Samoa, Southern Cook Islands, Austral Islands, southern Marquesas, northern and eastern Tuamotu Archipelago, and Pitcairn Islands.

Above normal rainfall is forecast in southern FSM, southern Marshall Islands, northern PNG, northern Solomon Islands, Nauru, Kiribati (Gilbert, Phoenix, and northern Line Islands), Tuvalu, Tokelau, Northern Cook Islands, Society Islands and northern Marquesas.

Water stress conditions may persist or develop in parts of the Northern Marianas, Palau, Marshall Islands, New Caledonia, Vanuatu, Tonga, Niue, and northern Tuamotu Archipelago.





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Water Stress Outlook

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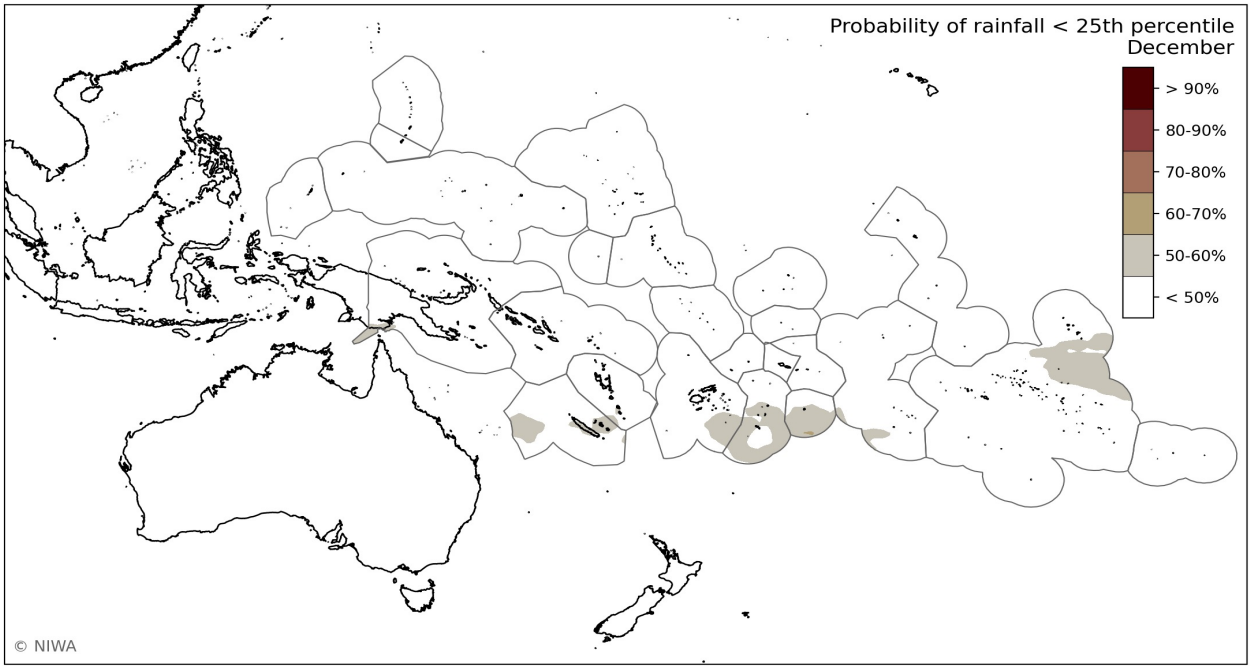
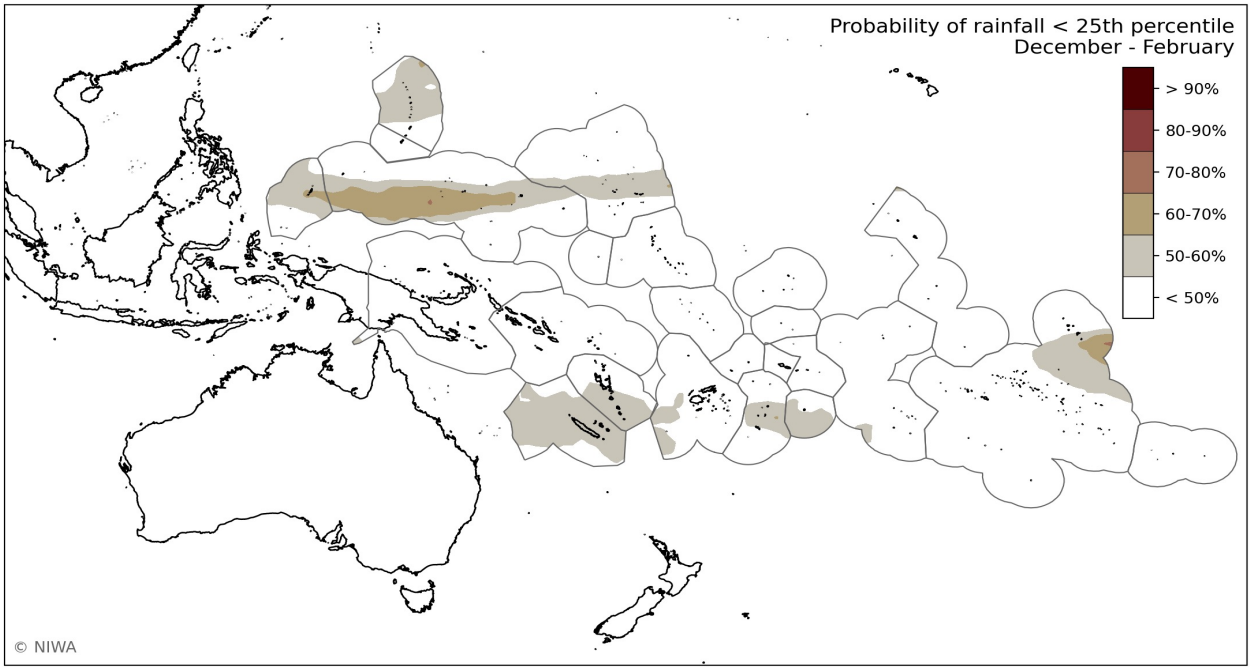
Probabilities of rainfall < 25th percentile

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

For December, the highest chances for very dry conditions are confined to portions of New Caledonia, eastern Fiji, Tonga, Niue, and northern Tuamotu Archipelago.

For December-February, very dry conditions may affect parts of the Northern Marianas, Palau, FSM, Marshall Islands, New Caledonia, southern Vanuatu, Tonga, Niue, northern Tuamotu Archipelago, and southern Marquesas.





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About

Understanding the Island Climate Update bulletin

The ICU utilises rainfall data from the Multi-Source Weighted-Ensemble Precipitation (MSWEP) and a multi-model ensemble forecast utilising 550+ members derived from nine global climate models available from the Copernicus Data Store.

Bulletin page	Description
Rainfall watch	Rainfall plots are derived from MSWEP 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 MSWEP 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	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. 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%. The bottom plots bring together conditions over the past 3 months and forecast conditions over the next month: • 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. 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).
Online Resources	**Additional regional and country-level resources are available online**: • 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. • A range of probabilistic one to five monthly and seasonal forecast plots updated around the 11th of each month. • Click here for the imagery and here for the underlying data.

WMO

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.

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