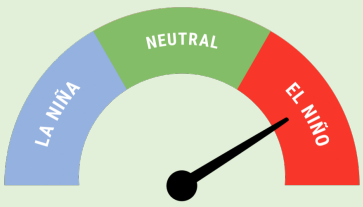
Island Climate Update

NIWA
Taihoro Nukurangi

ENSO Watch
October 2023

Recent



El Niño

El Niño was declared at the end of September as a majority of NIWA's criteria for classifying an El Niño event were satisfied.

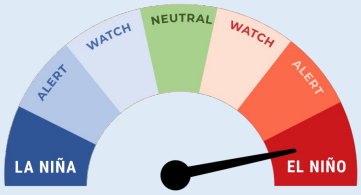
The Southern Oscillation Index (SOI) was -1.3 in September, within the El Niño range.

Tropical Pacific sea surface temperatures (SSTs) were within the range of a strong El Niño during September.

Forecast

100% chance for **El Niño** conditions to continue through **December 2023**

Chance for **El Niño** conditions persisting during **January-March 2024** **95%**



El Niño Alert

ENSO situation summary

El Niño has officially arrived. A majority of NIWA's criteria for classifying an El Niño event were satisfied during September.

The monthly NINO3.4 Index anomaly (in the central equatorial Pacific) at the end of September was +1.58˚C, within the range of a strong El Niño (classified when the NINO3.4 Index is greater than 1.5˚C). The September 2023 NINO3.4 Index is exceeded only by 2015 and 1997, with data back to 1981. From an oceanic perspective, this strengthening El Niño ranks close to the most significant events in recent decades.

The Southern Oscillation Index (SOI) was within the El Niño range during September with a value of -1.3.

Trade wind strength was was below normal in the west-central Pacific just east of the International Date Line and near normal or above normal farther east during September, similar to August. During October, there is a stronger indication for a reduction in trades in the east-central Pacific. This will likely see conditions in the Niño 3 and 3.4 regions continue to warm.

In the sub-surface eastern equatorial Pacific Ocean, anomalies of +3˚C to +6˚C were occurring in the upper 100 metres in the east as of late September. The distribution of the anomalously warm water remained consistent with the development of an east-based canonical El Niño event.

The abnormally warm waters are predicted to continue to surface and expand westward over the course of the next three to four months, with the event potentially peaking as a very strong El Niño (classified when the NINO3.4 Index is greater than 2.0˚C) in December 2023-January 2024.

Island Climate Update

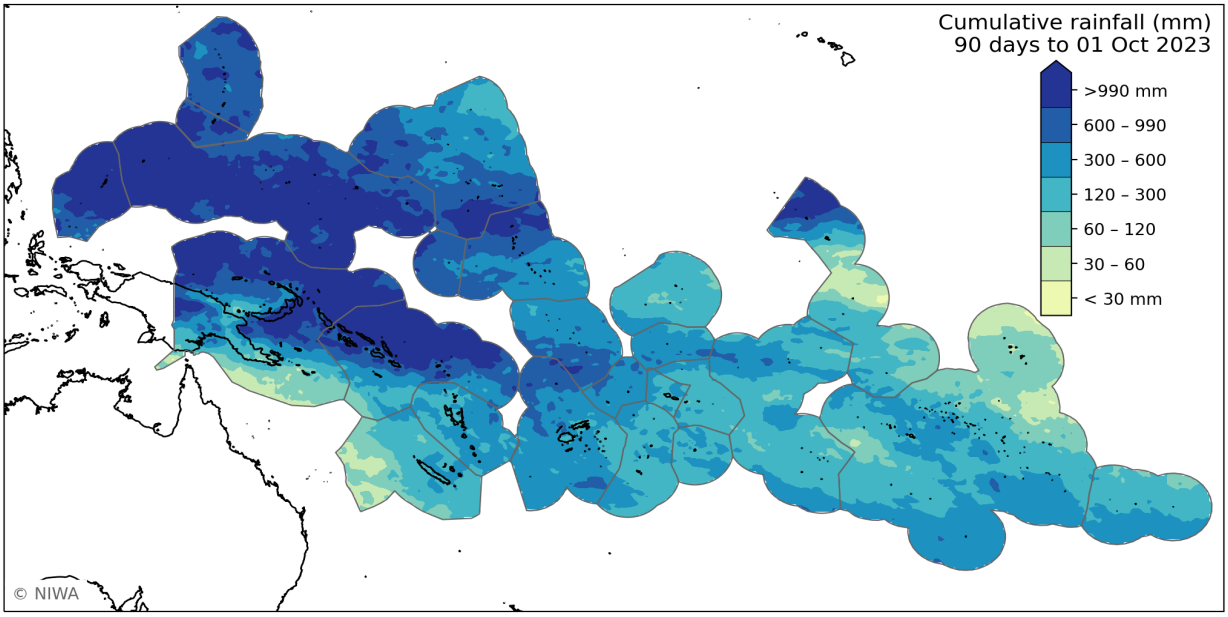
Rainfall Watch

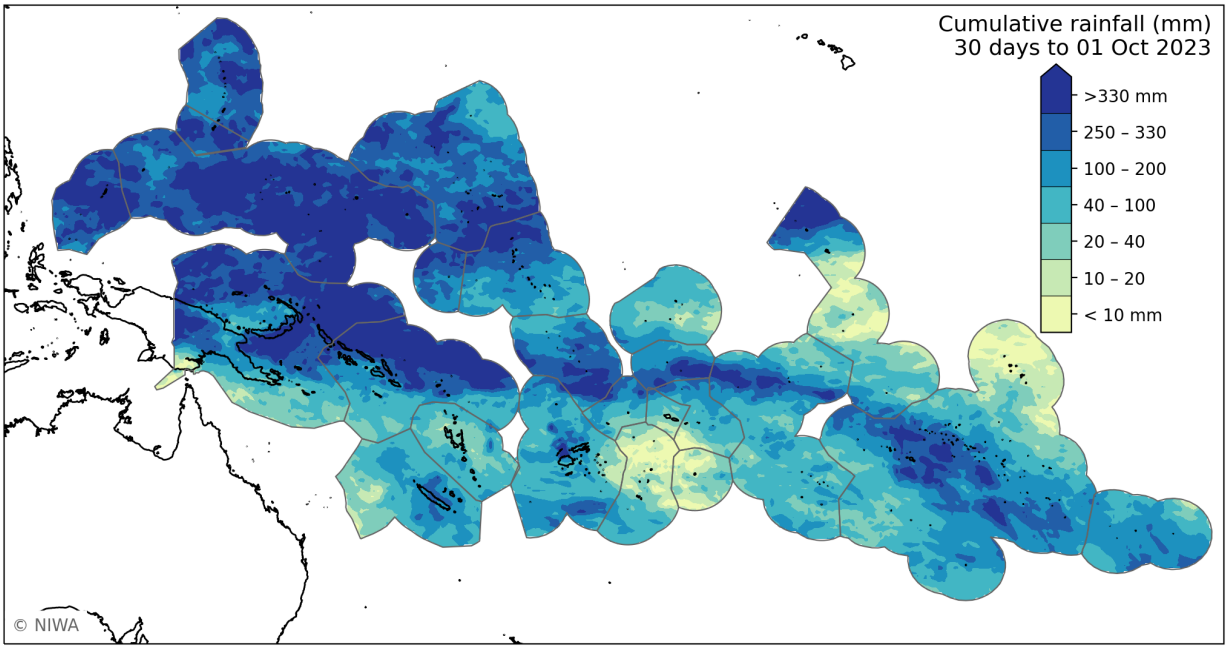
Regional situation summary (1 October 2023)

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

During July-September (top plot), less than 60 mm of rain was observed in southern Papua New Guinea (PNG) and the central Line Islands. Over 990 mm fell across parts of Palau, Federated States of Micronesia (FSM), Guam, Northern Marianas, southern Marshall Islands, northern Gilbert Islands, northern PNG, the Solomon Islands, and the northern Line Islands.

During September (bottom plot), less than 40 mm of rain fell in parts of southern PNG, Vanuatu, Tonga, Niue, the central Line Islands, and Marquesas. Over 330 mm fell across Northern Marianas, Guam, Palau, FSM, Marshall Islands, northern Gilbert Islands, northern PNG, the Solomons, Tuvalu, Tokelau, northern Cook Islands, northern Line Islands, Society Islands, and parts of the Tuamotu Archipelago.





Island Climate Update

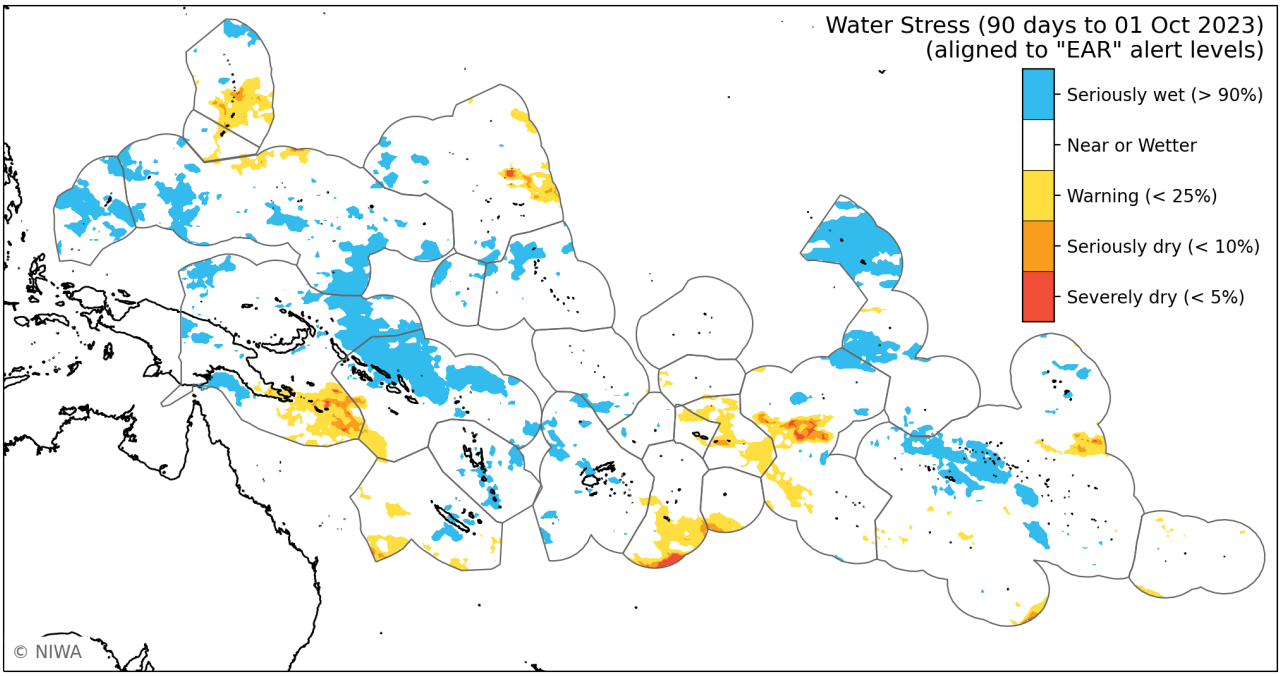
Water Stress Watch

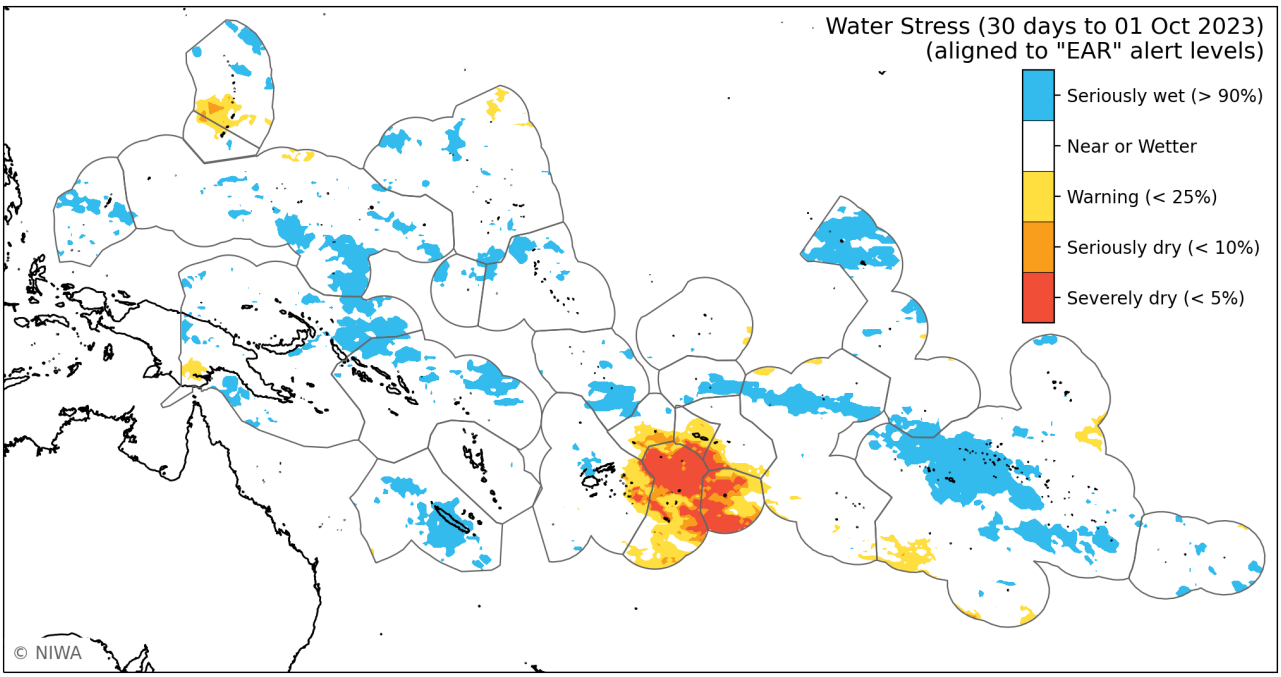
EAR regional situation summary (1 October 2023)

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

During July-September (top plot), severely or seriously dry conditions affected parts of the Northern Marianas, southern PNG, eastern Marshall Islands, and American Samoa.

During September (bottom plot), severely or seriously dry conditions affected Wallis & Futuna, Samoa, eastern Fiji, Tonga, and Niue.





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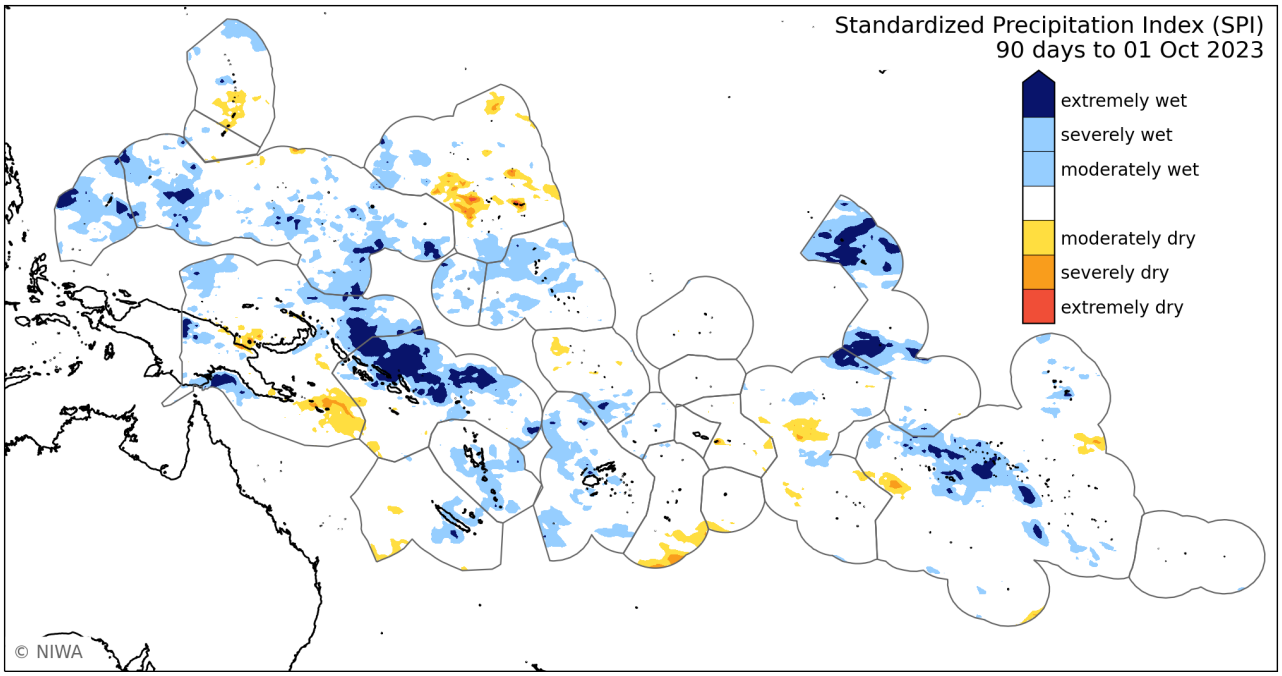
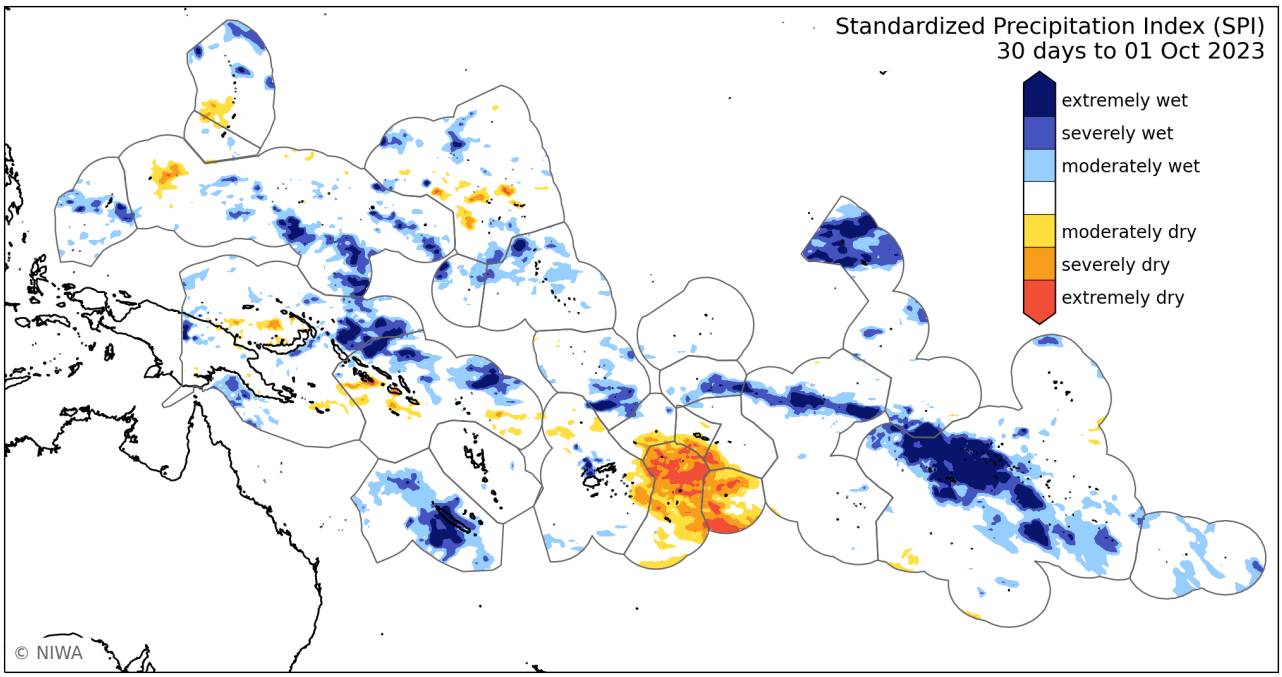
SPI Regional situation summary (1 October 2023)

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

During July-September (top plot), extremely or severely dry conditions occurred in parts of Northern Marianas, the Marshall Islands, PNG, and American Samoa.

During September (bottom plot), extremely or severely dry conditions occurred in western FSM, parts of the Marshall Islands, the Solomon Islands, Wallis & Futuna, eastern Fiji, Tonga, and Niue.



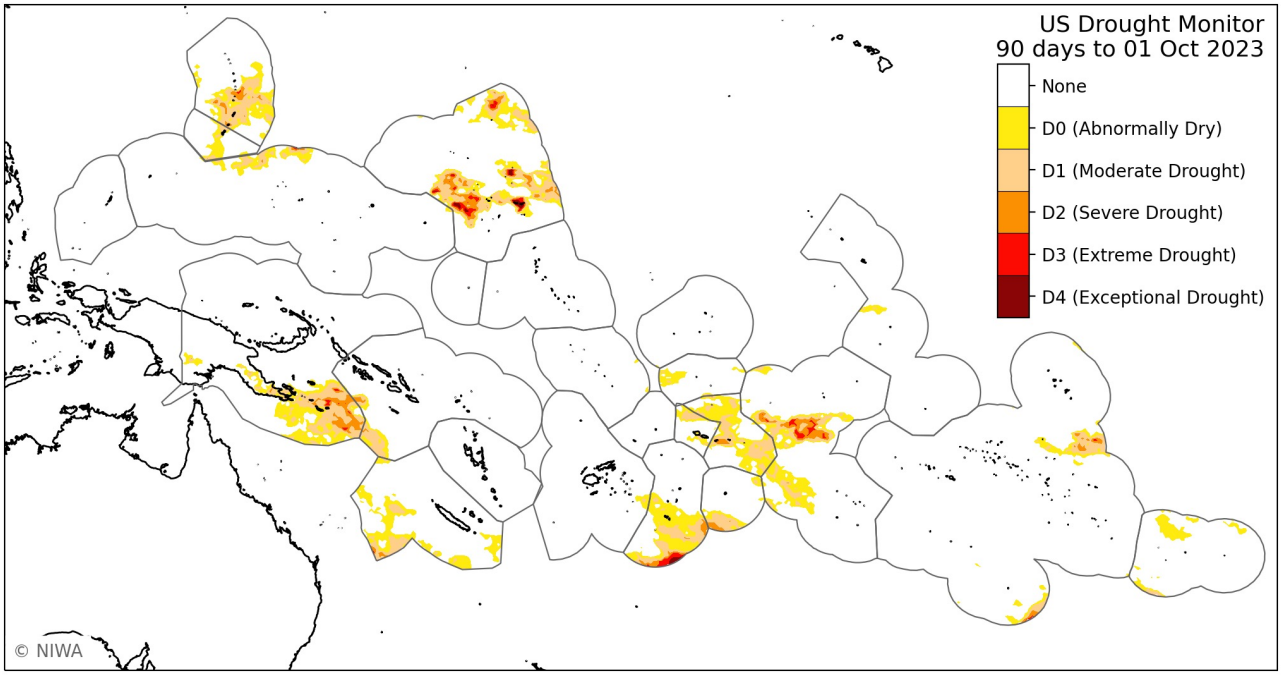


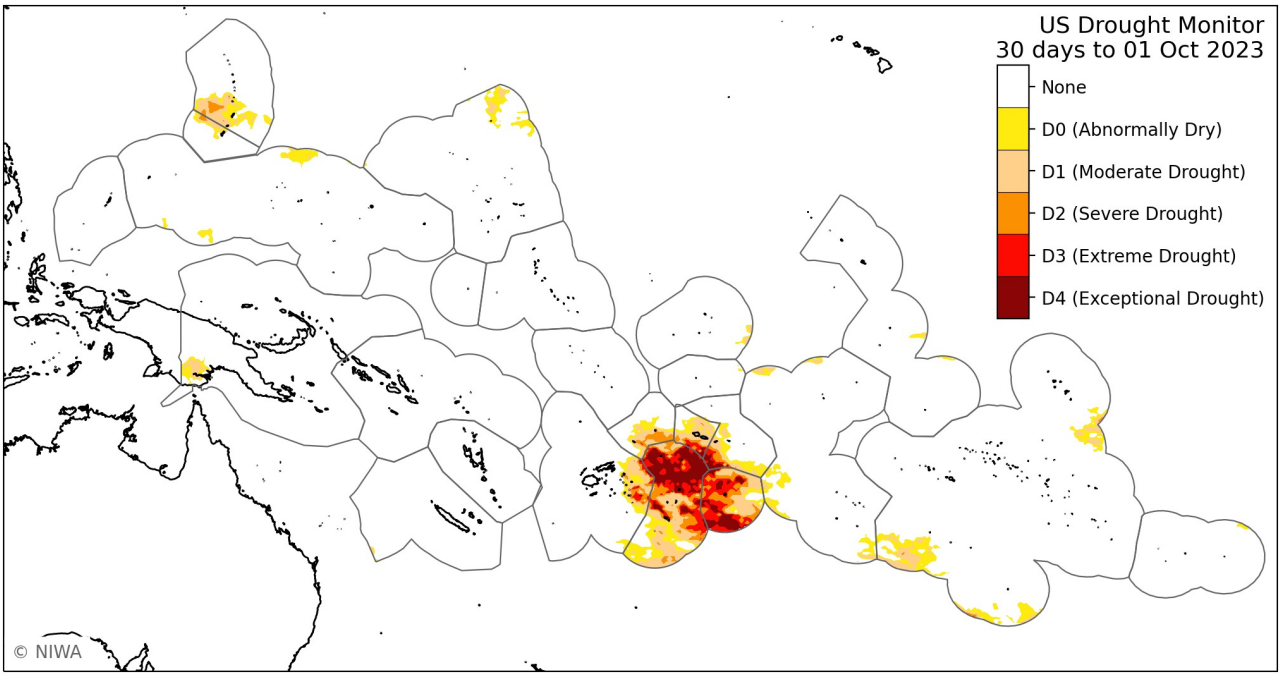
USDM Regional situation summary (1 October 2023)

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

During July-September (top plot), extreme or exceptional drought occurred in parts of the Northern Marianas, Marshall Islands, southern PNG, and American Samoa.

During September (bottom plot), extreme or exceptional drought occurred in eastern Fiji, Tonga, and Niue.





Island Climate Update

Water Stress Outlook

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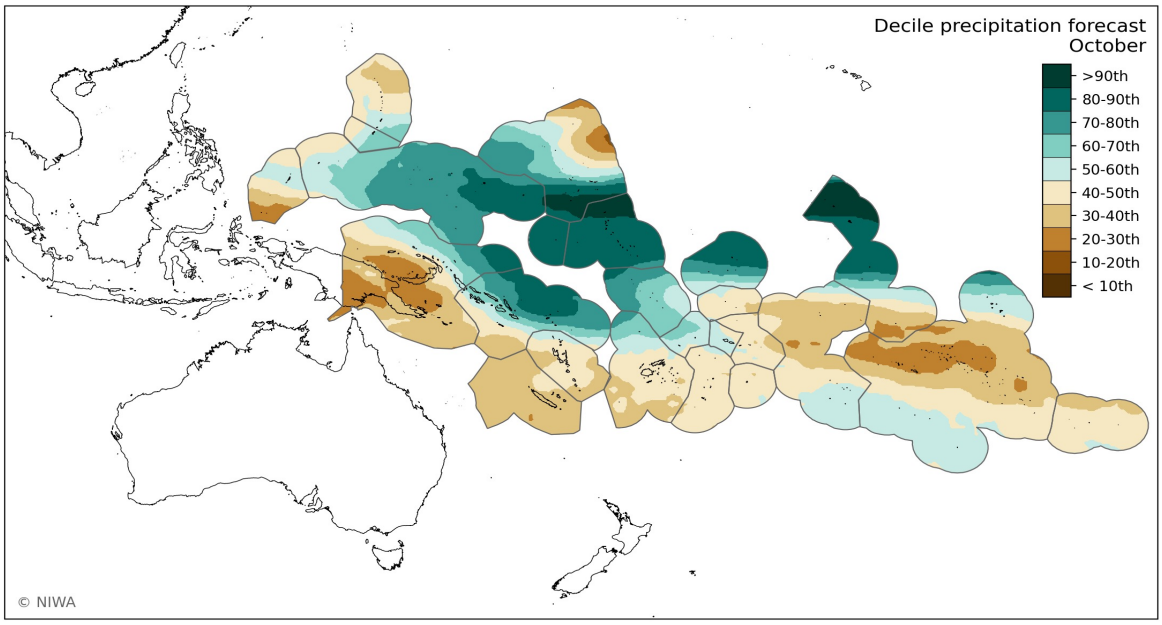
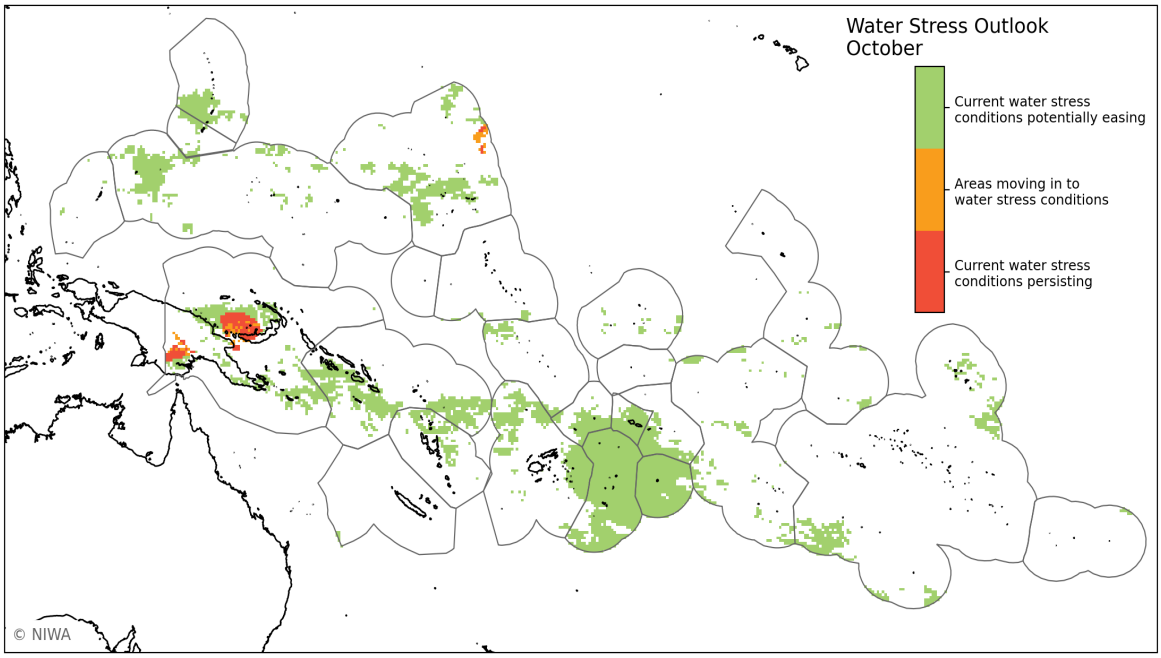
October 2023 forecast summary

During October, below normal rainfall is forecast across many island groups, including parts of the Northern Marianas, southern Palau, eastern Marshall Islands, PNG, New Caledonia, Vanuatu, Fiji, Tonga, Niue, American Samoa, Tokelau, Northern Cook Islands, Society Islands, Tuamotu Archipelago, and Pitcairn Islands.

Above normal rainfall is forecast in parts of the Northern Marianas, Guam, FSM, Marshall Islands, Nauru, Kiribati (Gilbert, Phoenix, and northern Line Islands), the Solomon Islands, Tuvalu, Wallis & Futuna, Samoa, southern Cook Islands, Austral Islands, and Marquesas.

Water stress conditions may persist or develop in parts of Papua New Guinea (PNG).





Island Climate Update

Water Stress Outlook

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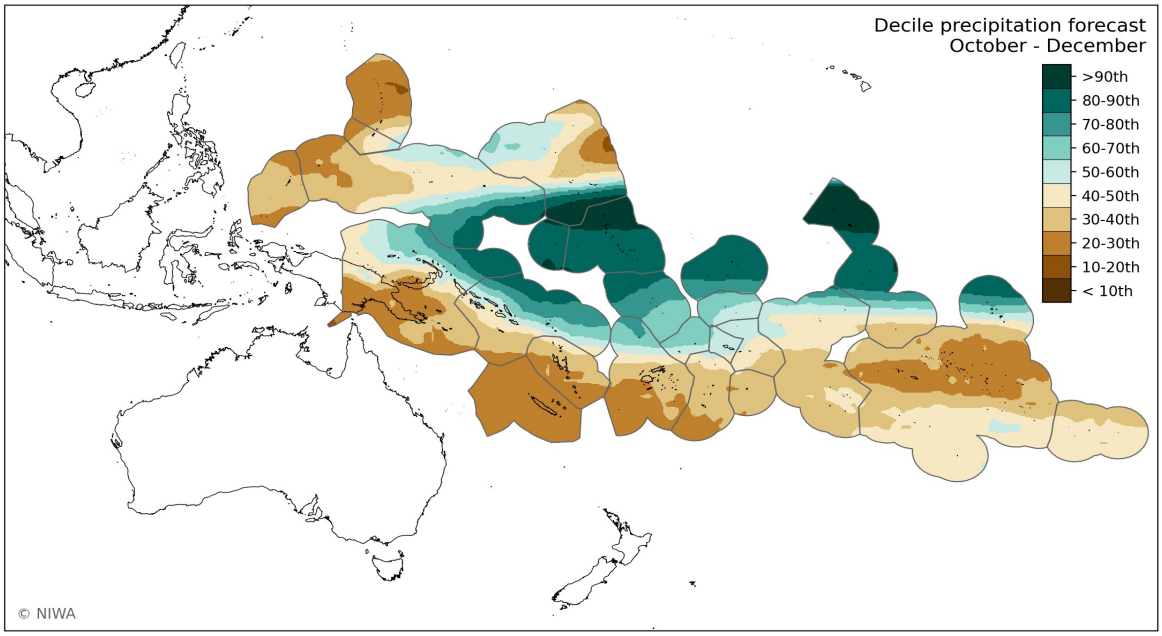
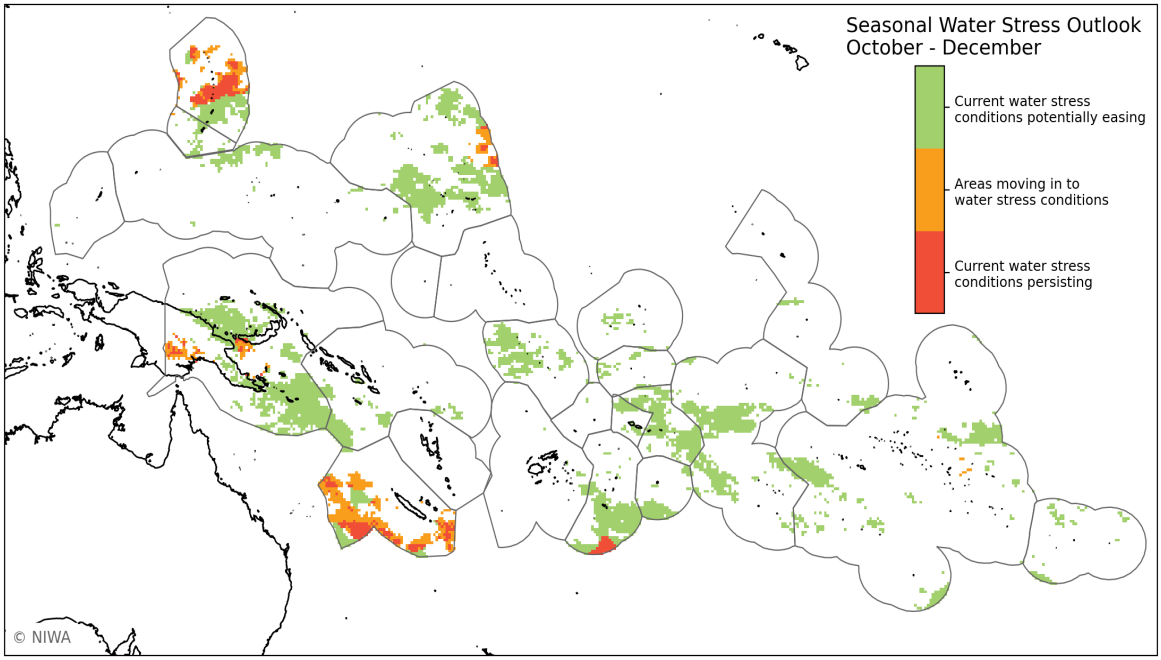
October-December 2023 forecast summary

During October-December, below normal rainfall is forecast across many island groups, including Northern Marianas, Guam, Palau, FSM, parts of the Marshall Islands, PNG, southern Solomon Islands, New Caledonia, Vanuatu, Fiji, American Samoa, Tonga, Niue, Cook Islands, Austral Islands, Society Islands, 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, Wallis & Futuna, Samoa, Tokelau, and Marquesas.

Water stress conditions may persist or develop in parts of the Northern Marianas, PNG, and around New Caledonia.





Island Climate Update

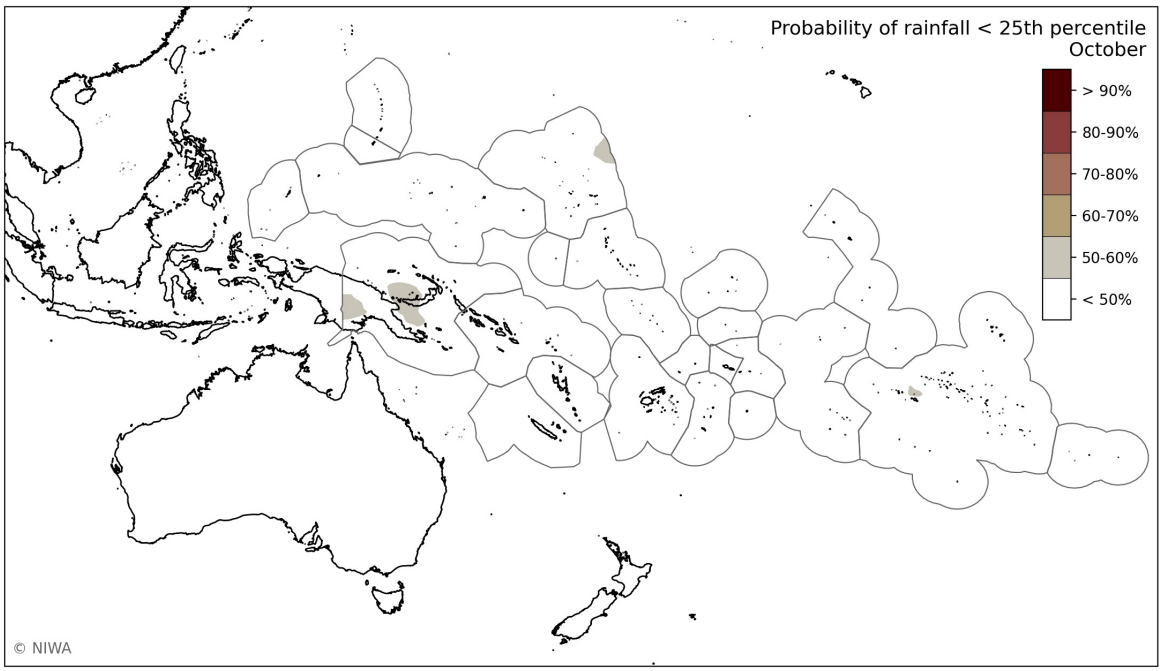
Water Stress Outlook

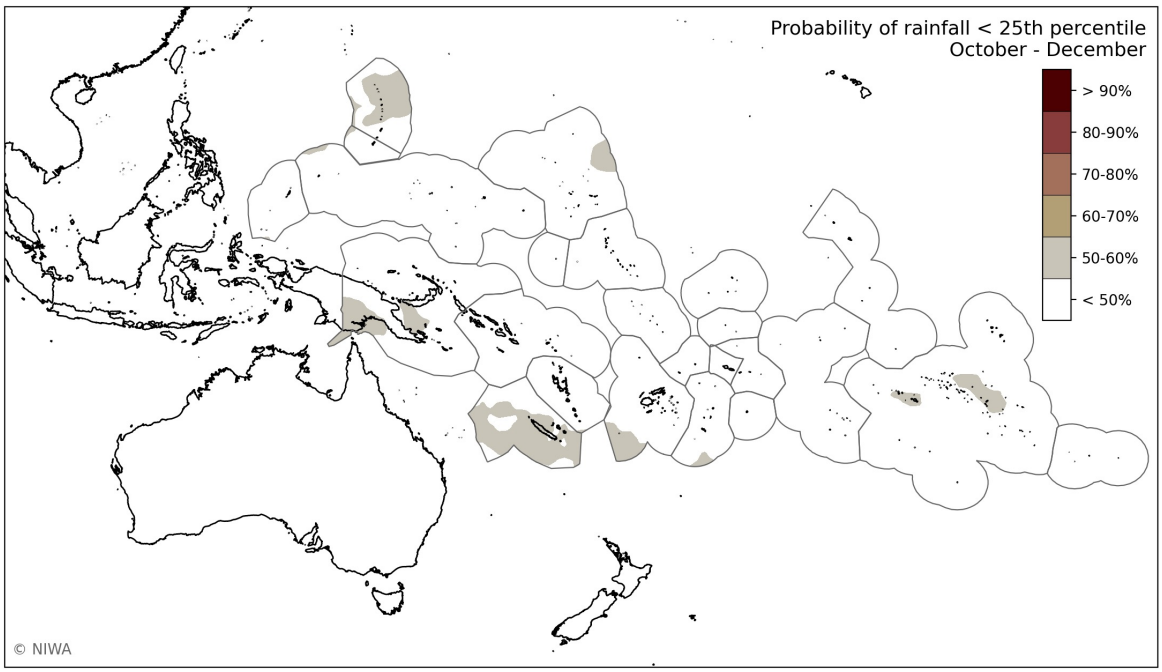
Probabilities of rainfall < 25th percentile

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

For October, the highest chances for very dry conditions are confined to portions of PNG and the Society Islands.

For October-December, very dry conditions may affect parts of the Northern Marianas, PNG, New Caledonia, Society Islands, and the Tuamotu Archipelago.





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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	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. **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.

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