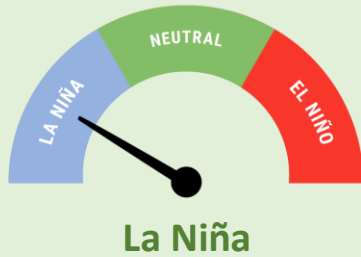


Island Climate Update



ENSO Watch
December 2022

Recent



La Niña

Moderate La Niña conditions continued in the equatorial Pacific during November.

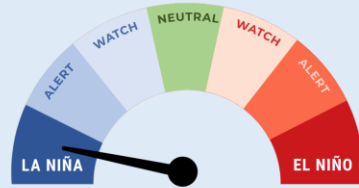
Sea surface temperatures (SSTs) were in the La Niña range, but the Southern Oscillation Index (SOI) was neutral.

Trade winds continued to blow stronger than normal, maintaining a moderate La Niña strength.

75% chance for **La Niña** conditions during **December 2022 – February 2023.**

Chance for **ENSO Neutral** conditions during **March-May 2023**

80%



La Niña Event

Forecast

ENSO situation summary

The NINO3.4 Index anomaly (in the central equatorial Pacific) over the last month was -0.92°C (climatology: 1991-2020), showing a cooling trend compared to October.

The SOI was $+0.3$ during November and $+1.3$ over the September-November period (climatology: 1991-2020), the latter within the La Niña range.

Trade winds were stronger than normal during November, sustaining oceanic La Niña conditions.

In the subsurface central equatorial Pacific, anomalies of -3°C to -5°C were located at 50-100 m depth in the east. This strong sub-surface expression will likely allow oceanic La Niña to continue through February. However, the West Pacific Warm Pool began an eastward progression with warm

anomalies now occurring in the central Pacific at 150-200 m depth. Any substantial relaxation or reversal in trade winds over the next three months could move the system toward ENSO-neutral.

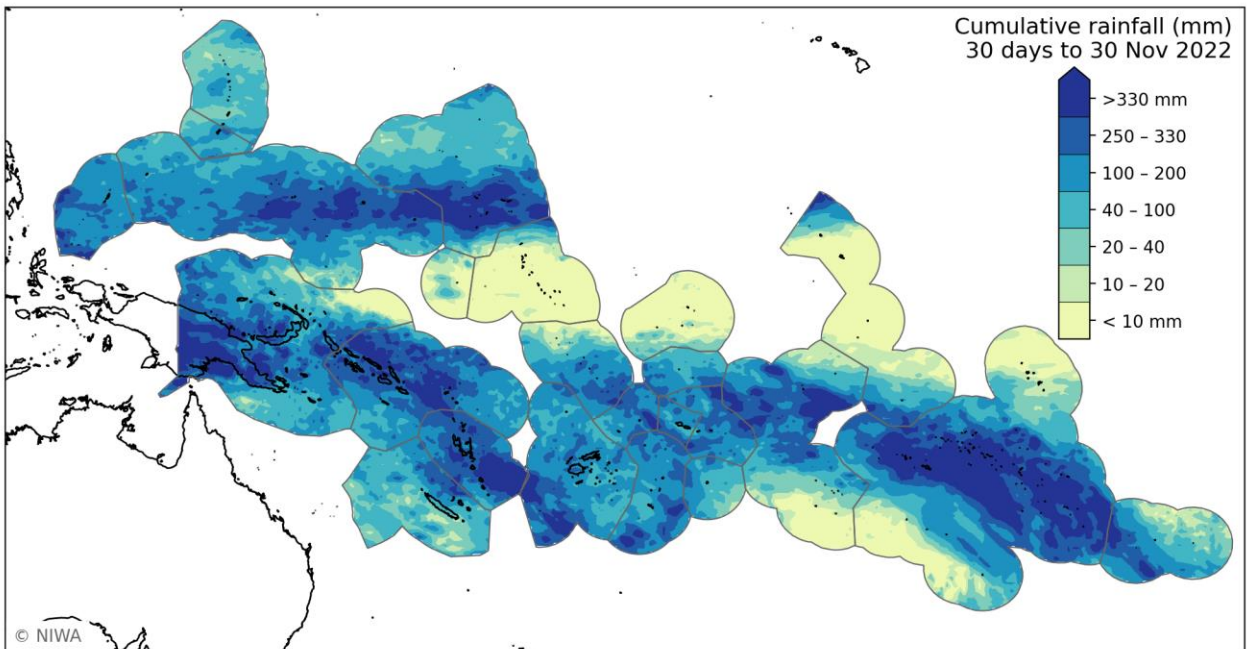
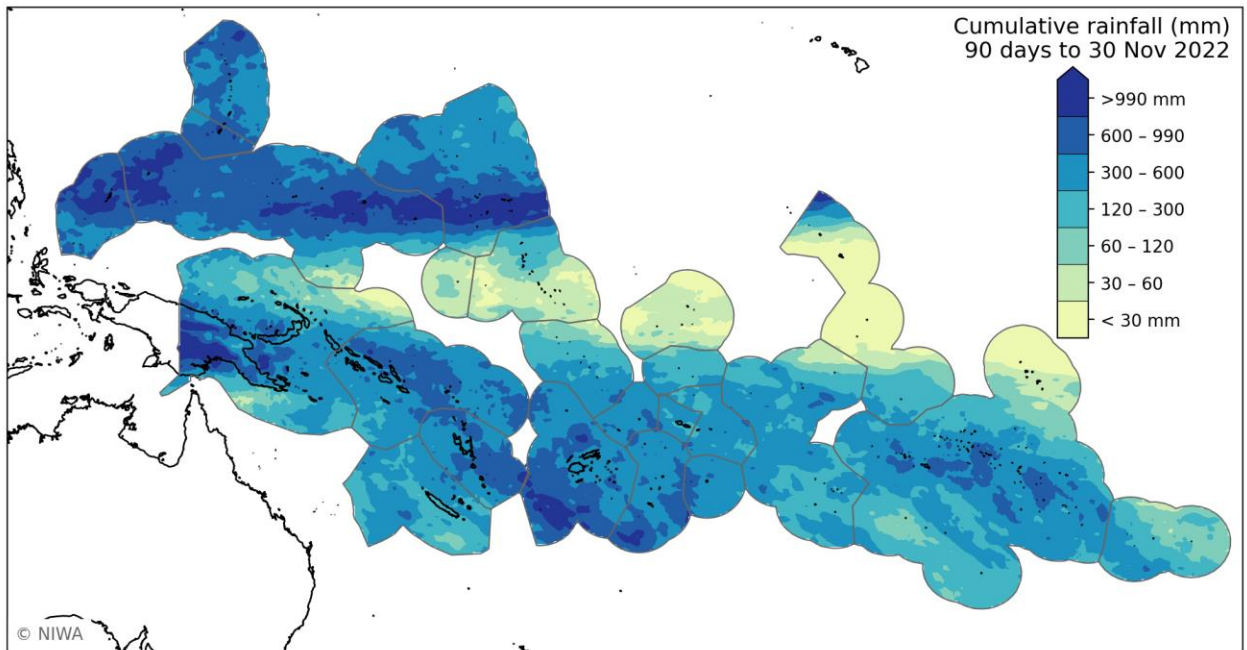
Our analysis indicates that a mature La Niña event is ongoing and is expected to last through to February (75% chance). An easing toward ENSO neutral is likely from March-May 2023 (80% chance). Beyond this, the long-term outlook for El Niño developing have risen to over 40% for winter 2023.

Regional situation summary (1 December 2022)

Satellite-derived rainfall summaries for the last month and three months are shown below. Low rainfall continued to be experienced around the equator with higher amounts in Micronesia, Melanesia, and for island groups toward the sub-tropics.

During September-November (top plot), less than 60 mm of rainfall fell in parts of Nauru, Kiribati, and Marquesas. More than 600 mm of rainfall fell in parts of Micronesia, Melanesia, and the Tuamotu Archipelago.

During November (bottom plot), less than 20 mm of rainfall fell in parts of Nauru, Kiribati, Marquesas, and the Southern Cook Islands. Heavier totals of more than 330 mm occurred in parts of Micronesia, many island groups across Melanesia, and eastward into Polynesia. Compared to October, November was wetter in Papua New Guinea (PNG), Solomon Islands, Tuvalu, Tokelau, Northern Cook Islands, and the Tuamotu Archipelago.

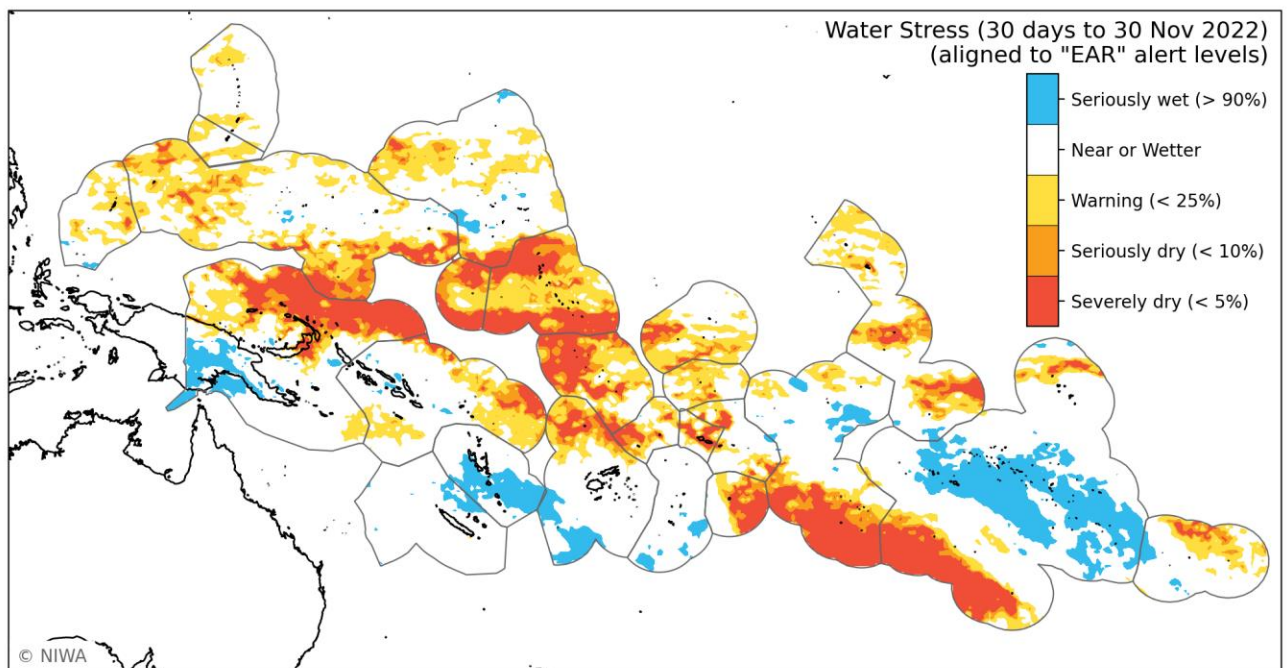
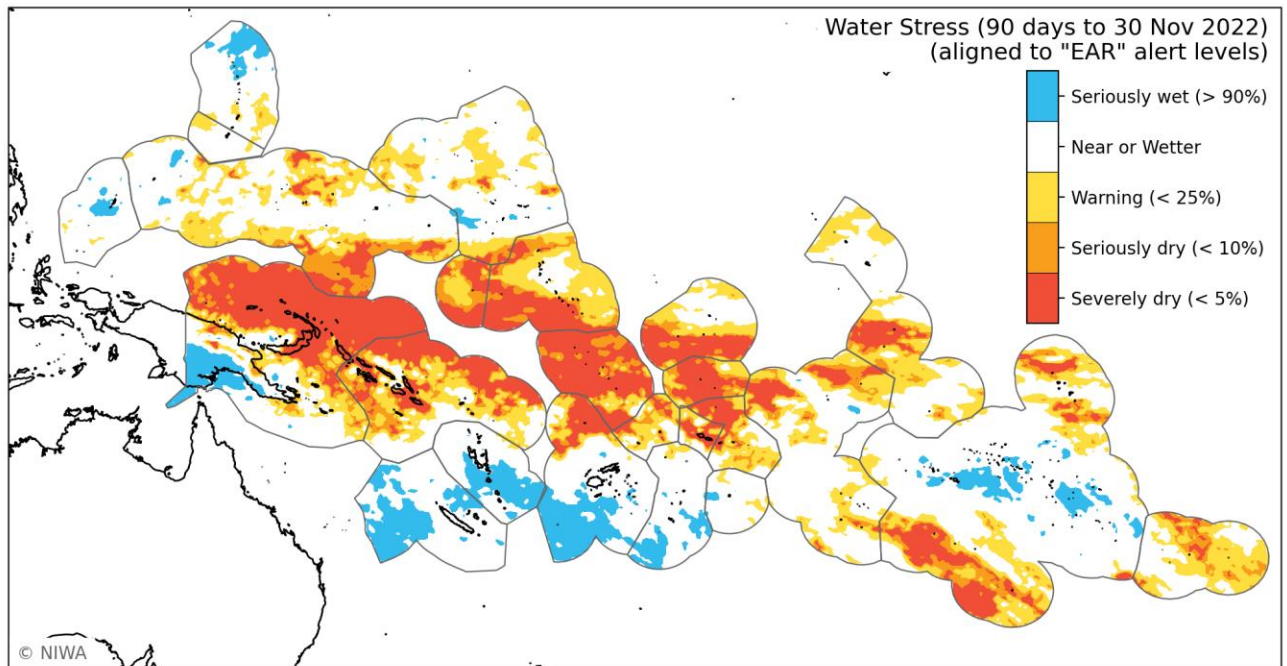


EAR regional situation summary (1 December 2022)

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 continued to affect parts of the Federated States of Micronesia (FSM), northern PNG, Solomons, Nauru, Kiribati, Tuvalu, Tokelau, Wallis & Futuna, Samoa, American Samoa, Northern Cooks, Marquesas, southern Tuamotu Archipelago, and Pitcairn Islands.

During November (bottom plot), severely or seriously dry conditions occurred in many of the same island groups but also included Niue and Southern Cook Islands. Conditions were wetter than last month in PNG.

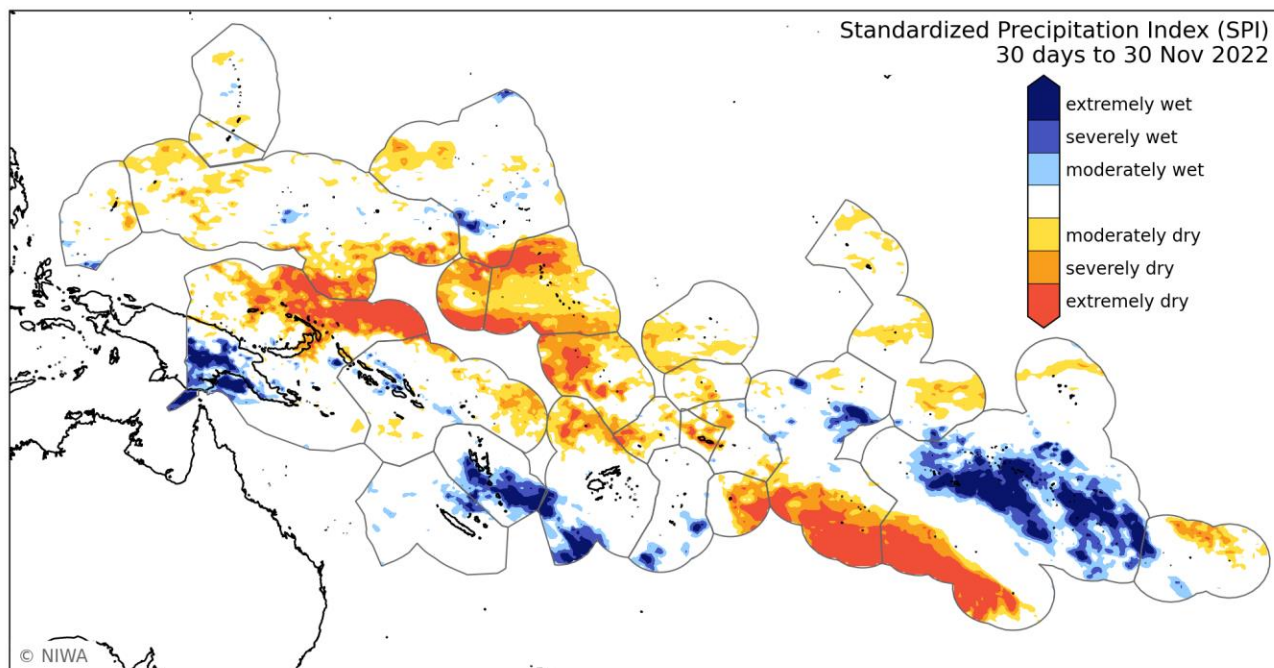
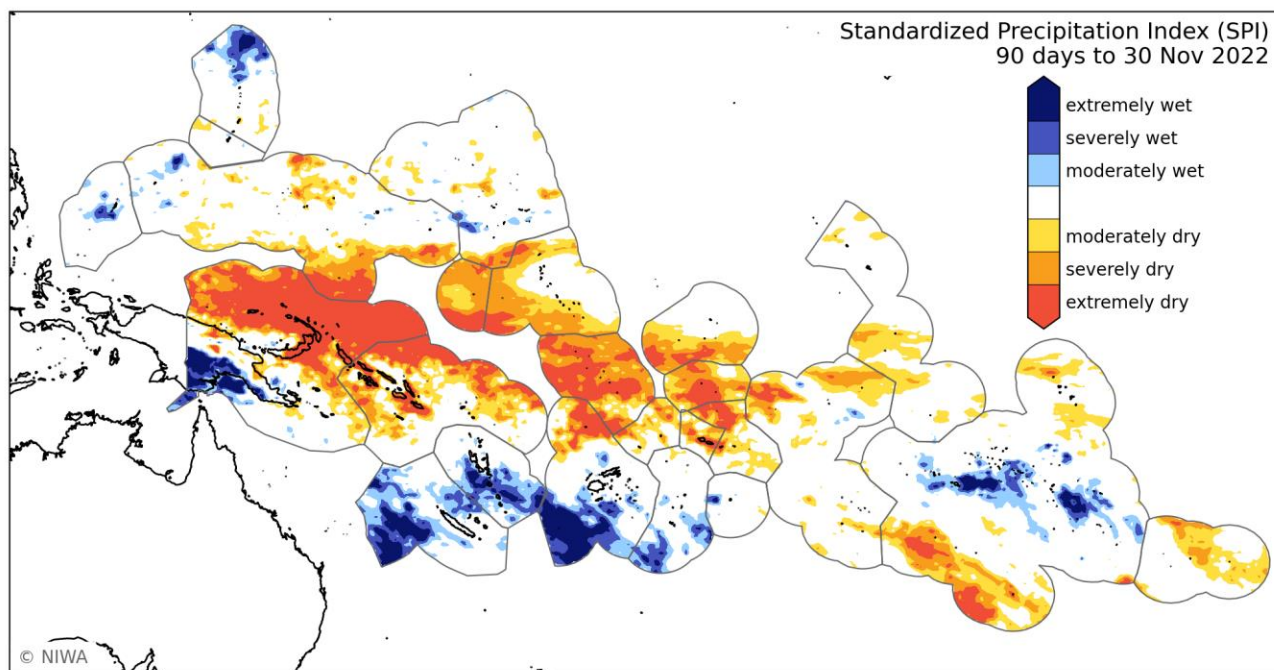


SPI Regional situation summary (1 December 2022)

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 southern FSM, northern PNG, Solomon Islands, Nauru, Kiribati (Gilbert and Phoenix Islands), Tuvalu, Tokelau, Wallis & Futuna, Samoa, and the southern Tuamotu Archipelago.

During November (bottom plot), extremely or severely dry conditions occurred in southern FSM, far northern PNG, Kiribati (Gilbert Islands), Tuvalu, Wallis & Futuna, Samoa, Niue, Southern Cook Islands, and the southern Tuamotu Archipelago.

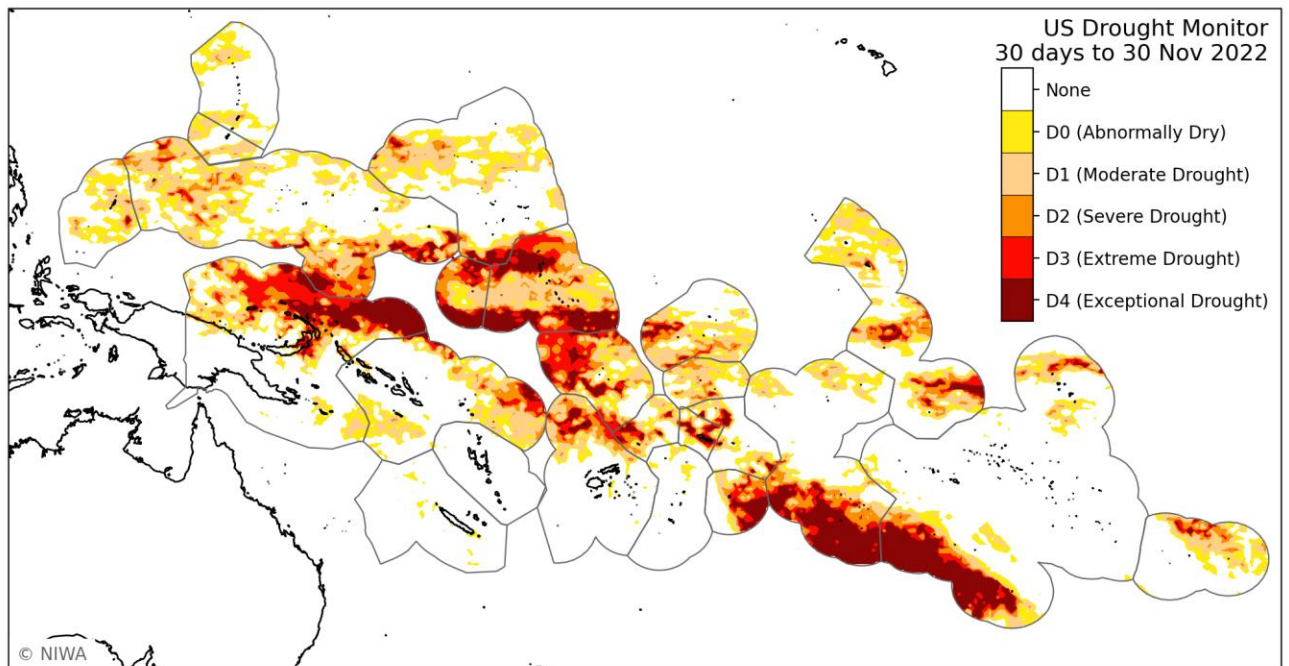
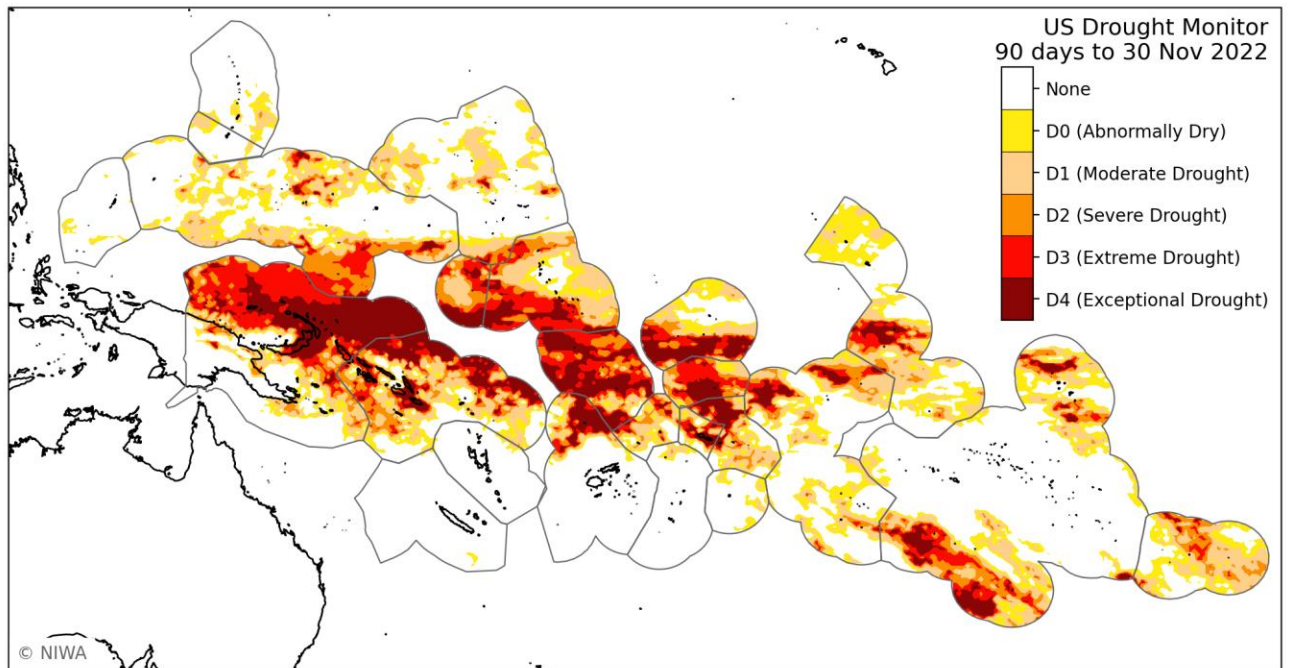


USDM Regional situation summary (1 December 2022)

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 FSM, northern PNG, Solomon Islands, Nauru, Kiribati, Tuvalu, Tokelau, Samoa, American Samoa, Northern Cook Islands, Marquesas, and the southern Tuamotu Archipelago.

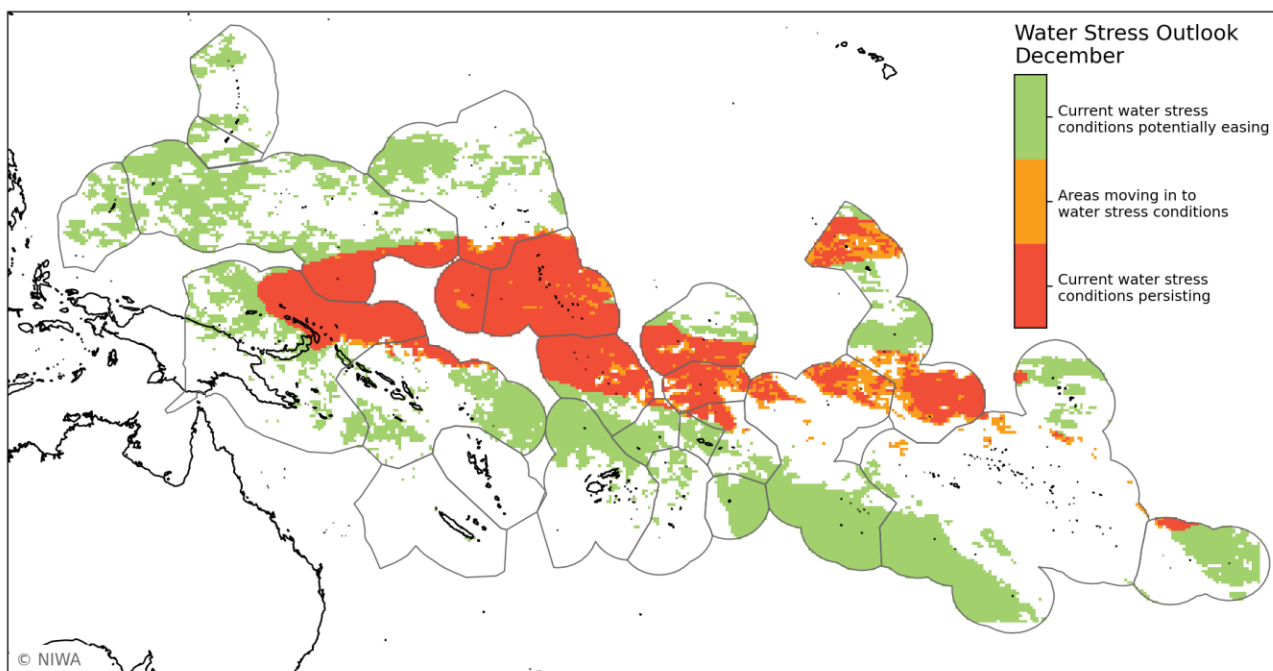
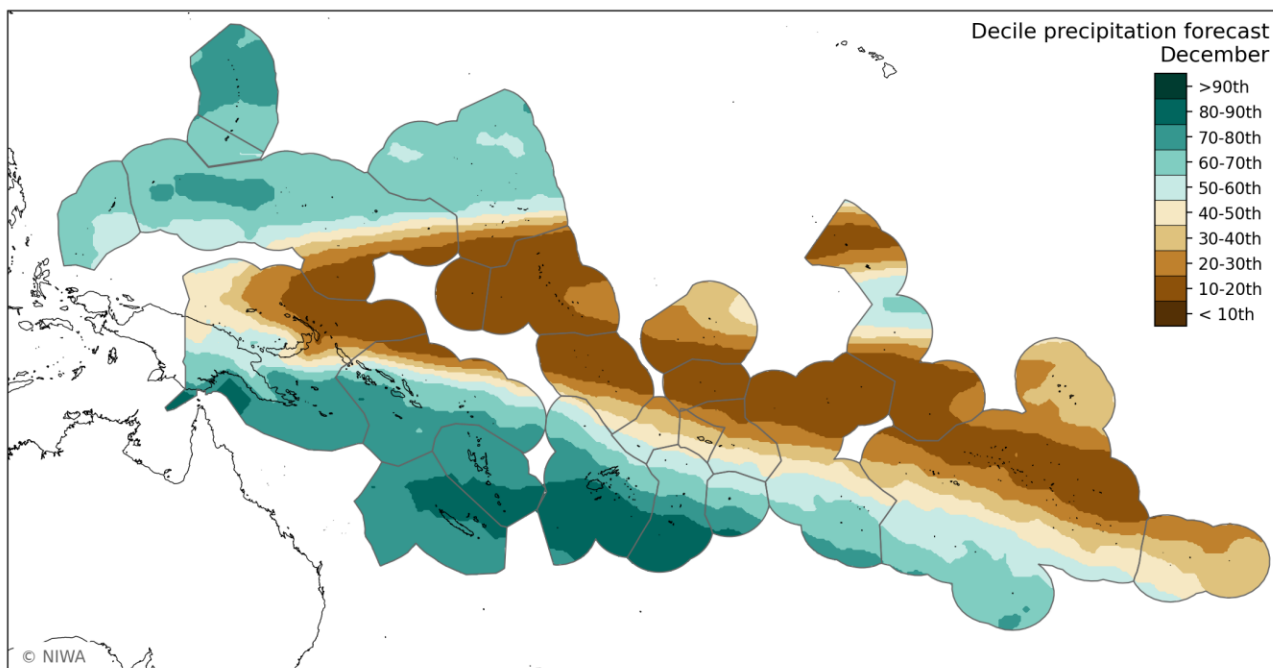
During November (bottom plot), extreme or exceptional drought occurred in many of the same island groups, but Niue and Southern Cook Islands were drier. PNG generally trended wetter.



December 2022 forecast summary

During December, there continues to be a high chance for drier than normal conditions along and extending southeastward of the equator. The outlook is very similar to the one issued in November, albeit with higher odds for wetter than normal conditions in the western North Pacific.

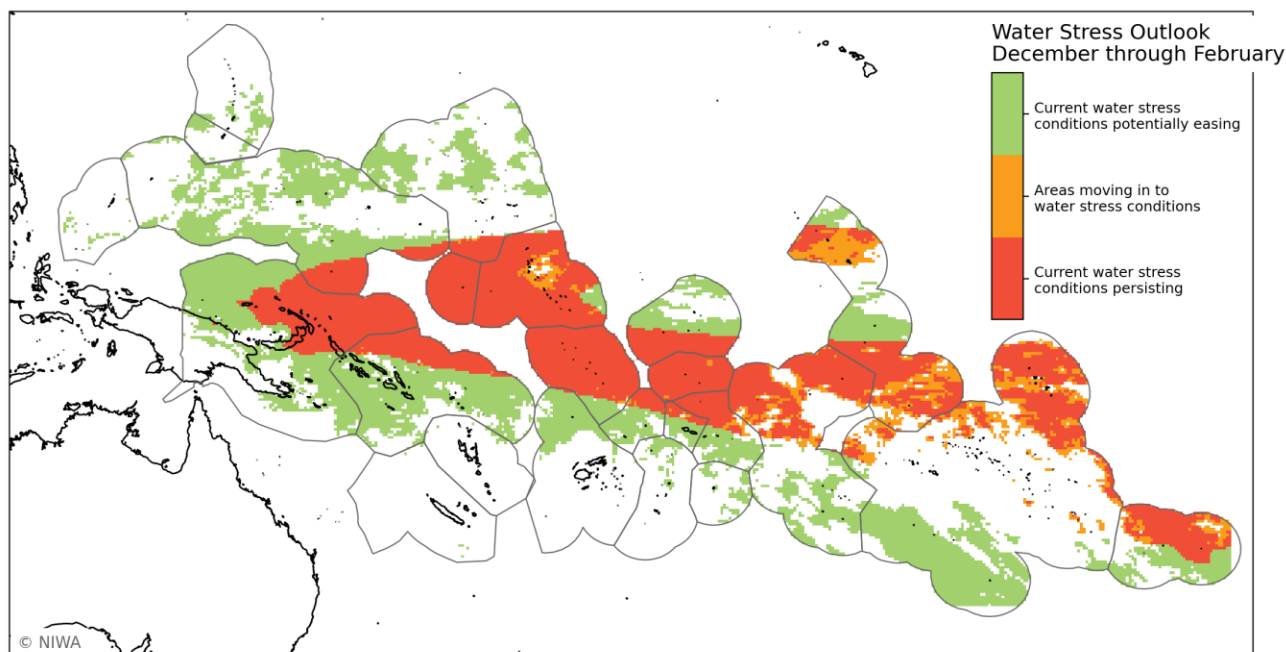
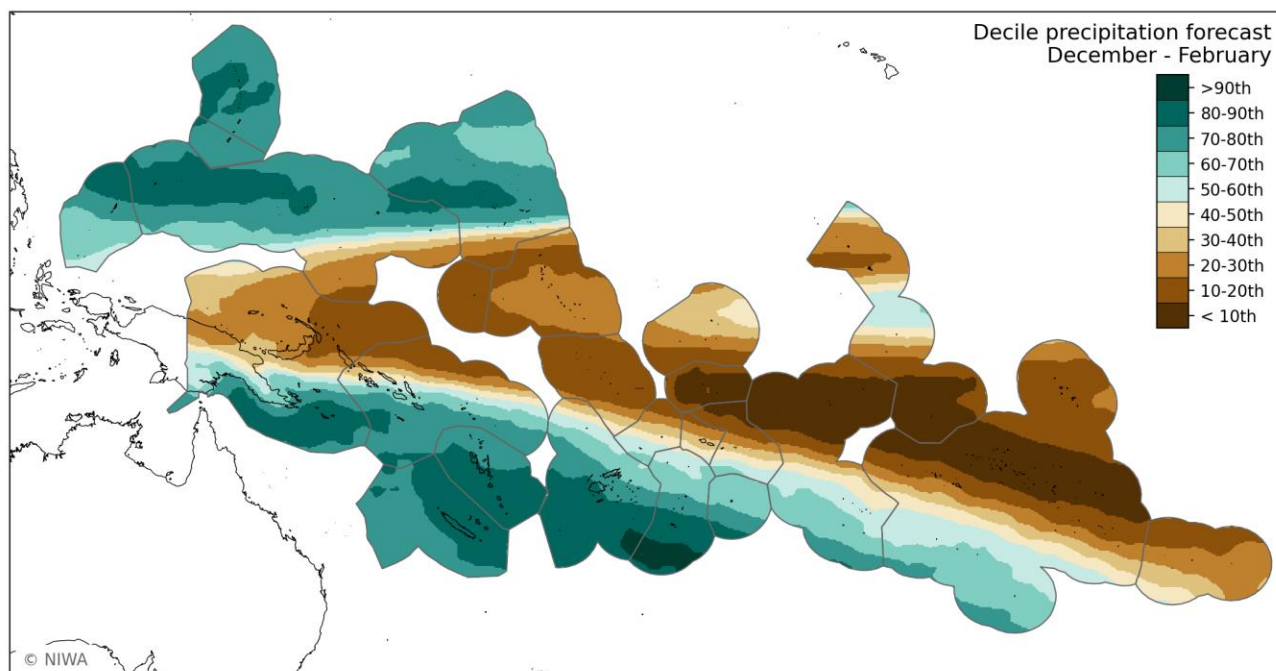
Water stress is forecast to persist in southern FSM, Nauru, Kiribati (Gilbert Islands, southern Phoenix Islands, and the northern and southern Line Islands), Tuvalu, Tokelau, and parts of the Northern Cook Islands.



December 2022 – February 2023 forecast summary

During December-February, there is a high chance for drier than normal conditions in island groups along and south-east of the equator. The odds for dryness have shifted south slightly compared to last month and increased in northern PNG, Samoa, American Samoa, and French Polynesia. There is a high chance for above normal rainfall in the off-equatorial South Pacific, including Vanuatu, New Caledonia, Fiji, and Tonga.

Seasonal water stress may ease in northern PNG, but persist in southern FSM, Nauru, Kiribati (Gilbert Islands, southern Phoenix Islands, northern and southern Line Islands), Tuvalu, Tokelau, Northern Cook Islands, parts of the Tuamotu Archipelago, Marquesas, and parts of the Pitcairn Islands.

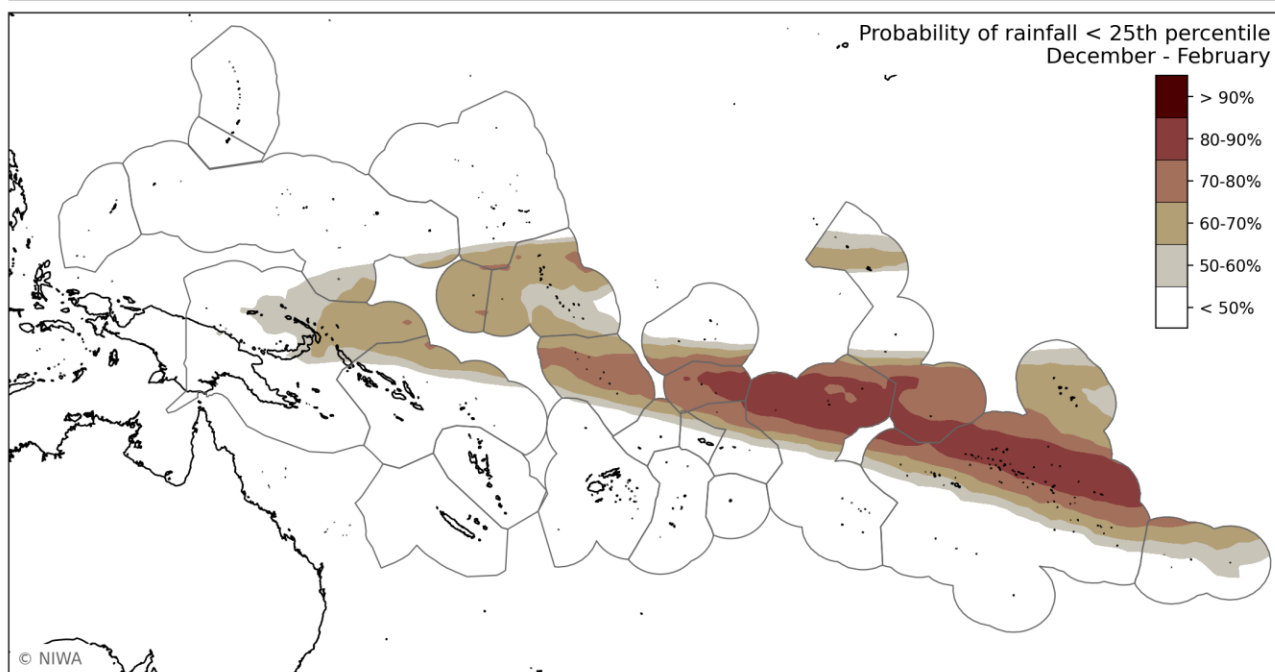
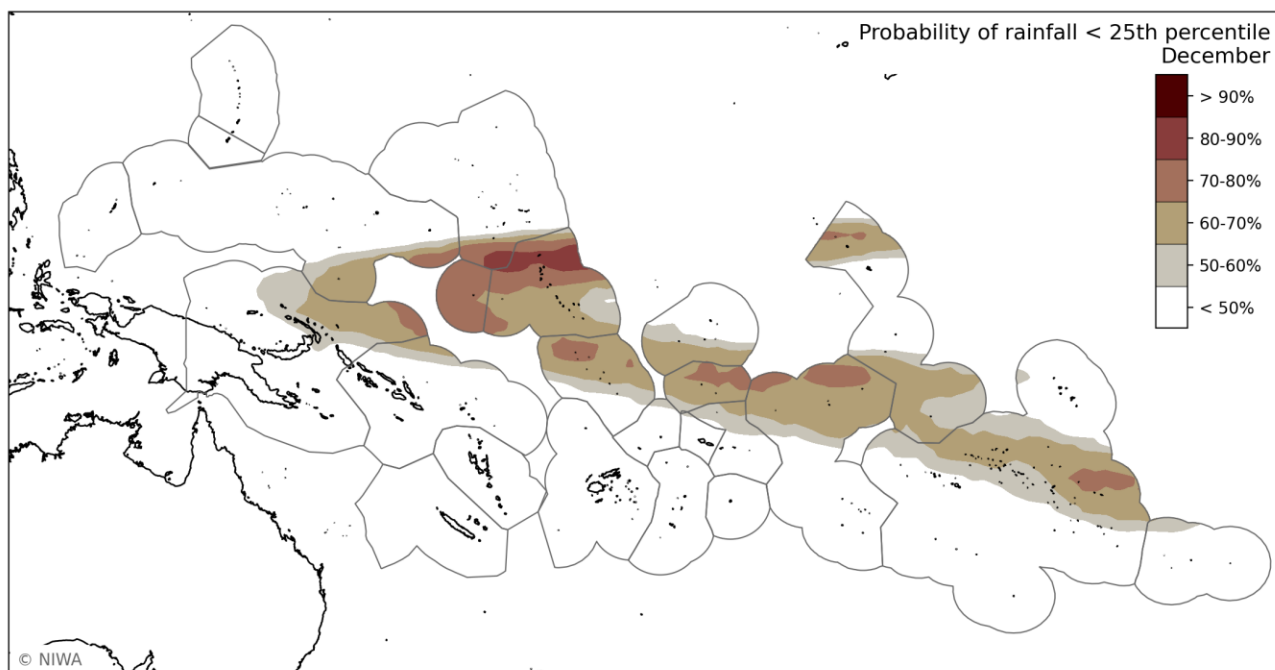


Probabilities of rainfall < 25th percentile

The probability (likelihood) of 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 odds for dryness are highest in southern FSM, southern Marshall Islands, Nauru, parts of Kiribati (mainly Gilbert Islands), Tuvalu, Tokelau, Northern Cook Islands, and the northern Tuamotu Archipelago. The odds for dryness decreased somewhat compared to last month except in the northern Gilbert Islands, where it increased.

For December-February, very dry conditions are likely in many of the same groups, with higher chances for Tokelau, Northern Cook Islands, southern Line Islands, and northern French Polynesia.



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 a 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> |



Additional regional and country-level resources are available online:

- Daily updated plots for 30, 60, 90, 180 and 365 day: a cumulative 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 RAV 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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