

# Global Water Monitor & Forecast Watch List

February 15, 2024

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## Introduction

The ISciences Water Security Indicator Model (WSIM) monitors and forecasts water anomalies on a global basis. Each month we produce data and a report that document current conditions and provide forecasts with lead times from 1 to 9 months. WSIM has been run continuously since April 2011 and has been validated against subsequently observed data. ISciences also provides assessments of the impacts of water anomalies on people, agriculture, and electricity generation. Detailed data and reports are available for purchase. Additional information and pricing are available upon request.

We have recently completed the latest Water Security Indicator Model (WSIM) analysis of global water anomalies using observed temperature and precipitation through January 2024 and an ensemble of forecasts issued the last week of January 2024. This edition of Global Water Monitor & Forecast Watch List presents a selection of regions likely to encounter significant water anomalies in the next few months.

This edition uses results from a new version of WSIM that uses temperature and precipitation data from the ECMWF Reanalysis v5 (ERA5) instead of gridded station data published by NOAA's Climate Prediction Center. Spatial resolution of the maps has sharpened from half-degree to quarter-degree and we expect higher fidelity in sparsely instrumented regions of the world. We have also changed the baseline period for computing statistical distributions from 1950-2009 (60 years) to 1981-2020 (40 years) to rely more exclusively on data from the satellite era. We have published more details and some side-by-side comparisons of the two versions of WSIM, which can be viewed [in our recent blogpost](#).

In addition to the implementation of a new version of WSIM, we have also compiled a list of user questions to help us improve the Global Water Monitor & Forecast Watch List. Please take a moment to complete our [user survey](#). We thank you in advance for your responses and any supplemental information you are able to provide.

All maps have quarter-degree resolution and depict our composite water anomaly index, which is based on WSIM estimates of soil moisture, evapotranspiration deficit, runoff, and total blue water anomalies. Shades of red indicate deficits and shades of blue indicate surpluses. Since different variables are used to estimate deficits and surpluses, it is possible for a single half-degree cell to register both a deficit and a surplus. These cases are depicted on the maps in shades of purple, with the more extreme value (deficit or surplus) used to determine the shade.

Deficits and surpluses are stated in terms of return period – a measure that characterizes the rarity of an event. For example, a return period of 10 years indicates an event that would occur, on average, once every ten years. Higher return periods indicate more extreme and, therefore, more disruptive anomalies. Return period is computed by comparison to cell-specific distributions of data from 1950 through 2009. Anomaly levels correspond to return periods: abnormal=3-5 years, moderate=5-10 years, severe=10-20 years, extreme=20-40 years, and exceptional=greater than 40 years.

Please note that the WSIM model makes use of seasonal temperature and precipitation forecasts produced by the U.S. National Oceanic and Atmospheric Administration (NOAA) Climate Forecast System Version 2 (CFSv2). These forecasts predict broad temperature and precipitation patterns, but do not effectively predict singular events such as tropical storms. Detailed outlooks and analyses of tropical storms are available from the NOAA National Hurricane Center.

There are numerous regions around the world where country borders are contested. ISciences depicts country boundaries on these maps solely to provide some geographic context. The boundaries are nominal, not legal, descriptions of each entity. The use of these boundaries does not imply any judgment on the legal status of any territory, or any endorsement or acceptance of disputed boundaries on the part of ISciences or our data providers.

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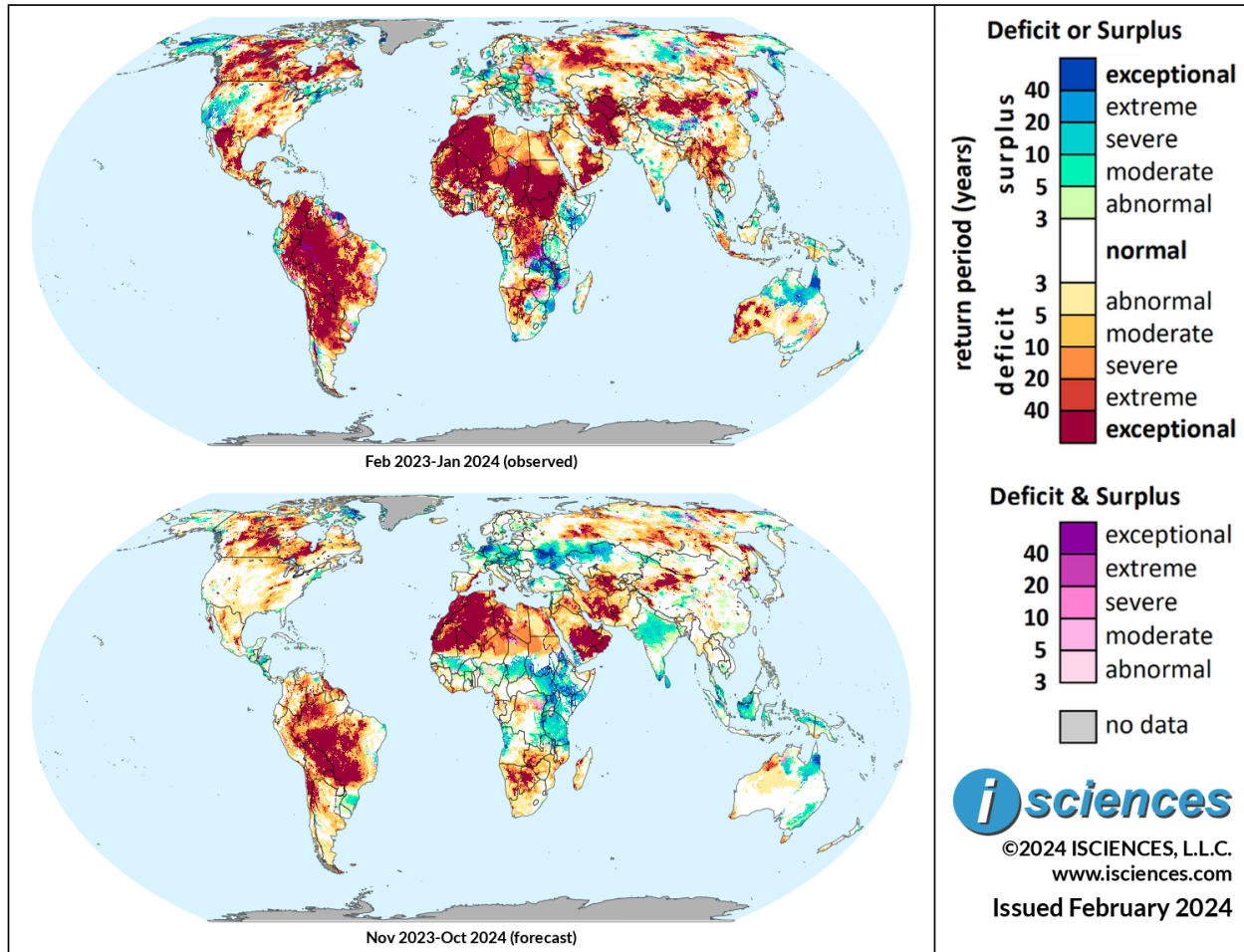
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## Worldwide Water Watch List

This map presents a selection of regions likely to encounter significant water anomalies during the one-year period beginning in November 2023 and running through October 2024 using 3 months of observed temperature and precipitation data and 9 months of forecast data.

ISciences Water Anomalies Forecast: February 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

### Watch List: Regional Synopsis

This synopsis provides highlights of regional water forecasts. More detailed analysis is available in “Watch List: Regional Details” immediately following the synopsis.

**United States:** Northernmost states, particularly Minnesota, are expected to observe moderate to severe deficit until July 2024 or longer.

**Canada:** Intense deficits are expected to linger in most provinces until July 2024 or longer.

**Mexico, Central America, and the Caribbean:** Northwestern regions of Mexico are expected to endure exceptional deficits until July 2024.

**South America:** Central Brazil is expected to observe prolonged exceptional deficits, continuing into October 2024 or longer.

**Europe:** Severe to exceptional surpluses are expected to span most of Continental Europe until April 2024.

**Africa:** Intense surplus is anticipated to arise in most of central Africa, lingering until October 2024 or longer.

**Middle East:** Intense exceptional deficits are forecast to continue in southern Saudi Arabia, Yemen, and Oman until April 2024.

**Central Asia and Russia:** Exceptional deficits are expected in western and eastern Russia until April 2024, while surplus is forecast for southwestern Russia and Kazakhstan until October 2024 or longer.

**South Asia:** Moderate to severe surplus is forecast to span much of India, gradually covering much of the country until October 2024 or longer.

**Southeast Asia and the Pacific:** Intense surplus is expected to linger in much of Maritime Southeast Asia until October 2024 or longer.

**East Asia:** Surplus is expected to continue in various regions of southwestern China until July 2024.

**Australia & New Zealand:** Intense surplus is expected to persist throughout the Yorke Peninsula until July 2024.

## Watch List: Regional Details

### United States

The 12-month forecast ending in October 2024 anticipates exceptional deficits to diminish in most areas, but persist in some northern states and the Midwest. Extreme to exceptional surplus in western states are also expected to dissipate, becoming mostly normal to abnormal conditions.

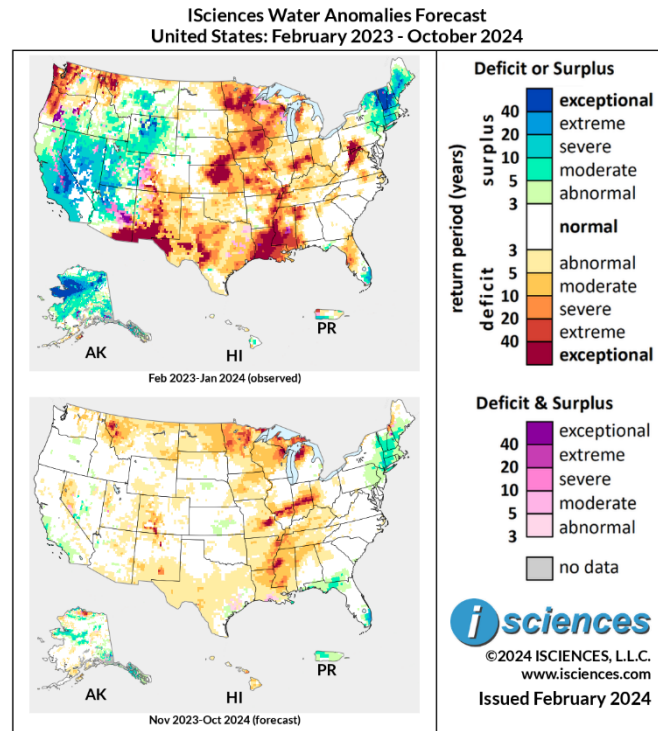
Extreme to exceptional deficits are expected in the following areas:

- East-central **Missouri**, appearing in areas within the Mark Twain National Forest, continuing into south-central **Illinois**, central **Indiana**, and western **Ohio**, near Cincinnati.
- Northwestern **Alabama**, near the city of Hamilton.
- Western **Montana**, in western to central areas of the Flathead National Forest.
- Northeastern **Minnesota**, in areas east of the Leech Lake Reservation. These deficits continue into northeastern **Wisconsin**, near the city of Marinette. Similarly intense deficits are expected to occur in **Michigan**, in northeastern regions of the Northern Lower Peninsula and eastern regions of the Upper Peninsula.

Moderate to severe surpluses are expected in the following regions:

- Southern **Florida**, near Fort Lauderdale and West Palm Beach.
- Widespread throughout **New Hampshire**, **Connecticut**, **Vermont**, and western **Massachusetts**.
- **Alaska**, within the Seward Peninsula and in eastern islands along the coast of the Gulf of Alaska.

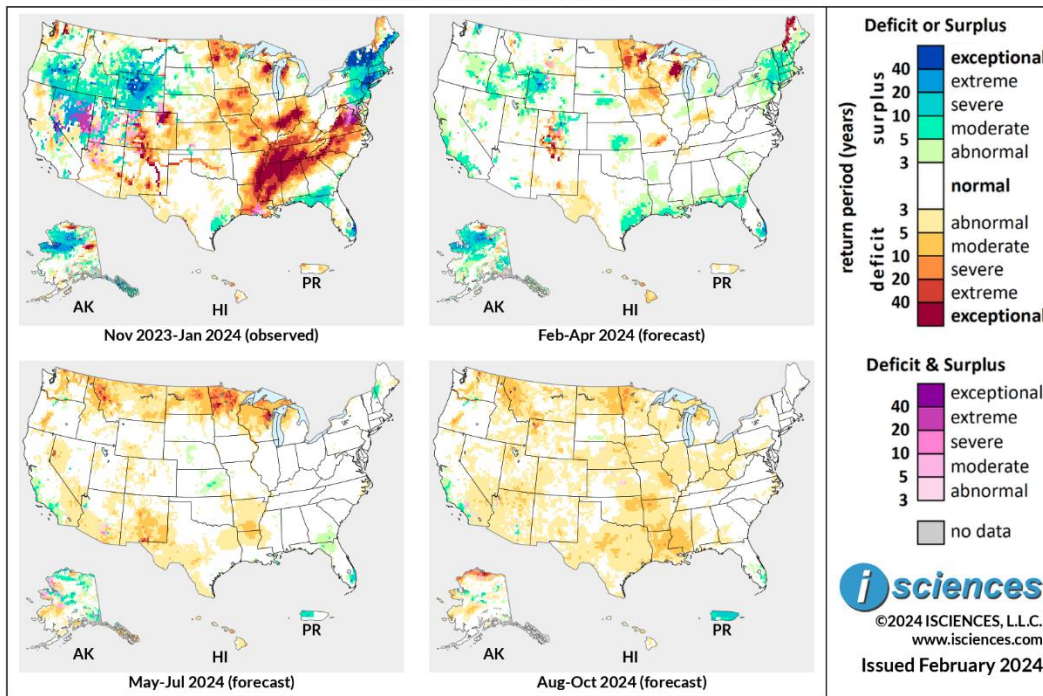
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

### ISciences Water Anomalies Forecast United States: November 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates that exceptional deficits in southeastern states will disappear. Intense deficits are expected to linger in north-central Minnesota, northeastern Wisconsin, southern Colorado, and northern New Mexico. Northernmost regions of Maine can expect similarly intense deficits to appear. Severe to extreme surplus is expected to linger in western Montana, central Colorado, central Idaho, and in most coastal areas along the Gulf of Mexico. Northeastern states can also anticipate moderate to severe surplus. In Alaska, intense surplus is anticipated throughout most of the northern portions of the state, including the Seward Peninsula.

From May through July 2024, most instances of surplus are expected to dissipate, with most of the country experiencing near-normal to abnormal deficits. However, severe to extreme deficits are expected in western Montana, central to northern Minnesota, and northeastern Wisconsin. Pockets of surplus are expected to occur in central, northern, and southeastern Alaska, as well as western regions of Puerto Rico.

The forecast for the final months – August 2024 through October 2024 – indicates that most regions of the Continental United States will experience near-normal to abnormal deficits. Areas experiencing concentrations of moderate deficit include southern Alabama, Louisiana, western Montana, eastern North Dakota, and northwestern Minnesota. In the non-continental U.S., northern coastal regions of Alaska are expected to experience extreme to exceptional deficits. The majority of Puerto Rico is expected to observe severe to extreme surplus expanding to cover the majority of the state.

Please note that WSIM forecast skill declines with longer lead times.

## Canada

The 12-month forecast ending in October 2024 shows some improvement, but exceptional deficits will persist in many regions of Canada.

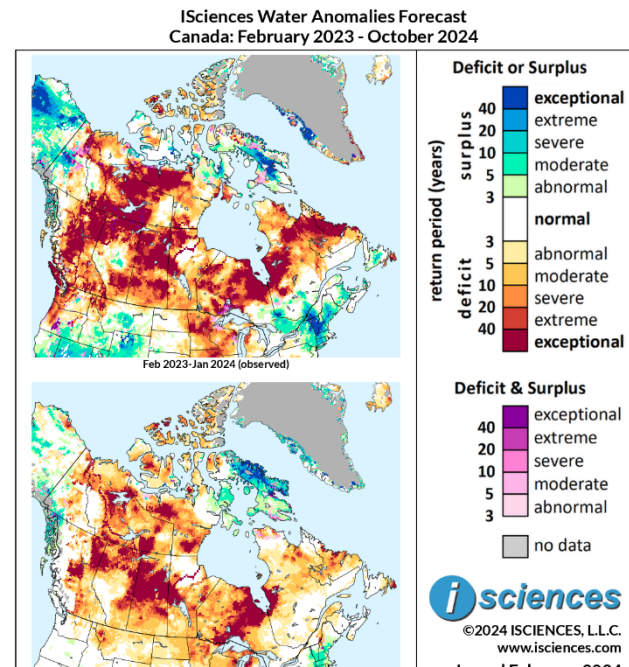
Extreme to exceptional deficits are expected in the following areas:

- Central and northeastern **British Columbia**, throughout the Bulkley-Nechako regional district, as well as the Northern Rockies territory. These deficits continue into northern and western **Alberta**.
- Central to northern **Saskatchewan**, appearing in most regions south of Lake Athabasca and north of Wapawekka Lake, continuing into western **Manitoba** in regions northwest of Lake Winnipeg.
- Southwestern to northeastern **Ontario**, stretching through most regions north of Lake Superior. Coastal regions of **Quebec** bordering the Hudson Bay can expect similarly intense deficits.
- **Northern Yukon**, in regions east of Vuntut National Park. Nearby, **Northwest Territories** can expect similarly intense deficits in areas surrounding Great Bear Lake and southeast of Great Slave Lake.
- **Nunavut**, in the central areas of the Kivalliq and Kitikmeot regions.

Severe to exceptional surpluses are expected in the following regions:

- **Nunavut**, throughout the majority of **Baffin Island**.
- Southwestern **Yukon**, in regions west of the city of Whitehorse.

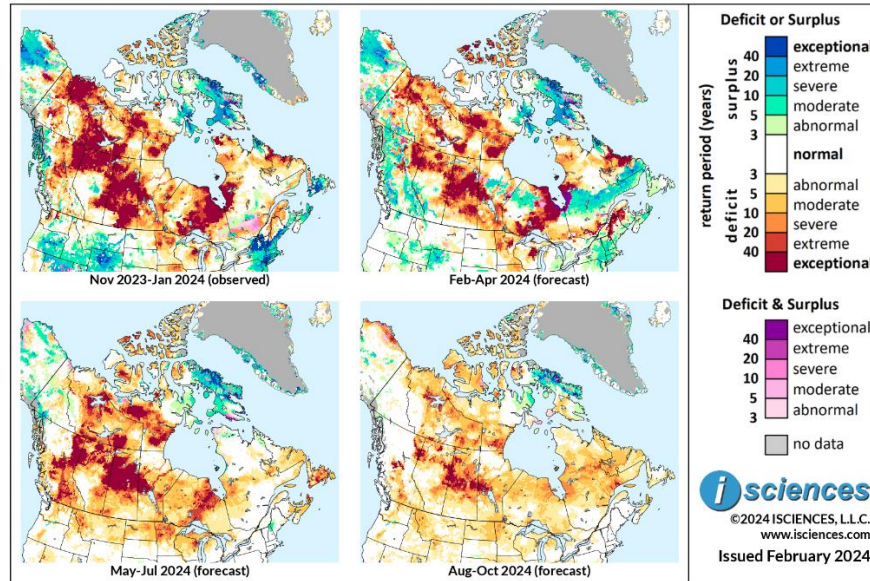
The 3-month maps (below) show the evolving conditions in more detail.



The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.



**ISciences Water Anomalies Forecast  
Canada: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 indicates that moderate to severe surpluses will appear throughout much of British Columbia, though central and northeastern regions can still anticipate exceptional deficits. These deficits continue into northern Alberta, central to southeastern Saskatchewan, and western regions of Manitoba. Exceptional deficits are also expected to continue in western Manitoba, in regions northwest of Lake Winnipeg, as well as across southern to northeastern Ontario. Western coastal regions of Quebec are expected to observe continued exceptional deficits with some transitional conditions. Surpluses will emerge across western, central, and eastern regions of Quebec. Northern regions of Yukon are forecast to endure exceptional deficit, which continues southeast into regions near Great Slave Lake in Northwest Territories. Nunavut’s Kivalliq and Kitikmeot regions are expected to endure similarly intense deficits. Further north, Baffin Island and regions north of Southampton Island should anticipate extreme to exceptional surpluses.

From May through July 2024, exceptional deficits are expected to persist in central and northeastern British Columbia, northern Alberta, central to northern Saskatchewan, and western Manitoba. Extreme to exceptional deficit is expected to emerge in south-central regions of British Columbia. Similarly intense deficits spanning southern to northeastern Ontario are also expected to continue. Further north, deficits in Northwest Territories in areas surrounding Great Bear Lake and regions southeast of Great Slave Lake are expected to persist. Similarly, Nunavut’s Kivalliq and Kitikmeot regions can expect exceptional deficits to linger. Surpluses in southwestern Yukon and Baffin Island are expected to remain.

The forecast for the final months – August 2024 through October 2024 – indicates that widespread exceptional deficits in western to central provinces to somewhat diminish, but remain in central and northeastern British Columbia, northern Alberta, central Saskatchewan, and western Manitoba. Moderate to severe deficits are expected to occur throughout Northwestern Territories, southern to northern Nunavut, Ontario, and Quebec. Intense surpluses are expected to continue in Baffin Island.

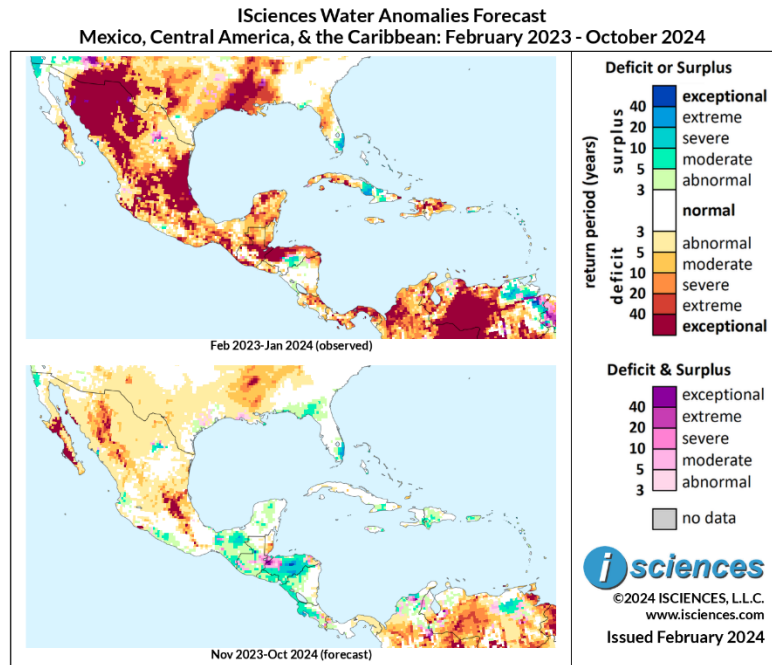
Please note that WSIM forecast skill declines with longer lead times.

## Mexico, Central America, and the Caribbean

The 12-month forecast ending in October 2024 anticipates widespread deficits in Mexico to mostly resolve, but still linger in northwestern and central regions of the country. Deficits in Central America are similarly expected to mostly disappear, instead becoming surpluses of varying intensity.

Extreme to exceptional deficits are expected in the following areas:

- Central **Mexico**, within the states of Puebla and Hidalgo.
- Northwestern **Mexico**, in central regions of the state of Sonora, continuing south into the state of Durango.
- Northern and southern **Baja California Sur**, in regions near the Biosfera El Vizcaino Reserve and in regions along the coast of Magdalena Bay.



*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

Moderate to severe surpluses are expected in the following regions:

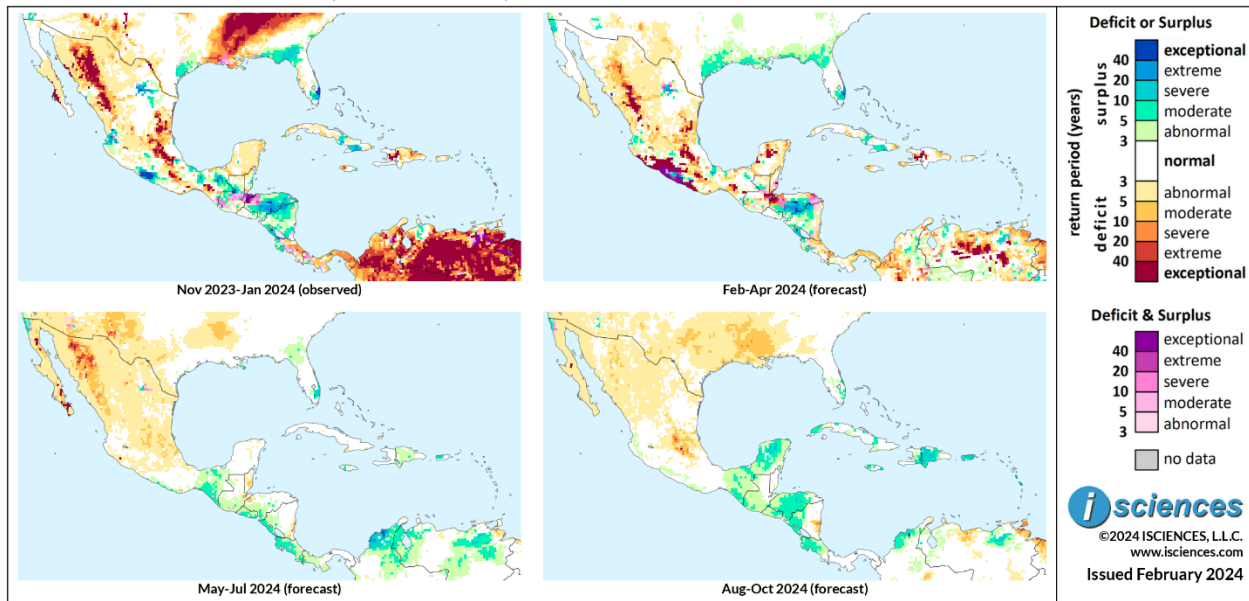
- **Honduras**, widespread throughout the country, with the most intense concentrations appearing in the department of Olancho.
- Western **Nicaragua**, in areas west of Lake Managua.
- Western **Costa Rica**, widespread throughout the Guanacaste province.

Severe to exceptional transitional conditions are anticipated in:

- Western **Honduras**, with the most concentrated anomalies occurring in the Santa Bárbara Department.
- Eastern **Guatemala**, in areas surrounding Izabal Lake.

The 3-month maps (below) show the evolving conditions in more detail.

**ISciences Water Anomalies Forecast**  
**Mexico, Central America, & the Caribbean: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates exceptional deficits to endure in northwestern Mexico, within the state of Durango, as well as further southeast, near Mexico City. Southern coastal regions of Mexico bordering the North Pacific Ocean are expected to observe exceptional deficits, with some transitional conditions appearing nearby. Exceptional deficits are also anticipated in central regions of the Yucatan Peninsula, as well as most areas near Lake Izabel. Severe to extreme surplus is expected to appear throughout Honduras, as well as places west of Lake Nicaragua.

From May through July 2024, mostly near-normal to abnormal deficits are expected to occur in Mexico. Some deficits will intensify in northwestern Mexico, becoming severe to extreme in northern and central Sonora. Central Baja California and southern Baja California Sur can anticipate similarly intense deficits. In southern Mexico, central regions of the state of Chiapas are expected to observe moderate to severe surplus. Similarly intense surplus continues south along western coastal regions of El Salvador, Nicaragua, and Costa Rica.

The forecast for the final months – August 2024 through October 2024 – indicates that deficits in northwestern Mexico will resolve, though moderate to severe deficits will emerge near Mexico City. Moderate to severe surplus is expected to linger in Chiapas, as well as continue north into the Yucatan Peninsula. Surpluses of equal intensity are expected to emerge throughout Honduras, western Nicaragua, and northern Costa Rica.

Please note that WSIM forecast skill declines with longer lead times.

## South America

The 12-month forecast ending in October 2024 anticipates that exceptional deficits will continue throughout most of Brazil, as well as some regions of the Bolivarian Nations. Similarly intense deficits are expected to continue in Chile and the Guianas.

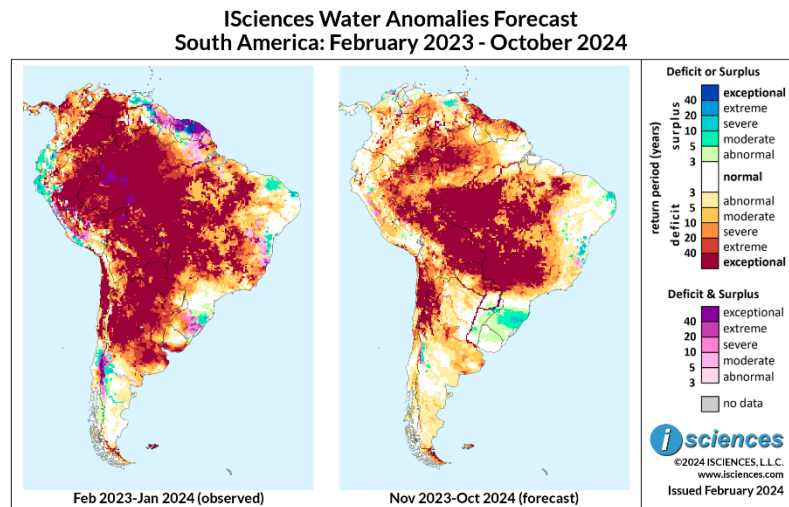
Extreme to exceptional deficits are expected in the following areas:

- **Brazil**, widespread throughout the country, throughout the states of Amazonas, Rondonia, Mato Grosso, and Mato Grosso do Sul, continuing east into western Minas Gerais and south into Sao Paulo.
- **Bolivia**, throughout the majority of northern to northeastern regions of the country, continuing into northern **Paraguay**. Some southern to eastern regions of Paraguay will also experience exceptional deficits.
- Eastern **Peru**, appearing near the Madre de Dios Territorial Reserve and continuing along the country's eastern border into the northern Amazon.
- **Colombia**, appearing in pockets in west-central regions, continuing into southern and western **Venezuela**.
- The majority of northern coastal regions of the **Guianas**.
- Northern **Chile**, throughout the Antofagasta Province and into northwestern regions of **Argentina**.

Moderate to severe surpluses are expected in the following regions:

- Southern **Brazil**, in the central regions of Rio Grande do Sul.

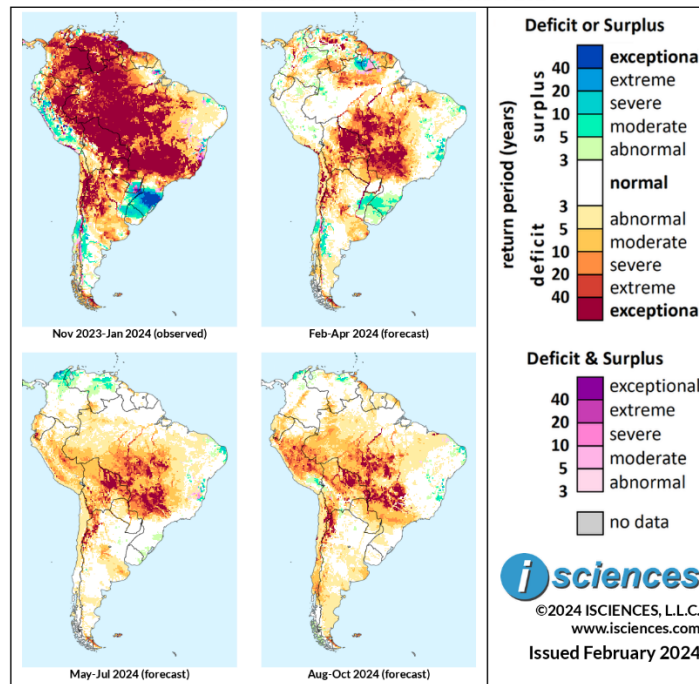
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

ISciences Water Anomalies Forecast  
South America: November 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 indicates that widespread exceptional deficits throughout northern Brazil will diminish, but will remain in the states of Mato Grosso, Mato Grosso do Sul, and Goias. Most of northeastern Bolivia is expected to observe similar conditions. Exceptional deficits are expected to mostly diminish in northern Chile, but remain in isolated pockets near the town of San Pedro de Atacama and the Andes Mountains. Western regions of Argentina’s Jujuy province are also expected to endure exceptional deficits. Further north, north-central regions of Amazonas can anticipate severe to extreme deficits, as well as southernmost regions of Venezuela, and northern coastal regions of the Guianas. Surplus is expected to continue in central areas of Rio Grande do Sul, as well as northeastern provinces of Argentina.

From May through July 2024, exceptional deficits in Brazil are expected to decrease further in size, though will linger in central to southern regions of Mato Grosso and Mato Grosso de Sul. Northeastern Bolivia is expected to endure exceptional deficits, as well as some northwestern regions of Argentina. Similarly intense deficits are expected to emerge in southernmost regions of Ecuador. Further north, severe to extreme surplus is expected to appear in the northernmost regions of Colombia. In east-central Venezuela, moderate to severe surplus is expected to occur.

The forecast for the final months – August 2024 through October 2024 – anticipates exceptional deficits throughout Brazil to persist. Similarly intense deficits are expected to continue in northeastern Bolivia and northwestern Argentina. Severe to extreme deficits are expected to spread further throughout central Peru.

Please note that WSIM forecast skill declines with longer lead times.

## Europe

The 12-month forecast ending in October 2024 anticipates widespread surpluses across most of Continental Europe, with the most intense surpluses occurring in Central and Eastern Europe.

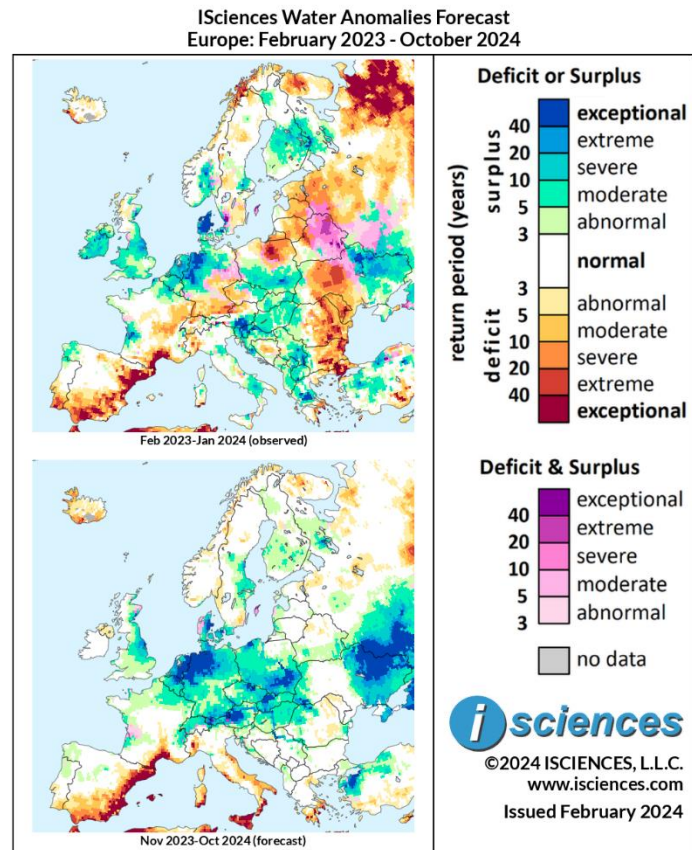
Severe to exceptional surpluses are expected in the following regions:

- Northeastern **Germany**, with the most intense concentrations appearing in the North Rhine-Westphalia. These surpluses continue west, covering both the **Netherlands** and **Belgium**.
- **Austria**, spreading throughout regions near Salzburg and throughout most central to northern regions of the country.
- Northeastern **Czech Republic**, near the city of Hradec Kralove. Similarly intense surpluses are anticipated further east in **Ukraine**, specifically in the Poltava, Sumy, Kyiv, and Chernihiv oblasts.
- Northwestern **Slovakia**, throughout regions near the city of Zilina, as well as southern **Poland**, near the cities of Lublin and Krakow. **Denmark** can expect similarly intense surpluses in the Jutland Peninsula.
- **United Kingdom**, in coastal regions near the city of Sunderland.

Extreme to exceptional deficits are expected in the following areas:

- Southern coastal regions of **France**, near the city of Montpellier.
- Most eastern and southern coastal regions of **Spain**, in areas bordering the Mediterranean Sea.
- Southern **Italy**, throughout coastal regions of Calabria, as well as throughout **Sicily** and southern coastal regions of Sardinia.

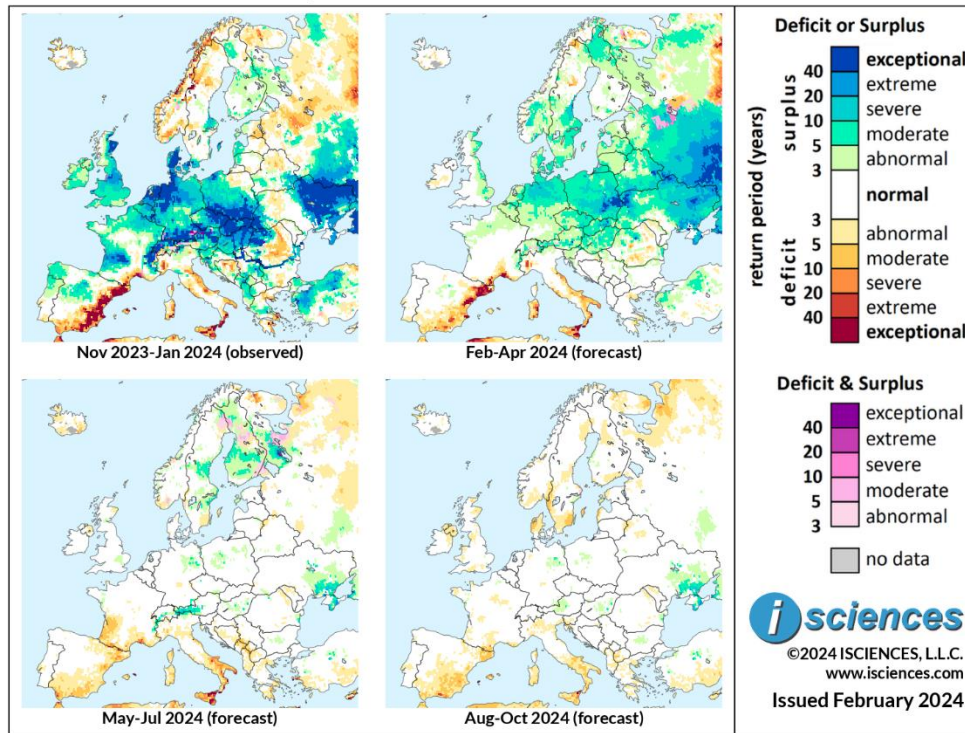
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

### ISciences Water Anomalies Forecast Europe: November 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates moderate to severe surplus to cover most of Central and Eastern Europe. The most concentrated surpluses are expected to continue in northern Germany, southeastern Poland, eastern Ukraine, and central Sweden. Deficits in southern France are expected to linger, as are similar anomalies throughout southern Italy, and the Catalonia region of Spain.

From May through July 2024, surpluses in Continental Europe are expected to mostly vanish, becoming near-normal to abnormal conditions throughout the area. Some moderate deficits are expected to linger, specifically in southwestern France, southern Spain, and southern Italy. Central Sweden and Finland can anticipate abnormal to moderate surplus.

The forecast for the final months – August 2024 through October 2024 – anticipates near-normal to abnormal conditions to continue throughout the vast majority of the region, with some moderate deficits appearing in southern Spain, southern Italy, Sicily, and southern Sweden.

Please note that WSIM forecast skill declines with longer lead times.

## Africa

The 12-month forecast ending in October 2024 anticipates exceptional deficits to diminish in eastern regions of the Sahara, but continue in western regions. Surplus is expected to emerge in the Sahel and expand in East Africa. Southern Africa can anticipate persistent pockets of intense deficit.

Extreme to exceptional deficits are expected in the following areas:

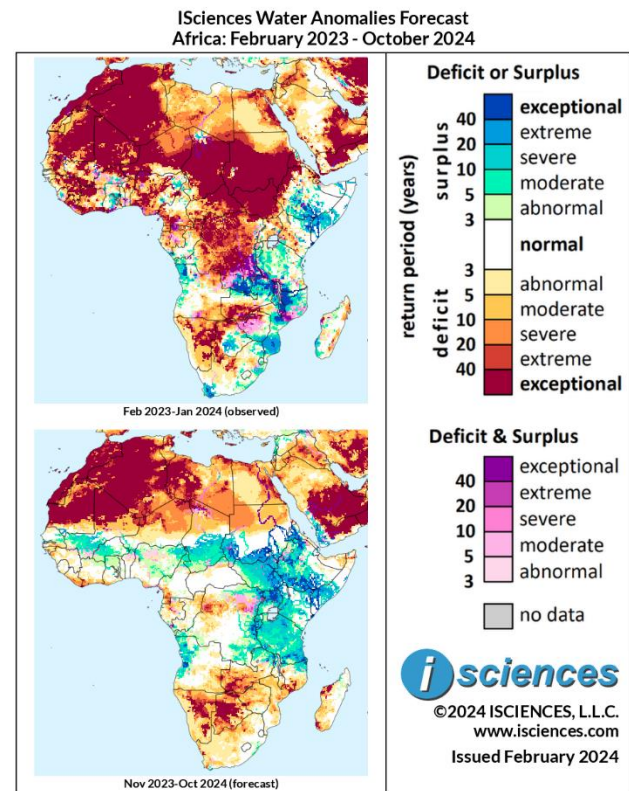
- Throughout the majority of **Algeria** and **Mauritania**, as well as northern **Mali**, in the Salam region.
- Throughout most of **Morocco** and **Western Sahara**.
- Western **Libya**, spreading throughout the Nalut and Jabal al Gharbi districts, as well as throughout the Fezzan region. Similar deficits are expected to appear in the country's northeastern coastal regions bordering the Mediterranean Sea, which continue into eastern **Egypt**, along the Nile River.
- Most central regions of **Botswana**, which continue north into southern **Namibia**. Nearby, central regions of **Zambia** can expect similar deficits.
- Northern and southern coastal regions of **Madagascar**, near the cities of Mahajanga and Toliara.

Severe deficits are expected to emerge in:

- Southeast **Libya**, throughout the Kufra District, continuing into **Sudan's** Northern state.
- Northern **Niger**, widespread throughout the Agadez region.
- Northeast **Democratic Republic of Congo**, within the Équateur Province.
- Along southern coastal regions of **Liberia**, **Ivory Coast**, and **Ghana**.

Severe to exceptional surpluses are expected in the following regions:

- Southern **Mali**, throughout regions near the city of Bamako and throughout much of **Burkina Faso**.
- **Chad**, widespread throughout central and southern regions, as well as southern portions of **Sudan**, throughout **South Sudan**, **Ethiopia**, and central **Somalia**.
- Throughout most of **Uganda** and **Tanzania**.
- Northern **Zambia**, in the Northern province, as well as western coastal regions of **Angola**.

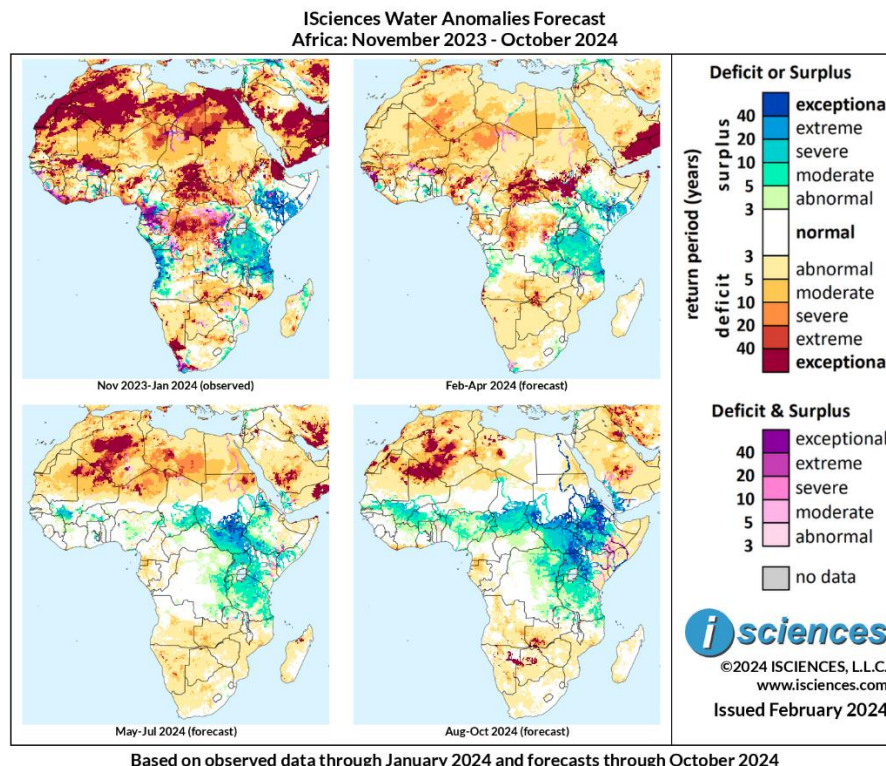


Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*



The 3-month maps (below) show the evolving conditions in more detail.



The forecast through April 2024 anticipates most of North Africa to experience moderate to severe drought, particularly in southwestern to central Algeria and northeastern regions of Niger. Some exceptional deficit is expected in central regions of the region, specifically in central Nigeria, Central African Republic, and throughout southern Sudan. Severe to extreme deficits are expected in western to northeastern Democratic Republic of Congo, as well as in regions along the border of southern Zimbabwe and northern Botswana. Surplus is expected to linger throughout Tanzania, Uganda, and southern Somalia.

From May through July 2024, exceptional deficits are expected to appear in central and southwestern regions of Algeria, northern Mali, central Niger, and west-central Libya. Surpluses in East Africa are expected to intensify, specifically throughout South Sudan, southern Sudan, Uganda, Kenya, and Tanzania. Most southern countries can anticipate abnormal deficits.

The forecast for the final months – August 2024 through October 2024 – anticipates exceptional deficit in Algeria and Mali to continue. Surpluses in East Africa are expected to intensify to extreme to exceptional surplus, with moderate to severe surplus continuing into southern Chad, throughout Niger, and Burkina Faso, and southern Mali. Tanzania is expected to endure continued moderate surplus. Further south, southern regions of Mozambique, eastern Namibia, and western to central Botswana can anticipate pockets of exceptional deficits.

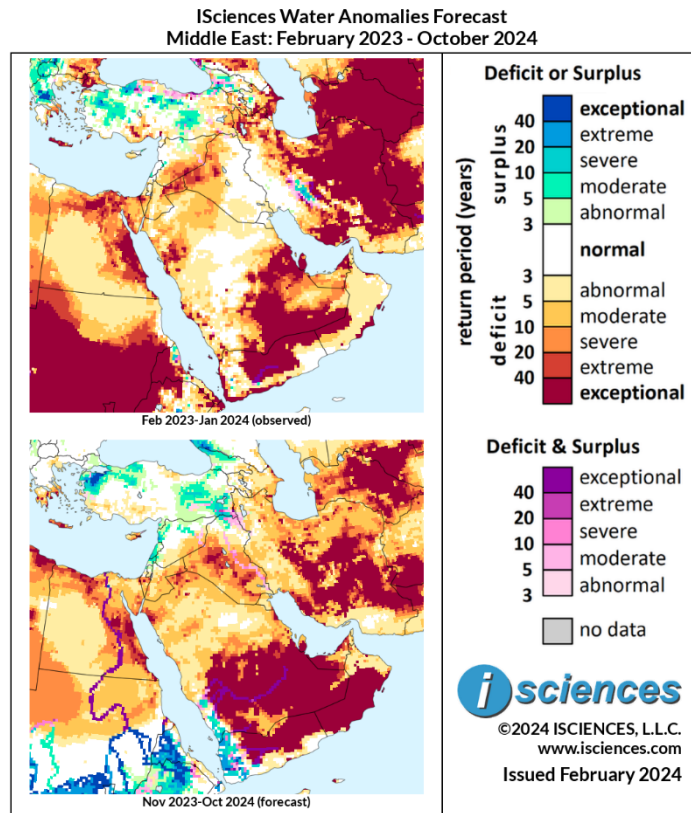
Please note that WSIM forecast skill declines with longer lead times.

## Middle East

The 12-month forecast ending in October 2024 expects exceptional deficits to expand throughout most Middle Eastern countries, with the highest concentrations occurring in Saudi Arabia, Yemen, Oman, and Iran. Western portions of Yemen and southwestern Saudi Arabia are expected to observe surpluses of varying intensity.

Extreme to exceptional deficits are expected in the following areas:

- **Saudi Arabia**, primarily throughout the Riyadh, Makkah, Asir, and Najran provinces, as well as the Eastern Region. These deficits continue into western areas of the **United Arab Emirates**.
- **Yemen** and **Oman**, widespread throughout both countries.
- **Iran**, spreading throughout the Fars, Kerman, Sistan and Baluchistan, Yazd, and South Khorasan provinces.
- **Iraq**, in eastern portions of the Al-Ahbar province and in regions southeast of Razzaza Lake.



Based on observed data through January 2024 and forecasts through October 2024

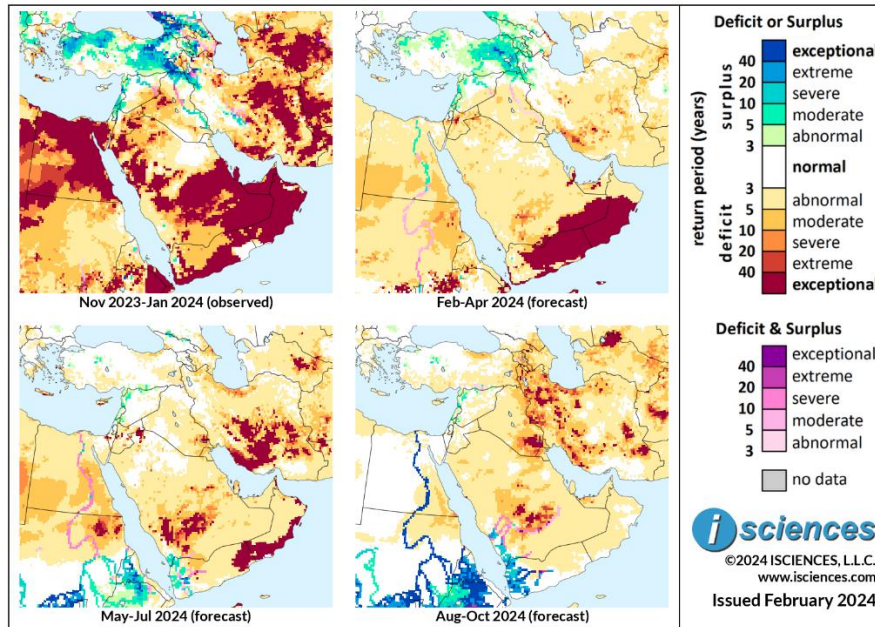
*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

Severe to exceptional surpluses are expected in the following regions:

- Western **Turkey**, in areas south of the Sea of Marmara.
- **Yemen**, in western coastal regions bordering the Red Sea, which continue into southwestern **Saudi Arabia**.

The 3-month maps (below) show the evolving conditions in more detail.

**ISciences Water Anomalies Forecast  
Middle East: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates widespread exceptional deficits to significantly decrease in size throughout the majority of the region. Some deficits will persist in southeastern regions of Saudi Arabia, as well as throughout Yemen and Oman. Small, isolated pockets of extreme to exceptional deficit are expected to occur in central United Arab Emirates, southwestern regions of Iran’s Fars Province, and central regions of Jordan. Surpluses are expected to diminish in western Turkey, but emerge in eastern regions of the country.

From May through July 2024, exceptional deficits in Yemen and Oman are expected to decrease in size significantly, but still persist in eastern Yemen and southern to central coastal regions of Oman. Exceptional deficits are expected to reappear in southwestern Saudi Arabia, as well as in southwestern to central regions of Iran. Isolated pockets of similarly intense deficits are expected to appear in regions bordering northern Saudi Arabia and Jordan, as well as eastern regions of Iraq, in southern regions of the Qal’at Saleh. Further north, severe to extreme deficits are anticipated in northern coastal regions of Iran bordering the Caspian Sea. Some surplus is expected to reappear in western regions of Yemen.

The forecast for the final months – August 2024 through October 2024 – anticipates exceptional deficits to further decrease in size in south-central Saudi Arabia, but expand in eastern Iraq and throughout western, southern, and eastern Iran. Northern coastal regions near the Caspian Sea are expected to intensify. Surplus in western Yemen is expected to intensify and continue further north into southwestern Saudi Arabia.

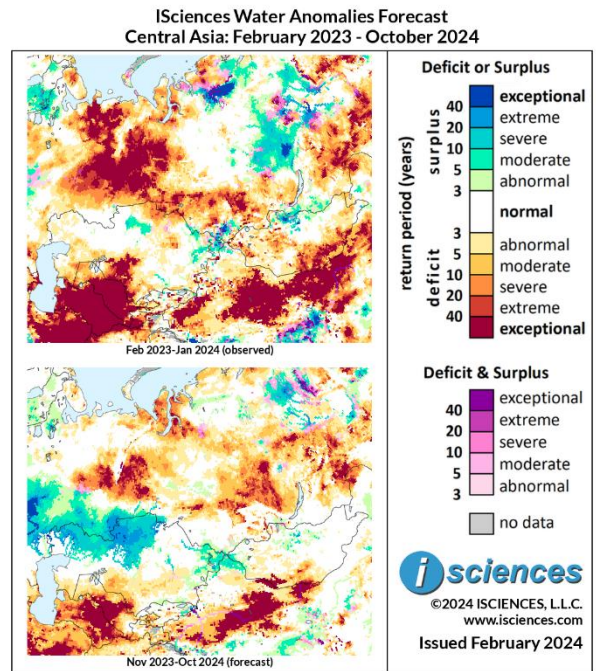
Please note that WSIM forecast skill declines with longer lead times.

## Central Asia and Russia

The 12-month forecast ending in October 2024 anticipates exceptional deficits in western Russia to persist, but decrease in size.

Extreme to exceptional deficits are expected in the following areas:

- Western **Russia**, within the Khanty-Mansi Autonomous Okrug.
- Northwestern **Russia**, throughout northern regions of the Yamalo-Nenets Autonomous Okrug, particularly within the Tazovsky District and near the settlement of Novy Port.
- Southeastern **Russia**, throughout southern, central, and eastern areas of the Irkutsk Oblast, continuing into the Olekminsky Uls District and southern portions of the Sakha Republic.
- Central regions of **Uzbekistan**, continuing south into northern, northwestern, and central **Turkmenistan**.



Based on observed data through January 2024 and forecasts through October 2024

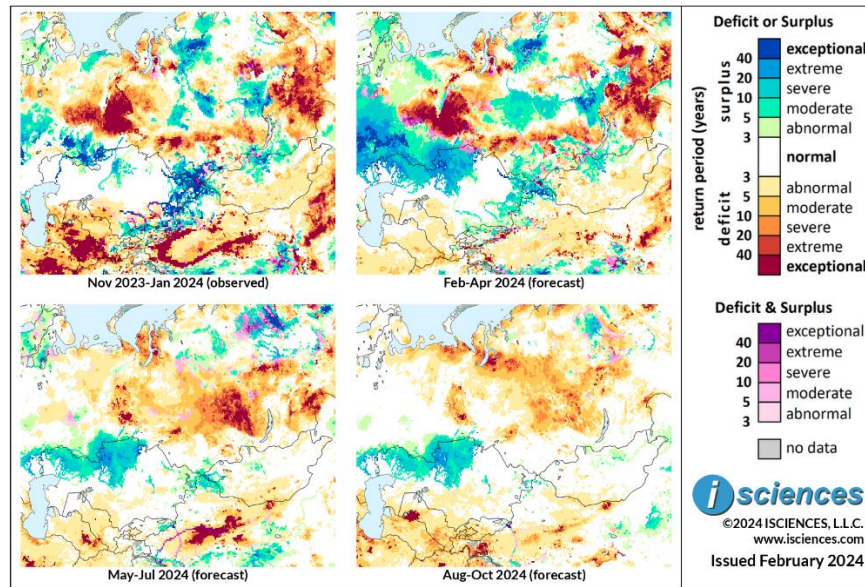
*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

Moderate to severe surpluses are expected in the following regions:

- Southwestern **Russia**, throughout the Omsk Oblast, stretching further west into the Chelyabinsk Oblast.
- **Kazakhstan**, widespread throughout northern and eastern regions of the country.

The 3-month maps (below) show the evolving conditions in more detail.

**ISciences Water Anomalies Forecast  
Central Asia: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 indicates severe to exceptional surplus will expand significantly throughout western Russia, covering much of the Sverdlovsk Oblast, Perm Krai, and Komi Republic. These surpluses continue further south into northwestern to northern Kazakhstan, with similarly intense surpluses continuing in easternmost portions of the country. Intense deficits are expected to appear in the Sverdlovsk Oblast, which continue farther east, stretching into southern areas of Lake Baikal and further northwest into southern to central regions of the Sakha Republic. Nearby, severe to exceptional surpluses are anticipated in the Irkutsk Oblast, in areas within the northern Sakha Republic, and southern portions of Taymyrsky Dolgano-Nenetsky District.

From May through July 2024, severe to exceptional deficits are expected to expand in size in regions west of Lake Baikal, in the Irkutsk Oblast. Similarly intense deficits are expected to continue in regions further east, in the Kalarsky District of the Zabaykalsky Krai, as well as the Lensky Ulus within the Sakha Republic. Northern regions of Yamalo-Nenets Autonomous Okrug can anticipate severe to extreme deficits to persist. Severe to exceptional surpluses are anticipated to continue in northern to northwestern Kazakhstan, as well as in the Olenyoksky District of the Sakha Republic.

The forecast for the final months – August 2024 through October 2024 – anticipates severe to extreme deficits to linger in northern regions of Yamalo-Nenets Autonomous Okrug and in the Omsk Oblast. Similarly intense deficits are expected to occur further east in central Russia, in most regions north and northwest of Lake Baikal. Moderate to severe surplus is expected to continue in northern to northwestern Kazakhstan and regions along the southwestern Russian border. Similarly intense surpluses are expected to emerge in northern portions of the Sakha Republic.

Please note that WSIM forecast skill declines with longer lead times.

## South Asia

The 12-month forecast ending in October 2024 anticipates moderate to severe surplus to spread significantly throughout India. Extreme to exceptional deficits are expected to resolve in Bangladesh, but continue in Afghanistan and Pakistan.

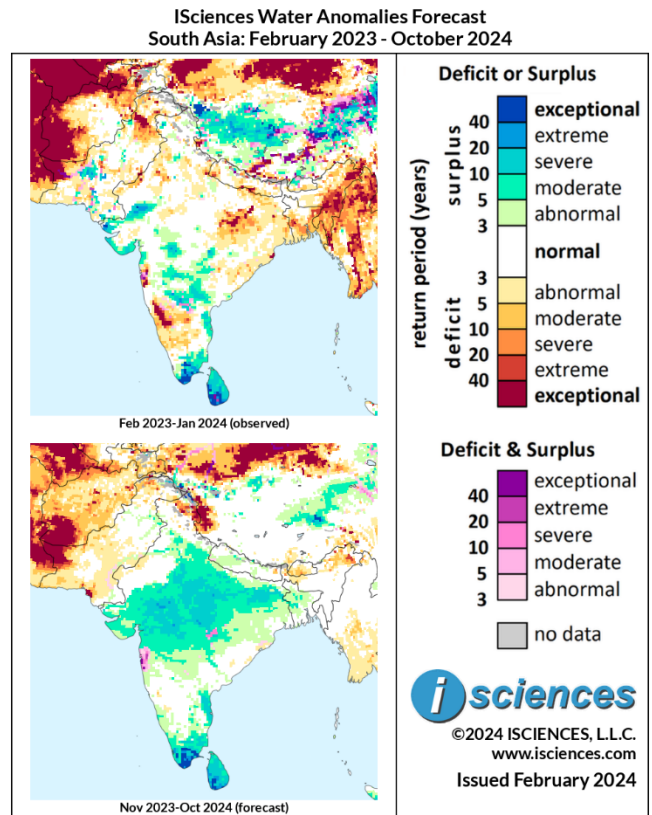
Severe to exceptional surpluses are expected in the following regions:

- Central **India**, widespread throughout the states of Madhya Pradesh, eastern Rajasthan, southern Uttar Pradesh, and Bihar.
- Southern **India**, with the most intense surpluses appearing in southern coastal regions of the Kanyakumari District.
- **Sri Lanka**, with the highest concentrations appearing in southwestern coastal regions of the country.

Extreme to exceptional deficits are expected in the following areas:

- Southern **Pakistan**, throughout the Nimruz Province.
- Western **Afghanistan**, throughout the Balochistan Province.
- Northern **India**, in the easternmost regions of Ladakh.

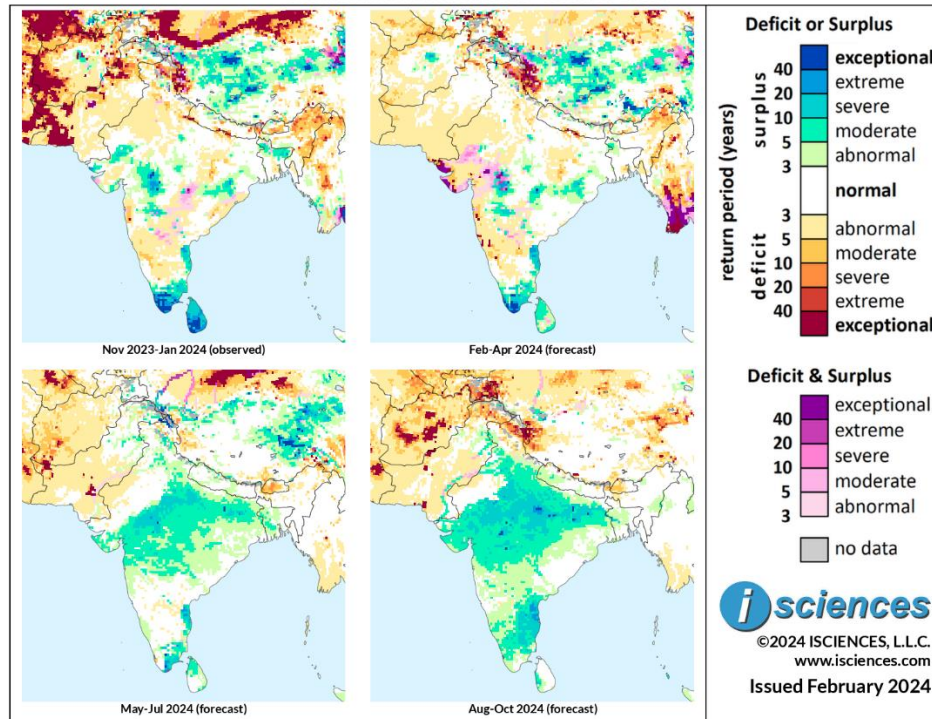
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

ISciences Water Anomalies Forecast  
South Asia: November 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates that pockets of intense surplus will linger in central India in Madhya Pradesh, as well as in eastern coastal regions of Andhra Pradesh, and southern regions of the Kanyakumari District. Isolated, intense deficits are expected to appear in western coastal regions of Gujarat, as well as some emergence of transition conditions in the same areas. Northern regions of Bangladesh can expect severe to extreme deficits, as well as northern regions of India and Afghanistan. Sri Lanka can expect moderate to severe surplus to continue in its northern areas.

From May through July 2024, moderate to severe surplus is expected to expand throughout most central regions of India, as well as further east into Bihar, and west into coastal regions of Gujarat. Surpluses in southern regions of India are expected to persist, as well as in northern regions of Sri Lanka. Small regions of eastern and western Pakistan are expected to observe exceptional deficits, as well as southern portions of Afghanistan. Much of the rest of the region can expect near-normal to abnormal conditions.

The forecast for the final months – August 2024 through October 2024 – anticipates surplus to expand further throughout central and southern India. In central Afghanistan, pockets of exceptional deficits are expected to emerge, as well as further east, in eastern Ladakh.

Please note that WSIM forecast skill declines with longer lead times.

## Southeast Asia and the Pacific

The 12-month forecast ending in October 2024 indicates that lingering deficits throughout Maritime Southeast Asia will mostly resolve, instead becoming severe to exceptional surpluses across much of the region. Similarly intense surpluses are expected in Peninsular Malaysia.

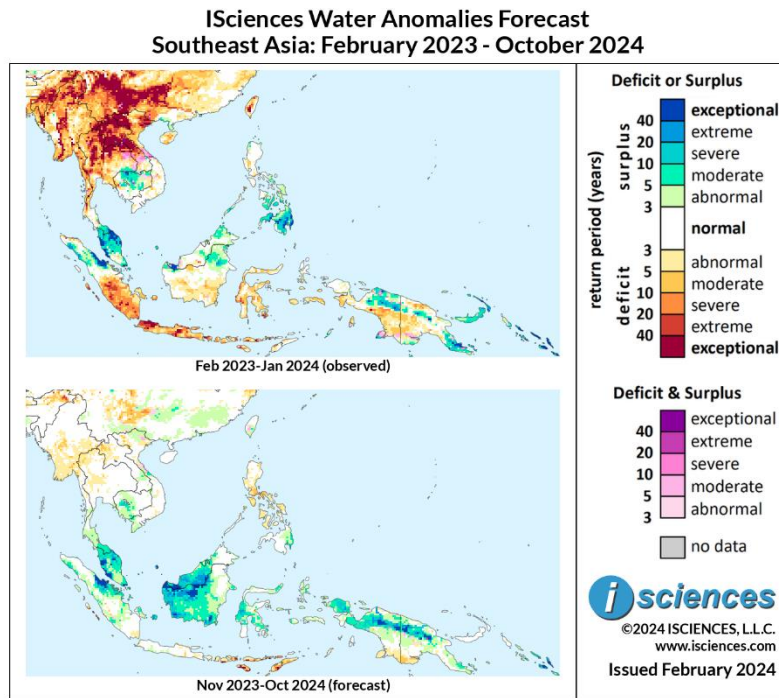
Severe to exceptional surpluses are expected in the following regions:

- **Peninsular Malaysia**, widespread throughout most of the region.
- **Indonesia**, with the highest concentrations lingering in northern Sumatra, northwestern to northern Kalimantan, and central Sulawesi.
- **Papua and Papua New Guinea**, appearing across north-central areas of both regions.

Severe to exceptional deficits are expected in the following areas:

- **Indonesia**, in eastern regions of the Lesser Sunda Islands.

The 3-month maps (below) show the evolving conditions in more detail.

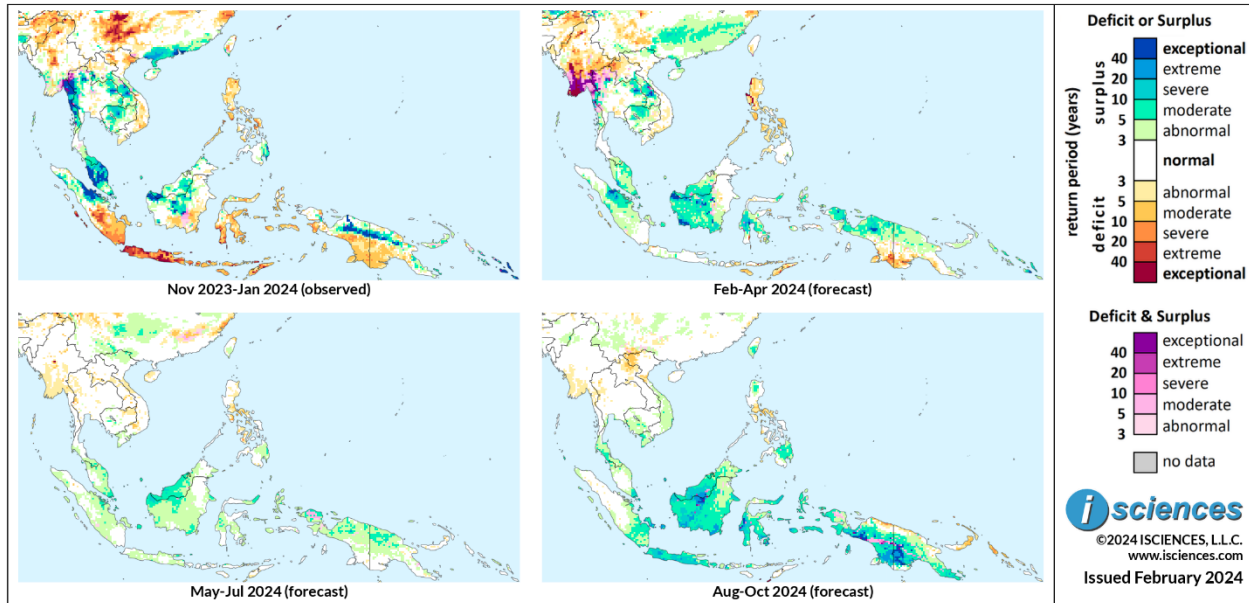


Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*



**ISciences Water Anomalies Forecast  
Southeast Asia: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 anticipates extreme to exceptional surplus to linger throughout most of Maritime Southeast Asia, with surplus intensifying throughout Indonesia. Particular areas to be affected include northern Sumatra, most of Kalimantan, and central Sulawesi. Regions of central Papua can also expect surpluses of similar intensity. Southern coastal regions of Papua and Papua New Guinea can anticipate severe to extreme deficits.

From May through July 2024, most countries in Southeast Asia should expect mostly near-normal to abnormal conditions, though moderate to severe surplus is expected throughout Sarawak.

The forecast for the final months – August 2024 through October 2024 – anticipates that severe to moderate surplus will emerge throughout most of Maritime Southeast Asia, predominantly in Kalimantan, Java, and Sulawesi. Papua and Papua New Guinea are expected to also experience similarly intense surplus in southern and central portions of the regions.

Please note that WSIM forecast skill declines with longer lead times.

## East Asia

The 12-month forecast ending in October 2024 anticipates exceptional deficits in China to mostly diminish, but persist in some northwestern and eastern regions. Surplus in eastern Tibet is expected to continue, but resolve in the rest of the province.

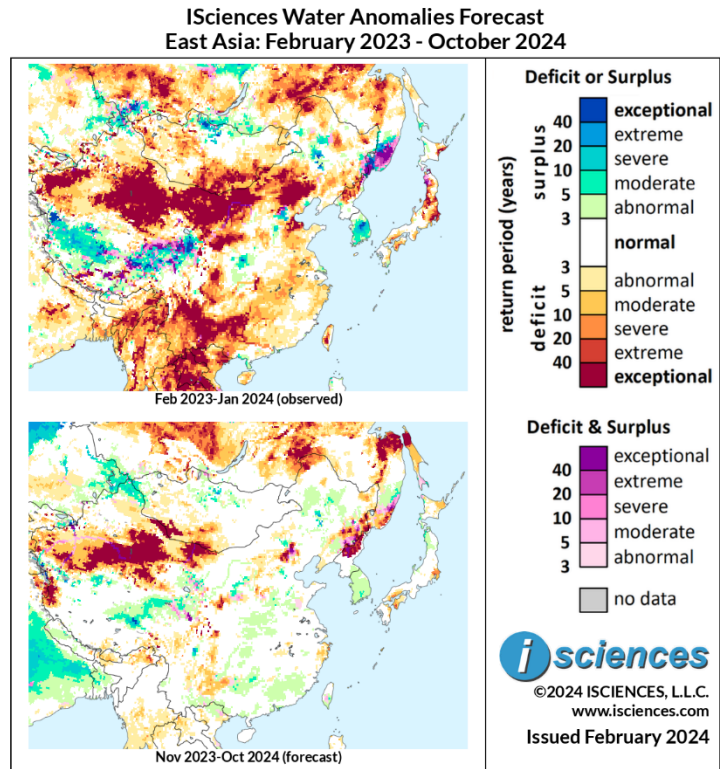
Extreme to exceptional deficits are expected in the following areas:

- Northwestern **China**, throughout central regions of Xinjiang, western Gansu, and western regions of Inner Mongolia.
- Northeastern **China**, in eastern regions of Liaoning and southern Jilin.
- Southwestern **China**, in western Tibet.
- **North Korea**, throughout the Ryanggang Province.

Severe to exceptional surpluses are expected in the following regions:

- Southwestern **China**, in eastern regions of Tibet.
- Northwestern regions of **China**, in the northernmost regions of Xinjiang.

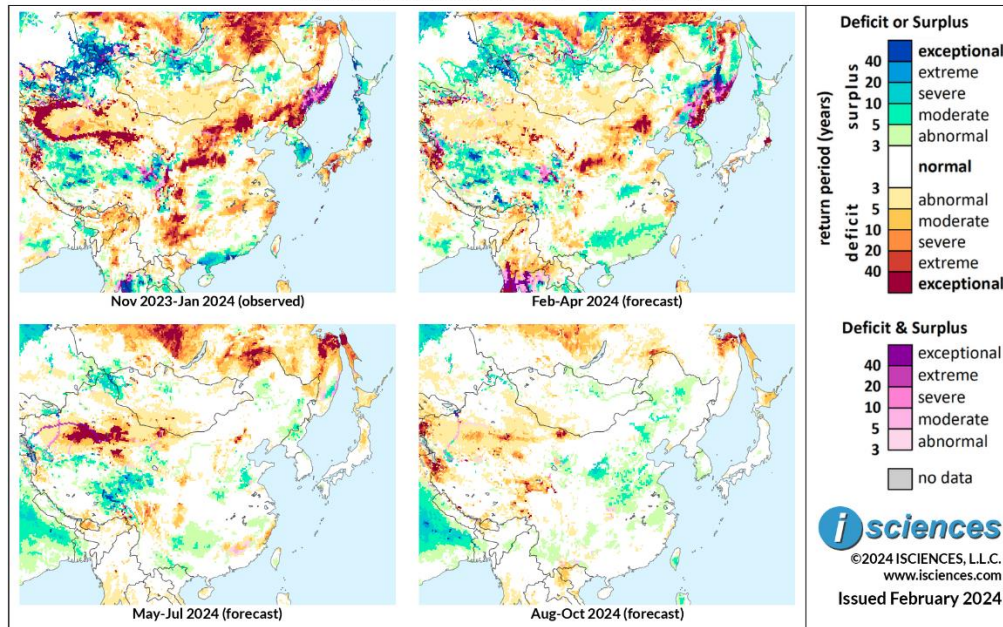
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through January 2024 and forecasts through October 2024

*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

**ISciences Water Anomalies Forecast  
East Asia: November 2023 - October 2024**



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 indicates surplus is expected to continue in pockets throughout eastern, southern, and central to west-central Tibet. However, the westernmost regions of Tibet’s Nigari Prefecture should anticipate exceptional deficits. Exceptional deficits are forecast to continue in southern Gansu and eastern Inner Mongolia. Further east, a mixture of exceptional deficits and transitional conditions are anticipated in eastern and southern regions of Liaoning, Jilin, and Heilongjiang. Northernmost regions of North Korea can expect a mixture of exceptional deficits and transitional conditions to linger.

From May through July 2024, exceptional deficit is expected to appear throughout much of central to north-central Xinjiang. Similar deficits are expected to linger in western Inner Mongolia. Further south, eastern regions of Tibet are expected to observe continued moderate to severe surplus. Much of the remaining regions are expected to experience mostly near-normal conditions.

The forecast for the final months – August 2024 through October 2024 – anticipates exceptional deficits in northwestern China to diminish, becoming mostly abnormal deficits with some exceptional deficits appearing in central Xinjiang and western Inner Mongolia. Eastern Tibet is expected to experience isolated pockets of moderate to severe deficit.

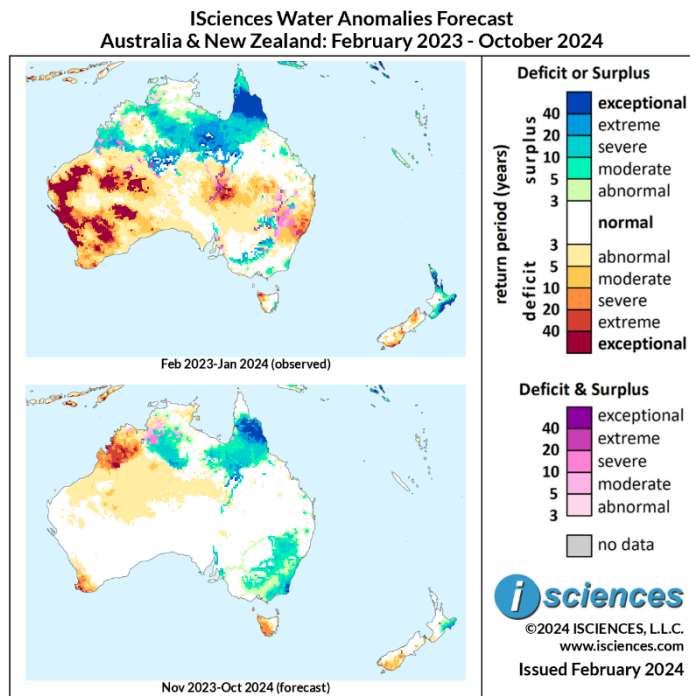
Please note that WSIM forecast skill declines with longer lead times.

## Australia and New Zealand

The 12-month forecast ending in October 2024 anticipates that most anomalies in the region will diminish. However, intense surplus is expected to continue in the Yorke Peninsula, southern New South Wales, and Victoria. Deficits will persist in northern and southern Western Australia.

Severe to exceptional surpluses are expected in the following regions:

- Northern **Queensland**, with the highest concentrations throughout central regions of the Yorke Peninsula.
- Southeastern coastal regions of **Victoria**.
- Central **Northern Territory**, primarily in regions near the town of Mataranka.
- Northern **New Zealand**, widespread in areas along the eastern coast of the country, near the Raukumara region.



Based on observed data through January 2024 and forecasts through October 2024

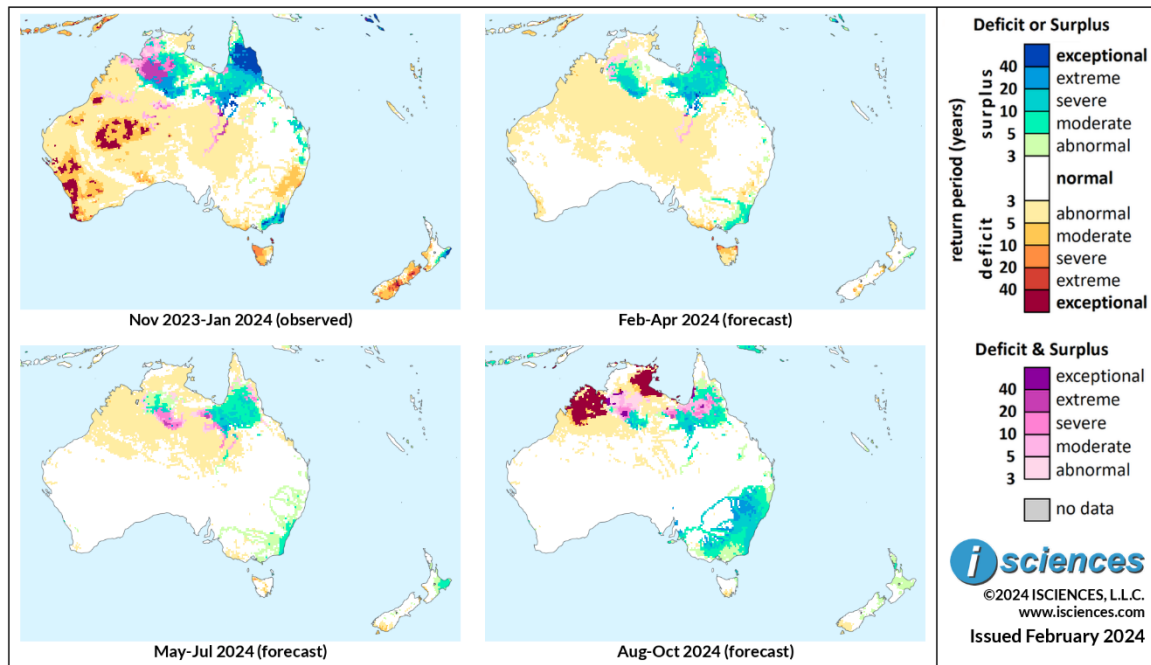
*The map on top depicts long-term deficit and surplus anomalies as of January 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of October 2024.*

Severe to exceptional deficits are expected in the following areas:

- Northern regions of **Western Australia**, widespread in areas near and surrounding the King Leopold Ranges.
- Southwestern coastal regions of **Western Australia**, near the town of Pemberton.
- Western **Tasmania**, across most of the region.
- Southern **New Zealand**, near the city of Dunedin.

The 3-month maps (below) show the evolving conditions in more detail.

### ISciences Water Anomalies Forecast Australia & New Zealand: November 2023 - October 2024



Based on observed data through January 2024 and forecasts through October 2024

The forecast through April 2024 indicates that severe to extreme surplus will continue in the Yorke Peninsula, as well as in north-central areas of the Northern Territory. Some southeastern coastal regions of Victoria can expect moderate surplus. Severe to extreme deficit is expected to linger in Tasmania, primarily in northwestern and northeastern coastal regions.

From May through July 2024, surplus is expected to persist in the Yorke Peninsula and southeastern Australia. Surpluses are expected to emerge in Northeastern New Zealand.

The forecast for the final months – August 2024 through October 2024 – anticipates exceptional deficits to appear in northern regions of Western Australia, and eastern coastal regions of the Northern Territory. Severe to extreme surplus is expected to expand significantly in southeastern regions of the country, throughout Victoria and New South Wales. Severe to extreme surplus is expected to continue in the Yorke Peninsula, with some transitional conditions also appearing in the same area.

Please note that WSIM forecast skill declines with longer lead times.