

# Global Water Monitor & Forecast Watch List

December 18, 2023

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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 November 2023 and an ensemble of forecasts issued the last week of November 2023. 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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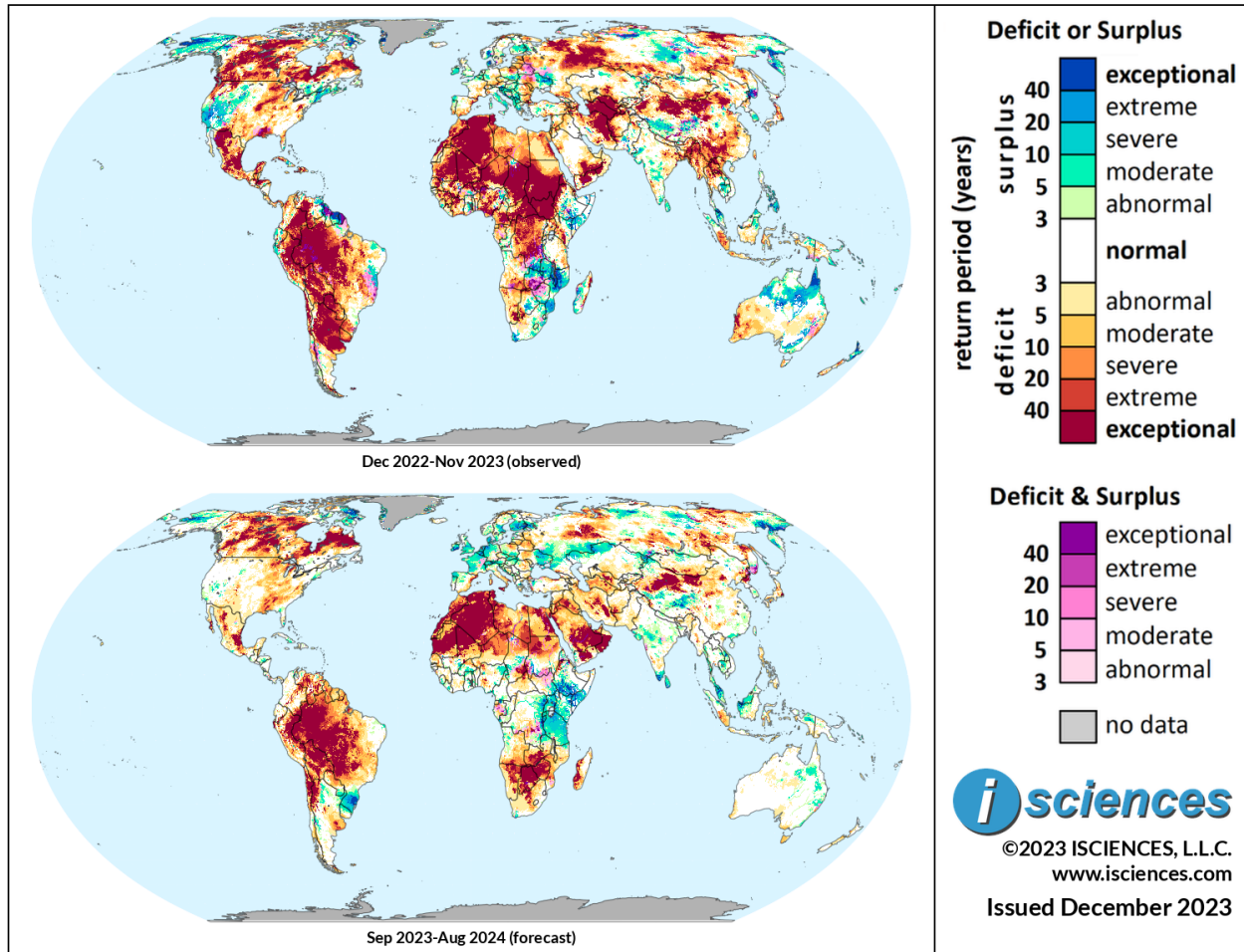
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## Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: December 2022 - August 2024



Based on observed data through November 2023 and forecasts through August 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:** Several states in the southeastern U.S. are expected to observe exceptional deficits until February 2024.

**Canada:** Widespread exceptional deficits are expected to occur throughout most provinces until May 2024 or longer.

**Mexico, Central America, and the Caribbean:** Portions of northwestern and eastern regions of Mexico can expect exceptional deficits to occur through February 2024 or longer.

**South America:** Exceptional deficits are expected to be widespread in much of western Brazil and the Bolivarian Nations through February 2024 or longer.

**Europe:** Exceptional deficits in eastern Europe are expected to dissipate, becoming mostly moderate to severe surplus throughout much of Continental Europe and the United Kingdom through February 2024 or longer.

**Africa:** Severe to extreme surpluses are expected to appear in central to eastern regions of Africa, continuing through August 2024 or longer.

**Middle East:** Exceptional deficits are expected to linger in southern portions of the region, specifically Yemen and Oman, until May 2024 or longer.

**Central Asia and Russia:** Northwestern and eastern regions of Russia are expected to experience persisting exceptional deficits throughout February 2024 or longer.

**South Asia:** Much of India is expected to observe near-normal conditions, though some southern and central regions can expect pockets of severe to extreme surplus through May 2024.

**Southeast Asia and the Pacific:** Northern and central regions of Maritime Southeast Asia are expected to endure severe to exceptional surpluses throughout February 2024 or longer.

**East Asia:** Most northern regions of China are anticipated to endure exceptional deficits through February 2024 or longer.

**Australia & New Zealand:** Moderate surplus is expected to occur in eastern regions of Australia through August 2024 or longer.

## Watch List: Regional Details

### United States

The 12-month forecast ending in August 2024 indicates that intense surplus in western states will mostly subside, as well as most intense deficits in the Upper Midwest. However, deficits are expected to linger in Minnesota, as well as in southern states such as Louisiana, Mississippi, and Alabama.

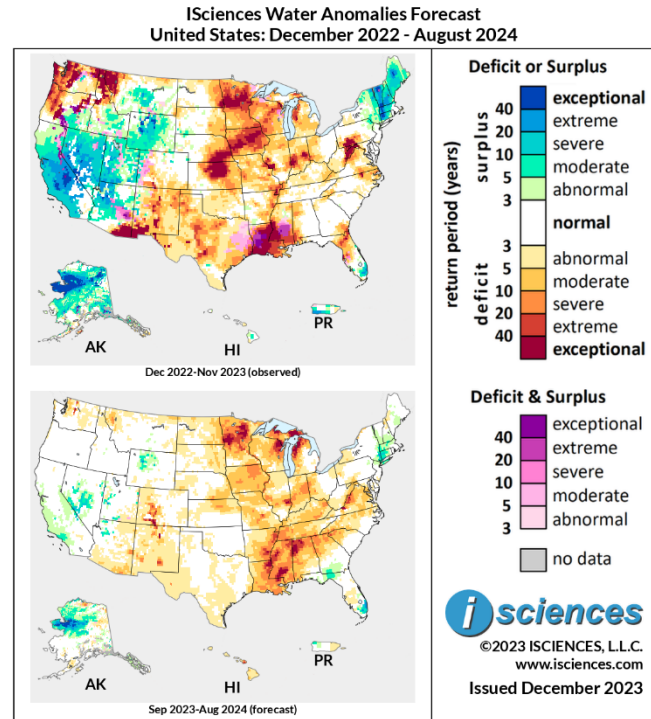
Deficits of varying intensity are expected in the following areas:

- **Louisiana, Mississippi, and Alabama**, with moderate to severe deficits occurring throughout most regions of the states. Exceptional anomalies are expected in northeastern Louisiana into south-central Mississippi, as well as northwestern Alabama.
- Central to northern **Minnesota**, with exceptional deficits expected to occur in most regions near the Upper and Lower Red Lakes, as well in areas bordering **North Dakota's** city of Fargo.
- Northeastern **Wisconsin**, with exceptional deficits in regions near the Chequamegon-Nicolet National Forest, moving into northern coastal regions of **Michigan**. Similar deficits are expected in areas within **Michigan's** Lower Peninsula.
- Pockets of east-central **Indiana** and areas along the shared border of **West Virginia and Virginia**.

Moderate to severe surpluses are expected in the following regions:

- **Nevada**, with pockets appearing throughout central regions of the state.
- Western to central **Connecticut**, spanning most regions.
- Southeastern **Florida**, southeast of Lake Okeechobee.
- **Alaska**, throughout the Seward Peninsula.

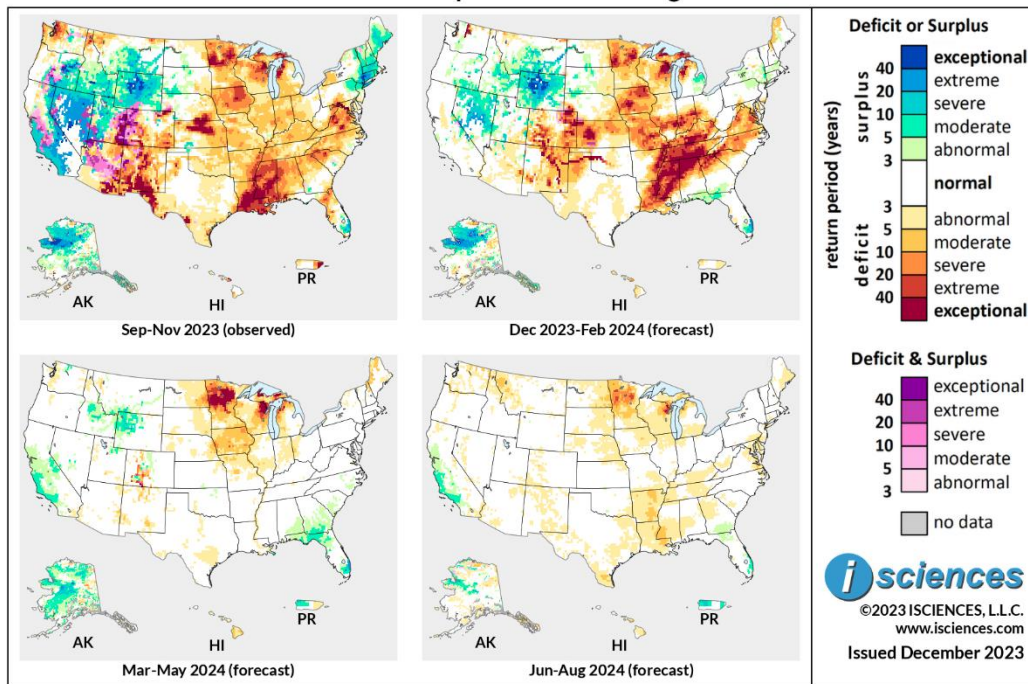
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

**ISciences Water Anomalies Forecast  
United States: September 2023 - August 2024**



**Based on observed data through November 2023 and forecasts through August 2024**

The forecast through February 2024 anticipates exceptional deficits to expand throughout many southeastern states, including throughout Louisiana, Mississippi, and northern Alabama, into Tennessee, Kentucky, and pockets throughout Indiana, Illinois, Iowa, and Missouri. Similarly intense deficits are expected further west in New Mexico, northern Texas, western and eastern Colorado, and western Kansas. Widespread surplus is expected throughout Wyoming, southern Montana, Nevada, and regions throughout the Seward Peninsula in Alaska.

From March through May 2024, most intense anomalies in central and southern states will dissipate, with exceptional deficits still expected to occur in central to northern Minnesota, northeastern Wisconsin, and northern coastal regions of Michigan. Moderate surplus is expected in northwestern Colorado, northern and southern Florida, and throughout Alaska.

The forecast for the final months – June 2024 through August 2024 – anticipates near-normal conditions throughout most of the country, with deficits persisting in northern Minnesota, but will considerably decrease in intensity. Some exceptional deficits can be expected to linger in northeastern Wisconsin. Moderate surplus is expected to persist along the western coast of California and in Alaska, throughout the Seward Peninsula.

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

## Canada

The 12-month forecast ending in August 2024 expects exceptional deficits to persist across most provinces, though exceptional anomalies will somewhat decrease in size in northern provinces including Northwest Territories and Nunavut. Exceptional deficits in Quebec are expected to increase in size.

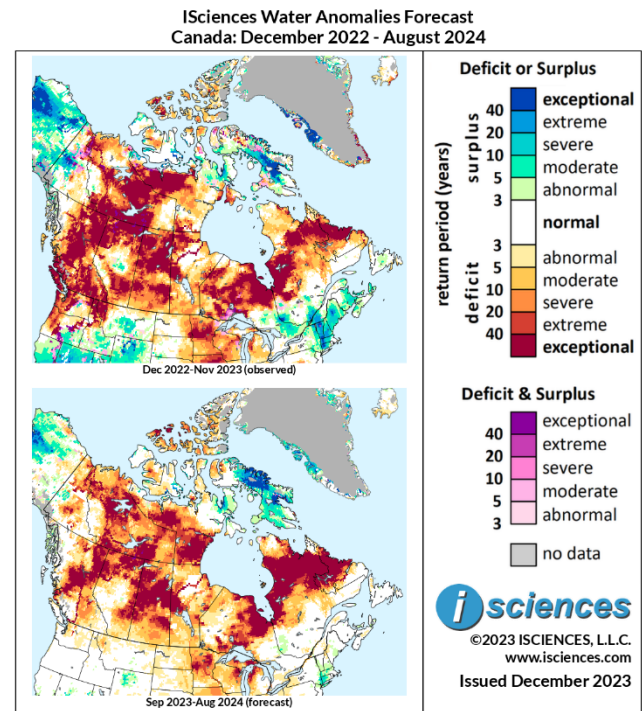
Extreme to exceptional deficits are expected in the following areas:

- Central to northeastern **British Columbia**, in regions southwest of Williston Lake, as well as the Northern Rockies region. These deficits continue into northwestern **Alberta**, in regions within and surrounding MacKenzie County.
- Central **Saskatchewan**, in most areas south of Lake Athabasca and north of Wapawekka Lake, as well as regions north of the town of Kamsack. These deficits continue into west-central **Manitoba**, in areas northwest of Lake Winnipeg.
- Northeastern **Ontario**, in northern regions of the Unorganized North Cochrane District, into much of north-central **Quebec**, into regions of **Newfoundland**.
- Northern **Yukon**, in eastern portions of the Old Crow region, which continues east into **Northwest Territories**, spreading far throughout the province.
- Northern, western, and southern **Nunavut**, in southern portions of the Kitikmeot and Kivalliq regions. Similar deficits are found further north, throughout most northern areas of the Qikiqtaaluk Region.

Extreme to exceptional surpluses are expected to occur in:

- The Qikiqtaaluk Region of **Nunavut**, covering much of Baffin Island.

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

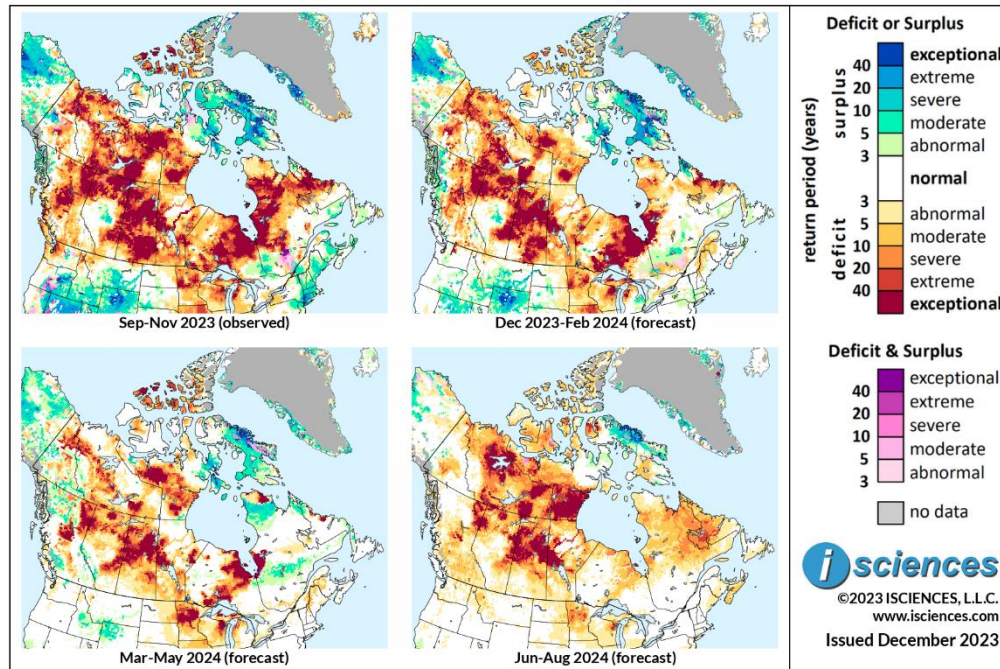


Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*



**ISciences Water Anomalies Forecast  
Canada: September 2023 - August 2024**



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 indicates that exceptional deficits throughout most provinces will continue. These regions include central to northeastern British Columbia, northern Alberta, the majority of Saskatchewan, western Manitoba, and much of central to northeastern Ontario. Deficits will continue up the coast of Hudson Bay into western coastal regions of Quebec. Deficits in Northwest Territories will persist, which will travel further northwest into northern Yukon. Similarly intense deficits will endure in western and southern Nunavut.

From March through May 2024, intense deficits are expected to linger, but slightly decrease in size. Affected areas include central and northeastern British Columbia, isolated pockets across northern Alberta, central Saskatchewan, western Manitoba, and central to northeastern Ontario. Similarly, deficits in northern Yukon will continue, which spread further southeast in pockets across Northwest Territories and western to southern Nunavut. Deficits in the northernmost islands of northern Nunavut will increase in intensity, becoming extreme to exceptional.

The forecast for the final months – June 2024 through August 2024 – exceptional deficits are expected to linger, but further diminish in size. Deficits will continue in isolated portions of northeastern British Columbia, northeastern Alberta, central Saskatchewan, and western Ontario. Further north, exceptional deficits are expected to emerge in areas surrounding to mostly dissipate, but may expand in southern regions of the province. Extreme to exceptional surplus is expected to continue in central 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 August 2024 expects widespread deficits in Mexico to diminish, though will still continue in northwestern and eastern regions of the country.

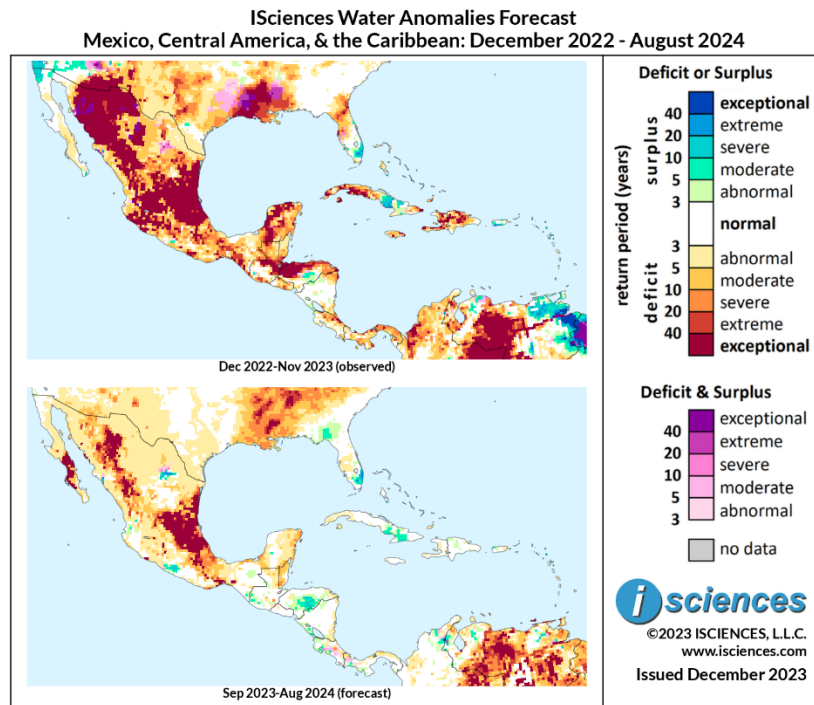
Extreme to exceptional deficits are expected in the following areas:

- **Mexico**, throughout many areas of the country, including central to southern Baja California Sur, central to southeastern Sonora and Durango, and widespread throughout San Luis Potosi, continuing east towards the country's eastern coast.

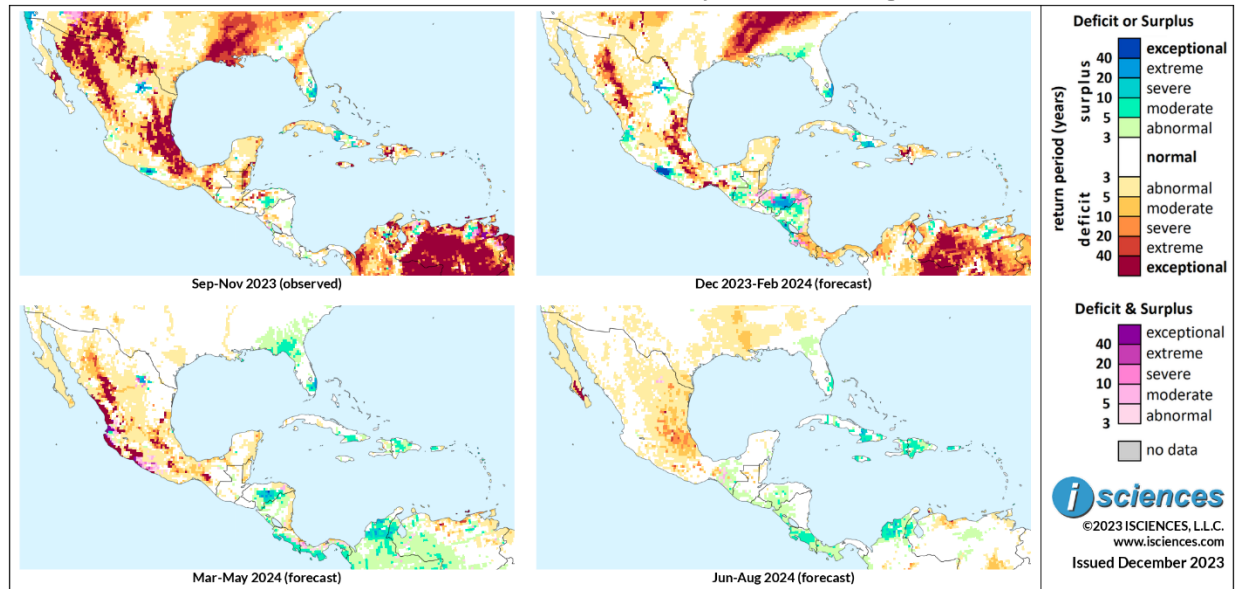
Moderate to severe surpluses are expected in the following regions:

- Eastern **Honduras**, throughout regions near the city of Catacamas.
- Eastern **Cuba**, throughout the Las Tunas region.

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



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



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 indicates that existing widespread exceptional deficits in Mexico are expected to decrease in size, though will persist in Sonora and Durango. Further east, deficits in San Luis Potosi, Hidalgo, and Puebla can expect similarly intense deficits to persist. Eastern Honduras can expect widespread surpluses to persist, as well as western coastal regions of Nicaragua. Much of Costa Rica and Panama can expect moderate to severe deficits to emerge.

From March through May 2024, exceptional deficits in the Mexican states of Sonora and Durango are expected to diminish in size, though will reappear along the country's western coast. Moderate to severe surplus in eastern Honduras is expected to persist, while similarly intense surpluses will emerge in Costa Rica.

The forecast for the final months – June 2024 through August 2024 – anticipates most intense deficits in Mexico to diminish, leaving some moderate to severe deficits in San Luis Potosi which continue towards the eastern coast, as well as isolated exceptional deficits in southern Baja California Sur. Some regions in Central America can anticipate moderate surplus, particularly throughout Costa Rica.

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

## South America

The 12-month forecast ending in August 2024 anticipates widespread exceptional deficits to continue throughout most regions of western and central Brazil, as well as throughout much of the Bolivarian Nations.

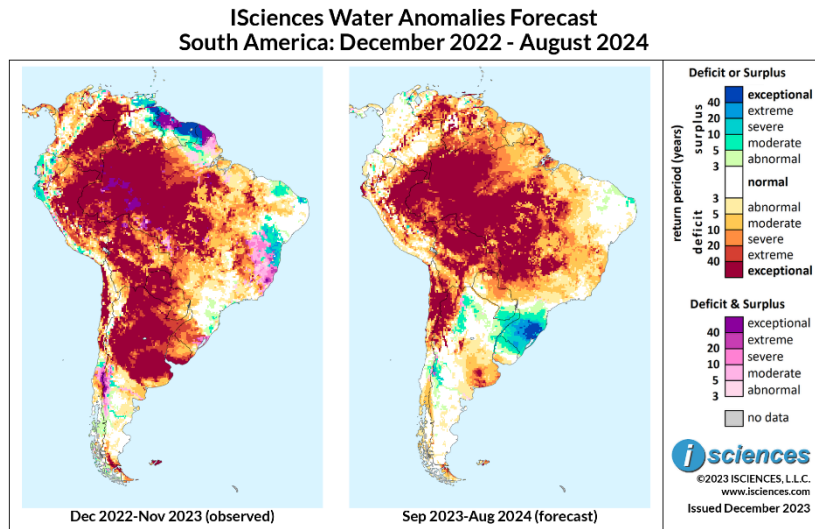
Extreme to exceptional deficits are expected in:

- Western and central **Brazil**, throughout the majority of the state of Amazonas, and into regions of Rondonia, Para, and Mato Grosso.
- Eastern **Peru**, in regions near the Mashco Piro and Made De Dios Reserves.
- **Bolivia**, throughout the Beni Department and in regions northeast of the Silvestre Amazónica Manuripi National Reserve.
- Northern **Chile**, throughout the Antofagasta Region.
- West-central **Venezuela**, in areas near the Aguaro-Guariquito National Park.

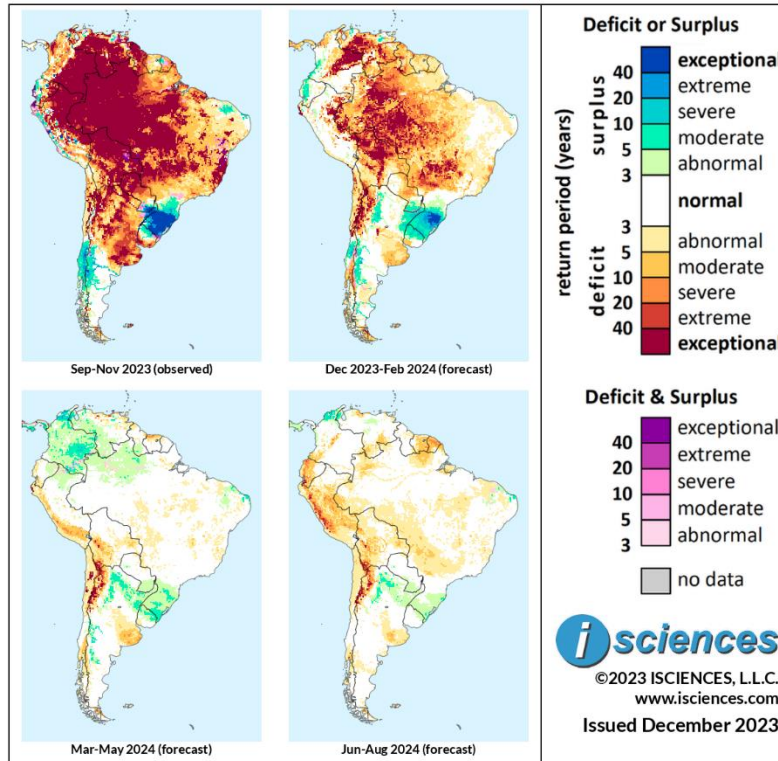
Moderate to severe surpluses are expected in the following regions:

- Southeastern **Brazil**, throughout the state of Rio Grande do Sul.

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



ISciences Water Anomalies Forecast  
South America: September 2023 - August 2024



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 anticipates widespread exceptional deficits in northern countries to lessen considerably in size, though are still expected to remain in northeastern Colombia, western Venezuela, and throughout much of west-central and southern Brazil. Nearby, the Brazilian state of Rio Grande do Sul is expected to observe extreme to exceptional surplus.

From March through May 2024, widespread deficits are expected to vanish throughout much of the region. Some exceptional anomalies will persist, specifically in northwestern Argentina, while northern Chile, southwestern Bolivia, and southern Peru will observe moderate to severe deficits.

The forecast for the final months – June 2024 through August 2024 – anticipates near-normal conditions to continue throughout the continent, with some severe to exceptional deficits continuing in northwestern Argentina and southwestern Peru. Some moderate surplus is anticipated to persist in the northernmost regions of Colombia.

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

## Europe

The 12-month forecast ending in July 2024 anticipates widespread surpluses throughout much of the United Kingdom and Ireland as well as Continental Europe. Deficits are expected in Eastern Europe and the Balkans.

The map on top depicts long-term deficit and surplus anomalies as of October 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of July 2024.

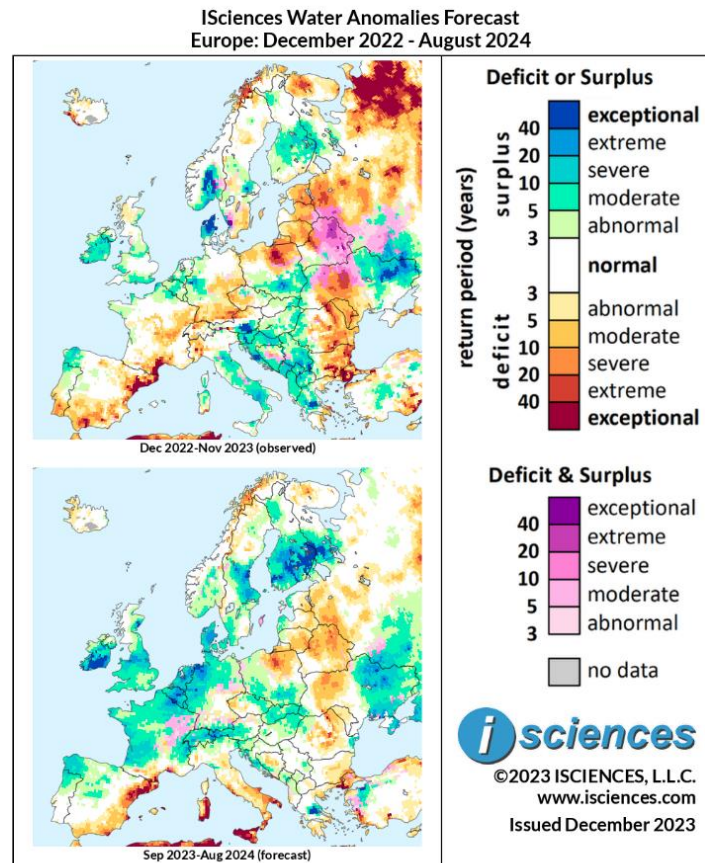
Severe to exceptional surpluses are expected in:

- Much of central to eastern **Norway**, which spread further east into southern **Sweden** and throughout most of **Finland**.
- **Netherlands** and **Belgium**, widespread throughout both countries, spreading further into western **Germany**.
- Regions along the southern border of **Austria**, as well as southern **Poland** and western areas of the Czech Republic.
- Northwestern **Spain**, throughout the community of Galicia.
- Throughout most of the **United Kingdom** and **Ireland**.

Severe to exceptional deficits are expected in the following regions:

- Western **Ukraine**, in areas west of the city of Kyiv.
- Eastern regions of the **Balkans**, particularly eastern **Bulgaria**, **Moldova**, and throughout most of **Romania**.
- North-central **Poland**, throughout the Warmian-Masurian Voivodeship.
- Northeastern **Belarus**, in areas near the city of Viciebsk.
- Northwestern **Spain**, in coastal areas of the Catalonia region.

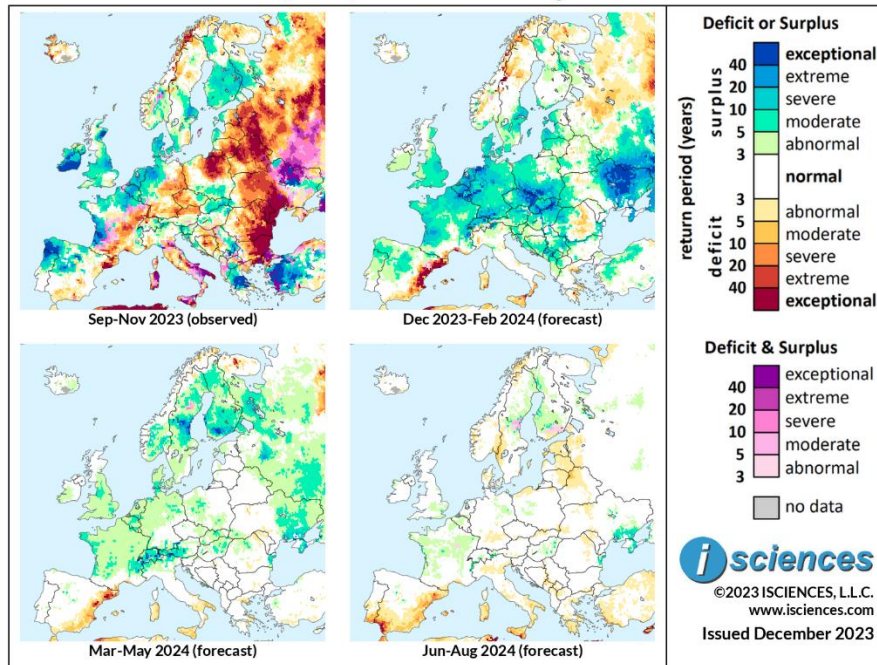
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

**ISciences Water Anomalies Forecast  
Europe: September 2023 - August 2024**



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 indicates that most intense deficits in eastern Europe will dissipate, with near-normal conditions emerging in western Ukraine, Belarus, and Bulgaria. Eastern Ukraine can expect widespread exceptional surpluses to emerge, as well as areas in southwestern Poland, eastern to northeastern Czech Republic, and throughout Slovakia. Further west, similarly intense surpluses will emerge in western and southern Germany, continuing into the Netherlands, and Belgium. Moderate to severe surplus is expected in much of France, central to eastern Germany, central Spain, and in central to southern regions of the United Kingdom. In Spain, deficits are expected to expand throughout the Catalonia region of northeastern Spain.

From March through May 2024, much of Continental Europe can expect near-normal to moderate surplus conditions across most of the region. The most intense surpluses are expected to occur in Switzerland and western Austria, as well as central Sweden and southern Finland. Further south, the Catalonia region of Spain is expected to observe extreme to exceptional deficits.

The forecast for the final months – June 2024 through August 2024 – anticipates near-normal conditions to continue throughout most of the region, though southern coastal regions of Spain will experience extreme to exceptional deficits. Further north, Spain’s Catalonia region can anticipate deficits to continue, but will downgrade to moderate to severe intensity.

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

## Africa

The 12-month forecast ending in August 2024 anticipates exceptional deficits to dissipate central regions of the country, but persist in Algeria, Mali, Mauritania, and nearby western coastal regions. Regions of southeastern Africa are expected to observe surpluses of varying intensity, while southern countries such as South Africa, Namibia, and Zimbabwe should expect exceptional deficits to emerge.

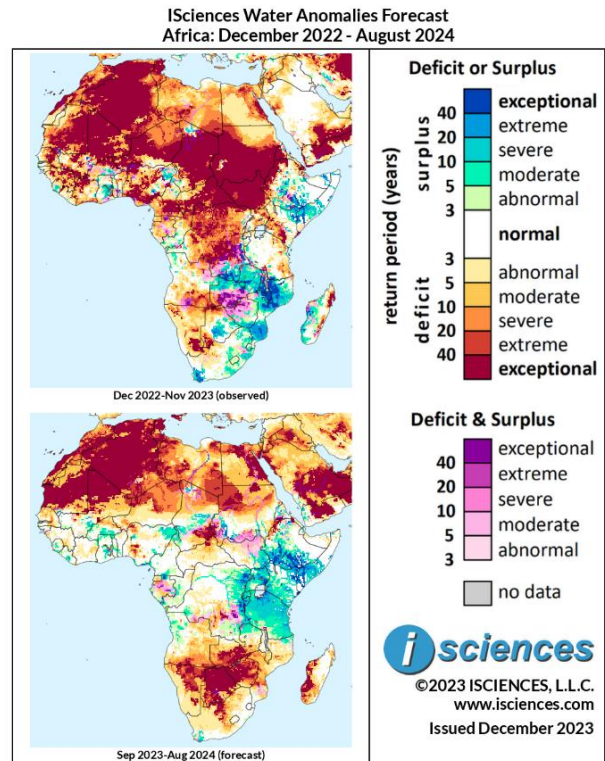
Extreme to exceptional deficits are expected in the following areas:

- **Algeria**, widespread throughout the country. Deficits continue into northern **Mali** and across the majority of central **Mauritania**, into western coastal regions of **Morocco** and **Western Sahara**.
- Western and southeastern **Libya**, throughout western portions of the Nalut and Ghat districts. Extreme deficits will appear in the Kufra District, continuing into northwestern **Sudan**, and become widespread across most coastal regions of **Egypt** along the Mediterranean and Red Seas.
- Southeastern **Chad**, widespread across the Salamat region.
- Central to northern **Namibia**, continuing throughout much of **Botswana**, **Zimbabwe**, and central to eastern **Zambia**.
- **Madagascar**, with exceptional deficits occurring along most western coastal regions of the country.

Severe to exceptional surpluses are expected in the following regions:

- Southern **Ethiopia**, covering most regions south of the Yabelo Wildlife Sanctuary, into most of **Kenya** and southern **Somalia**.
- **Tanzania**, widespread throughout much of the country.
- Northeastern **Democratic Republic of Congo**, throughout eastern regions of the Ituri province, moving east into the majority of **Uganda**.

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

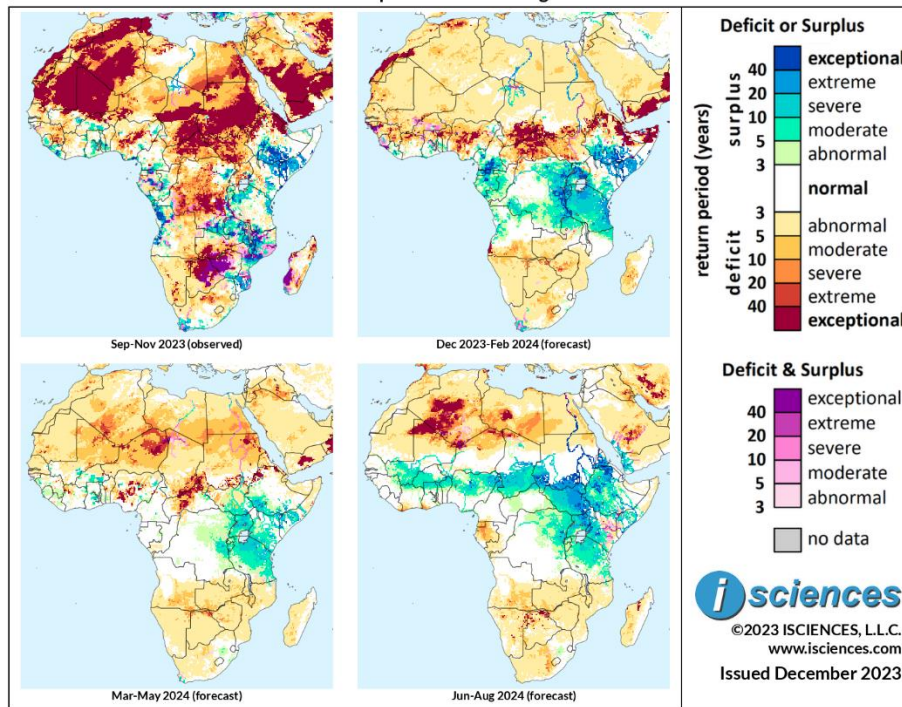


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*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*



ISciences Water Anomalies Forecast  
Africa: September 2023 - August 2024



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 anticipates deficits to emerge in Morocco and Western Sahara, as well as in a band across northern portions of Ivory Coast into Nigeria, southwestern Chad, Central African Republic, southern Sudan, and northern Ethiopia. Northernmost regions of the Horn of Africa are expected to observe exceptional deficits. Central countries are expected to observe severe to extreme surplus, with the highest concentrations appearing in Cameroon, Gabon, eastern Democratic Republic of Congo, Uganda, Tanzania, and throughout most southern regions of the Horn of Africa.

From March through May 2024, surpluses in eastern Africa are expected to downgrade in size but persist, particularly in Uganda, Tanzania, and Kenya. Exceptional anomalies are expected to downgrade in size but continue in central Nigeria, northeastern Niger, southeastern Chad, and central regions of Central Africa Republic.

The forecast for the final months – June 2024 through August 2024 – a band of severe to extreme surplus is expected to emerge across Burkina Faso, and is expected to continue east into northern Nigeria, southern Chad, southern Sudan, South Sudan, Uganda, and southern Kenya. These surpluses are expected to expand further into much of Tanzania, Ethiopia, and northeastern Democratic Republic of Congo. Further north, exceptional deficits are expected to appear in northern Mali, central Algeria, and west-central Libya.

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

## Middle East

The 12-month forecast ending in August 2024 anticipates exceptional deficits to expand throughout Saudi Arabia, as well as Yemen and Oman. Similar deficits will continue throughout areas of Iran, though will significantly decrease in size.

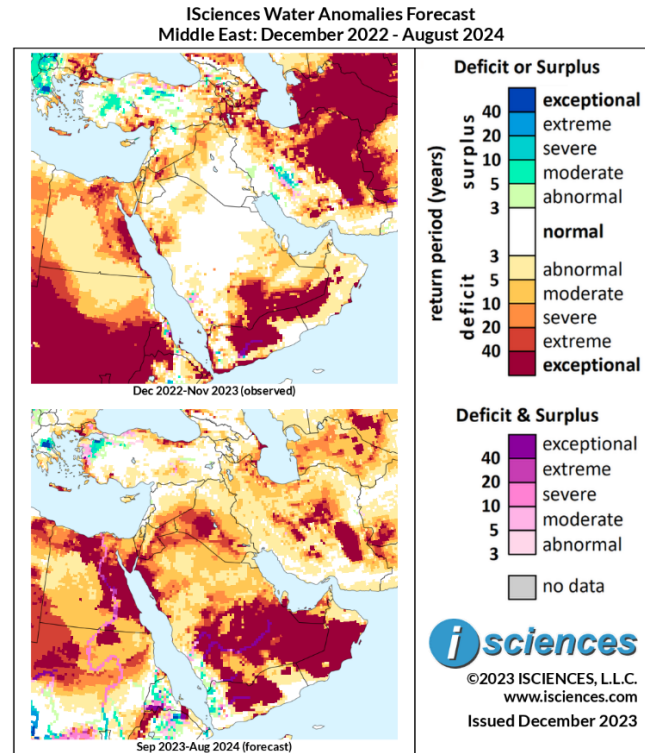
Extreme to exceptional deficits are expected in the following areas:

- Central to southern **Saudi Arabia**, throughout the Riyadh and Al Ahsa provinces, continuing into much of the **United Arab Emirates**.
- Central **Yemen**, throughout much of the Shabwah Governorate, continuing throughout much of **Oman**.
- **Jordan**, continuing through southern and northern regions, moving east into northern **Saudi Arabia** and west-central **Iraq**, throughout most areas in the Al-Qādisiyyah Governorate.
- Central to eastern **Iran**, in northern regions of the Sistan and Baluchestan Province.
- Northern coastal regions of **Turkey**.

Moderate to severe surpluses are expected in the following regions:

- Northwestern **Turkey**, near the city of Istanbul.
- Western **Yemen**, with moderate surpluses occurring along the country's western coast.

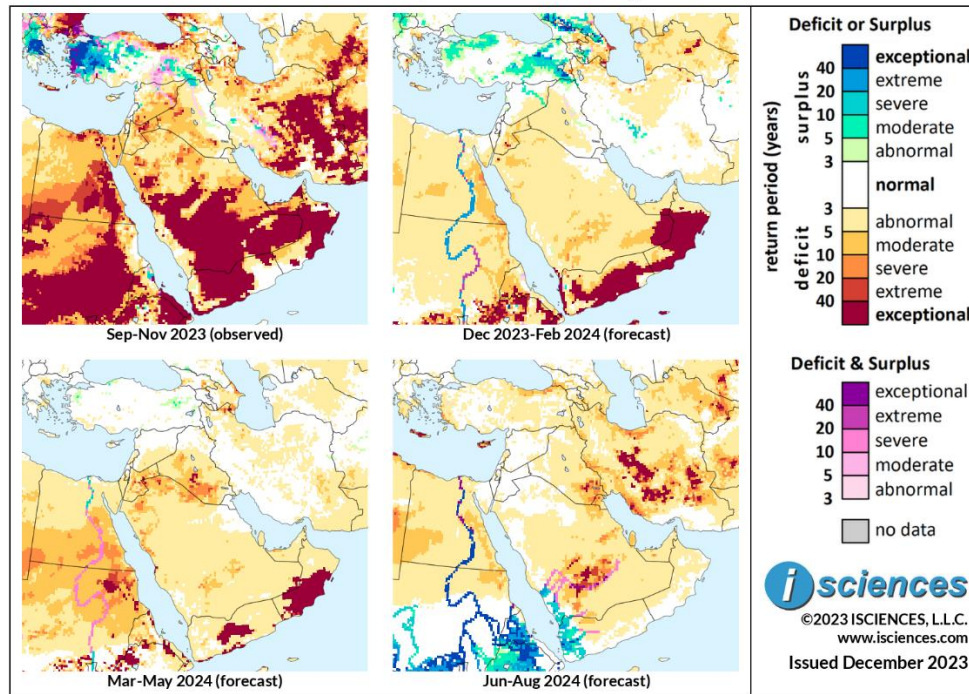
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Based on observed data through November 2023 and forecasts through August 2024

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**ISciences Water Anomalies Forecast  
Middle East: September 2023 - August 2024**



**Based on observed data through November 2023 and forecasts through August 2024**

The forecast through February 2024 anticipates most intense deficits in the region to dissipate, though exceptional deficits are expected to continue throughout most of Yemen and Oman. Intense surpluses are expected in northwestern and eastern regions of Turkey, as well as throughout northern regions of Georgia. Most other regions in the Middle East can anticipate near-normal conditions.

From March through May 2024, most of the Middle East can expect near-normal to moderate conditions to continue throughout the majority of the region. Exceptional deficits are expected to persist in central Yemen and throughout Oman. In Iraq, regions south of Therthar Lake can expect severe to exceptional deficits, as well as some areas in central Jordan.

The forecast for the final months – June 2024 through August 2024 – exceptional deficits are expected to disappear in Yemen and Oman, but reappear in south-central Saudi Arabia, near the city of Riyadh. Severe to extreme surpluses are expected to appear in western coastal regions of Yemen, as well as southwestern regions coastal regions of Saudi Arabia. Further north, some pockets of exceptional deficits are expected in southeastern Iraq and much of central Iran.

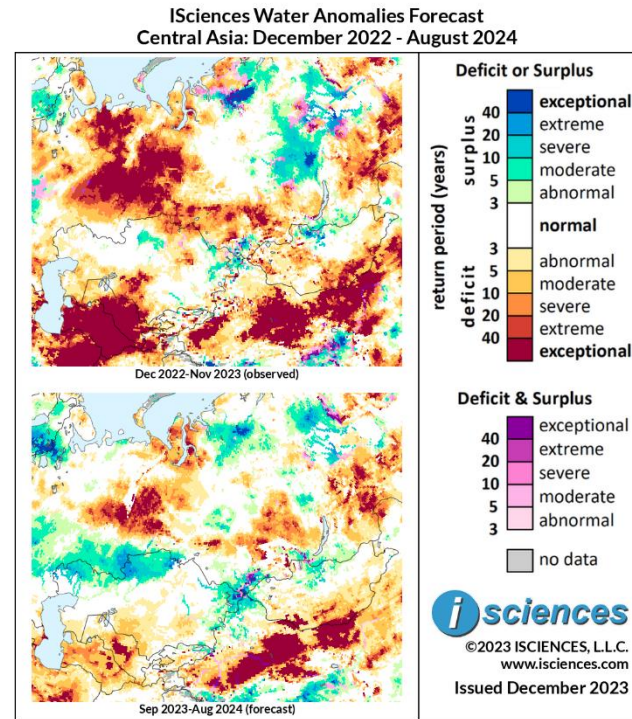
Please note that WSIM forecast skill declines with longer lead times.

## Central Asia and Russia

The 12-month forecast ending in August 2024 anticipates exceptional deficits in western and southeastern Russia to endure, but decrease significantly in size. Pockets of exceptional surplus are expected to linger in areas of northern Russia, but can expect to remain isolated in areas near the Taymyrsky Dolgano-Nenetsky District.

Extreme to exceptional deficits are expected in the following areas:

- Northern **Russia**, throughout northern coastal regions of Yamalo-Nenets Autonomous Okrug.
- Western **Russia**, in central regions of the Western Siberian Plain.
- Southeastern **Russia**, throughout central, southern, and eastern regions of the Irkutsk Oblast. These deficits are expected to continue north into southernmost regions of the Sakha Republic.
- Central regions of **Uzbekistan** and **Turkmenistan**.



Based on observed data through November 2023 and forecasts through August 2024

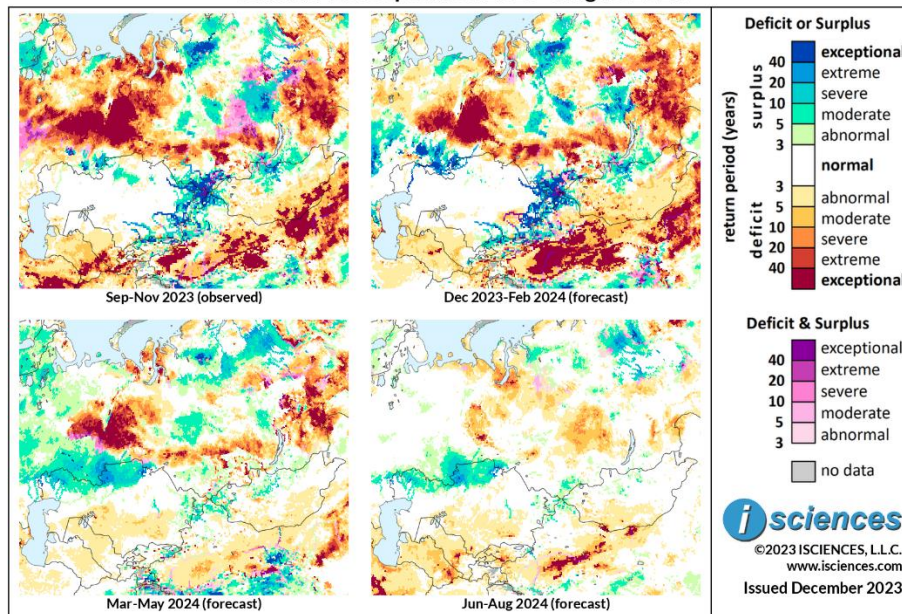
*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficits and surpluses as of August 2024.*

Severe to exceptional surpluses are expected in the following regions:

- Northern **Russia**, in southern regions of the Anabarsky and Taymyrsky Dolgano-Nenetsky districts.
- Northern and eastern **Kazakhstan**, appearing throughout the North Kazakhstan and Pavlodar regions, as well as throughout the Kurshim District.

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

**ISciences Water Anomalies Forecast  
Central Asia: September 2023 - August 2024**



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 anticipates that widespread, intense deficits in the Khanty-Mansi Autonomous Okrug are expected to continue, which move further east into southern regions of Krasnoyarsk Krai and across southern Siberia, passing through regions near the cities of Novosibirsk and Krasnoyarsk. Central regions of the Taymyrsky Dolgano-Nenetsky District are expected to observe exceptional surplus, which continues southeast into regions near the city of Bratsk. In eastern Kazakhstan, exceptional surplus is expected to be widespread, throughout the Kurshim District and continuing south further into the Almaty and Jambyl regions. These surpluses will continue further south into northern regions of Kyrgyzstan.

From March through May 2024, intense deficits are expected to persist in the Khanty-Mansi Autonomous Okrug, which continue east into southern Krasnoyarsk Krai and western to central regions of the Irkutsk Oblast. Similar deficits are expected in southern regions of the Sakha Republic, east of Lake Baikal. Central regions of the Taymyrsky Dolgano-Nenetsky District can expect severe to exceptional surplus, as well as regions further southeast, in the Olenyoksky District. Northern Kazakhstan can expect similarly intense surpluses. In northern Russia, deficits in northern coastal regions of Taymyrsky Dolgano-Nenetsky District are expected to continue.

The forecast for the final months – June 2024 through August 2024 – indicates that most intense anomalies will disappear from the region. However, severe to extreme surplus is expected to continue in northern Kazakhstan and northern regions of the Sakha Republic, as are deficits in northern coastal regions of Taymyrsky Dolgano-Nenetsky District.

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

## South Asia

The 12-month forecast ending in August 2024 anticipates surpluses to strengthen in southernmost regions of India, with moderate to severe surpluses remaining in western and west-central states of the country. Pockets of deficit throughout eastern India and Bangladesh are expected to diminish, while deficit in southern Afghanistan and northwestern Pakistan is expected to continue, but decrease in size.

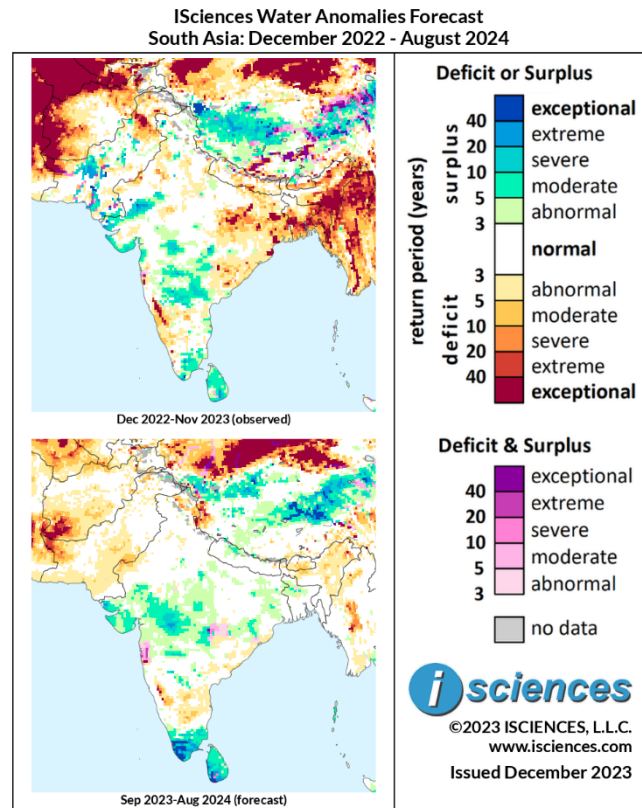
Severe to exceptional surpluses are expected in the following regions:

- Southernmost **India**, through the states of Kerala and Tamil Nadu.
- Central **India**, in southern regions of the state of Madhya Pradesh and throughout Gujarat.
- **Sri Lanka**, throughout the country, with the highest concentrations appearing in southern coastal regions.

Severe to exceptional deficits are expected in the following areas:

- Southwest **Pakistan**, in northwestern regions of the Chagai District.
- Southwest **Afghanistan**, in southern regions of the Chahar Burjak District.

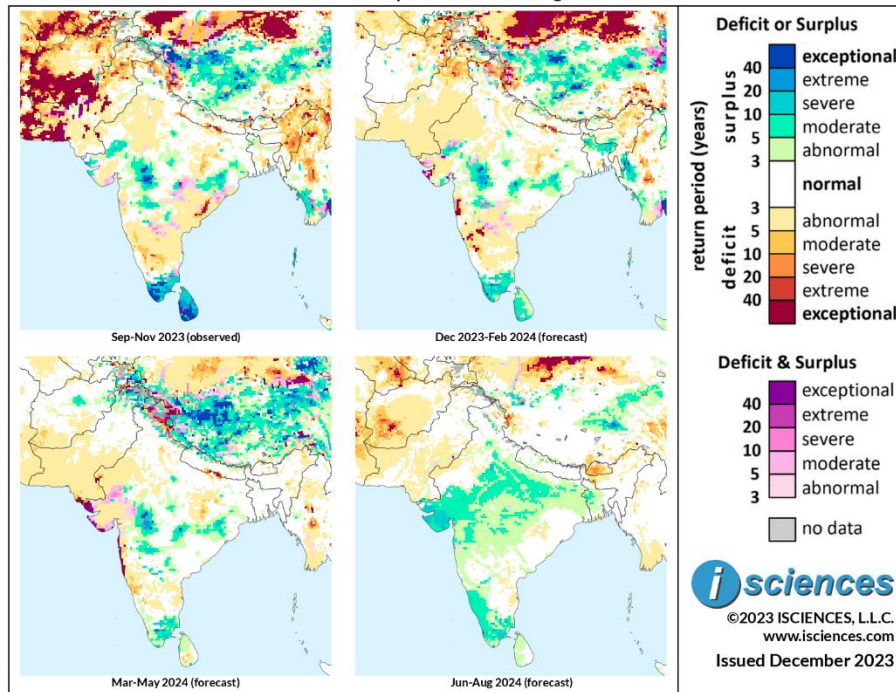
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

ISciences Water Anomalies Forecast  
South Asia: September 2023 - August 2024



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 anticipates severe to exceptional surplus to occur in west-central regions of Madhya Pradesh and in Karnataka. Similarly intense surpluses are expected in northern Bangladesh and in western to central Sri Lanka. Northern Pakistan can expect moderate to severe deficits to occur near the city of Islamabad. The rest of the region can expect mostly near-normal to moderate conditions.

From March through May 2024, severe to extreme surpluses are expected to linger in west-central regions of Madhya Pradesh, as well as Tamil Nadu and West Bengal. Some exceptional deficits will occur in western coastal regions of Gujarat, Maharashtra, and northernmost regions of Himachal Pradesh.

The forecast for the final months – June 2024 through August 2024 – anticipates most regions to experience continued near-normal conditions, though several regions of India, including the states of Gujarat, Madhya Pradesh, Karnataka, and Tamil Nadu, will experience an emergence of moderate to severe surplus.

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

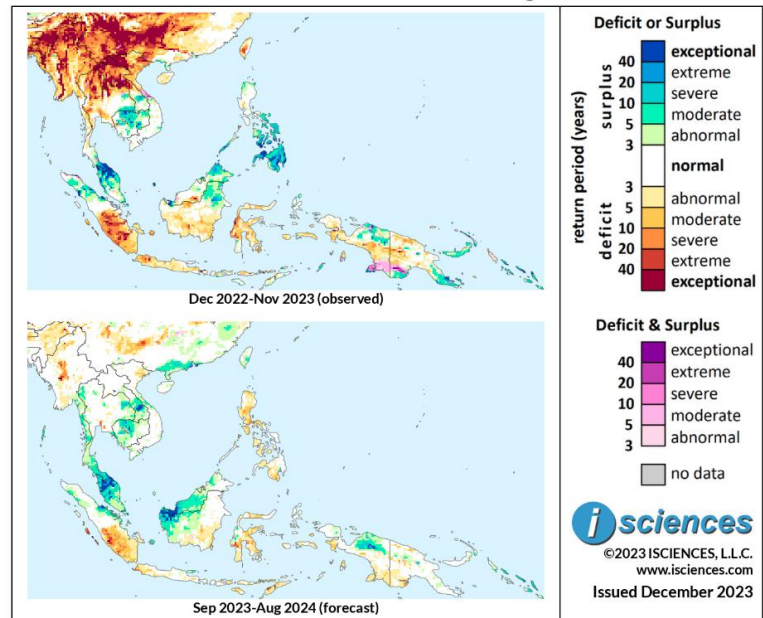
## Southeast Asia and the Pacific

The 12-month forecast ending in August 2024 anticipates severe to exceptional surplus to continue in various parts of Malaysia, as well as Laos and Cambodia. Deficits are expected to persist in Sumatra, but downgrade in intensity.

Moderate to severe surpluses are expected in the following regions:

- Peninsular **Malaysia**, throughout the states of Perak and Kelantan.
- **Indonesia**, with concentrations in northwestern Kalimantan and western Borneo.
- Papua, in regions near the Tolikara Regency.
- Southern **Laos**, within the Salavan Province.
- Western **Cambodia**, near Tonle Sap.

ISciences Water Anomalies Forecast  
Southeast Asia: December 2022 - August 2024



Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

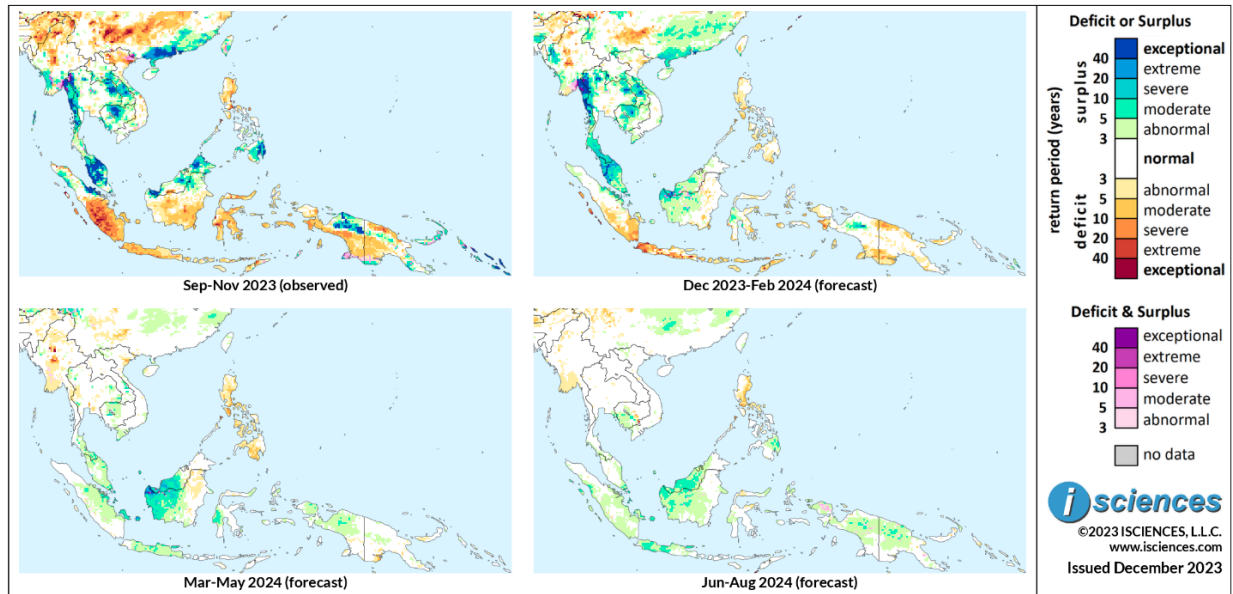
Severe to extreme deficits are expected in the following areas:

- **Indonesia**, in central to southern areas of Sumatra. Similarly intense deficits are expected in pockets across Sulawesi and the Mentawai Islands Regency.

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



**ISciences Water Anomalies Forecast  
Southeast Asia: September 2023 - August 2024**



Based on observed data through November 2023 and forecasts through August 2024

The forecast through February 2024 anticipates severe to exceptional surpluses to persist in western Thailand, continuing south and covering much of Peninsular Malaysia. Similarly intense surpluses are expected in northern and eastern Thailand, which continue into southern Laos and western Cambodia.

In Maritime Southeast Asia, deficits are anticipated in southern Sumatra, throughout Java, and the Lesser Sunda Islands.

From March through May 2024, much of Mainland and Maritime Southeast Asia will experience near-normal conditions. However, northwestern Kalimantan and western Borneo will experience persisting severe to exceptional surplus.

The forecast for the final months – June 2024 through August 2024 – anticipates near-normal conditions throughout much of the area. Some moderate surpluses are expected in Maritime Southeast Asia, mostly in western Java and Borneo.

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

## East Asia

The 12-month forecast ending in August 2024 anticipates widespread deficits throughout China to diminish, though still continuing in northwestern and northern regions of the country. Southwestern regions can expect pockets of severe to exceptional surplus to endure.

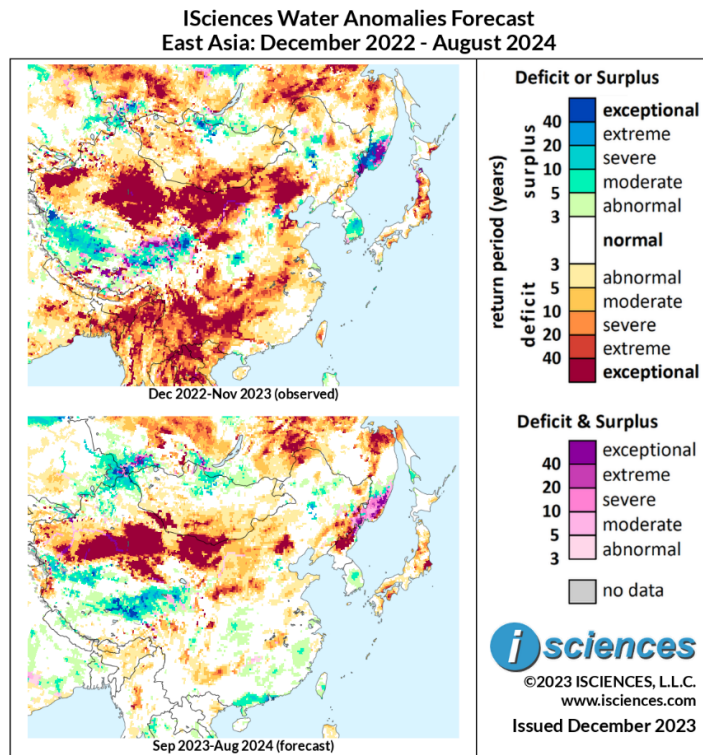
Extreme to exceptional deficits are expected in the following areas:

- Northwestern **China**, throughout southeastern Xinjiang, northern Qinghai, and northern Gansu. Similarly intense deficits can be found further east in northern **Shanxi**.
- Northern and eastern **China**, in western Inner Mongolia, as well as in areas near the cities of Beijing and Shenyang.
- **North Korea**, widespread throughout most northern regions of the country.
- **Japan**, in coastal regions east of Tokyo.

Severe to exceptional surpluses are expected in the following regions:

- **Southwestern China**, in eastern regions of Tibet.

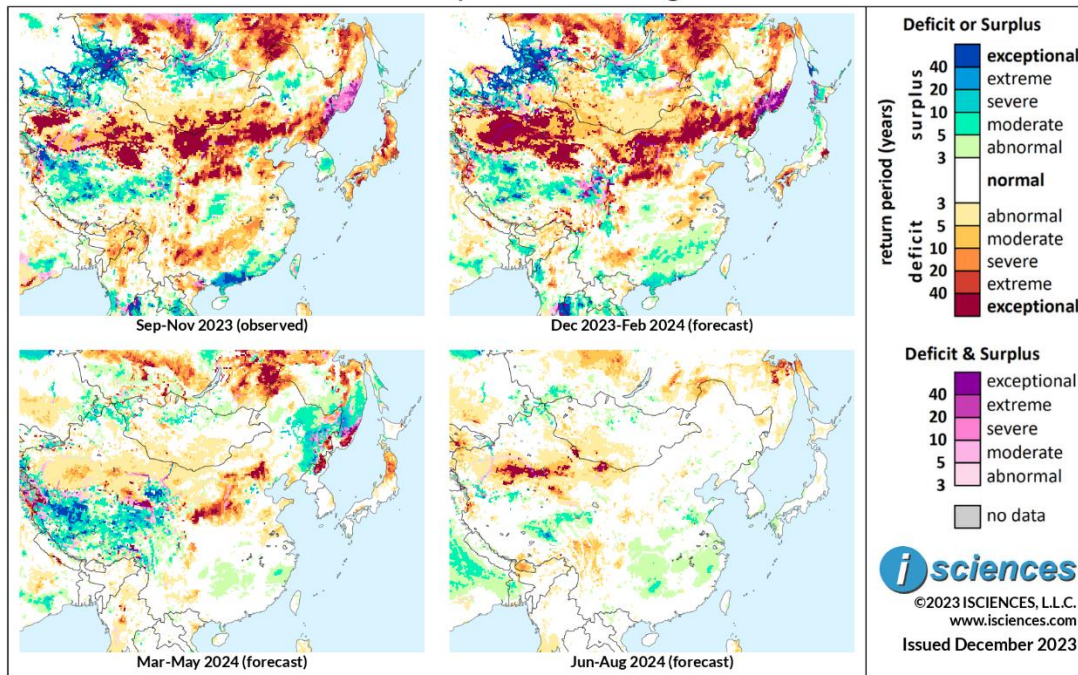
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through November 2023 and forecasts through August 2024

*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

**ISciences Water Anomalies Forecast  
East Asia: September 2023 - August 2024**



**Based on observed data through November 2023 and forecasts through August 2024**

The forecast through February 2024 anticipates deficits to intensify throughout much of northern China, with exceptional anomalies spreading throughout much of Xinjiang, Qinghai, Gansu, and Inner Mongolia. Nearby, transitional conditions are expected to intensify in eastern regions of Heilongjiang. Surpluses of varying intensity are expected to endure in Tibet, as well as further east in the provinces of Fujian and Guangdong.

From March through May 2024, severe to exceptional surplus is expected to intensify throughout southwestern China, in the Tibet region, as well as in central Qinghai. Exceptional deficits are expected to persist in the Shanxi and Hebei provinces. Northeastern China can anticipate exceptional deficits and transitional conditions to diminish, though severe to extreme surpluses are expected to emerge in the Liaoning and Jilin provinces.

The forecast for the final months – June 2024 through August 2024 – indicates that most of China will observe near-normal conditions, though deficits in northwestern China are expected to remerge.

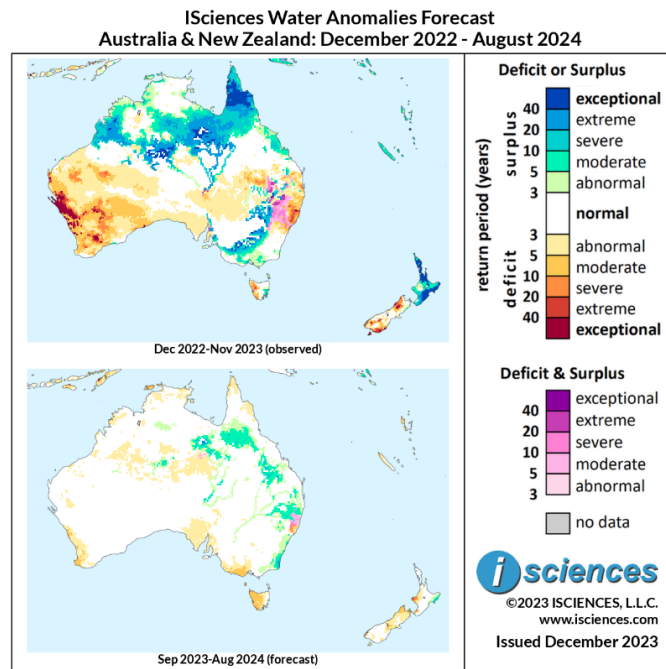
Please note that WSIM forecast skill declines with longer lead times.

## Australia and New Zealand

The 12-month forecast ending in August 2024 anticipates most intense anomalies in the region to dissipate, leaving some instances of moderate surplus in western to central Queensland, eastern New South Wales, and eastern Northern Territory.

Moderate to severe surpluses are expected in the following regions:

- Central **Queensland**, in regions near the Einasleigh River. Further southwest, significant portions of the Isaac region can expect similarly intense anomalies.
- Eastern **Northern Territory**, near the Ranken region.
- Northeastern **New South Wales**, appearing near the coastal city of Coffs Harbour. Nearby, similarly intense anomalies continue in southeastern **New South Wales** into eastern coastal areas of **Victoria**'s East Gippsland region.



Based on observed data through November 2023 and forecasts through August 2024

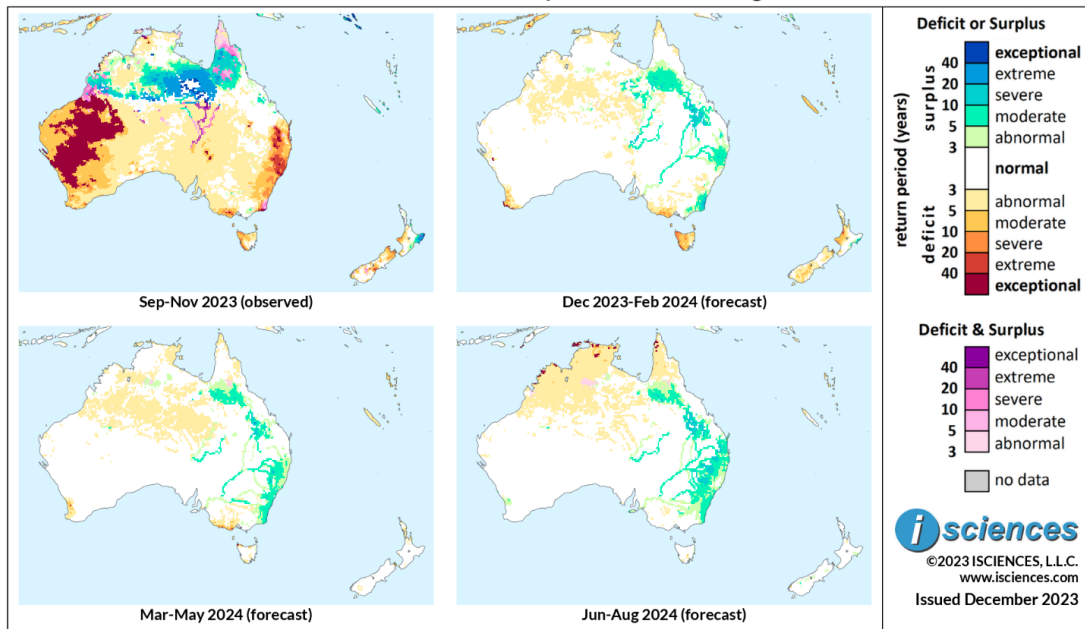
*The map on top depicts long-term deficit and surplus anomalies as of November 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of August 2024.*

Deficits of varying intensity are expected in the following areas:

- Southern **Victoria**, with moderate deficits throughout most southern coastal regions near the Great Otway National Park.
- **Tanzania**, with moderate deficits covering most western and central regions of the country.
- Northern **New Zealand**, with severe deficits along the southwest coast of Taranaki in North Island.

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

**ISciences Water Anomalies Forecast  
Australia & New Zealand: September 2023 - August 2024**



**Based on observed data through November 2023 and forecasts through August 2024**

The forecast through February 2024 expects exceptional deficits in western and eastern regions of the continent to disappear, leaving some moderate to severe surplus anomalies throughout central and southeastern Queensland, as well as southeastern New South Wales and eastern coastal regions of Victoria. Moderate to severe deficits are expected to persist in western and central Tasmania. Some deficits are expected to continue in western coastal regions of Victoria, as well as in coastal regions of the South West region of Western Australia. In New Zealand, most intense anomalies in South Island will dissipate, though some moderate to severe deficits will continue in western portions of North Island, near the Taranaki region.

From March through May 2024, existing surpluses in central and southeastern Queensland are expected to persist. Similarly intense surpluses throughout eastern New South Wales will grow in size and continue further south into eastern regions of Victoria. Conditions in Tasmania and New Zealand are expected to be mostly normal.

The forecast for the final months – June 2024 through August 2024 – anticipates surpluses across Queensland and New South Wales to continue, with surpluses expanding further inland into east-central New South Wales. Normal conditions in New Zealand and Tasmania are expected to continue.

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