

# Global Water Monitor & Forecast Watch List

March 16, 2024

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## Table of Contents

Introduction ..... 2

Worldwide Water Watch List..... 4

Watch List: Regional Synopsis..... 4

Watch List: Regional Details..... 6

    United States..... 6

    Canada ..... 8

    Mexico, Central America, and the Caribbean ..... 10

    South America..... 12

    Europe..... 14

    Africa ..... 16

    Middle East ..... 18

    Central Asia and Russia ..... 20

    South Asia ..... 22

    Southeast Asia and the Pacific ..... 24

    East Asia ..... 26

    Australia and New Zealand ..... 28

## 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 February 2024 and an ensemble of forecasts issued the last week of February 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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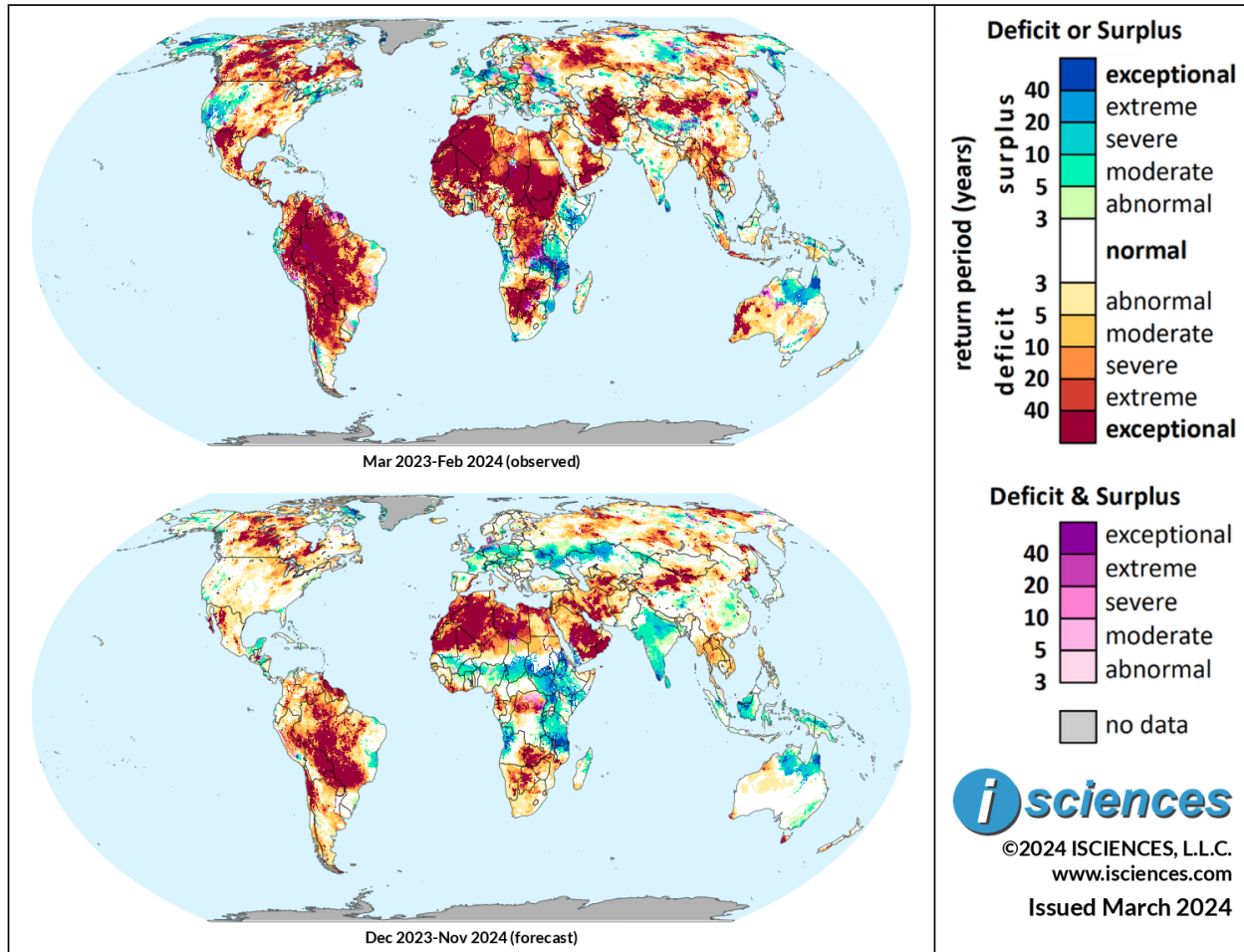
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## Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: March 2023 - November 2024



Based on observed data through February 2024 and forecasts through November 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:** Regions of the Upper Midwest are expected to observe lingering extreme to exceptional deficits until August 2024.

**Canada:** Portions of the Prairie Provinces and Northern Territories can anticipate exceptional deficits to linger until August 2024 or longer.

**Mexico, Central America, and the Caribbean:** Northwestern regions of Mexico are expected to endure lingering deficits until November 2024 or longer.

**South America:** Portions of central to southern Brazil and the Bolivarian Nations should anticipate deficits until August 2024.

**Europe:** Widespread surpluses are expected throughout most European regions until May 2024.

**Africa:** Surpluses are expected to emerge throughout the Sahel starting in June 2024 and are expected to last until November 2024 or longer.

**Middle East:** Intense deficits are expected to linger in pockets throughout southern Middle Eastern countries until May 2024.

**Central Asia and Russia:** Exceptional deficits are expected to continue in western Russia until May 2024, while southwestern regions can expect surpluses to linger until August 2024.

**South Asia:** Much of India is expected to observe abnormal anomalies, though surpluses are expected to be widespread throughout India starting in June 2024 and continuing until November 2024 or longer.

**Southeast Asia and the Pacific:** Surpluses of varying intensity are expected to be present in much of Maritime Southeast Asia until November 2024 or longer.

**East Asia:** Widespread surplus is expected to emerge in Tibet, but resolve after May 2024.

**Australia & New Zealand:** Northern regions of Australia are expected to observe widespread surpluses through May 2024, which will shift to transitional conditions until August 2024.

## Watch List: Regional Details

### United States

The 12-month forecast ending in November 2024 indicates that most exceptional deficits are expected to dissipate, as are exceptional surpluses occurring in western and northeastern states. However, deficits are still expected to continue in some Upper Midwest regions.

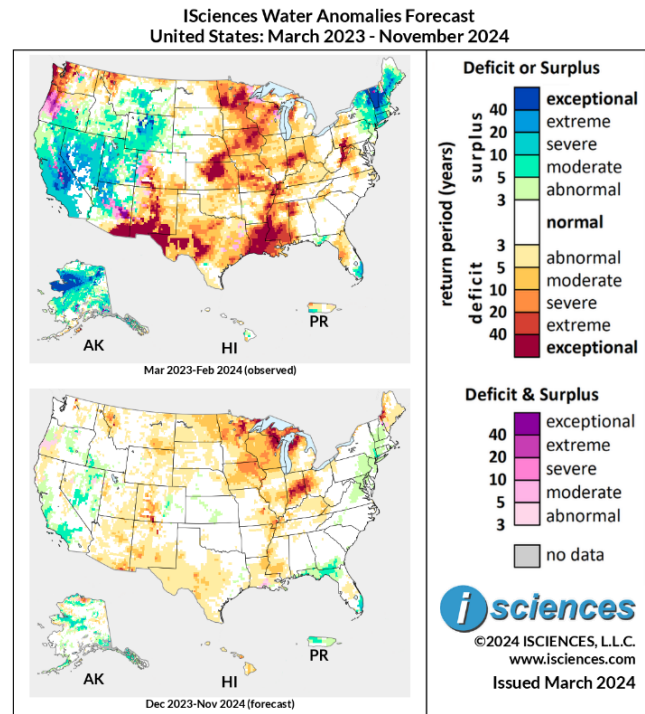
Severe to exceptional deficits are expected in the following areas:

- **Indiana**, spread throughout most central regions of the state.
- **Michigan**, throughout the Upper and Northern Lower peninsulas, continuing south into Oneida County, **Wisconsin**.
- **Minnesota**, with deficits occurring in St. Louis County.
- Western **Maine**, in Oxford County.

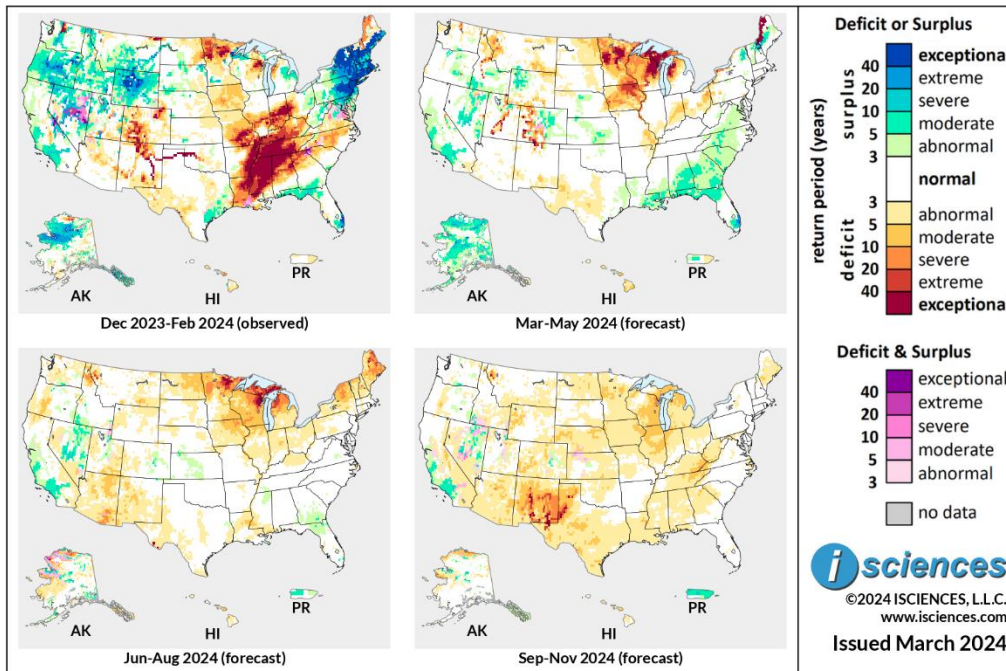
Moderate to severe surpluses are expected in the following regions:

- **Alaska**, with surpluses appearing in northern regions of the Seward Peninsula, which continue east into the Northwest Arctic Borough.
- Southern and northern **Florida**, along the state’s southeastern coast, as well as throughout regions near the city of Tallahassee.
- Southern **California**, with most anomalies appearing in areas northwest of Los Angeles. **Nevada** can expect similar anomalies to appear in places within and near Nye County.
- **Puerto Rico**, in most western regions of the island.

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



**iSciences Water Anomalies Forecast  
United States: December 2023 - November 2024**



**Based on observed data through February 2024 and forecasts through November 2024**

The forecast through May 2024 indicates that exceptional deficits in southeastern states will mostly resolve, becoming a mixture of normal conditions and abnormal to moderate surpluses. In the Upper Midwest, exceptional deficits are expected to expand, spreading further throughout the Upper and Northern Lower Peninsula regions of Michigan, as well as northeastern Wisconsin and central Minnesota. Northeastern Iowa can expect moderate to extreme deficits to arise. Areas along the western border of Maine can expect exceptional deficits to emerge. Some regions of western Colorado and central Utah should expect pockets of severe to extreme deficits. Surplus is expected to remain in northern and southern regions of Florida and expand through southern Alabama and southeastern Louisiana. Surplus is expected to expand throughout most of Alaska.

From June through August 2024, exceptional deficits are expected to remain in Minnesota, northeastern Wisconsin, and peninsular regions of Michigan. Moderate to extreme deficits are forecast to appear in central, eastern, and northeastern Maine and northern New York. Surpluses in California and Nevada are expected to remain. Much of Alaska is expected to transition from surpluses to near normal conditions with pockets of abnormal deficits.

The forecast for the final months – September 2024 through November 2024 – anticipates abnormal to moderate deficits to cover most of the country. Severe to exceptional deficits are expected to emerge throughout New Mexico and the Great Plains region of Texas. Moderate to severe surpluses may cover most of Puerto Rico.

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

## Canada

The 12-month forecast ending in November 2024 indicates that while existing exceptional deficits will downgrade in size and severity, they will persist in portions of most provinces.

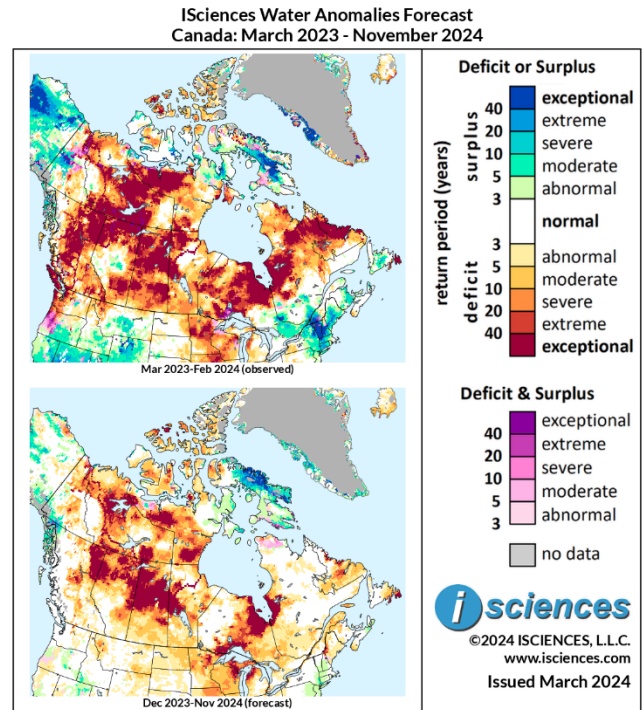
Severe to exceptional deficits are expected in the following areas:

- NE and central **British Columbia**, near the Omineca Protected Area and Northern Rockies region, which continues east into northwestern **Alberta**.
- Widespread throughout northern to central **Saskatchewan**, which extends daughter east into western **Manitoba**, in areas near Lake Winnipeg.
- Southern to southeastern **Ontario**, in areas directly north of Lake Superior, as well as areas bordering the coast of the Hudson Bay. Similarly deficits appear in western coastal regions of Quebec along the Hudson Bay.
- Northern **Yukon**, in regions south of Whitefish Station. These deficits continue east along the Mackenzie River into **Northwest Territories**, throughout areas surrounding Great Bear Lake. Exceptional deficits are also expected in areas southeast of Great Slave Lake.
- **Nunavut**, in western regions of the Kitikmeot Region, and southern areas of the Kivalliq Region.

Severe to exceptional surpluses are expected in the following regions:

- **Nunavut**, throughout Baffin Island.

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

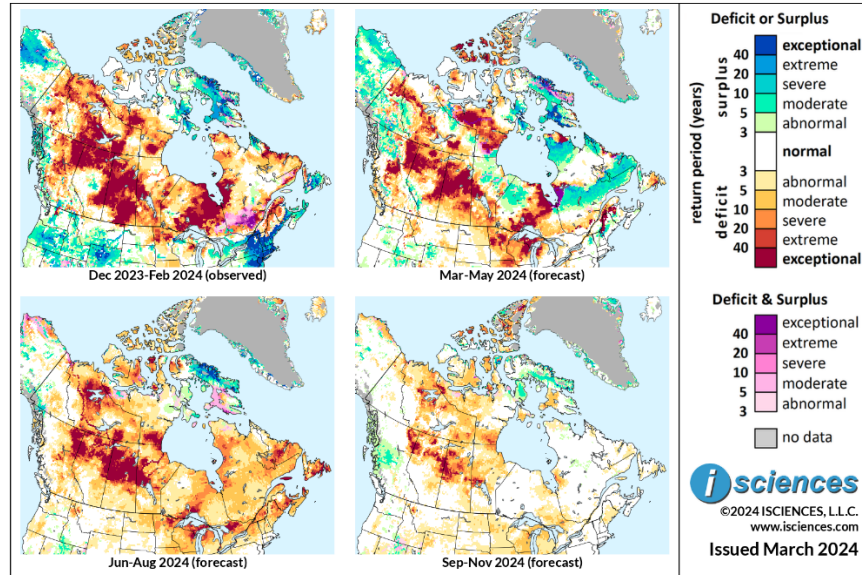


Based on observed data through February 2024 and forecasts through November 2024

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



ISciences Water Anomalies Forecast  
Canada: December 2023 - November 2024



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates deficits to remain throughout central and northeastern British Columbia, northwestern to eastern Alberta, and Saskatchewan. Regions northwest of Lake Winnipeg can expect similarly intense deficits. Central regions of Ontario north of Lake Superior are expected to observe exceptional deficits. Further north, deficits are expected to remain in northern Yukon and along the Mackenzie River, which continues into Northwest Territories. Exceptional deficits in western and southern Yukon are expected to broaden in size. Some regions of Canada are expected to experience moderate to severe surplus, including central and northern Quebec, Newfoundland, northeastern Ontario, northern British Columbia, and much of Yukon. Areas of Nunavut are expected to endure extreme to exceptional surplus, particularly in Baffin Island and regions west of the Northwestern Passages.

From June through August 2024, most surplus anomalies throughout the country are expected to diminish. Deficits are expected to continue in northeastern British Columbia, northern Alberta, and the majority of central to northern Saskatchewan. Areas northwest of Lake Winnipeg in Manitoba can expect similarly intense deficits. Southern regions of Ontario, particularly ones north of Lake Superior, should anticipate exceptional deficits. Northwestern coastal regions of Quebec are expected to observe severe deficits. Regions of Newfoundland and Labrador are also expected to observe widespread severe deficits, with some pockets of exceptional deficits.

The forecast for the final months – September 2024 through November 2024 – expects deficits in Alberta, British Columbia, and Saskatchewan to further decrease in size, becoming a mixture of near-normal conditions and abnormal deficits. Abnormal to moderate deficits are expected to appear throughout Nunavut and Northwest Territories.

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

## Mexico, Central America, and the Caribbean

The 12-month forecast ending in November 2024 indicates that most intense deficits throughout Mexico and Central America will diminish. However, exceptional deficits will persist in northwestern and east-central regions of Mexico. Regions within the Yucatan Peninsula and Central America can anticipate moderate to severe surplus.

Severe to exceptional deficits are expected in the following areas:

- Northwestern **Mexico**, throughout central and southern regions of Sonora.
- Central **Mexico**, near Mexico City.
- Central **Guatemala**, throughout areas surrounding Lake Izabal, moving into areas along the western border of **Honduras**.
- Throughout Baja California Sur and southern Baja California.

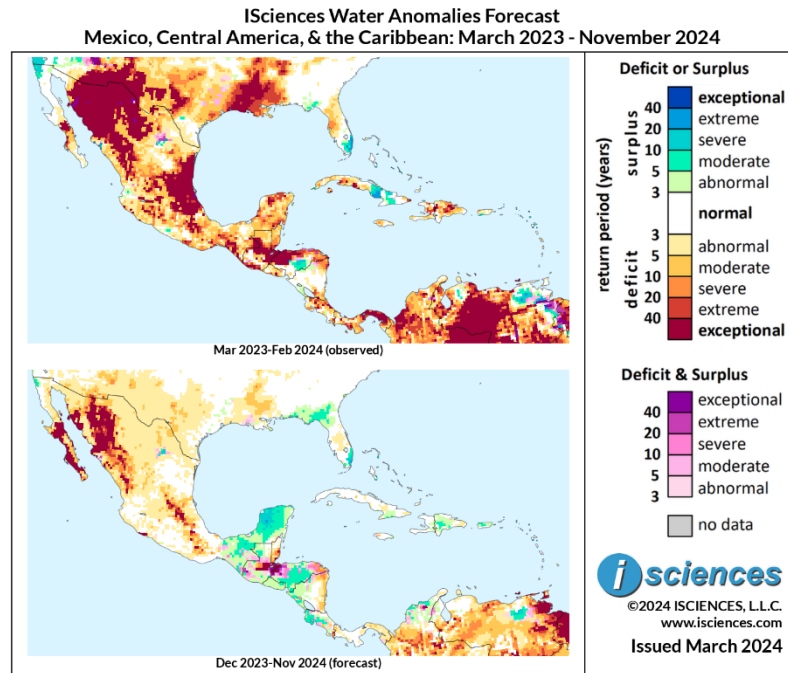
Severe to exceptional surpluses are expected in the following regions:

- **Mexico**, throughout the Yucatan Peninsula.
- **Honduras**, covering most central and southern areas of the country.

Transitional conditions are anticipated in:

- Western **Honduras**, throughout the Santa Barbara department, spreading into central **Guatemala**.

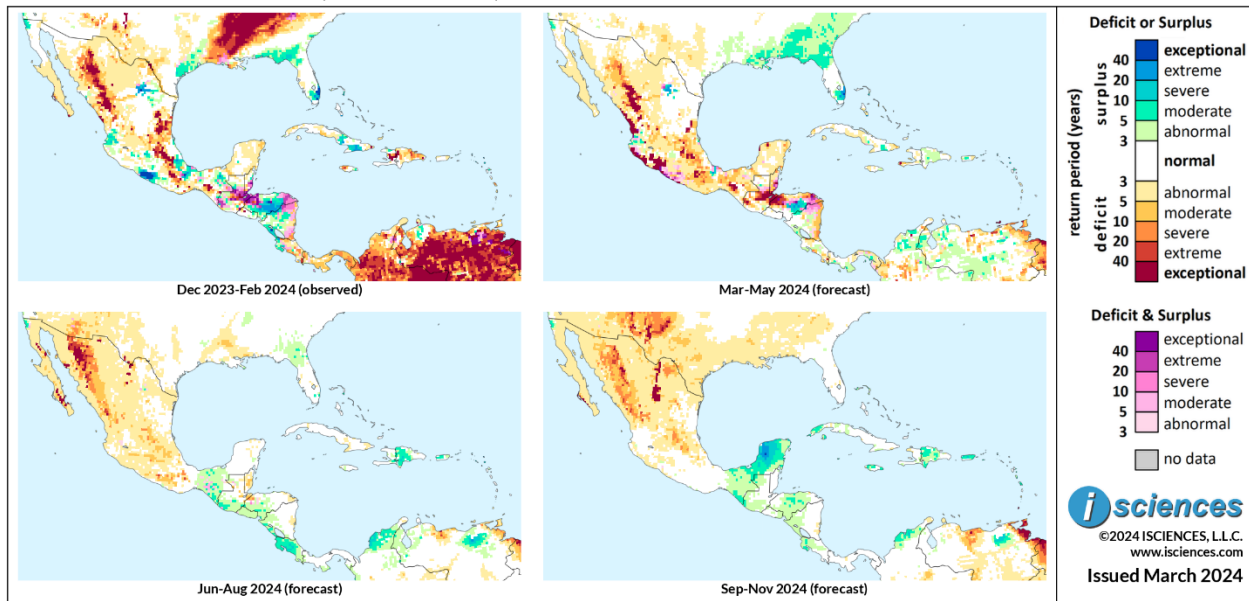
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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

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



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates that exceptional deficits will continue in northwestern Mexico, with similarly intense anomalies arising along the coasts of Jalisco, Colima, and Michoacan. Pockets of exceptional deficits are also expected to continue in areas near Mexico City. Exceptional deficits will continue in central Guatemala and western Honduras, with some moderate to severe surplus persisting in southeastern Honduras.

From June through August 2024, exceptional deficits are expected to continue in northwestern Mexico, but diminish in most other portions of the country, becoming abnormal to moderate deficits. In Central America, abnormal to moderate surplus is expected to expand to coastal regions of Guatemala, El Salvador, and Nicaragua. The majority of Costa Rica is expected to observe moderate to severe surplus.

The forecast for the final months – September 2024 through November 2024 – anticipates deficits in northwestern Mexico to linger, though will mostly downgrade from exceptional to severe. North-central Mexico may experience pockets of exceptional deficit. Much of the Yucatan Peninsula can anticipate severe to extreme surplus to emerge.

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

## South America

The 12-month forecast ending in November 2024 indicates that exceptional deficits will resolve in some regions of the Bolivarian Nations, but remain widespread throughout much of Brazil and some northern and central regions of the continent.

Extreme to exceptional deficits are expected in the following areas:

- The **Guianas**, along the entirety of the region's northern coast.
- **Brazil**, across the states of Rondonia, Mato Grosso, and Mato Grosso do Sul. Eastern regions of Amazonas can also anticipate intense concentrations of exceptional deficit.
- Eastern **Peru**, spreading throughout regions near the Sierra Del Divisor National Park and into the Murunahua, Mashco Piro, and Madre De Dios Territorial reserves. These deficits spread further south into northern portions of **Bolivia** and spread through most central to eastern areas of the country.
- **Paraguay**, widespread throughout the majority of the country.
- Northern **Chile**, throughout the Antofagasta Region, spreading east into western regions of **Argentina**.

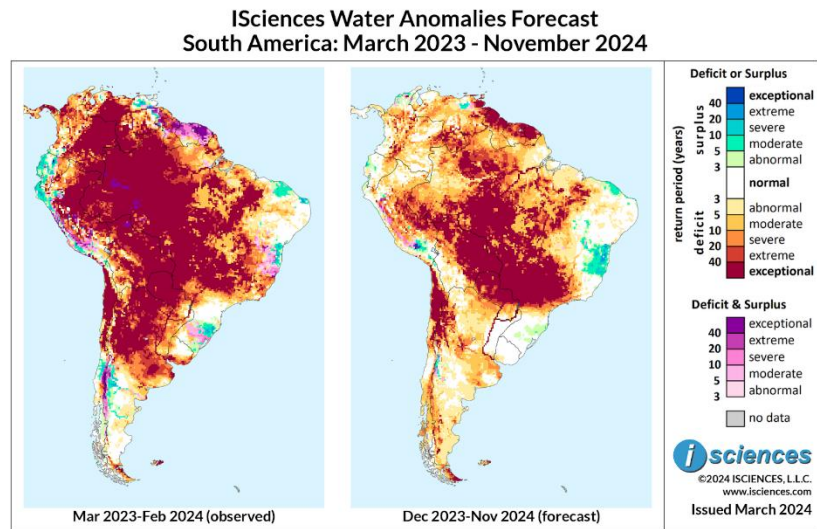
Moderate to severe deficits are anticipated in:

- **Colombia**, with pockets appearing in western regions of Putumayo, continuing further north into North Santander.
- Southern **Venezuela**, throughout most of the state of Amazonas.

Moderate to severe surpluses are expected in the following regions:

- Eastern **Brazil**, throughout the state of Espirito Santo and eastern regions of Minas Gerais.

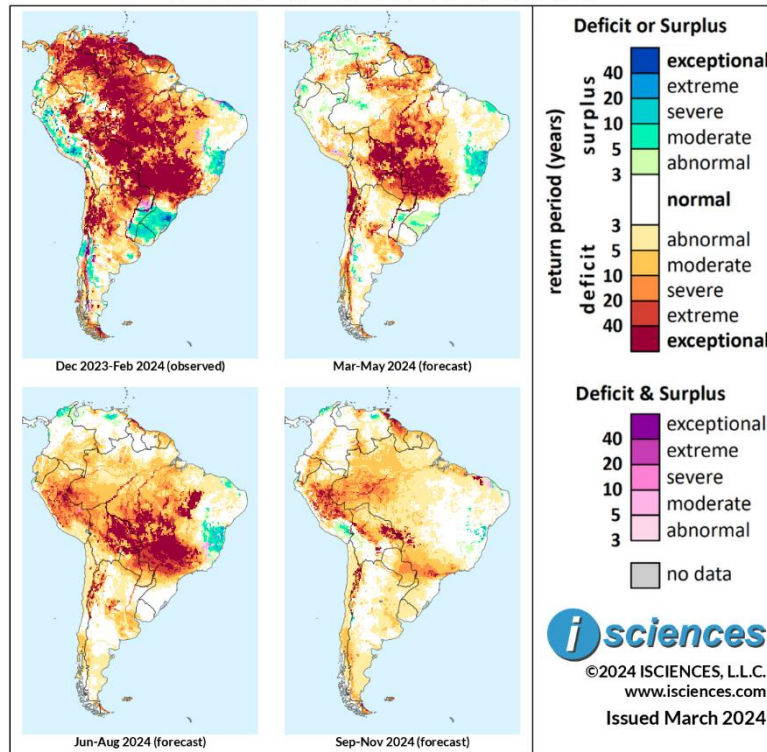
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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

**ISciences Water Anomalies Forecast**  
**South America: December 2023 - November 2024**



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates that exceptional deficits in northern and some central regions of Brazil will downgrade to moderate to severe levels. Southern Brazil will endure exceptional deficits in the states of Mato Grosso, Mato Grosso do Sul, and Sao Paulo. Exceptional deficits in the Guianas and Venezuela will mostly subside, with some anomalies lingering in southern Venezuela and coastal regions of the Guianas. Central and eastern Bolivia can anticipate exceptional deficits to persist. In Uruguay, exceptional deficits are expected to downgrade to severe to extreme anomalies. Similarly intense deficits will remain present in northern Chile, as well as northeastern and central Argentina. Surplus is anticipated to continue in the Brazilian states of Espirito Santo and eastern regions of Minas Gerais.

From June through August 2024, deficits are expected to remerge in most of Peru. Exceptional deficits are expected to linger in central and northeastern Bolivia, as well as southern regions of Brazil. These deficits will continue further south into northern areas of Paraguay. Deficits will dissipate in northern Chile, but remain in northwestern Argentina. Surplus will continue in Espirito Santo and Minas Gerais.

The forecast for the final months – September 2024 through November 2024 – exceptional deficits are expected to downgrade in Brazil, becoming mostly abnormal to moderate deficits. Severe to extreme deficits are expected to persist throughout Peru. Northern Guyana can expect similarly intense deficits, as well as eastern and west-central Bolivia. Exceptional deficits may persist in regions along the borders of northern Chile and northwestern Argentina.

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

## Europe

The 12-month forecast ending in November 2024 anticipates widespread surpluses in Continental Europe and the United Kingdom to diminish in severity but persist throughout most countries. Deficits are expected to mostly disappear from Continental Europe, but continue in coastal regions of Spain and Sicily.

Moderate to exceptional surpluses are expected in the following regions:

- Northeastern **Germany**, in most northwestern regions of Lower Saxony.
- Southeastern **France**, spread throughout regions near the Écrins National Park. These surpluses reappear nearby in easternmost regions of **Switzerland** and western and central **Austria**.
- Widespread throughout **Poland**, **Slovakia**, and the **Czech Republic**.
- Northeastern **Ukraine**, widespread throughout the Kharkiv Oblast.
- The **United Kingdom**, throughout the county of Norfolk.

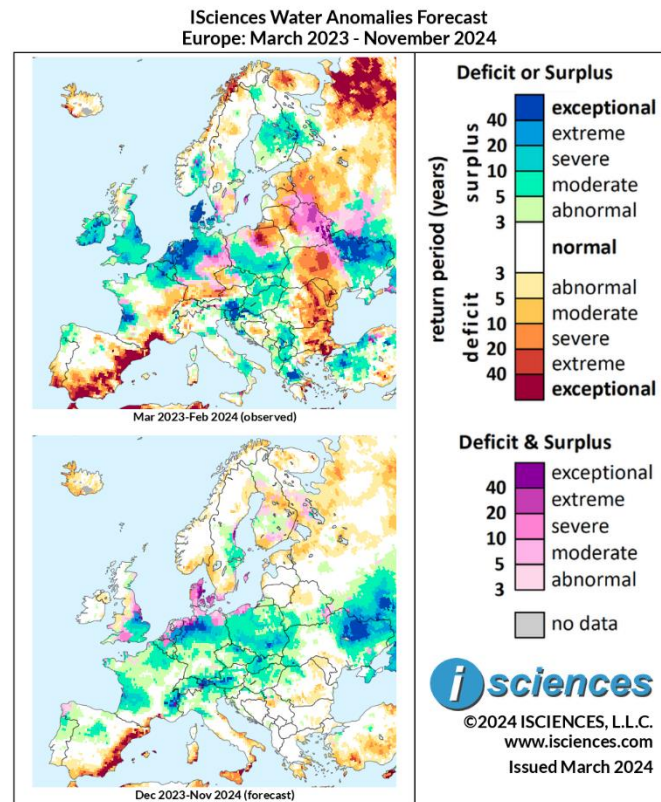
Severe to exceptional deficits are expected in the following areas:

- Along the entirety of **Spain's** eastern and southeastern coasts.
- Southernmost coastal regions of **Italy**, and throughout **Sardinia**.

Transitional conditions are expected to emerge in:

- Widespread throughout northern **Germany**, expanding north into most of **Denmark**.

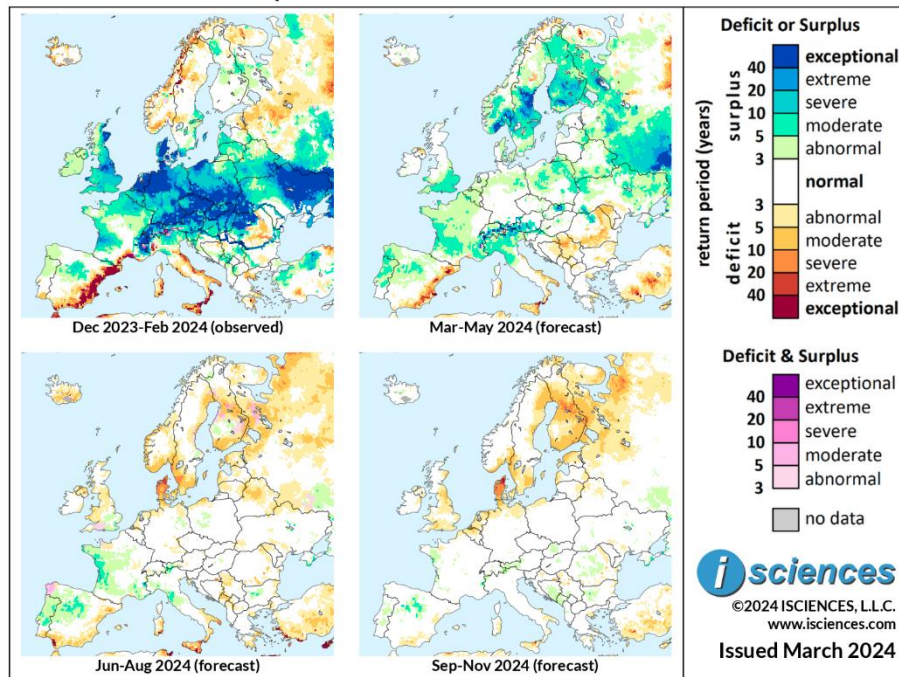
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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

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



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates intense surpluses in Continental Europe will significantly diminish. Some severe to extreme surpluses are expected to linger in northern Italy, Switzerland, Austria, and central Slovakia. Further north, exceptional surpluses are expected in southeastern Norway, near the city of Oslo, as well as along the country’s southeastern coast. Similarly intense surpluses are expected to appear in most of central Sweden and throughout Finland. Severe to extreme deficits are expected to linger but downgrade in intensity, along Spain’s eastern and southeastern coasts, as well as southern Italy and Sardinia.

From June through August 2024, most regions of Europe can anticipate intense anomalies to disappear, as most regions will observe mostly near normal to abnormal anomalies. Denmark is expected to endure severe to extreme deficits, as well as some southern regions of Finland, Norway, and Italy. Persisting deficits in Sardinia are expected to spread further south into coastal regions of the island.

The forecast for the final months – September 2024 through November 2024 – anticipates mostly near-normal to abnormal anomalies to persist throughout most regions of Europe. However, Denmark and Finland are expected to observe continued deficits.

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

## Africa

The 12-month forecast ending in November 2024 indicates that deficits will remain in many regions of the Sahara Desert and in some central and southern countries. Surpluses are expected to emerge in the Sahel, as well as in parts of Tanzania and Angola.

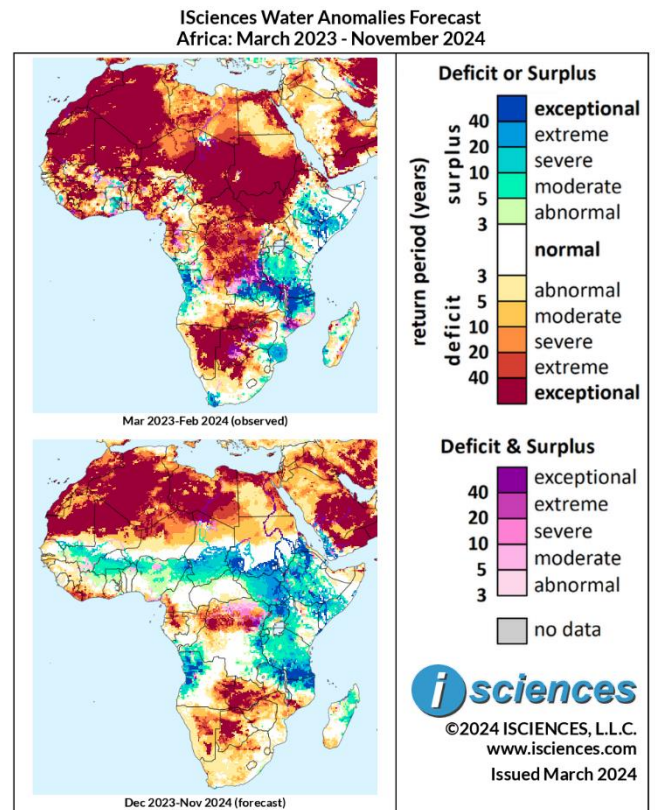
Severe to exceptional deficits are expected in the following areas:

- Much of the Sahara Desert, covering most portions of **Mauritania, Mali,** and **Algeria**. Northern and eastern regions of **Egypt** and southwestern to eastern areas of **Libya** can expect similarly intense deficits.
- Most regions of **Morocco** and **Western Sahara**.
- Northern **Democratic Republic of Congo**, spanning from Bolomba to regions near Ubundu. Central **Gabon** can expect deficits of similar severity.
- **Botswana**, spreading throughout the Ghazi region, spreading further south and north to Makgadikgadi Pans National Park and the Kgalagadi District.
- **Zambia**, throughout the Western Province, and **Namibia**, across the Khomas Region.

Severe to exceptional surpluses are expected in the following regions:

- **Ethiopia** and **South Sudan**, widespread throughout both countries.
- Southern **Sudan**, in southern areas of South Kordofan. These surpluses continue west into most of central to southern **Chad**.
- **Uganda**, with the highest concentrations appearing near the Agago region.
- **Tanzania**, widespread throughout the Kululu region.
- Northwestern **Angola**, throughout the Bengo Province.

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

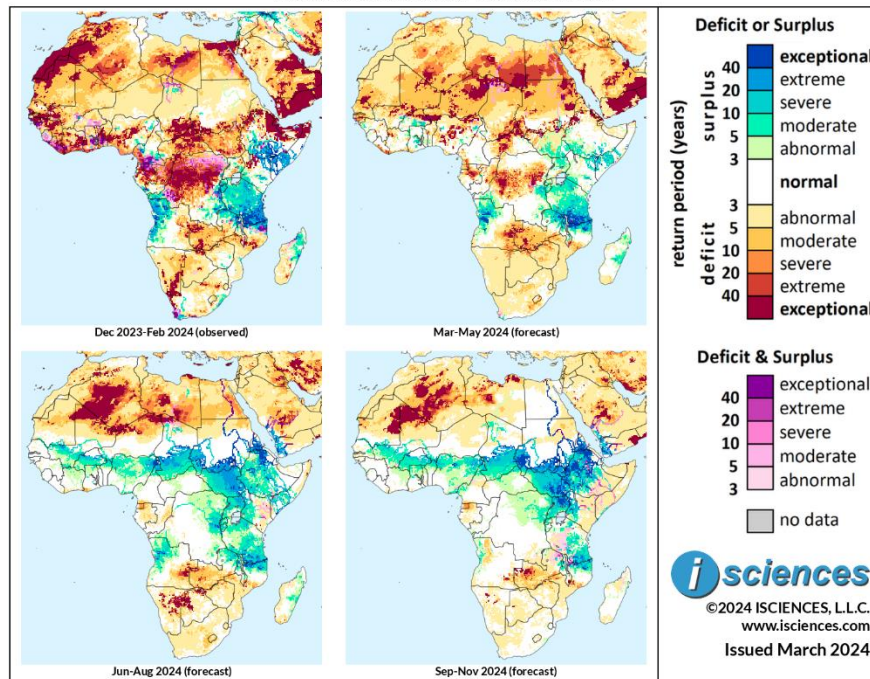


Based on observed data through February 2024 and forecasts through November 2024

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



ISciences Water Anomalies Forecast  
Africa: December 2023 - November 2024



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 indicates that while the majority of northern Africa can anticipate abnormal to moderate deficits, areas of northwestern Niger, southeastern regions of Libya, and southern regions of Egypt can anticipate extreme to exceptional deficits. Regions that should anticipate similarly intense deficits include central to northeastern Mali, southwestern Algeria, central Nigeria, central Burkina Faso and southern Chad. Western and eastern regions of the Democratic Republic can expect similarly intense deficits, as well as eastern Angola and south-central Zambia. Surplus in Ethiopia is expected to dissipate, while northwestern Angola, southern Somalia, northeastern Zambia, and southern Tanzania can expect severe to exceptional surplus.

From June through August 2024, pockets of deficits are expected to further downgrade throughout most of Africa. Some regions will still endure exceptional deficits, including central to southeastern Algeria, central Libya, and northwestern Niger. Surplus is expected to emerge throughout most of the Sahel, spreading far easter from southern Mali to the Central African Republic and Ethiopia. Surpluses continue further south, spreading throughout Uganda and into most of Tanzania, with exceptional surpluses appearing in southernmost regions of Tanzania. Northwestern Angola can anticipate moderate to severe surpluses to linger, with exceptional deficits appearing in the country's eastern regions and into western Botswana.

The forecast for the final months – September 2024 through November 2024 – indicates that deficits will emerge in eastern Mauritania. Similarly intense deficits will persist in Mali, Algeria, and east-central Libya. Surplus is expected to persist across the Sahel, as well as throughout Uganda and Tanzania. Deficits may persist in western Zambia.

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

## Middle East

The 12-month forecast ending in November 2024 indicates that exceptional deficits will expand in size throughout southern regions of the Middle East, as well as throughout Iraq and Iran. Intense surplus is expected to arise in western Yemen.

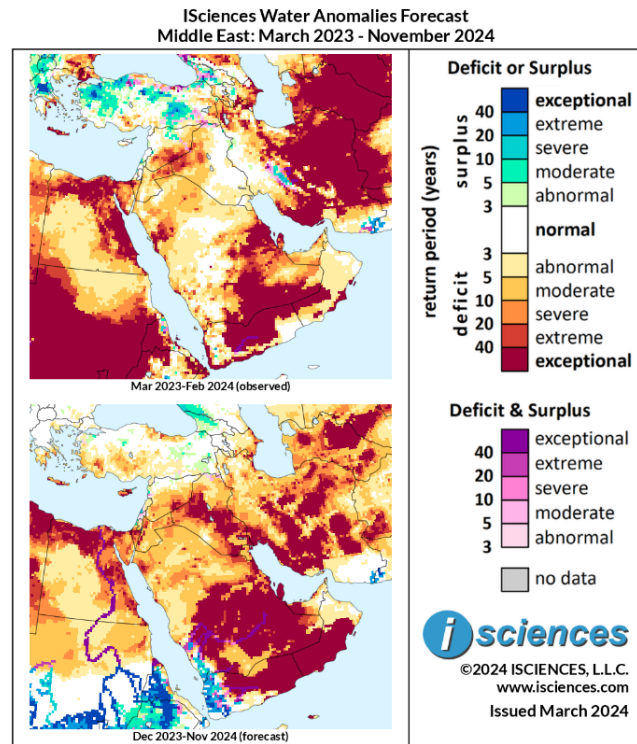
Severe to exceptional deficits are expected in the following areas:

- **Saudi Arabia**, throughout much of the Riyadh, Makkah, Asir, and Najran provinces. These deficits will also cover much of the Eastern Region.
- Central to eastern **Yemen**, covering much of the region, continuing east and covering much of western to central **Oman**.
- The majority of central **Iraq**, covering areas surrounding the Therthar and Habbaniyah lakes. These deficits spread into western and eastern portions of the country and continue into much of **Iran**.
- **Israel**, covering much of the country's southern region.

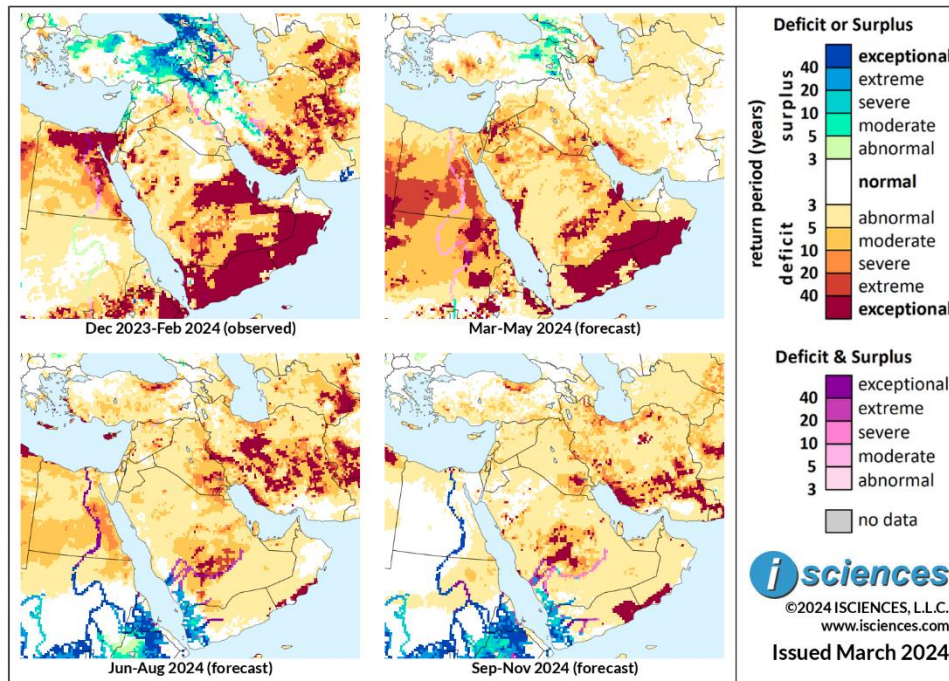
Severe to exceptional surpluses are expected in the following regions:

- Western **Yemen**, spreading through most of the Al Hudaydah Governorate.

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



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



**Based on observed data through February 2024 and forecasts through November 2024**

The forecast through May 2024 indicates that exceptional deficits in central Saudi Arabia will transition into abnormal to moderate deficits, though exceptional deficits will continue in southeastern regions of the country. Yemen and Oman are expected to endure widespread exceptional deficits. Further north, southern Israel is expected to observe continued exceptional deficits. Southeastern Iraq and southwestern Iran can anticipate moderate to severe deficits. Widespread surplus in eastern Turkey is expected to mostly subside, with moderate to severe deficits appearing in southwestern regions of the country.

From June through August 2024, most exceptional deficits in Saudi Arabia, Yemen, and Oman are expected to subside, though some will still remain in regions in the Saudi Arabian city of Riyadh and along the southern coast of Oman. Western Yemen can expect intense surpluses to reappear in the Al Hidayah Governatore. Exceptional deficits are expected to reemerge across most of southern Iran, as well as in the Dhi Qar Governorate in Iraq. Northeastern coastal regions of Turkey along the Black Sea can anticipate severe to extreme deficits to arise.

The forecast for the final months – September 2024 through November 2024 – indicates that central Saudi Arabia will experience continued exceptional deficit, as well as southern coastal regions of Yemen and Oman. Intense deficits will continue in southeastern Iraq and across southern Iran. Western Yemen can anticipate extreme to exceptional surplus to continue.

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

## Central Asia and Russia

The 12-month forecast ending in November 2024 indicates that widespread exceptional deficits in western Russia will mostly subside, though similarly intense deficits will emerge in southeastern Russia. Surpluses are expected to dissipate in east-central Russia in areas near Lake Baikal, with surpluses of equal intensity emerging in southwestern Russia and northern Uzbekistan.

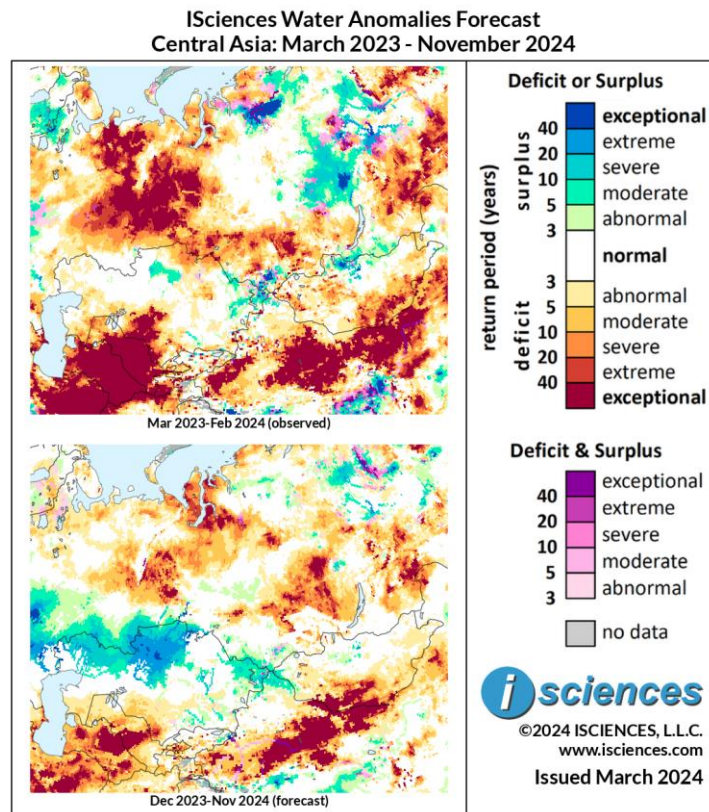
Severe to exceptional deficits are expected in the following areas:

- Western **Russia**, in areas near the Oktyabrsky District in the Khanty-Mansi Autonomous Okrug.
- Northwestern **Russia**, in coastal regions of the Yamalo-Nenets Autonomous Okrug, as well as in the Yamalsky District and near the settlement of Novy Port.
- Southeastern **Russia**, throughout central and northern regions of the Irkutsk Oblast, as well as the Kalarsky and Tungiro-Olyokminsky Districts.
- Central regions of **Uzbekistan**, in the Navoiy Region, which continue into the Daşoguz Region of Turkmenistan.

Severe to exceptional surpluses are expected in the following regions:

- Southwestern **Russia**, beginning in the Orenburg Oblast and spreading east to the Kurgan Oblast.
- **Kazakhstan**, widespread throughout the Akmola, Kostanay, Aktobe, West Kazakhstan, and North Kazakhstan Regions.

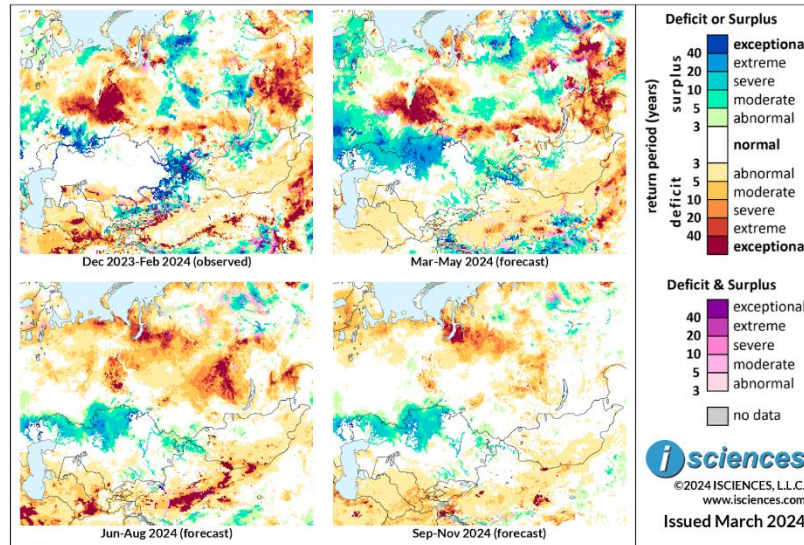
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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

ISciences Water Anomalies Forecast  
Central Asia: December 2023 - November 2024



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 expects widespread exceptional deficits to occur in the Khanty-Mansi Autonomous Okrug, which continue further east through the Omsk Oblast and into the Irkutsk Oblast. Northern regions of the Yamalo-Nenets Autonomous Okrug can expect similarly intense deficits to persist. Further east, exceptional deficits are expected to remain widespread in the Zabaykalsky Krai, eastern regions of the Irkutsk Oblast, and southern regions of the Sakha Republic. Central regions of the Krasnoyarsk Krai can expect similarly intense deficits. Further northeast, pockets of surplus are expected to endure in southwestern regions of the Taymyrsky Dolgano-Nenetsky District and northeastern areas of the Evenkiyski District. Northern regions of the Olenyoksky District can expect widespread surpluses of moderate to extreme intensity. In Kazakhstan, surpluses are expected throughout the Aktobe, Akmola, Kostanay, West Kazakhstan, and North Kazakhstan Regions.

From June through August 2024, exceptional deficits are expected to persist in the Yamalo-Nenets Autonomous Okrug, as well as the Nadymy and Yamalsky Districts. Similar deficits are expected to persist near the settlement of Novy Port. Similarly intense deficits are expected to occur in the Northern Tungiro-Olyokminsky District, the Uvatsky District and in northern coastal regions of the Zapolyarny District. In western Russia, regions within the Oktyabrsky District, in the Khanty-Mansi Autonomous Okrug, can also expect intense deficits.

The forecast for the final months – September 2024 through November 2024 – anticipates most deficits to resolve, though exceptional deficits will still remain in coastal regions of the Yamalo-Nenets Autonomous Okrug, the Nadymy District, the Yamalsky District, and near the settlement of Novy Port.

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

## South Asia

The 12-month forecast ending in November 2024 indicates that most exceptional deficits in Pakistan and Afghanistan will dissipate, though some regions are expected to experience lingering deficits. India is expected to observe widespread surplus throughout the country.

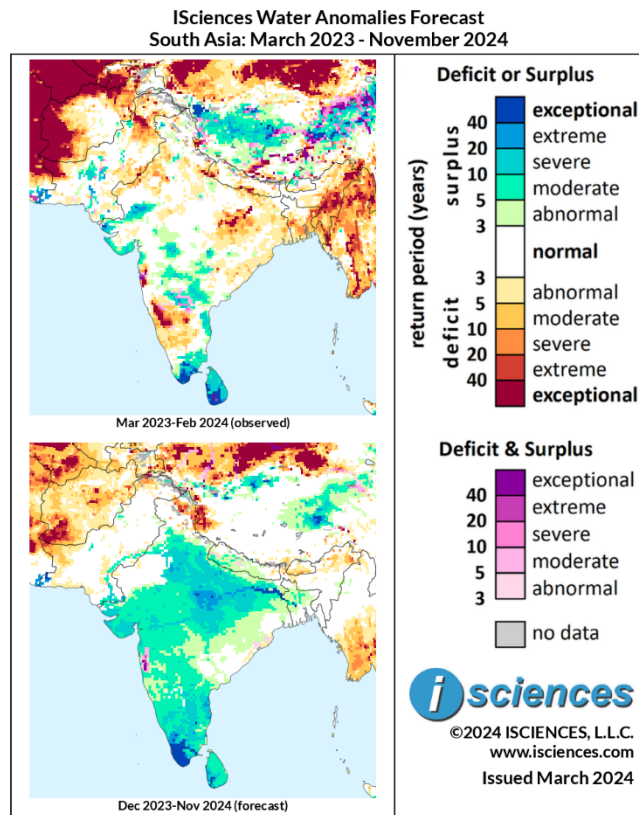
Severe to exceptional surpluses are expected in the following regions:

- Throughout **India**, with the most intense anomalies occurring in southernmost coastal regions of the country, in the states of Tamil Nadu and Kerala. Similarly intense anomalies are expected along the Ganges River.
- **Sri Lanka**, with the highest concentrations appearing in southwestern coastal regions of the country.

Severe to exceptional deficits are expected in the following areas:

- Northern **India**, in the states of Himachal Pradesh and Uttarakhand.
- Southern **Afghanistan**, within the Nimruz Province.

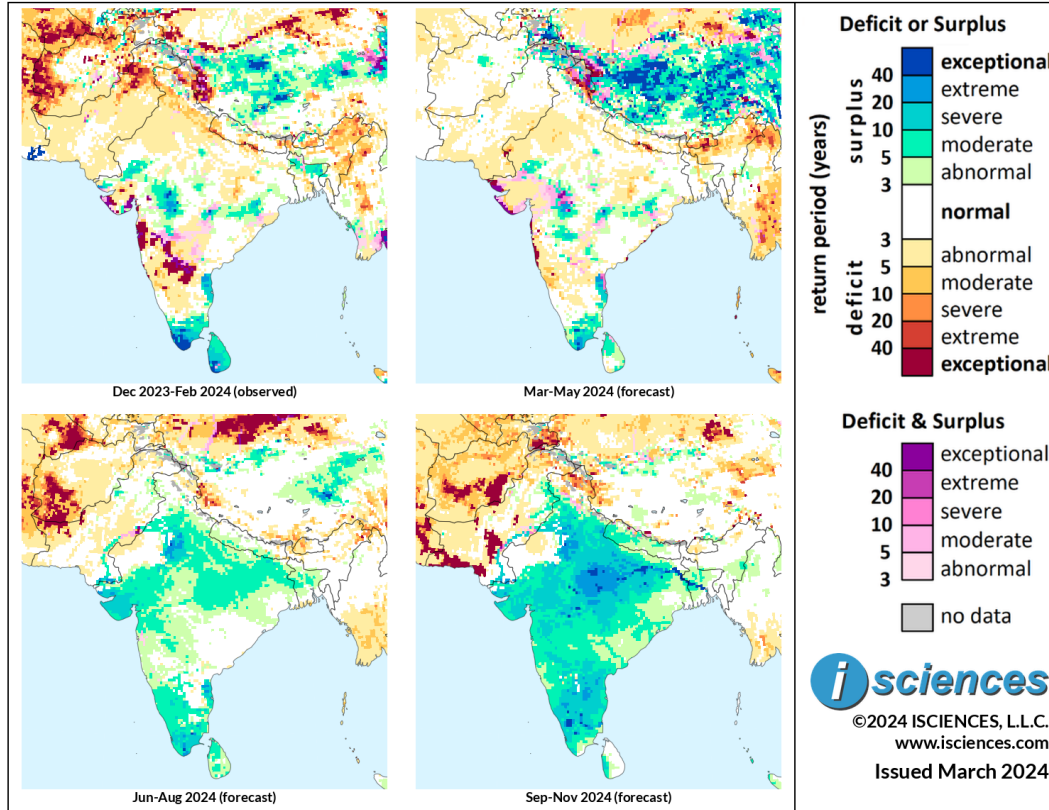
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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**ISciences Water Anomalies Forecast  
South Asia: December 2023 - November 2024**



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates mostly abnormal conditions in most areas of India, though some regions of Madhya Pradesh will experience isolated pockets of severe to extreme surplus. Southernmost coastal regions of India can anticipate similarly intense surplus, as well as eastern coastal regions of Andhra Pradesh. Some western coastal regions of Gujarat can anticipate intense transitional conditions to arise.

From June through August 2024, exceptional deficit is expected to reappear in southern Afghanistan, which continues south into some regions of Pakistan’s Balochistan province. Surpluses in India are expected to expand in size, spreading throughout Gujarat and into central and eastern regions across the country. Southernmost regions of India can expect similarly intense surplus anomalies to continue.

The forecast for the final months – September 2024 through November 2024 – anticipates India to experience further expansion of surplus across the country. The most intense concentrations are expected to appear in southern and central states, and along the Ganges River. In Pakistan, exceptional deficits are expected to emerge in southern coastal regions of the country. Similarly intense deficits are forecast further north in central and eastern Afghanistan.

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

## Southeast Asia and the Pacific

The 12-month forecast ending in November 2024 indicates that deficits will persist throughout Mainland Southeast Asia, but decrease in intensity, becoming mostly moderate to severe anomalies. Intense surplus is expected to expand throughout Maritime Southeast Asia, particularly in central Indonesia, Papua, and Papua New Guinea.

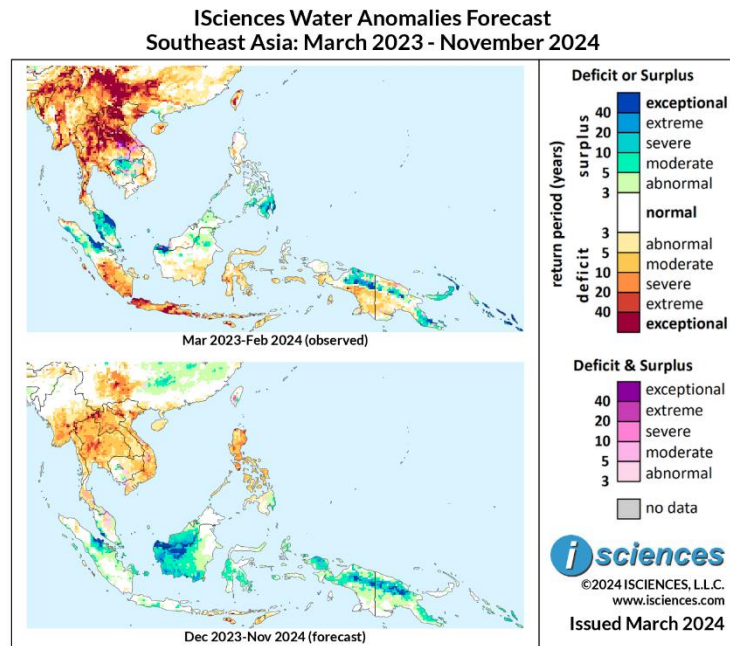
Severe to exceptional surpluses are expected in the following areas:

- **Indonesia**, with the highest concentrations emerging in northern coastal regions of Sumatra, as well as Kalimantan and Sarawak.
- **Papua and Papua New Guinea**, with anomalies occurring across most of the northern to central regions of both regions.

Moderate to severe deficits are expected in the following areas:

- Widespread throughout **Thailand**, moving west into southern **Myanmar**.
- **Vietnam** and **Laos**, throughout both countries.
- Northern **Philippines**, throughout the island of Luzon.
- Throughout most of the eastern portions of the Lesser Sunda Islands.

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

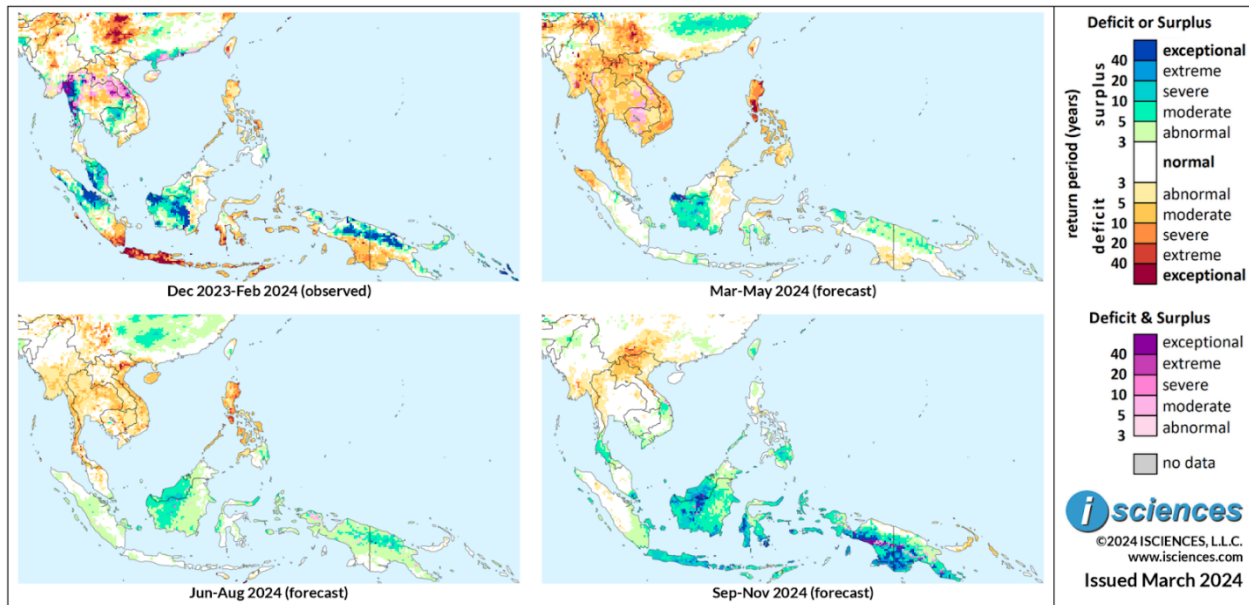


Based on observed data through February 2024 and forecasts through November 2024

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



### ISciences Water Anomalies Forecast Southeast Asia: December 2023 - November 2024



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 indicates that surpluses across most of Maritime Southeast Asia will lessen in intensity, though will continue in western portions of Kalimantan and Sarawak. Further north, deficits are expected to intensify in the northern Philippines, primarily throughout the island of Luzon. Mainland Southeast Asia is expected to observe widespread moderate to severe deficits throughout Myanmar, Laos, Vietnam, Malaysia, and Cambodia.

From June through August 2024, deficits in Mainland Southeast Asia are expected to lessen in intensity, though still persist. Deficits in the northern Philippines are expected to continue, but diminish slightly in severity. Surplus in north-central Papua New Guinea are expected to intensify into moderate anomalies.

The forecast for the final months – September 2024 through November 2024 – expects much of Maritime Southeast Asia to observe intense surplus throughout most countries, especially in regions of central and southern Indonesia, as well as Papua and Papua New Guinea. Deficits in Mainland Southeast Asia are expected to resolve in some areas, becoming normal conditions and abnormal deficits. Moderate deficits are expected to linger in northern Laos.

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

## East Asia

The 12-month forecast ending in November 2024 indicates that exceptional deficits will persist in northwestern regions of China, but lessen in size in northern and northeastern China. Surpluses occurring in Tibet are also expected to remain but diminish in size.

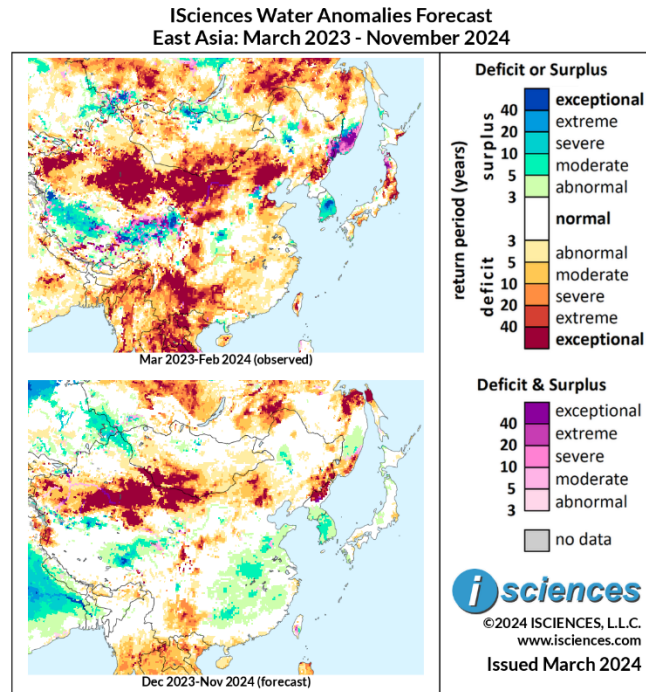
Severe to exceptional deficits are expected in the following areas:

- Western **China**, throughout southeastern regions of Xinjiang, western to central Gansu, and westernmost regions of Inner Mongolia.
- Northeastern **China**, in the eastern regions of southern Heilongjiang and southern Jilin.
- Southwestern **China**, in Tibet, within the Ngari Prefecture.
- Southern **China**, in the Baoshan Prefecture of Yunnan.
- **North Korea**, throughout the Ryanggang, Chagggang, and North Hamgyong provinces.

Severe to exceptional surpluses are expected in the following regions:

- Southwestern **China**, in eastern regions of Tibet, near Namucuo Lake.

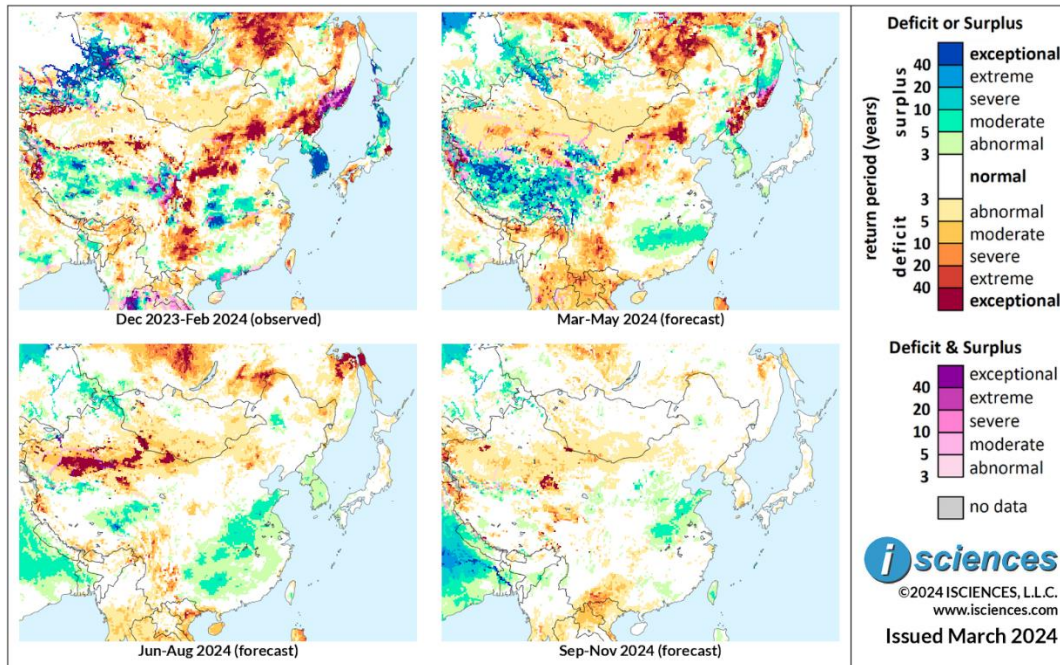
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Based on observed data through February 2024 and forecasts through November 2024

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



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates widespread surplus to emerge throughout Tibet. Exceptional deficits are expected to persist in regions near the city of Beijing, as well as in northern Shaanxi. North Korea should also anticipate exceptional deficits to persist throughout the Chaggang, Ryanggang, and North Hamgyong provinces.

From June through August 2024, exceptional deficits are expected to appear in western China, occurring in southeastern regions of Xinjiang and western to central Gansu. Eastern regions of Tibet, near Namucuo Lake, can also anticipate moderate to extreme surpluses.

The forecast for the final months – September 2024 through November 2024 – anticipates most intense anomalies to dissipate further throughout the region. Small pockets of deficit may appear in southern regions of the Bayingolin Mongol Autonomous Prefecture in Xinjiang.

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

## Australia and New Zealand

The 12-month forecast ending in November 2024 indicates that deficits in Western Australia will recede, while intense surplus in Northern Territory and Queensland will persist. Moderate surpluses are forecast to emerge in the Murray-Darling River Basin.

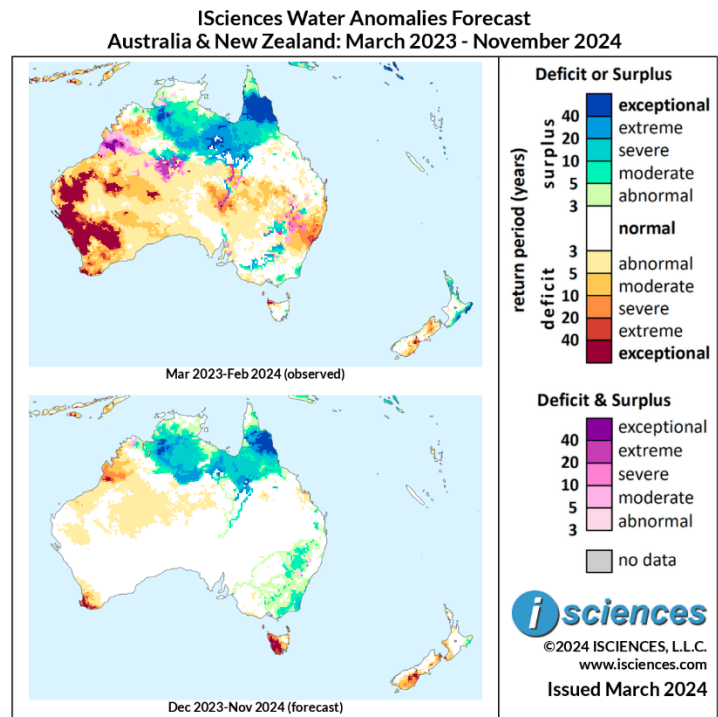
Severe to exceptional surpluses are expected in the following regions:

- **Queensland**, with the highest concentrations throughout east-central regions of the Yorke Peninsula. Some similarly intense surpluses are anticipated in the Gulf Country region.
- **Northern Territory**, affecting most central and northern regions, especially areas along the banks of the Victoria River and within the Tanami East locality.

Severe to exceptional deficits are expected in the following areas:

- Northeastern regions of **Western Australia**, in the Gingerah and Waterbank regions.
- Southwestern coastal regions of **Western Australia**, near the town of Augusta.
- Western **Tasmania**, across most of the region.
- Southern **New Zealand**, near the city of Christchurch.

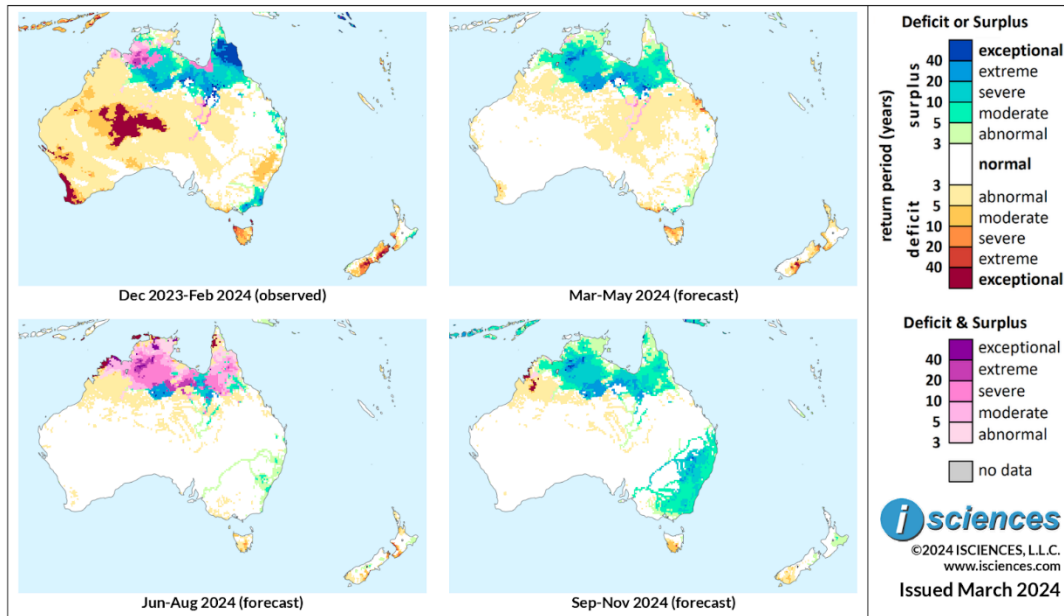
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through February 2024 and forecasts through November 2024

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**ISciences Water Anomalies Forecast  
Australia & New Zealand: December 2023 - November 2024**



Based on observed data through February 2024 and forecasts through November 2024

The forecast through May 2024 anticipates exceptional deficits in east-central and southwestern Western Australia to subside, becoming mostly near normal conditions. Surpluses in northern regions of Northern Territory and Queensland, particularly the Yorke Peninsula, are expected to linger. Moderate to severe deficits are expected to continue in portions of Tasmania, as well as in southern regions of New Zealand near the town of Oamaru.

From June through August 2024, surpluses in northern regions of Northern Territory and Queensland are expected to change, becoming severe to extreme transitional conditions. Some severe to extreme surplus is anticipated to continue in Northern Territory, near the cities of Simpson and Alice Springs. Exceptional deficits are expected to arise in northern coastal regions of Western Australia and in northernmost portions of the Yorke Peninsula. Deficits in Tasmania are expected to downgrade, becoming moderate to abnormal deficits.

The forecast for the final months – September 2024 through November 2024 – expects surpluses to reemerge in Northern Territory and Queensland. Similarly intense surpluses are expected to appear through New South Wales and Victoria.

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