

# Global Water Monitor & Forecast Watch List

April 15, 2024

*For more information, contact:*  
*Thomas M. Parris, President, 802-864-2999, [parris@isciences.com](mailto:parris@isciences.com)*

## 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 March 2024 and an ensemble of forecasts issued the last week of March 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 1991-2020 (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.

---

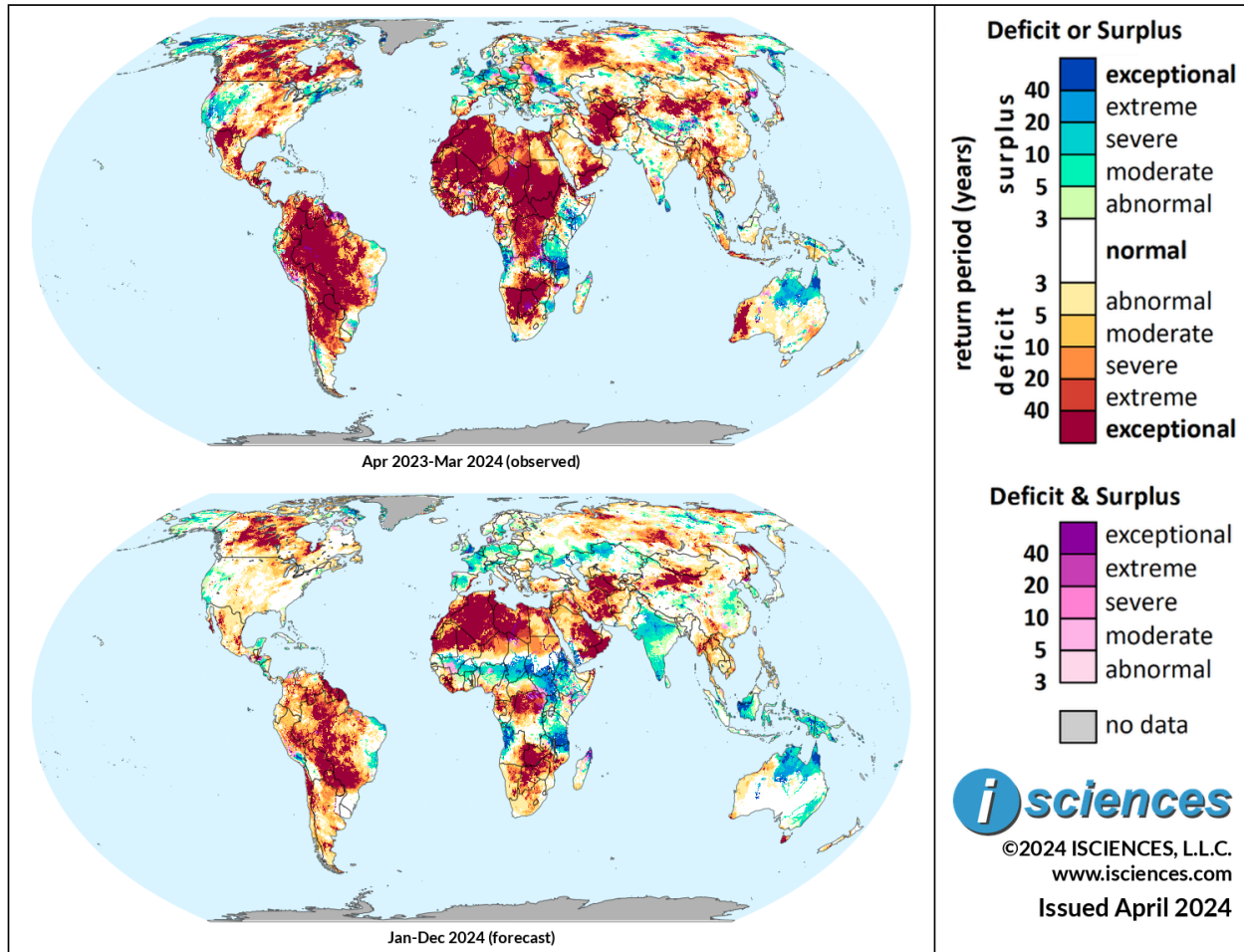
*Copyright 2022 ISCIENCES, L.L.C. Global Water Monitor & Forecast Watch List is the property of ISCIENCES, L.L.C. It is protected by U.S. copyright laws and may not be reproduced in any way without the written permission of ISCIENCES, L.L.C.*

*The user assumes the entire risk related to user's use of information in ISCIENCES, L.L.C. Global Water Monitor & Forecast: Watch List, including information derived from Water Security Indicators Model (WSIM). This information may include forecasts, projections and other predictive statements that represent ISCIENCES, L.L.C.'s assumptions and expectations in light of currently available information and using the highest professional standards. Actual results may differ from those projected. Consequently, no guarantee is presented or implied as to the accuracy of specific forecasts, projections or predictive statements contained herein. ISCIENCES, L.L.C. provides such information "as is," and disclaims any and all warranties, whether express or implied, including (without limitation) any implied warranties of merchantability or fitness for a particular purpose. In no event will ISCIENCES, L.L.C. be liable to you or to any third party for any direct, indirect, incidental, consequential, special or exemplary damages or lost profit resulting from any use or misuse of this data.*

## Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: April 2023 - December 2024



Based on observed data through March 2024 and forecasts through December 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:** Intense deficits are expected to continue within the Upper Midwest until June 2024 or longer.

**Canada:** Exceptional deficits are anticipated to cover most of the Prairie Provinces until December 2024 or longer.

**Mexico, Central America, and the Caribbean:** Northwestern Mexico is expected to observe persisting deficits of varying intensity until September 2024 or longer.

**South America:** Brazil and eastern regions of the Bolivarian Nations are expected to persist until September 2024 or longer.

**Europe:** Surpluses are expected to persist in western and central Europe, as well as the British Isles, until June 2024 or longer.

**Africa:** Regions within the Sahel are expected to observe emerging surpluses near June 2024, which are expected to remain until December 2024 or longer.

**Middle East:** Southern Saudi Arabia, Yemen, and Oman are anticipated to endure exceptional deficits until June 2024 or longer.

**Central Asia and Russia:** Intense surplus in southwestern Russia and northern Kazakhstan is expected to continue until December 2024 or longer.

**South Asia:** Widespread surplus is expected to emerge in India around July 2024, which will continue into December 2024 or longer.

**Southeast Asia and the Pacific:** Surpluses of varying intensity are expected to continue in Maritime Southeast Asia throughout December 2024 or longer.

**East Asia:** Surplus is expected to remain widespread throughout southwestern China until June 2024 or longer.

**Australia & New Zealand:** Northern Australia is forecast to endure intense surplus continuing until June 2024 or longer.

## Watch List: Regional Details

### United States

The 12-month forecast ending in December 2024 indicates that many exceptional deficits in the United States will diminish, though some will persist as anomalies of lesser intensity in the Upper Midwest and some regions of the South. Intense surplus is anticipated in some western states, as well as in most of Alaska and Puerto Rico.

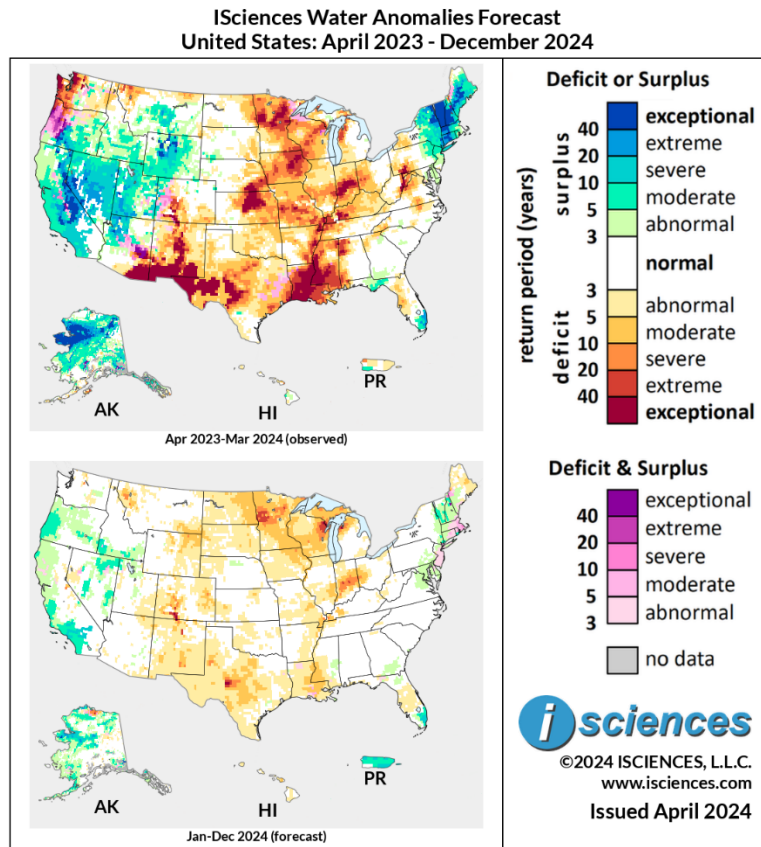
Moderate to extreme deficits are expected in the following areas:

- Western **Minnesota**, in regions near the White Earth Reservation.
- Northeastern **Wisconsin**, near the Superior National Forest. Similar deficits are expected nearby in the Upper Peninsula region of **Michigan**.
- Central **Indiana**, throughout regions near Indianapolis.
- Southern **Colorado**, near the town of Pagosa Springs.
- Northern **Alaska**, west of Prudhoe Bay.

Severe to exceptional surpluses are expected in the following regions:

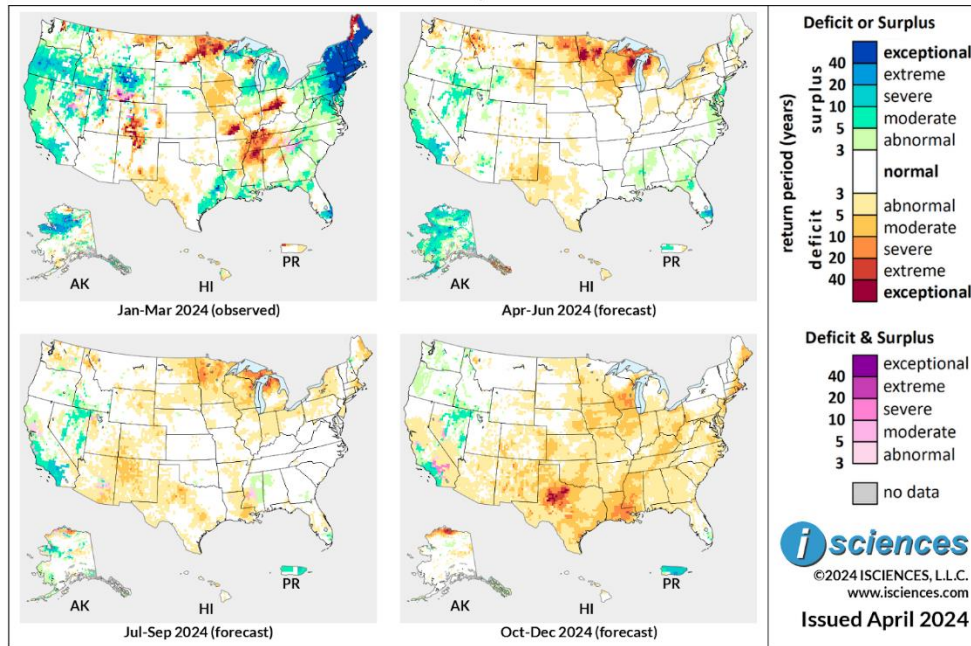
- Southwestern **Oregon**, throughout Coos County. Similar anomalies are expected in southern **California** in most regions near Santa Barbara.
- **Nevada**, in regions near the Walker River Reservation, the city of Wells, and within Lincoln County. Southwestern **Idaho** can expect similar anomalies, near the Four Corners Reservoir.
- **Puerto Rico**, widespread throughout the island.
- **Alaska**, with the highest concentrations appearing across the Seward Peninsula.

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



Based on observed data through March 2024 and forecasts through December 2024  
The map on top depicts long-term deficit and surplus anomalies as of March 2024, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of December 2024.

**ISciences Water Anomalies Forecast  
United States: January 2024 - December 2024**



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 anticipates deficits in the Upper Midwest to worsen, particularly in Minnesota, Wisconsin, and Michigan. These deficits spread further west into northeastern North Dakota. In Montana, Sanders County is expected to observe moderate to severe deficits. Southern California, Nevada, and southern Florida should anticipate surpluses ranging in intensity from moderate to extreme. Alaska is expected to experience widespread surpluses, as are the western regions of Puerto Rico.

From July through September 2024, surplus is expected to continue in southern California, as well as in Nevada. Deficits are expected to lessen in intensity in Wisconsin, Minnesota, and Michigan, becoming mostly moderate to severe anomalies. In Alaska, surplus is expected to diminish significantly across the state, but still remain in the Seward Peninsula. Puerto Rico will continue to observe widespread moderate to severe surplus.

The forecast for the final months – October 2024 through December 2024 – anticipates mostly abnormal deficits across much of the Continental U.S., though intense deficits are anticipated in central Texas, central to southern Louisiana, southwestern Mississippi, and southern Wisconsin. Some eastern regions of northeastern states can expect deficits of lesser intensity, primarily Maine and Massachusetts. Moderate to severe surplus is expected to linger in southern California and Nevada. Surplus will continue in Puerto Rico, but dissipate in Alaska. Deficits are expected to intensify and broaden in northern Alaska.

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

## Canada

The 12-month forecast ending in December 2024 anticipates exceptional deficits to lessen in size throughout most provinces, but remain in the West Coast, Prairie Provinces, and some provinces in the North region.

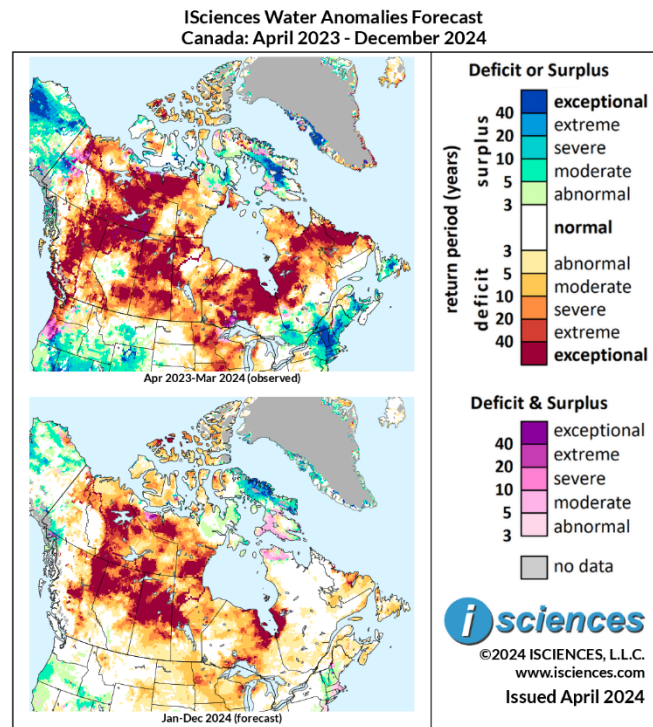
Extreme to exceptional deficits are expected in the following areas:

- Central and northeastern **British Columbia**, in the Northern Rockies region as well as the Omineca Protected Area, which continues east into the majority of northern **Alberta**.
- **Saskatchewan**, widespread throughout regions near Lake Athabasca, Reindeer Lake, and Cree Lake. These deficits continue east into **Manitoba**, in regions northwest of Lake Winnipeg.
- Southern **Ontario**, in regions north of Lake Superior. Deficits are also expected in northeastern coastal regions of the country, which continue into western coastal regions of Quebec, near La Grande Riviere Reservoir.
- **Northwest Territories**, in areas surrounding Great Bear Lake, as well as areas southeast of Great Slave Lake.
- **Nunavut**, in southern areas of the Kivalliq Region and western regions of the Kitikmeot Region.

Severe to exceptional surpluses are expected in the following regions:

- **Nunavut**, primarily in northern portions of Baffin Island.

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

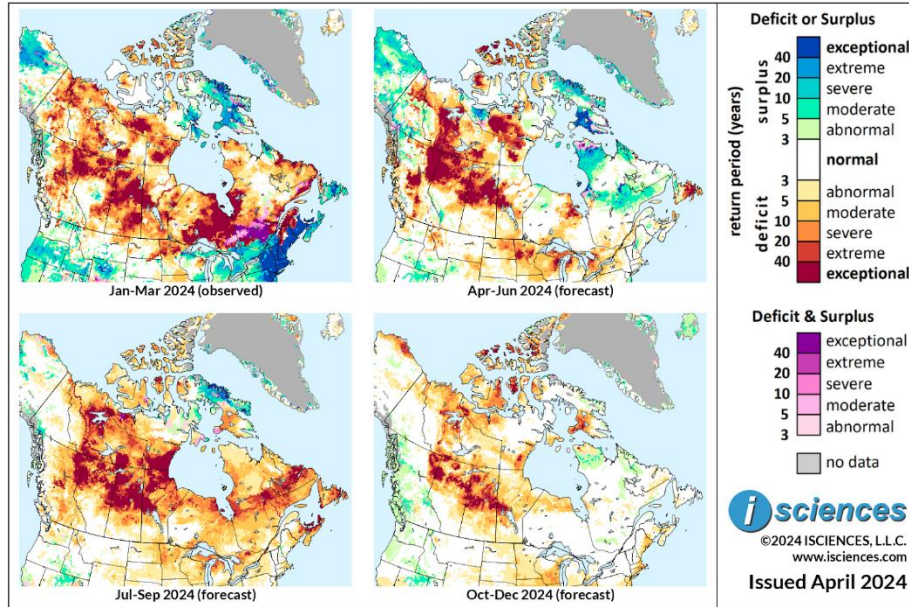


Based on observed data through March 2024 and forecasts through December 2024

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



**ISciences Water Anomalies Forecast  
Canada: January 2024 - December 2024**



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 anticipates that exceptional deficits will continue throughout central and northeastern regions of British Columbia, which continue east into northern Alberta, central Saskatchewan, and western Manitoba. Exceptional deficits are expected to dissipate in Ontario, though some are expected to remain present in northeastern coastal regions of the province. Eastern regions of Newfoundland are expected to observe extreme to exceptional deficits, as well as regions south of Great Bear Lake and west of Great Slave Lake in Northwest Territories. Exceptional deficits will persist in the Kivalliq and Kitikmeot regions of Nunavut. Northern and central Quebec are forecast to observe severe to exceptional surplus, as well as some northern regions of Newfoundland and Labrador. Severe to exceptional surplus is expected to continue throughout Baffin Island, with the highest concentrations appearing in the island’s southern regions.

From July through September 2024, moderate to severe deficits will expand throughout northern Alberta, Saskatchewan, central to northern Manitoba, Ontario, and Quebec. Exceptional deficits may arise in Newfoundland and Labrador. Further north, regions near Great Bear Lake and Great Slave Lake are expected to observe continuing exceptional deficits. Severe to exceptional surplus is expected to continue in northern to central regions of Baffin Island.

The forecast for the final months – October 2024 through December 2024 – expects exceptional deficits to continue to downsize throughout most provinces, though persist in pockets throughout northern Alberta, central Saskatchewan, and western Manitoba. Regions near Great Bear Lake can expect similar deficits to persist. Deficits are expected to intensify in Nunavut, specifically in southwestern regions of Baffin Island and in the Taloyoak Inuit Owned Lands.

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

## Mexico, Central America, and the Caribbean

The 12-month forecast ending in December 2024 indicates that exceptional deficits will decrease in size throughout Mexico, but remain in northwestern and eastern parts of the country. Similarly intense deficits are expected to arise in portions of Guatemala and Honduras.

Severe to exceptional deficits are expected in the following areas:

- Northwestern **Mexico**, throughout portions of Sonora, western Chihuahua, and northern Sinaloa.
- Baja California Sur, widespread throughout the state.
- **Mexico**, throughout regions east of Mexico City.
- Central **Guatemala**, in regions surrounding Izabel Lake. These deficits continue east into regions of northwestern and eastern **Honduras**, eastern coastal regions of **Nicaragua**, and central to southern **Belize**.

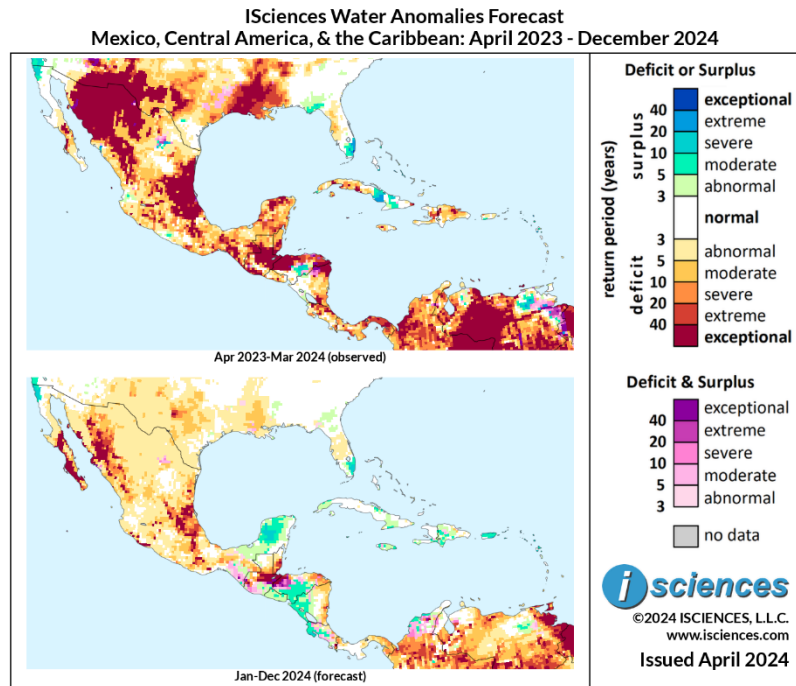
Severe to exceptional surpluses are expected in the following regions:

- **Mexico**, throughout the Yucatan Peninsula.
- Central **Honduras**, widespread throughout most of the region.
- Western **Nicaragua**, in regions near Lake Cocibolca, spreading into northern **Costa Rica**.

Extreme to exceptional transitional conditions are anticipated in:

- Western **Honduras**.

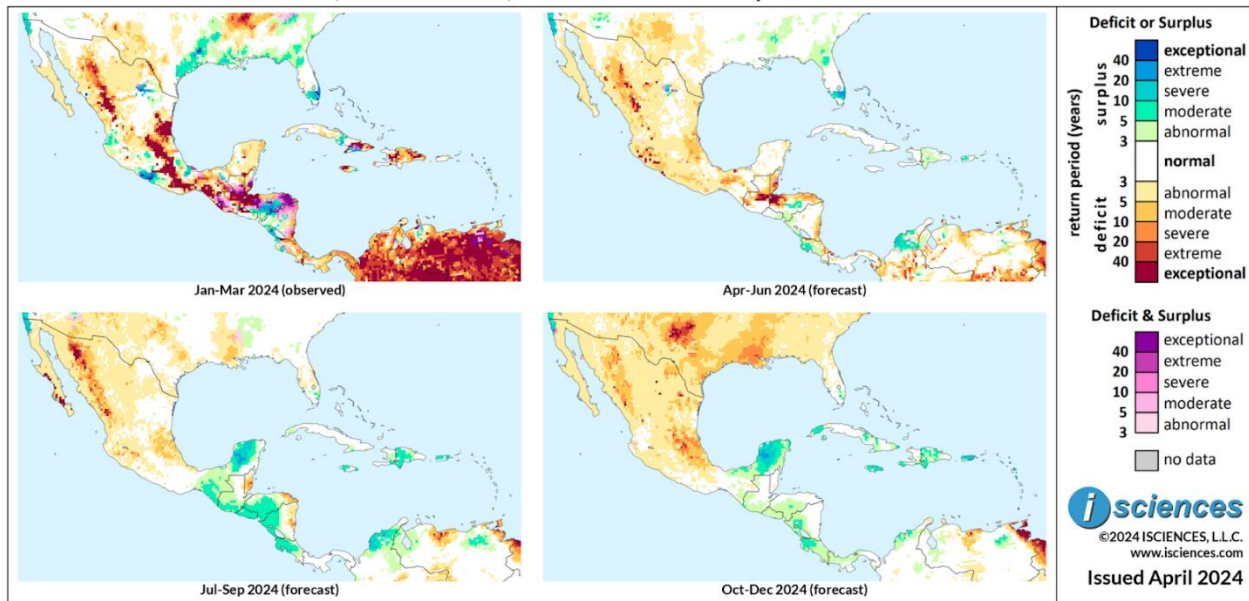
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

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



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 anticipates deficits in Sonora to continue, with some pockets of similar deficits appearing near coastal regions of Jalisco and Colima. Some regions near Mexico City are expected to continue enduring deficits of varying intensity. Exceptional deficits will persist in central Guatemala, western Honduras, El Salvador, and Nicaragua, with some moderate surplus appearing in east-central regions of Honduras and northern Costa Rica.

From July through September 2024, exceptional deficits are expected to linger in northwestern Mexico, persisting in the state of Sonora. Deficits along the western coast of Mexico are expected to diminish, as well as exceptional deficits in Guatemala and Honduras, which are expected to become moderate surplus, spanning throughout much of Central America. Severe to extreme surpluses will appear throughout the Yucatan Peninsula.

The forecast for the final months – October 2024 through December 2024 – anticipate surpluses in the Yucatan Peninsula to linger. Deficits in northwestern Mexico are expected to lessen in intensity, becoming moderate to severe deficits. Similar deficits may arise in regions of north-central Mexico.

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

## South America

The 12-month forecast ending in December 2024 anticipates exceptional deficits to remain widespread throughout Brazil, as well as in pockets throughout the Bolivarian Nations. Some surplus is expected to intensify in eastern coastal regions of Brazil.

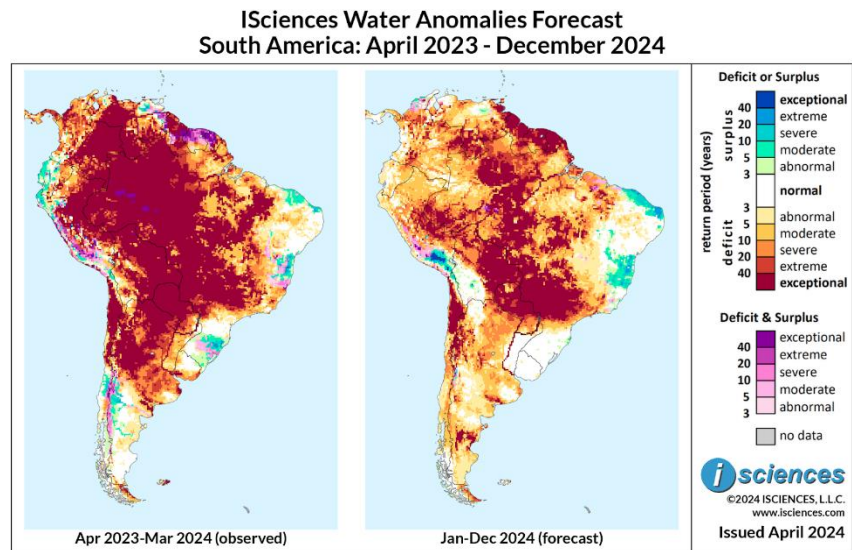
Extreme to exceptional deficits are expected in the following areas:

- **Guianas**, throughout most of the region.
- Southern **Venezuela**, widespread across the state of Amazonas. These anomalies continue into northeastern **Colombia** in regions nearby El Tuparro National Park.
- **Brazil**, covering most states within the country. The highest concentrations are anticipated in the states of Amazonas, Acre, northwestern Mato Grosso, Mato Grosso do Sul, and Parana. These deficits are expected to continue into **Uruguay**, covering the majority of the country.
- Eastern **Peru**, throughout regions of the Peruvian Amazon.
- **Northern Chile**, throughout the regions of Antofagasta, Tarapacá, and Arica y Parinacota. Similarly deficits are expected in northwestern and south-central **Argentina**, in the Catamarca, La Rioja, San Juan, and Chubut provinces.

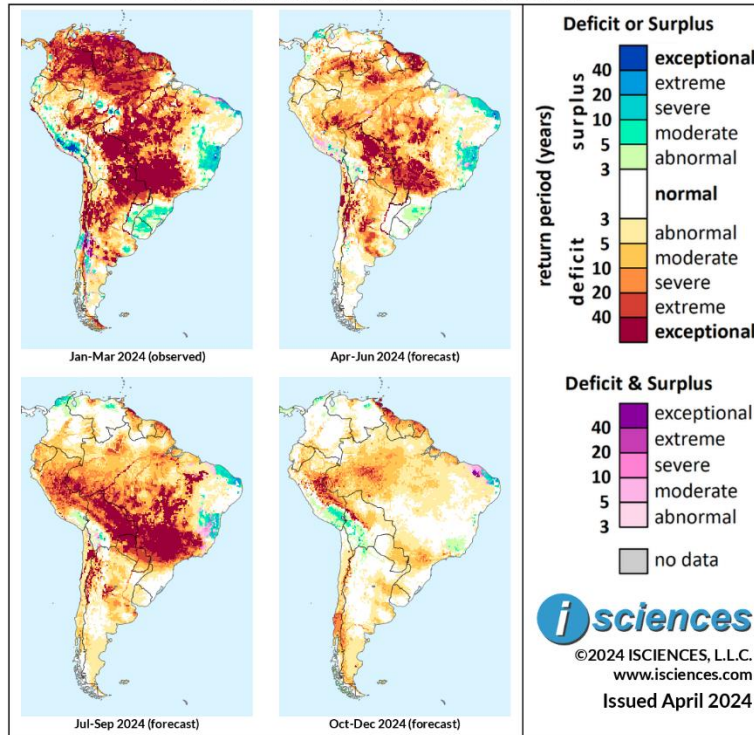
Severe to exceptional surpluses are expected in the following regions:

- Eastern **Brazil**, in coastal regions of the states of Rio Grande do Norte, Espirito Santo, and Rio De Janeiro, as well as eastern portions of the state of Minas Gerais.
- Southern **Peru**, in areas near the city of Cusco.

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



**ISciences Water Anomalies Forecast  
South America: January 2024 - December 2024**



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 indicates that exceptional deficits in northern and central South America will decrease in size, but persist in pockets throughout coastal regions of the Guianas, northeastern Colombia, and the Brazilian states of Para, Mato Grosso, and Mato Grosso de Sul. Exceptional deficits reappear nearby in northern to northeastern Bolivia, as well as in northern Chile and western to central Argentina. Surpluses are expected to continue in eastern Brazil, in the states of Rio Grande do Norte, Espirito Santo, and Rio De Janeiro.

From July through September 2024, exceptional deficits are expected to expand in size in Brazil, mostly affecting southern states, including Acre, Rondonia, Mato Grosso, Mato Grosso de Sul, Parana, and Rio Grande de Sul. Exceptional deficits also are expected to expand throughout northeastern to eastern Bolivia. Further south, regions along the border of northern Chile and northwestern Argentina are expected to observe exceptional deficits. Surplus is expected to continue in eastern Brazil, in Espirito Santo, Rio De Janeiro, and Rio Grande do Norte.

The forecast for the final months – October 2024 through December 2024 – anticipates exceptional deficits in Brazil to mostly resolve, though some may persist in central regions of the state of Amazonas. Extreme to exceptional deficits will also continue in northern Guyana, northeastern coastal regions of Venezuela, and throughout Suriname. Similarly intense deficits will continue in eastern to southern Peru, which continue into northwestern and central Bolivia. Severe to extreme deficits may arise near the southern Chilean region of Los Ríos.

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

## Europe

The 12-month forecast ending in December 2024 indicates that some intense surpluses in Continental Europe will dissipate, while some will continue in western and central Europe, the Nordic Countries, and the United Kingdom. Intense deficits are anticipated in southern portions of Continental Europe.

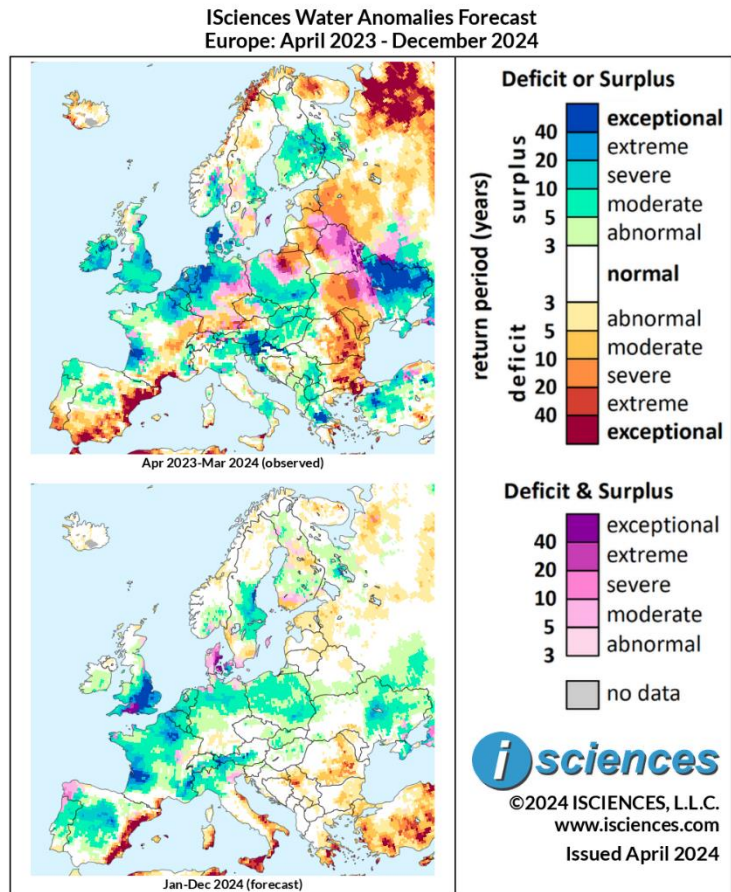
Severe to exceptional surpluses are expected in the following regions:

- **France**, in regions near the Aisne, Marne, and throughout areas near the town of Royan.
- Western and central **Austria**, throughout the states of Tyrol and near the town of Schladming. These anomalies are expected to continue south into northern **Italy**, near the city of Bolzano.
- **Ukraine**, in areas surrounding the Kremenchuts'ke Reservoir.
- Throughout the majority of **Belgium, Netherlands**, northern **Germany**, and **Poland**.
- Southeastern **United Kingdom**, appearing near the city of Stockholm and throughout areas bordering the Baltic Sea. Similar anomalies are expected in eastern coastal regions of **Sweden**, near the city of Hudiksvall.

Severe to exceptional deficits are expected in the following areas:

- Along most western coastal regions of **Spain**, beginning in Catalonia and spreading south into areas near the city of Almeria.
- Eastern and southern coastal regions of **Italy**, with the highest concentrations appearing in the Marche, Foggia, and Calabria regions. Similar deficits are expected to occur throughout Sicily and eastern to southern coastal regions of Sardinia.
- **Romania**, in regions north and northeast of Bucharest, as well as in northeastern **Serbia**.
- **Greece**, with the most intense anomalies appearing near Athens and Argolis.

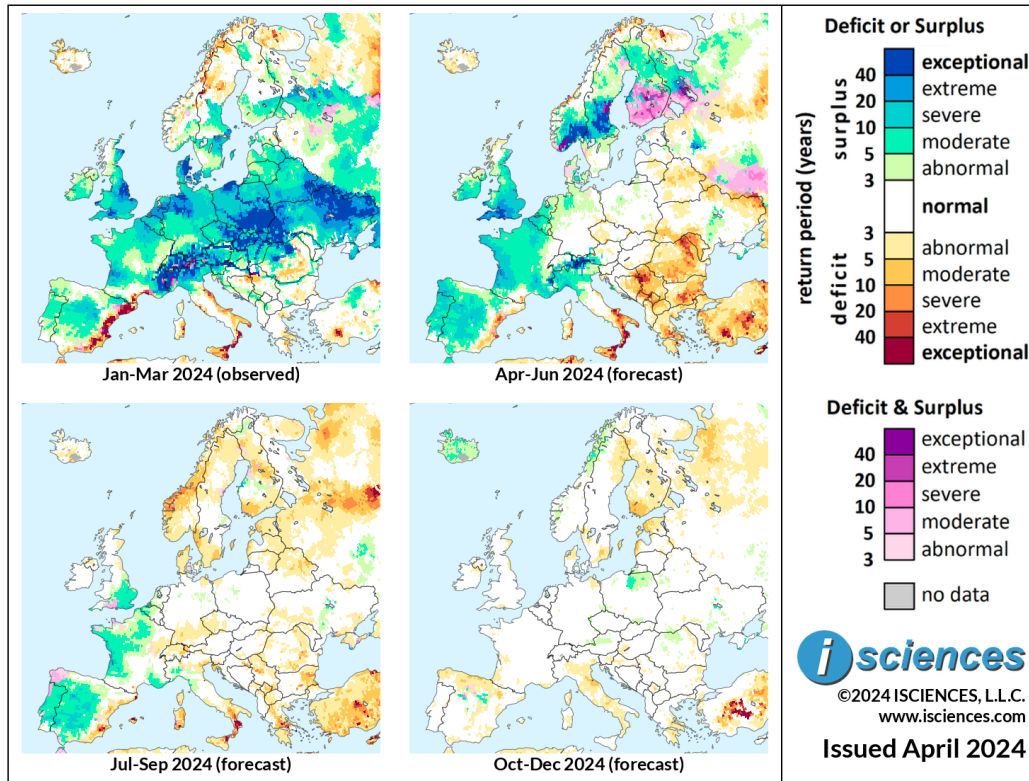
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

## ISciences Water Anomalies Forecast Europe: January 2024 - December 2024



**Based on observed data through March 2024 and forecasts through December 2024**

The forecast through June 2024 indicates that exceptional surpluses will arise in southeastern portions of Norway, as well as central Sweden. Similar surpluses are expected to continue in western Austria and northern regions of Italy. Moderate to severe surpluses are forecast throughout France, Spain, and Portugal. Extreme to exceptional deficits are anticipated in southern Italy, Sicily, northwestern Serbia, northwestern Romania, south-central Bulgaria, and throughout Moldova. Outside of Continental Europe, southwestern coastal regions of the United Kingdom can expect to experience extreme to exceptional surpluses.

From July through September 2024, intense anomalies are expected to dissipate from most European countries. However, moderate to severe surpluses are expected to persist in Portugal, Spain, western to northern France, and southeastern United Kingdom. Severe to exceptional deficits are anticipated in coastal regions of western to central coastal regions of Norway, southern Italy, southern Greece, and southern Sardinia. Regions of southeastern Spain, near the city of Murcia, can expect similar deficits.

The forecast for the final months – October 2024 through December 2024 – anticipates most areas of Europe to observe near normal to abnormal anomalies. Some moderate deficits are anticipated in southern Finland.

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

## Africa

The 12-month forecast ending in December 2024 anticipates exceptional deficits to continue in northern and northwestern African countries, as well as some central and southern countries. Intense surpluses are expected to emerge in areas throughout the Sahel.

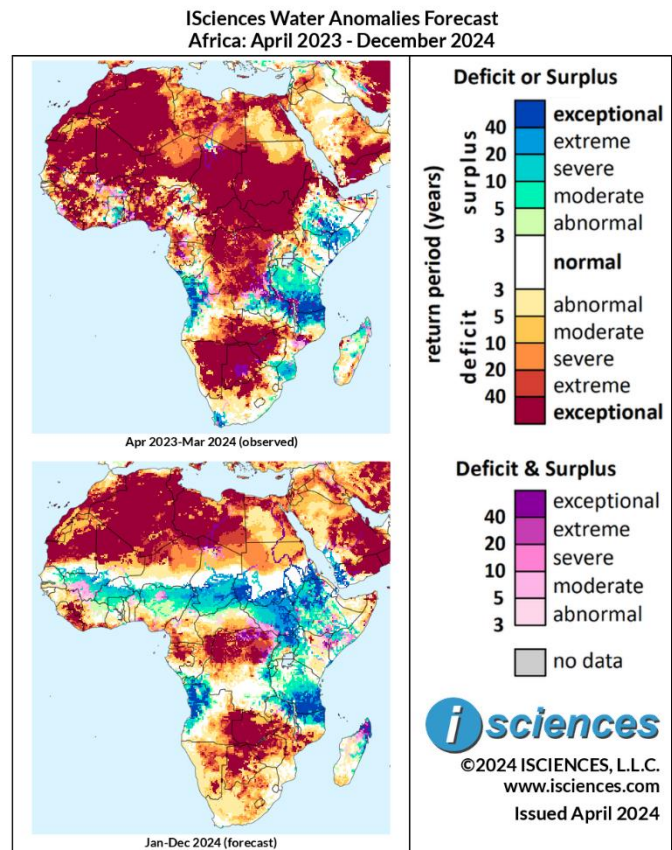
Extreme to exceptional deficits are expected in the following areas:

- Widespread throughout **Algeria**, **Libya**, northernmost regions of **Egypt**, northern **Mali**, **Mauritania**, and **Tunisia**.
- **Western Sahara** and **Morocco**, covering most of both countries.
- **Liberia**, covering most of the country. These deficits continue north into southern **Guinea**,
- Central **Gabon**, spreading further into northern regions of the Republic of **the Congo**, as well as the northern areas of the **Democratic Republic of Congo**.
- The majority of southern to central **Zambia** and **Botswana**. Western to central **Zimbabwe** and eastern **Namibia** should anticipate similarly widespread deficits.

Severe to exceptional surpluses are expected in the following regions:

- Many regions within and surrounding the Sahel, including areas of southern **Mali**, most of **Burkina Faso**, and northern **Nigeria**.
- Southern to central **Chad**, southwestern **Sudan**, the majority of **South Sudan**, and northern **Ethiopia**.
- Western **Angola**, with the highest concentrations in areas around the city of Luanda.
- Southern **Tanzania**, in regions south of Nyerere National Park. These anomalies continue further south into northern **Mozambique**, within the Niassa Hunting Blocks areas.
- Northern and northeastern coastal regions of **Madagascar**.

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

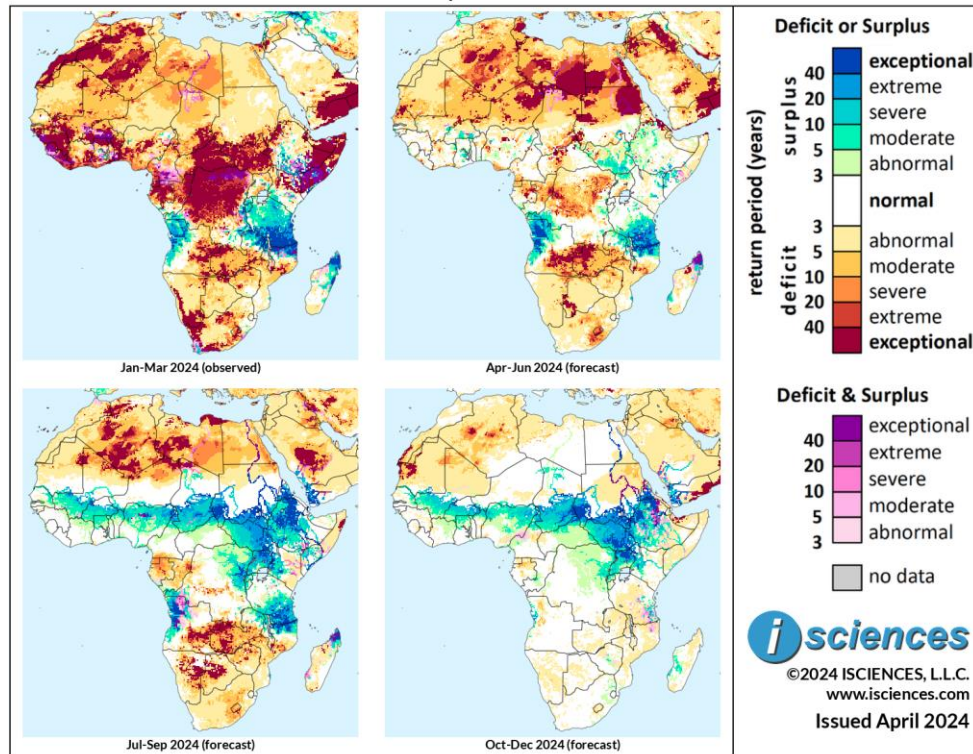


Based on observed data through March 2024 and forecasts through December 2024

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



ISciences Water Anomalies Forecast  
Africa: January 2024 - December 2024



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 anticipates exceptional deficits to continue in north-central Algeria, northeastern Niger, southern to southeastern Libya, southwestern Egypt, and northeastern Sudan. Further south, northern regions of the Democratic Republic of Congo are expected to observe severe to extreme deficits, which continue further west into Gabon. Exceptional deficits are expected to endure in southern Angola and southern Zambia. In northwestern Angola, exceptional surpluses are expected to persist, as are similar surpluses in southern Tanzania and northern Mozambique.

From July through September 2024, intense surpluses are expected to emerge across the Sahel. Surpluses of similar intensity are expected to linger in eastern regions of the Democratic Republic of Congo, western Angola, southern Tanzania, and northern Mozambique. Exceptional deficits in some northern African countries are expected to expand, particularly in Algeria, western Libya, northern Mali, and eastern Mauritania. Several southern countries are expected to observe similar deficits, particularly in southeastern Angola, southern Zambia, eastern Namibia, and central Botswana.

The forecast for the final months – October 2024 through December 2024 – expects widespread surpluses across the Sahel to continue. However, most other African countries can anticipate normal to abnormal conditions. Some exceptional deficits may persist in pockets of Algeria, Western Sahara, and western Mauritania.

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

## Middle East

The 12-month forecast ending in December 2024 anticipates exceptional deficits in Saudi Arabia, Yemen, and Oman to broaden in size. Similar deficits are expected to continue throughout Iran, as well as arise in Iraq and Turkey. Western Yemen is expected to experience exceptional surplus.

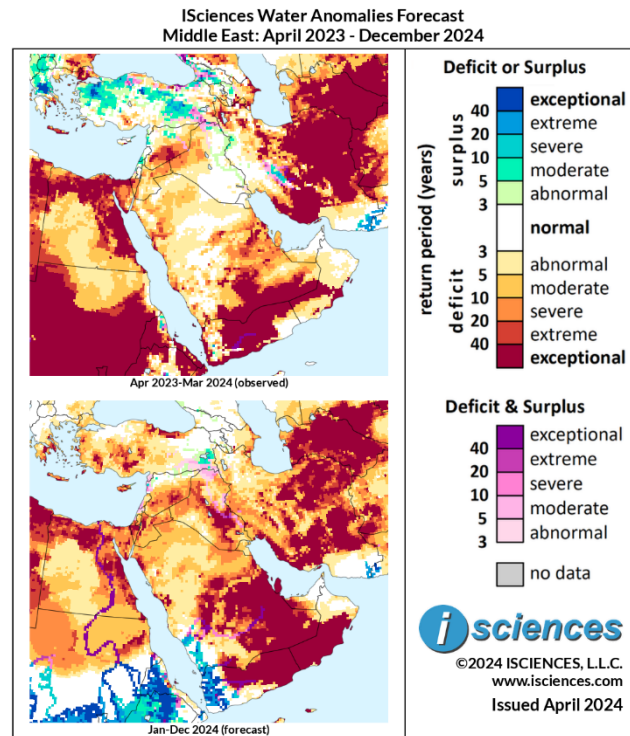
Severe to exceptional deficits are expected in the following areas:

- Central to southeastern **Saudi Arabia**, throughout the Riyadh and Al Ahsa provinces. These deficits continue into western areas of the United Arab Emirates.
- Central to eastern **Yemen**, covering much of the country and spreading throughout the majority of **Oman**.
- **Iraq**, appearing in regions southeast of Therthar Lake.
- **Iran**, widespread in most northeastern to southwestern portions of the country.
- Southeastern **Syria**, near the Sokhneh region. These deficits continue into western and northwestern **Jordan, Israel**, and in **Turkey**, near along the country's northeastern coast bordering the Black Sea, and in pockets throughout the Antalya Province.

Severe to exceptional surpluses are expected in the following regions:

- Western coastal regions of **Yemen**, continuing into the Sana'a Governorate.

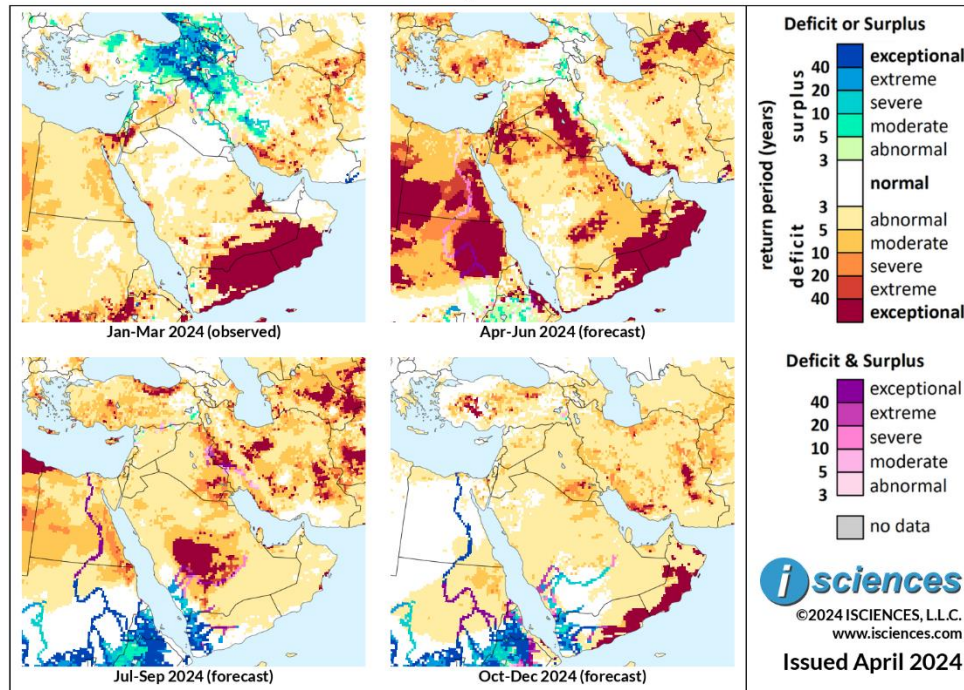
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

**ISciences Water Anomalies Forecast  
Middle East: January 2024 - December 2024**



**Based on observed data through March 2024 and forecasts through December 2024**

The forecast through June 2024 anticipates that eastern Yemen will endure exceptional deficits, as well as the majority of Oman. Similar deficits will arise near the Al Aflaj Governorate of Saudi Arabia. Exceptional deficits are expected to be widespread in central Iraq, in the majority of areas surrounding Tharthar Lake. Similar deficits are expected throughout Jordan. In Iran, southwestern coastal regions along the Persian Gulf are expected to observe exceptional deficits. Southwestern regions of Turkey, near the city of Antalya, as well as in northeastern coastal regions bordering the Black Sea.

From July through September 2024, exceptional deficits are expected to arise in central Saudi Arabia. In Yemen and Oman, exceptional deficits will resolve, becoming abnormal deficits. Western Yemen should anticipate exceptional surpluses to emerge. Pockets of severe to exceptional deficits will continue in southern Iraq, continuing west into regions of Iran, near the city of Dezful. These deficits persist further into north-central and southeastern Iran. In Turkey, exceptional deficits of coastal areas bordering the Black Sea are expected to continue.

The forecast for the final months – October 2024 through December 2024 – anticipates exceptional deficits in central Saudi Arabia to resolve, becoming abnormal deficits. Exceptional deficits will emerge in southern Yemen, which will continue into western to central Oman. Western Yemen will continue to experience exceptional surpluses. Further north, pockets of severe to exceptional deficits are anticipated in west-central and northeastern Turkey, southern Iraq, and southwestern to eastern regions of Iran.

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

## Central Asia and Russia

The 12-month forecast ending in December 2024 expects exceptional deficits in western and eastern Russia to mostly diminish, but still linger in isolated areas. Similar deficits are expected to continue northwest of Lake Baikal. Intense surplus is anticipated in regions of northern Kazakhstan and northeastern Russia, as are exceptional deficits in Turkmenistan and Uzbekistan.

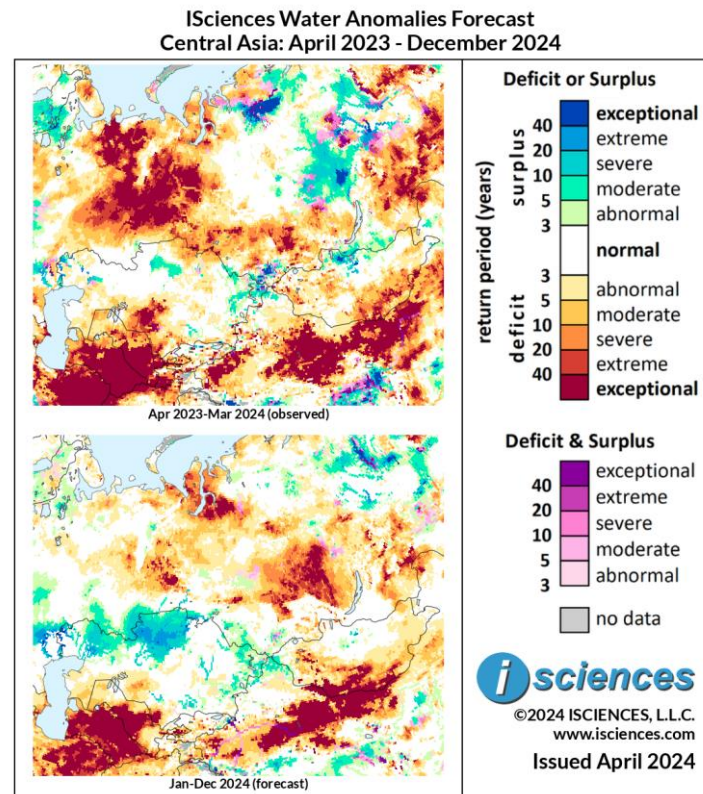
Extreme to exceptional deficits are expected in the following areas:

- Western **Russia**, in isolated areas within the Khanty-Mansi Autonomous Okrug.
- Northwestern **Russia**, throughout the Yamalo-Nenets Autonomous Okrug.
- Southeastern **Russia**, widespread throughout western, southern, and central regions of the Irkutsk Oblast. Similar deficits are anticipated to appear in pockets across the Zabaykalsky Krai.
- Central regions of **Uzbekistan**, as well as throughout **Turkmenistan**.

Severe to exceptional surpluses are expected in the following regions:

- Northeastern **Russia**, in the northern regions of the Olenyoksky District, in the Sakha Republic.
- Northern **Kazakhstan**, throughout the Akmola and North Kazakhstan regions.

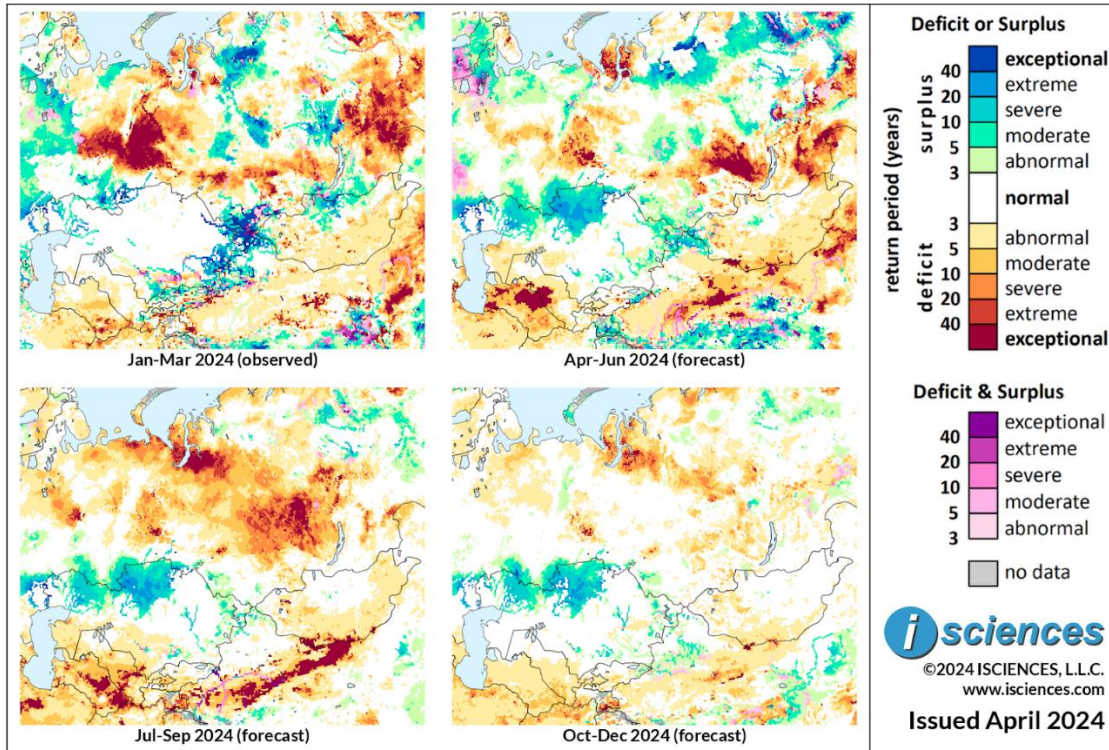
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

### ISciences Water Anomalies Forecast Central Asia: January 2024 - December 2024



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024 anticipates an emergence of exceptional deficits in regions west of Lake Baikal, covering most central regions of the Irkutsk Oblast. Similar deficits are expected to persist in the Yamalo-Nenets Autonomous Okrug and near the settlement of Novy Port. Exceptional deficits within the Khanty-Mansi Autonomous Okrug are expected to decrease in size significantly, but remain present in isolated areas. Exceptional surplus is expected to expand in northern regions of the Olenyoksky District in the Sakha Republic, as well as in central regions of the Krasnoyarsk Krai. Severe to extreme surplus is expected to emerge in northern Kazakhstan. Further south, exceptional deficits are anticipated to emerge in central Uzbekistan and Turkmenistan.

From July through September 2024, exceptional deficits are expected to expand in size throughout the Yamalo-Nenets Autonomous Okrug, as well as in central areas of the Irkutsk Oblast. Surplus is expected to linger in northern Kazakhstan, but mostly diminish in northeastern Russia. Exceptional deficits are expected to endure in central Turkmenistan but mostly diminish in central Uzbekistan, instead emerging in eastern portions of Uzbekistan.

The forecast for the final months – October 2024 through December 2024 – indicates that normal to abnormal anomalies will cover most of the region, though intense deficits are expected to remain in Yamalo-Nenets Autonomous Okrug and northern Taymyrsky Dolgano-Nenetsky District, as are severe to extreme surplus in northern Kazakhstan.

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

## South Asia

The 12-month forecast ending in December 2024 anticipates a widespread emergence of surplus in India, with the most intense concentrations appearing in central, southern, and eastern regions of the country. Exceptional deficits are expected in regions of Afghanistan and Pakistan.

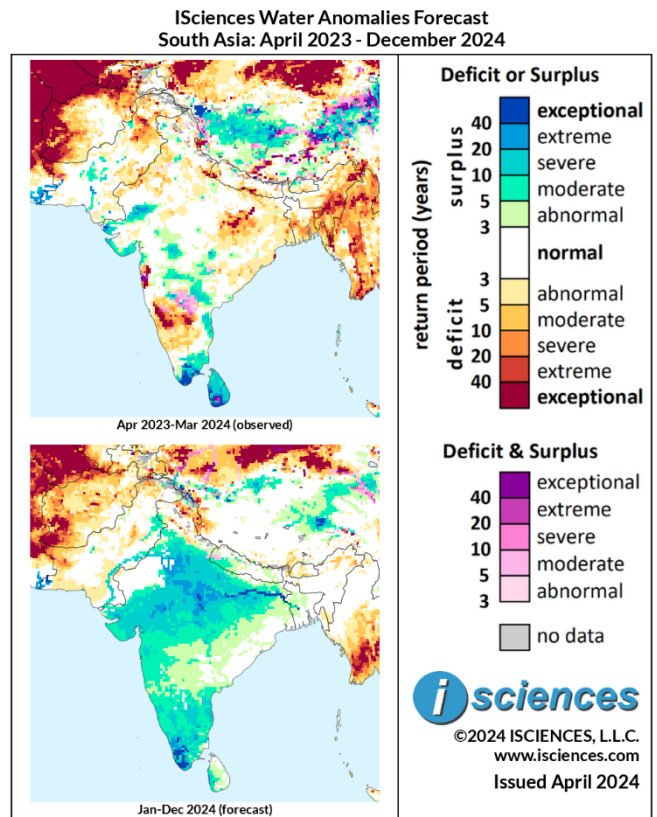
Severe to exceptional surpluses are expected in the following regions:

- **India**, widespread throughout the country, with the most intense concentrations appearing in the Ganges River Basin, southern Kerala and Tamil Nadu, central Uttar Pradesh, and near New Delhi.
- Western coastal regions of **Sri Lanka**.

Severe to exceptional deficits are expected in the following areas:

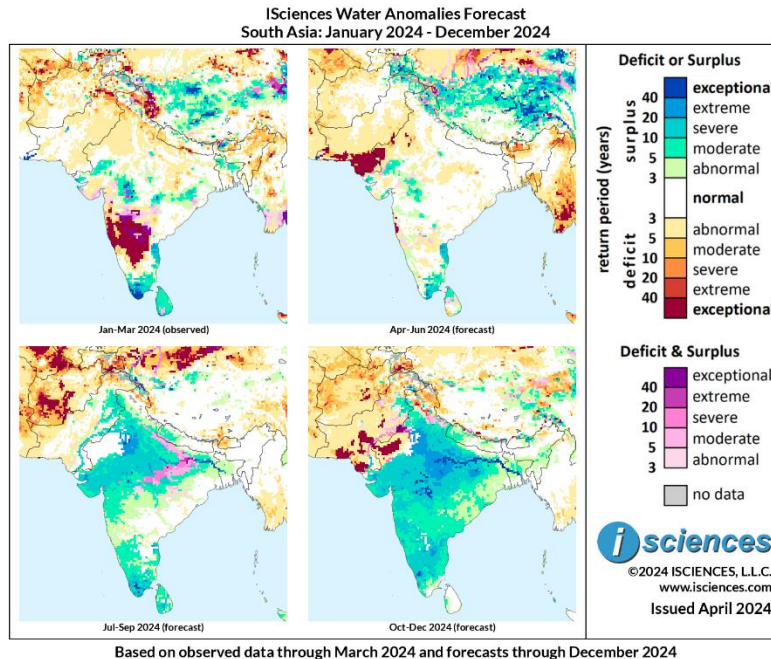
- Southwestern **Afghanistan**, in southern regions of the Nimruz Province. These deficits continue into western **Pakistan**, in Chagai, Balochistan.
- Northern **India**, in Himachal Pradesh.

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



Based on observed data through March 2024 and forecasts through December 2024

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



The forecast through June 2024 expects exceptional deficits to arise in southern Pakistan, in the Sindh province. Western regions of the Indian states of Gujarat and Rajasthan. Southeastern coastal regions of India can expect pockets of severe to exceptional surplus, particularly in eastern Andhra Pradesh and southern Tamil Nadu. Northern Sri Lanka can expect similarly intense surplus.

From July through September 2024, widespread surpluses are expected to reemerge in India, with severe to extreme transitional conditions occurring in central Uttar Pradesh and Bihar. Sri Lanka is expected to experience an expansion of moderate to severe surpluses across the country. Exceptional deficits will arise in central and southern Afghanistan.

The forecast for the final months – October 2024 through December 2024 – anticipates widespread surplus to continue throughout India, with exceptional surpluses in the Ganges River Basin. Some exceptional deficits will arise portions of Rajasthan. Exceptional deficits are also anticipated in pockets throughout southern to central Pakistan. Northwestern to northern areas in Afghanistan can anticipate moderate to severe deficits.

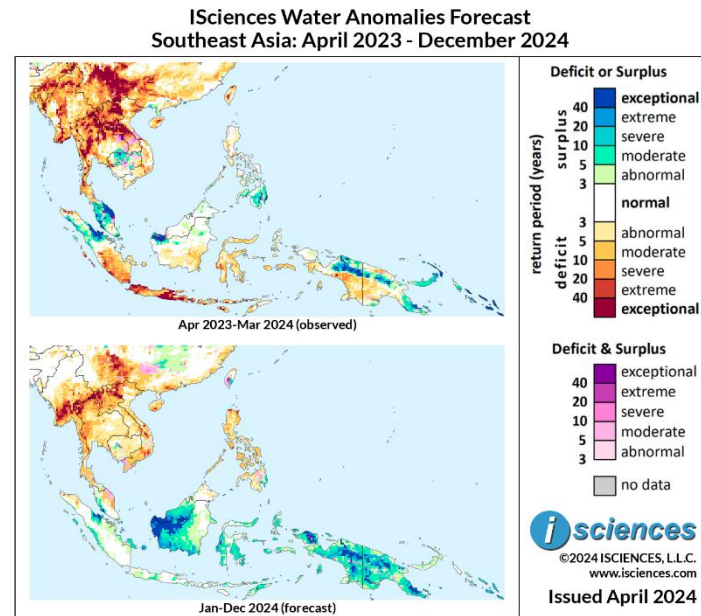
Please note that WSIM forecast skill declines with longer lead times.

## Southeast Asia and the Pacific

The 12-month forecast ending in December 2024 indicates that exceptional deficits in Mainland Southeast Asia will persist but lessen in size, while intense surpluses will expand throughout Maritime Southeast Asia.

Severe to exceptional surpluses are expected in the following regions:

- **Indonesia**, with the highest concentrations appearing in West and North Kalimantan, and Sarawak in Northern Sumatra near the city of Medan. Sulawesi can also expect widespread surpluses of moderate to severe intensity.
- **Papua**, throughout West Papua and continuing east into the Tolikara and Mappi regencies.
- **Papua New Guinea**, throughout regions near the April Salome Forest Management Area.



Based on observed data through March 2024 and forecasts through December 2024

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

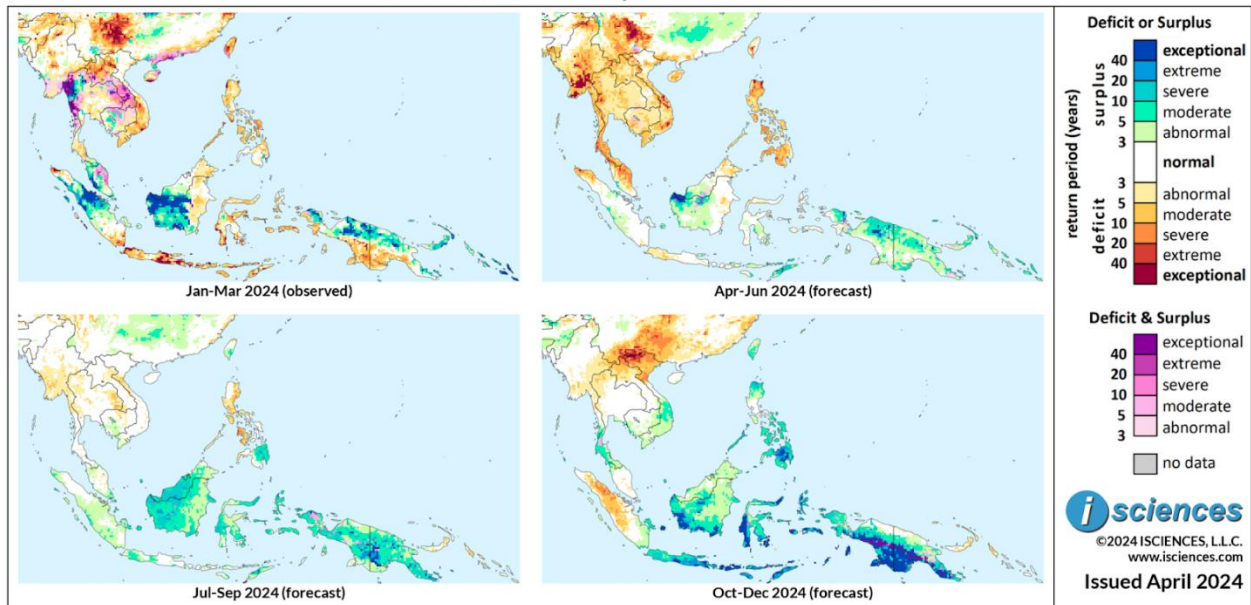
Severe to exceptional deficits are expected in the following areas:

- Southern to eastern **Myanmar**, appearing in the Ayeyarwady region and moving further into the Yangon and Bago regions, into the Loi Hkilek Mountains.
- Northern **Thailand**, across northernmost regions of Chiang Mai and Chiang Rai. These deficits continue into northern **Laos**, throughout areas near the Nam Ha National Biodiversity Conservation Area.

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



**ISciences Water Anomalies Forecast  
Southeast Asia: January 2024 - December 2024**



Based on observed data through March 2024 and forecasts through December 2024

The forecast through June 2024, exceptional deficits are expected to arise in southern Myanmar, specifically in the Ayeyarwady Region. Deficits of lesser intensity are expected to continue further south, through southernmost Myanmar and into the majority of Southern Thailand and the Malay Peninsula. Northernmost regions of Vietnam are expected to observe extreme to exceptional deficits. Similar deficits are forecast in northern coastal regions of North Sumatra and throughout the Philippines. Exceptional surpluses are expected to appear in northwestern coastal regions of West Kalimantan, with lesser intensity surpluses appearing in central Kalimantan, as well as central Papua.

From July through September 2024, most intense deficits in Mainland Southeast Asia are expected to dissipate, becoming mostly near normal conditions. In Maritime Southeast Asia, surpluses are expected to be widespread throughout most regions of Indonesia and the southern Philippines, as well as Papua and Papua New Guinea. Northern and central regions of the Philippines are forecast to observe moderate to severe deficits.

The forecast for the final months – October 2024 through December 2024 – anticipates exceptional deficits in northern Vietnam to reemerge. Much of Sumatra may experience moderate to severe deficits. Exceptional surpluses are anticipated to occur in the Lesser Sunda Islands, southern Kalimantan, Sulawesi, southern Philippines, and throughout most of southern to central Papua and Papua New Guinea.

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

## East Asia

The 12-month forecast ending in December 2024 indicates that exceptional deficits will mostly dissipate in northeastern China, but continue in northern, southern, and northwestern portions of the country. Exceptional surplus is expected to diminish in southwestern China, though moderate to severe surpluses may continue in eastern regions of the country.

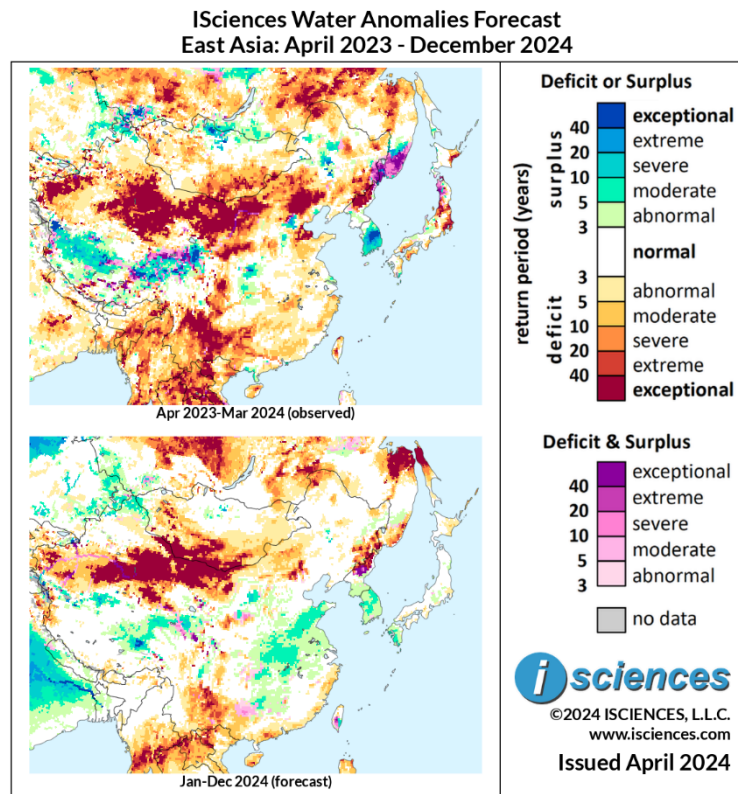
Extreme to exceptional deficits are expected in the following areas:

- Western **China**, throughout eastern Xinjiang, western to central Gansu, and western Inner Mongolia.
- Northeastern **China**, in regions of the Liaoning, Jilin, and southern Heilongjiang.
- Southern **China**, in the central regions of the Yunnan province.
- **North Korea**, particularly in the North Hamgyong Province.

Severe to extreme surpluses are expected in the following regions:

- Eastern **China**, within the Shandong and Henan provinces.
- Southwestern **China**, in isolated regions of Tibet, specifically near the city of Nagqu.

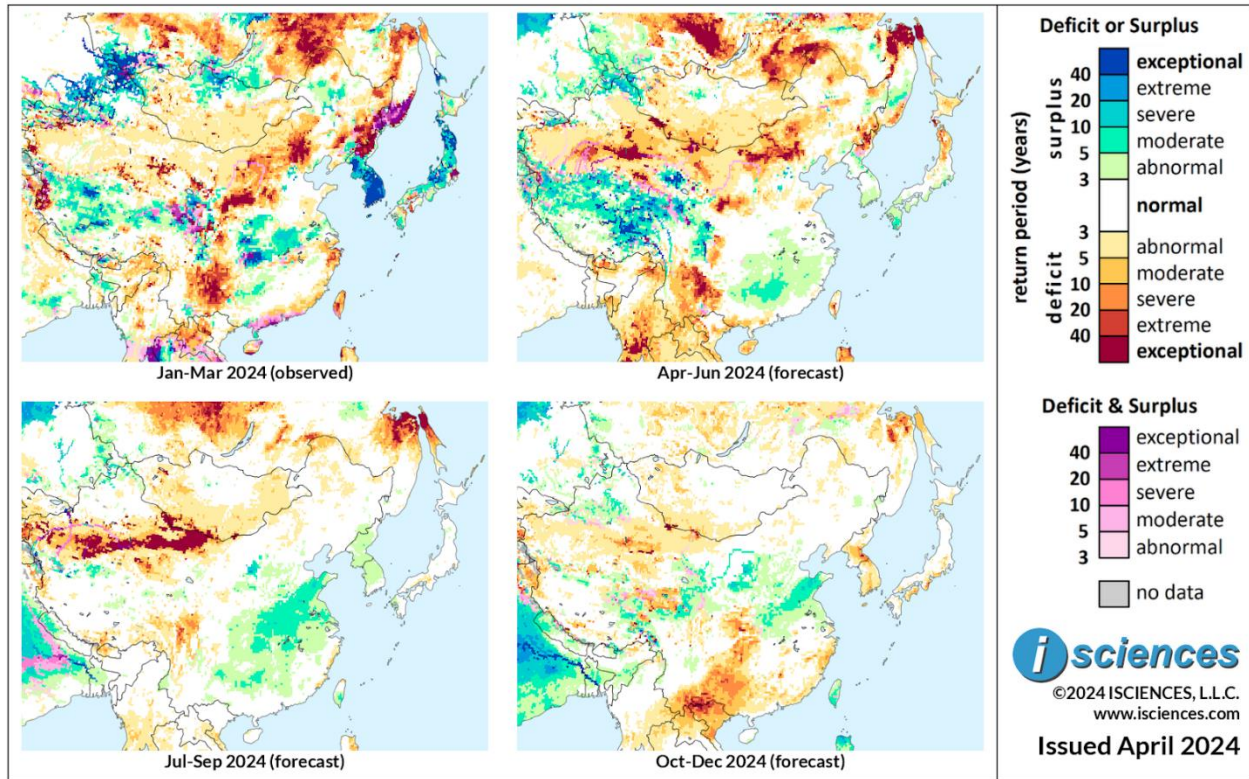
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

## ISciences Water Anomalies Forecast East Asia: January 2024 - December 2024



**Based on observed data through March 2024 and forecasts through December 2024**

The forecast through June 2024 indicates that pockets of surplus will expand in Tibet, covering much of the region. Pockets of exceptional deficits are expected to emerge in eastern regions of Inner Mongolia, eastern Xinjiang, and Gansu. In eastern China, southern portions of Jilin are expected to observe small occurrences of exceptional deficits, with travel further south into northern regions of North Korea. Further south, deficits are expected to persist in the Yunnan province.

From July through September 2024, exceptional deficits are expected to expand in western Inner Mongolia, spreading further through Gansu and into western Xinjiang. Surplus in eastern China is expected to expand, particularly in the Shandong and Henan provinces.

The forecast for the final months – October 2024 through December 2024 – anticipates exceptional deficits to mostly disappear from northwestern China. Some regions of southern China, particularly Yunnan and Guizhou, may experience severe to extreme deficits. Surplus in the Shandong and Henan provinces are expected to decrease in size but remain present.

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

## Australia and New Zealand

The 12-month forecast ending in December 2024 indicates that intense surplus will occur in most northern and central regions of Australia, with exceptional deficits diminishing in portions of the country near its western coast. Exceptional deficits are expected to emerge in Tasmania, as well as in pockets across New Zealand.

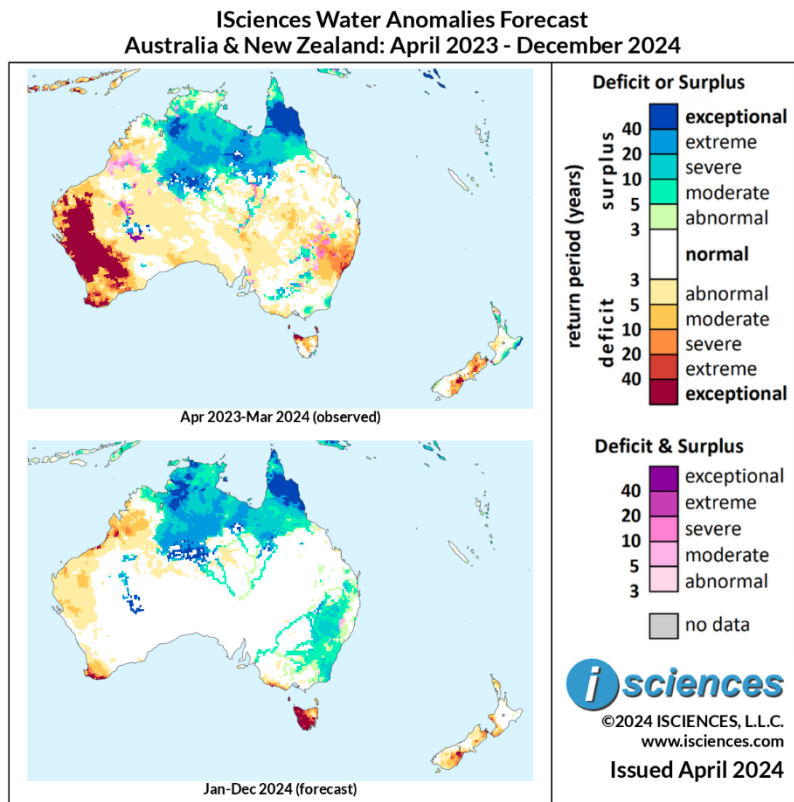
Severe to exceptional surpluses are expected in the following regions:

- **Northern Territory**, widespread throughout most northern and central regions of the territory.
- Northern **Queensland**, with exceptional surpluses appearing primarily throughout the Yorke Peninsula.
- Eastern to southeastern **New South Wales**, spreading through Wollemi National Park and into coastal regions of the Southern Tablelands.
- **Western Australia**, near Lake Carnegie.

Severe to exceptional deficits are expected in the following areas:

- Northern and southern **Western Australia**, in northern coastal regions near Port Hedland, as well as in coastal regions near the city of Albany.
- **Tasmania**, widespread throughout western and central portions of the country.
- **New Zealand**, with isolated pockets of exceptional surplus appearing near the cities of Dunedin and Nelson.

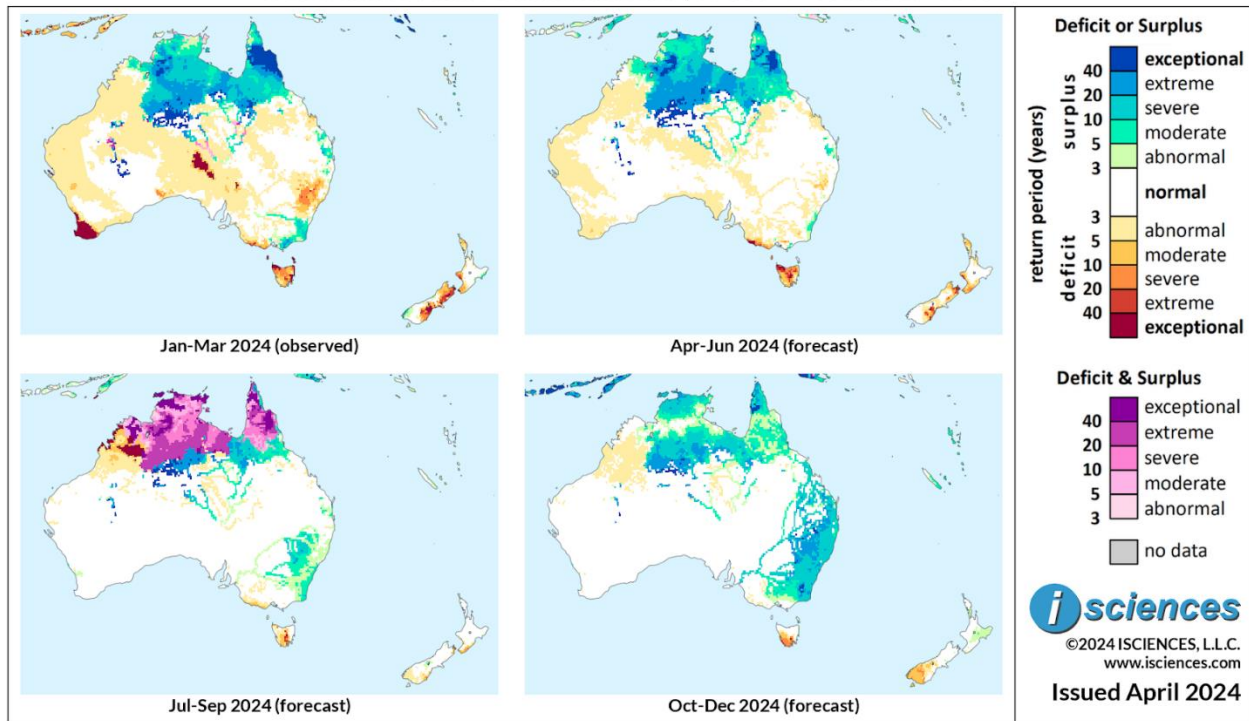
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through March 2024 and forecasts through December 2024

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

## ISciences Water Anomalies Forecast Australia & New Zealand: January 2024 - December 2024



**Based on observed data through March 2024 and forecasts through December 2024**

The forecast through June 2024 anticipates that surpluses will continue throughout central and northern portions of Northern Territory and northern Queensland. Similarly intense surpluses are expected to continue in Western Australia near Lake Carnegie. Exceptional deficits are expected to occur along the southwestern coast of Victoria, as well as throughout Tasmania. Deficits in New Zealand near Dunedin, Portland, and Wellington are expected to continue.

From July through September 2024, surpluses in Northern Territory and Queensland are expected to mostly change into transitional conditions, covering most of both regions. Severe to extreme surpluses are expected to persist in central Northern Territory and Queensland. Moderate to severe surplus is anticipated to emerge in east-central regions of New South Wales. Exceptional deficits may emerge in northern portions of Western Australia. Deficits in Tasmania are expected to downgrade in size and intensity, but endure in most regions of the country.

The forecast for the final months – October 2024 through December 2024 – indicates that intense surpluses may return in northern to central Queensland and Northern Territory. Similarly intense surpluses may expand throughout New South Wales and southeastern regions of Queensland. Southern Tasmania is expected to observe severe to extreme deficits. Southernmost regions of New Zealand are expected to observe an emergence of moderate to severe deficits.

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