

# Global Water Monitor & Forecast Watch List

October 18, 2023

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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 September 2023 and an ensemble of forecasts issued the last week of September 2023. This edition of Global Water Monitor & Forecast Watch List presents a selection of regions likely to encounter significant water anomalies in the next few months.

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

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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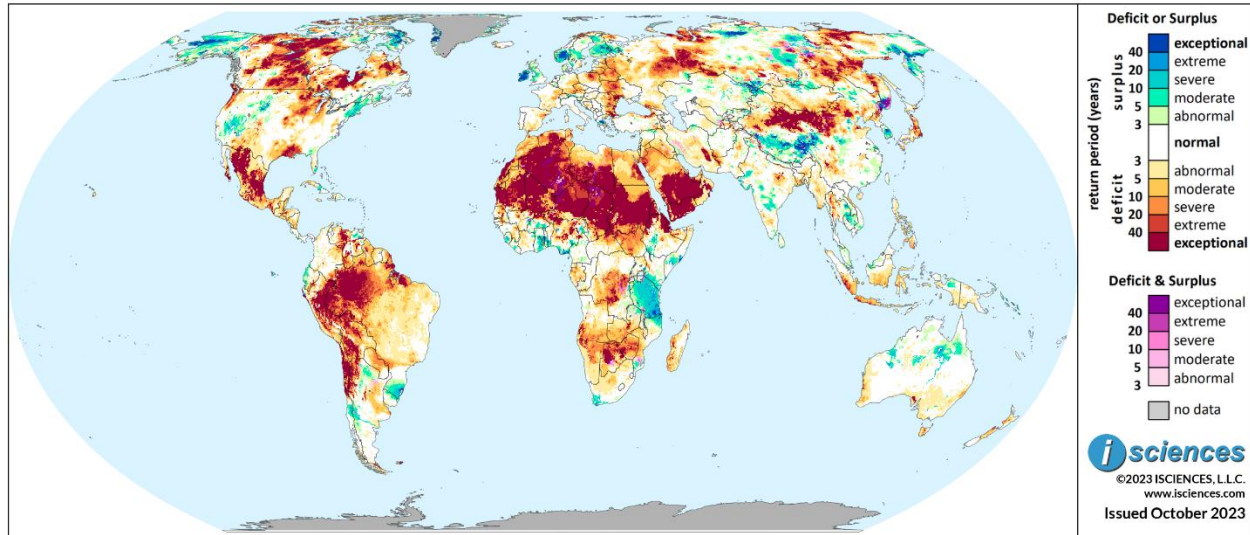
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## Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: July 2023 - June 2024



Based on observed data through September 2023 and forecasts through June 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:** Exceptional deficits are expected to linger in northern midwestern states throughout December 2023 or longer.

**Canada:** Exceptional deficits are expected to linger in most provinces throughout March 2024 or longer.

**Mexico, Central America, and the Caribbean:** Mexico is expected to experience persisting widespread exceptional deficits throughout March 2024 or longer.

**South America:** Extreme to exceptional deficits are expected to occur in northwestern Brazil and in pockets throughout the Bolivarian Nations until December 2023 or longer.

**Europe:** Severe to extreme deficits are expected to occur in most of Continental Europe until December 2023 or longer, while moderate to extreme surplus is expected in Finland, Norway, and Sweden until March 2024 or longer.

**Africa:** Severe to extreme surplus is expected to continue in Tanzania and neighboring regions until June 2024 or longer.

**Middle East:** Exceptional deficits are expected to occur throughout southern regions until December 2024 or longer.

**Central Asia and Russia:** Exceptional deficits are expected to linger in pockets of the Ural region throughout March 2024 or longer.

**South Asia:** Most regions can anticipate near-normal conditions, while pockets of central India can expect moderate surplus throughout March 2024 or longer.

**Southeast Asia and the Pacific:** Extreme to exceptional deficits are expected to occur throughout much of Maritime Southeast Asia until December 2023 or longer.

**East Asia:** Northern regions of China can anticipate exceptional deficits throughout December 2023 or longer.

**Australia & New Zealand:** Extreme to exceptional surplus is expected to occur in northern regions of Australia throughout December 2023 or longer.

## Watch List: Regional Details

### United States

The 12-month forecast ending in June 2024 anticipates isolated pockets of intense deficits to continue in midwestern states, southern states, and the Pacific Northwest, but are expected to decrease in magnitude. Extreme to exceptional surpluses are expected to continue but similarly decrease in magnitude, particularly in western states and in northern Alaska.

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

Severe to extreme surpluses are expected in the following regions:

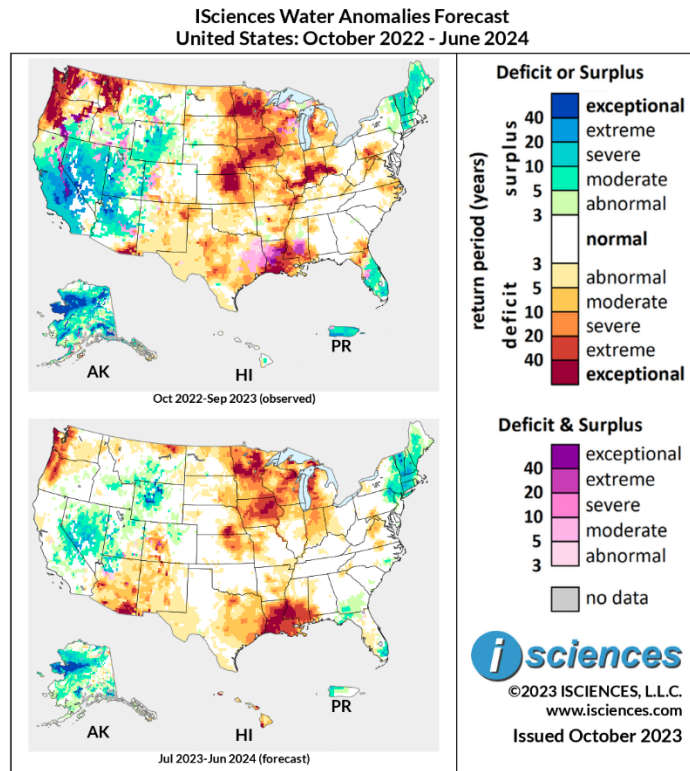
- **Nevada**, throughout the majority of the state. These anomalies continue east into much of western to southwestern **Utah** into northwestern regions of **Arizona**, in areas within Mohave County.
- Southern **Maine**, with widespread surpluses continuing throughout the entirety of **Vermont**, **New Hampshire**, **Connecticut**, western to central **Massachusetts**, southeastern **New York**, and northwestern **Pennsylvania**.
- Southern **Florida**, in areas southeast of **Lake Okeechobee**.

Exceptional surpluses are expected in:

- **Alaska**, throughout the entirety of the Seward Peninsula, continuing east further inland to western regions of the Yukon-Koyukuk Region.
- **Wyoming**, in areas within the Wind River Reservation, which move northeast into areas in Washakie County.

Extreme to exceptional deficits are expected in the following areas:

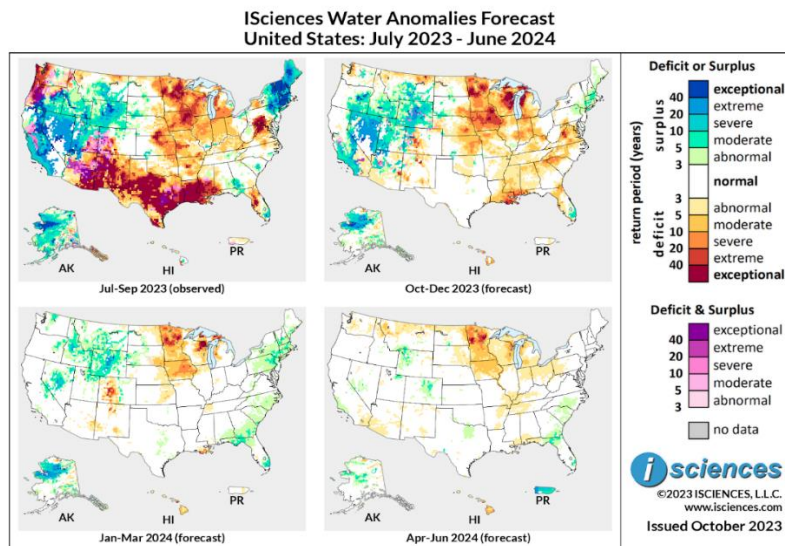
- **Louisiana**, widespread throughout the majority of the state. These deficits continue into southwestern **Mississippi**, in areas throughout Wilkinson County.
- Northeastern **Iowa**, within and in surrounding areas of Black Hawk County. Further north, similar deficits are anticipated in northern to central **Minnesota** in areas near Mille Lacs Lake, the Leech Lake Reservation, and the Red Lake Reservation. Coastal regions of **Michigan** along Lake Michigan and Lake Superior can also expect similarly intense deficits.
- Southeastern **Nebraska**, in areas within and surrounding Thayer County.
- Western regions of the Pacific Northwest, particularly coastal regions of **Washington** and **Oregon**.



Based on observed data through September 2023 and forecasts through June 2024

- Southeastern **Arizona**, in areas southeast of Tucson.

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



The forecast through December 2023 anticipates extreme to exceptional deficits to occur throughout Iowa, north-central Minnesota, eastern Wisconsin, and coastal regions of Michigan along Lake Michigan and Lake Superior. Deficits in southeastern Louisiana and southern Alabama are expected to linger, but decrease in severity, becoming mostly moderate to severe deficits. Much of Virginia, northwestern South Carolina, and midwestern states can anticipate widespread moderate deficits. Western states, primarily southwestern California, Nevada, Wyoming, southern Idaho, Montana, and Utah, should expect intense surpluses to continue, but will mostly downgrade in intensity to extreme to severe anomalies. Deficits in western coastal regions of the Pacific Northwest will dissipate, but severe to extreme surplus in eastern Oregon will persist. In the non-continental U.S., northwestern Alaska will continue to experience widespread surpluses, mainly of severe to extreme intensity throughout the Seward Peninsula and into southern regions of the North Slope Borough, the Northwest Arctic Borough, and north-central areas of the Yukon-Koyukuk Borough.

From January through March 2024, moderate to severe surpluses are expected to continue in central Wyoming, southern Montana, central Nevada, and northeastern Utah. Deficits are expected to persist in west-central Colorado, northern to central Minnesota, and eastern Iowa, but are expected to lessen in intensity into mostly moderate to severe anomalies. Northeastern Wisconsin can expect exceptional deficits to linger, but slightly decrease in magnitude. Outside of the Continental U.S., much of Alaska's Seward Peninsula is expected to observe extreme to exceptional surplus, which continues further inland into southern areas of the North Slope Borough, the Northwest Arctic Borough, and north-central portions of the Yukon-Koyukuk Borough.

The forecast for the final months – April 2024 through June 2024 – anticipates surpluses in Idaho, Wyoming, Nevada, and Montana to further decrease in intensity, becoming mostly near-normal conditions. Deficits in Iowa will persist but similarly decrease in intensity, becoming moderate deficits.

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

## Canada

The 12-month forecast ending in June 2024 anticipates intense deficits to occur throughout most provinces, with some decrease in extent in the western provinces.

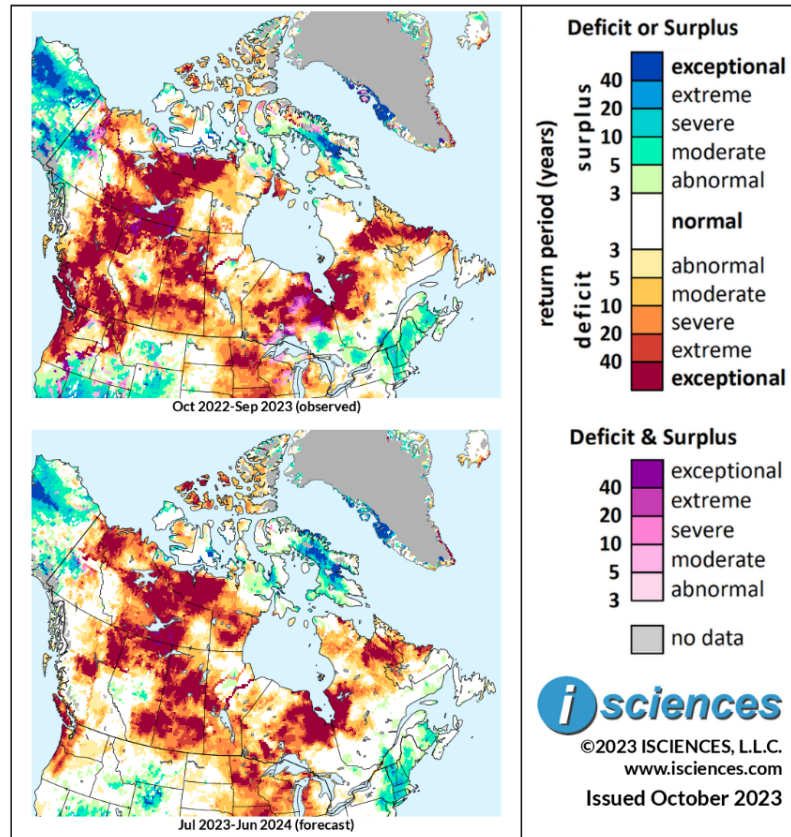
The map on top depicts long-term deficit and surplus anomalies as of September 2023, while the map on the bottom depicts a forecast of long-term deficits and surpluses as of June 2024.

Extreme to exceptional deficits are expected in the following areas:

- Central and northeastern **British Columbia**, in the Northern Rockies and eastern Bulkley-Nechako Regions, into northern and southern **Alberta**.
- **Saskatchewan**, widespread throughout the province, into central **Manitoba**, north of Lake Winnipeg.
- Northeastern **Ontario**, along the coast of the Hudson Bay, and further inland into much of the Cochrane District. These deficits continue into northeastern areas of the province into eastern Rivière-Koksoak into northern coastal regions of **Newfoundland**.
- **Northwestern Territories**, widespread throughout the province, into northernmost areas of **Yukon** and **Nunavut's** Kitikmeot Region.

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

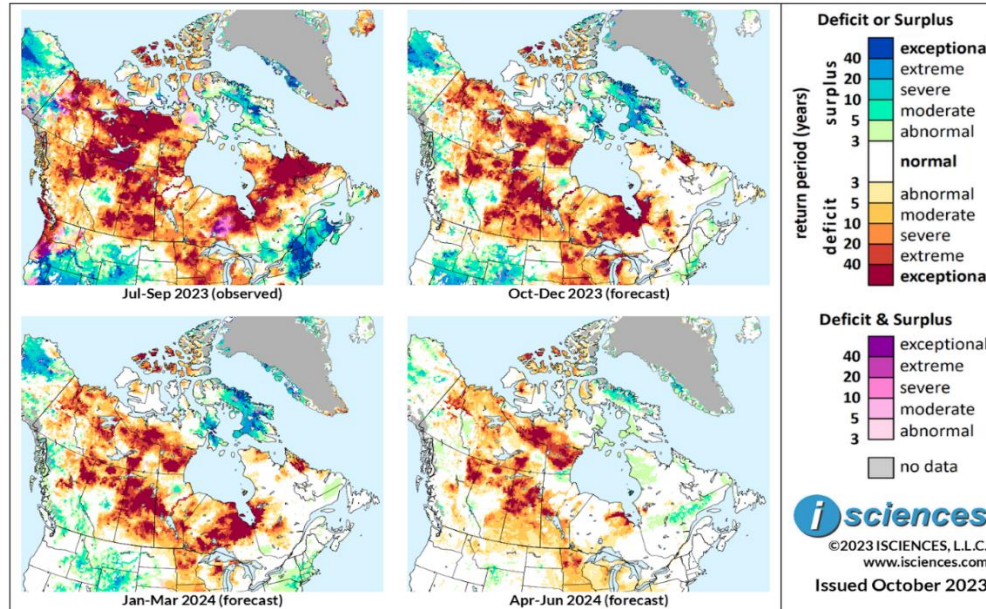
ISciences Water Anomalies Forecast  
Canada: October 2022 - June 2024



Based on observed data through September 2023 and forecasts through June 2024



**ISciences Water Anomalies Forecast  
Canada: July 2023 - June 2024**



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates extreme to exceptional deficits to occur throughout Iowa, north-central Minnesota, eastern Wisconsin, and coastal regions of Michigan along Lake Michigan and Lake Superior. Deficits in southeastern Louisiana and southern Alabama are expected to linger, but decrease in severity, becoming mostly moderate to severe deficits. Much of Virginia, northwestern South Carolina, and midwestern states can anticipate widespread moderate deficits. Western states, primarily southwestern California, Nevada, Wyoming, southern Idaho, Montana, and Utah, should expect intense surpluses to continue, but will mostly downgrade in intensity to extreme to severe anomalies. Deficits in western coastal regions of the Pacific Northwest will dissipate, but severe to extreme surplus in eastern Oregon will persist. In the non-continental U.S., northwestern Alaska will continue to experience widespread surpluses, mainly of severe to extreme intensity throughout the Seward Peninsula and into southern regions of the North Slope Borough, the Northwest Arctic Borough, and north-central areas of the Yukon-Koyukuk Borough.

From January through March 2024, moderate to severe surpluses are expected to continue in central Wyoming, southern Montana, central Nevada, and northeastern Utah. Deficits are expected to persist in west-central Colorado, northern to central Minnesota, and eastern Iowa, but are expected to lessen in intensity into mostly moderate to severe anomalies. Northeastern Wisconsin can expect exceptional deficits to linger, but slightly decrease in magnitude. Outside of the Continental U.S., much of Alaska's Seward Peninsula is expected to observe extreme to exceptional surplus, which continues further inland into southern areas of the North Slope Borough, the Northwest Arctic Borough, and north-central portions of the Yukon-Koyukuk Borough.

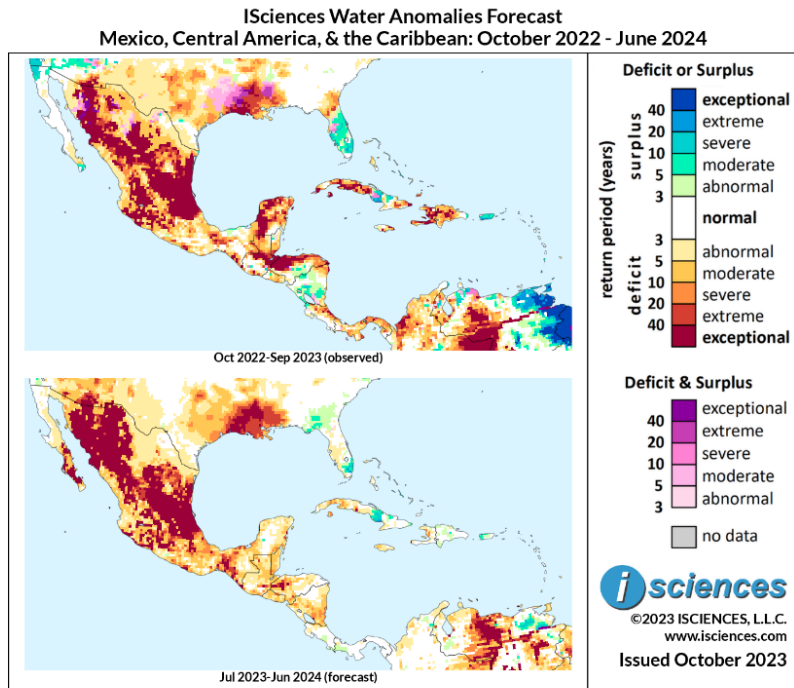
The forecast for the final months – April 2024 through June 2024 – anticipates surpluses in Idaho, Wyoming, Nevada, and Montana to further decrease in intensity, becoming mostly near-normal conditions. Deficits in Iowa will persist but similarly decrease in intensity, becoming moderate deficits.

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

## Mexico, Central America, and the Caribbean

The 12-month forecast ending in June 2024 anticipates exceptional, widespread deficits to continue throughout the majority of Mexico, while lessening in intensity in the Yucatan Peninsula and in northern Honduras. Much of Central America can expect near-normal conditions, with some deficits appearing in western Honduras and southern Nicaragua.

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



Deficits of varying intensity are expected in the following areas:

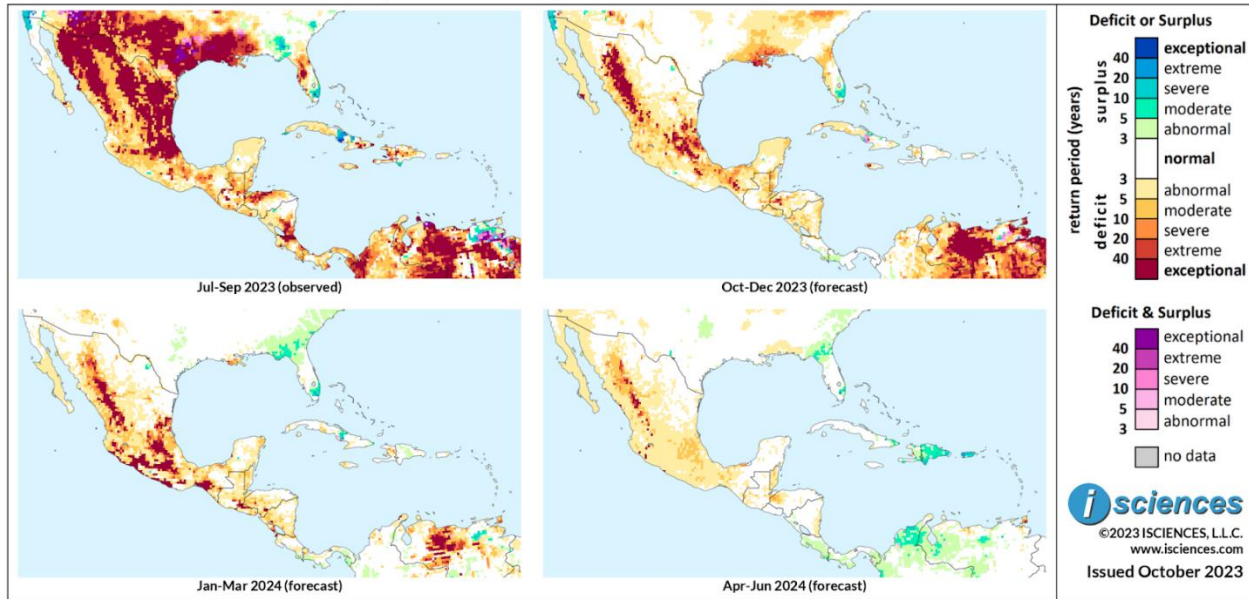
- **Mexico**, with exceptional deficits widespread throughout much of the country. The highest concentrations are expected in the states of Sonora, Chihuahua, Tamalupias, San Luis Potosi, Michoacan, western coastal regions of Colima, and Jalisco, as well as coastal regions of Veracruz.
- Western **Honduras** into **Guatemala**, with exceptional deficits occurring throughout the department of Santa Barbara, into the departments of Zacapa and Chiquimula.
- Southern **Nicaragua**, with moderate to severe deficits appearing east of Lake Cocibolca.

Severe to extreme surpluses are expected in the following regions:

- Eastern **Cuba**, throughout the municipality of Camaguey.

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

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



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 indicates that widespread exceptional deficits will decrease in magnitude, though will continue to linger throughout the states of Durango and San Luis Potosi. Severe to extreme deficits are also expected in western regions of Oaxaca. Much of Central America, as well as the Caribbean, can anticipate near-normal conditions.

From January through March 2024, exceptional deficits are expected to continue in the Mexican state of Durango, as well as in areas near Mexico City, but will mostly decrease in magnitude in other Mexican states. Northeastern areas of El Salvador can expect exceptional deficits, while the rest of Central America can anticipate near-normal conditions.

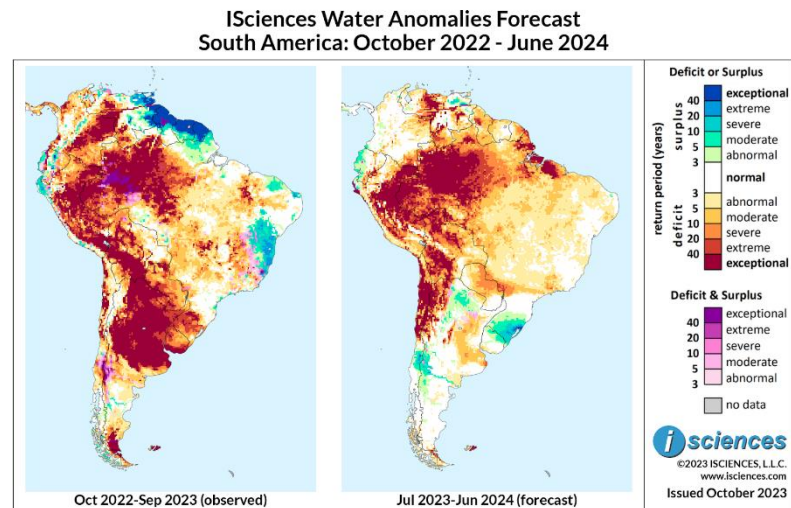
The forecast for the final months – April 2024 through June 2024 – indicates that widespread deficits throughout Mexico will continue to decrease in magnitude and intensity, with exceptional deficits occurring primarily in the state of Durango. The majority of other areas of Mexico and Central America can anticipate near-normal conditions, while the Dominican Republic can expect mostly moderate surplus.

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

## South America

The 12-month forecast ending in June 2024 anticipates exceptional deficits in southern countries to mostly dissipate, though will still continue in northwestern Brazil, as well as the Bolivarian Nations. Exceptional surplus is expected to disappear in the Guianas, becoming near-normal conditions with some moderate deficit.

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



Extreme to exceptional deficits are expected in the following areas:

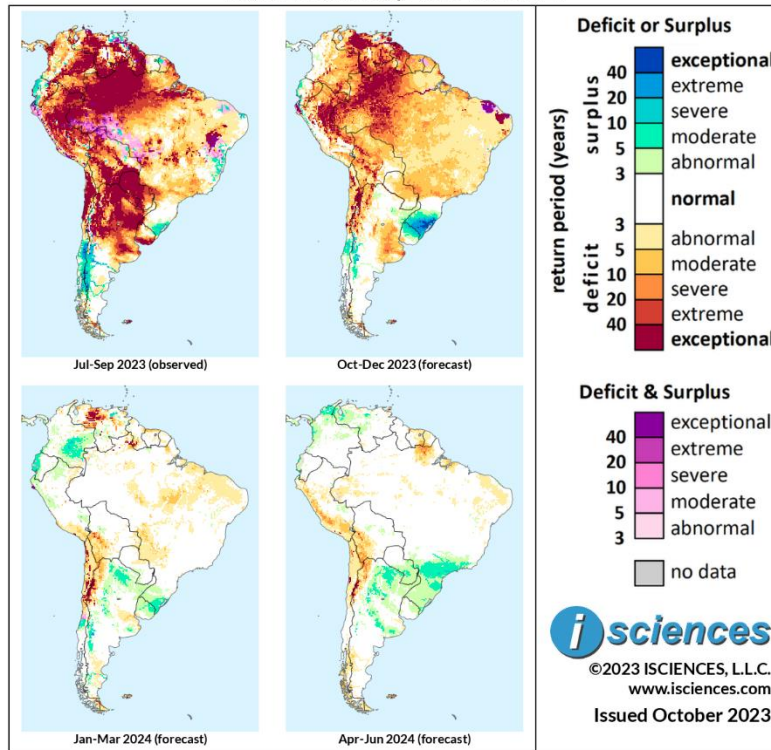
- Western and northeastern **Brazil**, widespread throughout the state of Amazonas, as well as in coastal regions of the states of Maranhao and Para.
- **Peru**, widespread throughout much of the region, with the heaviest concentrations appearing in regions east of the Pacaya Samiria National Park, and continuing south into the Mashco Piro Indigenous Reserve, Madre de Dios Territorial Reserve, and across the Peruvian Andes.
- Northern **Chile**, widespread from Arica and into much of the Coquimbo Region. These deficits continue into northwestern **Argentina** into the San Juan Province.
- Southwestern **Bolivia**, in most areas southwest of the city of Sucre.

Severe to extreme surpluses are anticipated in:

- Southern **Brazil**, with the highest concentration of surplus anomalies appearing north of the Lagoa dos Patos.
- Central **Chile**, appearing near the city of Concepción, into northern regions of the Neuquén Province in western **Argentina**.

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

**ISciences Water Anomalies Forecast  
South America: July 2023 - June 2024**



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates widespread deficits throughout much of northern countries, with exceptional deficits occurring throughout the Brazilian states of Amazonas and Acre, northern Venezuela, eastern Peru, and northern Guyana. Similar deficits continue further south in southwestern Bolivia and along Chile’s eastern border shared with western Argentina. Intense surplus is expected to expand in southern Brazil, particularly in areas near the Lagoa dos Patos and in northern Uruguay. Some instances of exceptional transitional conditions are anticipated in eastern Brazil in coastal regions of the state of Ceara.

From January through March 2024, anomalies are expected to decrease significantly throughout much of the continent. Some northern regions of Venezuela are expected to observe exceptional deficits, as well as some areas of the Coquimbo Region of Chile. Northern regions of Argentina can expect moderate surplus to occur, as well as western coastal regions of Ecuador and southeastern regions of Colombia.

The forecast for the final months – April 2024 through June 2024 – anticipates most regions to observe near-normal conditions, with some moderate deficits appearing along the western coast of Peru into southwestern Bolivia. Additionally, northernmost areas of Colombia and southern regions of Brazil in the state of Parana can expect moderate surplus.

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

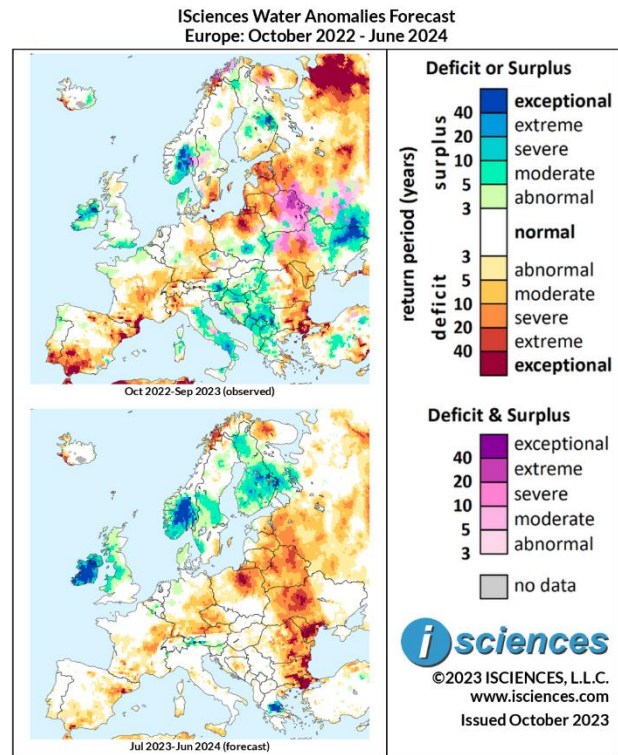
## Europe

The 12-month forecast ending in June 2024 anticipates intense deficits to occur in the Balkans, continuing north throughout most eastern European countries into portions of the Baltics. Much of southern Norway, Finland, and Ireland can expect intense surplus.

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

Extreme to exceptional surpluses are expected in the following regions:

- South-central **Norway**, throughout the county of Viken, as well as in neighboring areas.
- **Ireland**, widespread throughout the country.
- **Finland**, within the Kainuu Region.
- **Greece**, in the Central Greece Region.

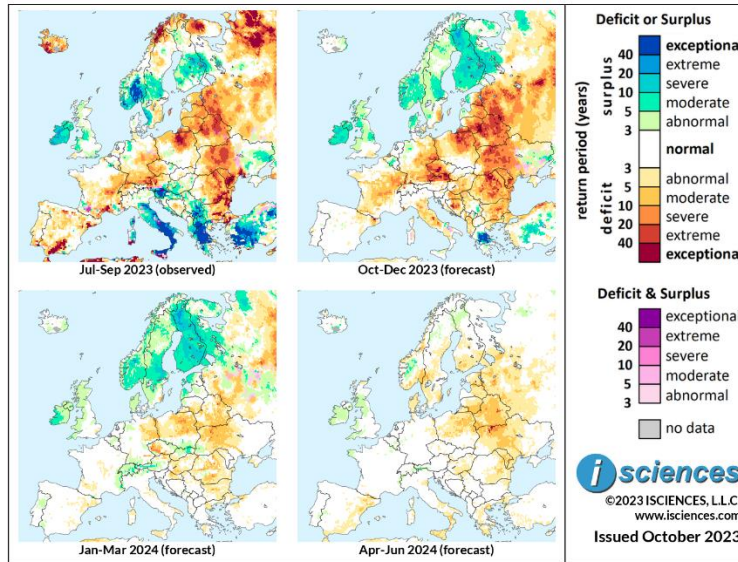


Deficits of varying intensity are expected in the following areas:

- Western **Ukraine**, with extreme to exceptional deficits occurring throughout the Rivne Oblast, which continue north, downgrading into moderate to severe deficits, spreading into the majority of **Belarus** and eastern regions of the **Baltics**.
- Northeastern Poland, with extreme to exceptional deficits near the city of **Olsztyn**.
- **Throughout** the majority of **Moldova**, southeastern **Bulgaria**, and eastern **Romania**.
- Northern **Norway**, with severe to extreme deficits occurring in the northern regions of the county of Nordland.
- **Czech Republic**, with moderate to severe deficits occurring in western regions, continuing into southeastern **Germany**, northeastern **France**, and into **Spain** in areas near Barcelona and Gibraltar.

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

**iSciences Water Anomalies Forecast  
Europe: July 2023 - June 2024**



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates severe to extreme deficits to linger throughout most eastern regions of the Baltics, which continue south into Belarus, western Ukraine, northeastern Poland, and northern Romania. Similarly intense deficits are anticipated in Slovakia and northern Hungary. Central Bosnia can also expect extreme deficits. Central Spain, eastern Germany, and central Italy are forecast to experience moderate to severe deficits. Further north, deficits in northern Norway are expected to dissipate, instead becoming near-normal conditions. Much of southern Norway, central Sweden, and the majority of Finland can expect moderate to severe surpluses to occur. Most of Ireland can expect similarly intense surpluses.

From January through March 2024, widespread moderate to severe surpluses are expected to occur throughout Finland, Norway, and Sweden. Intense surpluses in Ireland are expected to diminish, becoming mostly moderate surpluses in western regions. In Continental Europe, mostly moderate deficits are expected to cover eastern Germany, much of Poland, Belarus, western Ukraine, and western Czech Republic. Switzerland and areas of eastern Slovakia can expect mild to moderate surpluses.

The forecast for the final months – April 2024 through June 2024 – anticipates most of Europe to experience near-normal conditions, though mostly moderate deficits are expected to linger in western Ukraine, Belarus, and Poland. Areas along the shared border of Ukraine and Belarus may experience severe to extreme deficits.

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

## Africa

The 12-month forecast ending in June 2024 anticipates that exceptional deficits in northern African countries will expand to cover other countries, such as Niger and southern Libya. Transitional conditions in the Democratic Republic of Congo are expected to disappear, becoming deficits, while Tanzania can expect intense, persisting surplus.

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

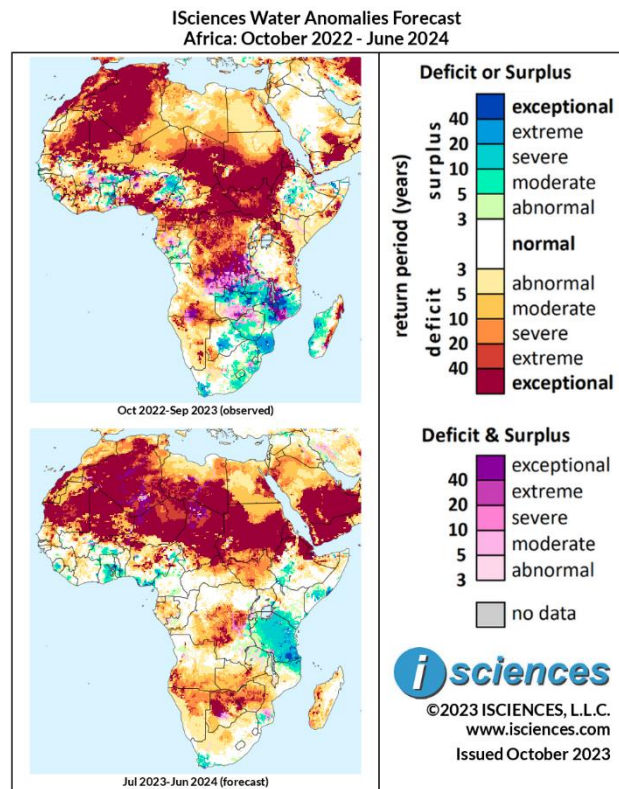
Extreme to exceptional deficits are expected in the following areas:

- In **Mauritania, Mali, Algeria, Niger, Sudan,** and **Chad**, widespread throughout the majority of each country.
- The majority of southern **Libya**.
- Western coastal regions of **West Sahara**.
- Northern regions of **Ethiopia**, in areas neighboring **Eritrea** and **Djibouti**.
- South-central **Democratic Republic of Congo**, in the Lomami Province, as well as in most regions of **Botswana**, western to northeastern **Zimbabwe**, western coastal regions of **Angola** and **Namibia**, and western **Madagascar**.

Severe to extreme surpluses are anticipated in:

- **Tanzania**, widespread throughout the country, with the most intense anomalies occurring in the Mtwara Region.
- **Ghana**, appearing in most southern to central regions, which continue east along the Gulf of Guinea into southernmost regions of **Nigeria**.
- Much of **Sierra Leone**.
- Southern regions of **Somalia**, west of the city of Mogadishu.

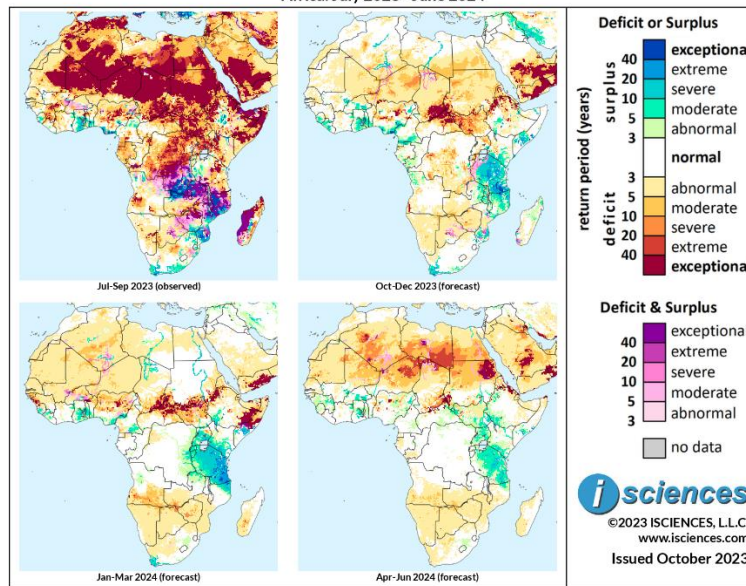
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through September 2023 and forecasts through June 2024



ISciences Water Anomalies Forecast  
Africa: July 2023 - June 2024



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 indicates that most exceptional anomalies in the continent will mostly vanish, though some regions may still experience intense deficits, such as regions within southeastern Chad, northwestern Ethiopia, and westernmost regions of Central African Republic. Further south, Tanzania and northern Mozambique can anticipate widespread severe to extreme surpluses, with similarly intense surpluses occurring nearby in southwestern Kenya and southern Somalia. In western Africa, coastal regions of Ghana, Togo, and Nigeria can anticipate moderate surplus.

From January through March 2024, exceptional deficits in central African countries are expected to noticeably increase in span, occurring in southeastern Ethiopia, northern regions of South Sudan, northern Central African Republic, and southeastern Chad. East-central regions of Nigeria can also expect isolated instances of exceptional deficit. Throughout most of Tanzania and Uganda, severe to extreme surplus is expected to occur, also appearing in southwestern regions of Kenya and Somalia. Additionally, moderate to severe surplus is anticipated in southern coastal regions of Ghana, Togo, and Benin, as well as along the Nile River.

The forecast for the final months – April 2024 through June 2024 – anticipates near-normal conditions in northern and southern regions of Africa, though severe to extreme deficits are expected to appear in pockets of southeastern Libya, central Niger, northwestern Algeria, southeastern Chad, and northeastern Sudan. In Tanzania and Uganda, surpluses are expected to continue, but will somewhat decrease in intensity, becoming mostly moderate to severe surplus.

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

## Middle East

The 12-month forecast ending in June 2024 anticipates exceptional deficits to increase in magnitude throughout southern Saudi Arabia and Yemen. Exceptional deficits in eastern Iran are expected to persist, but significantly decrease in extent.

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

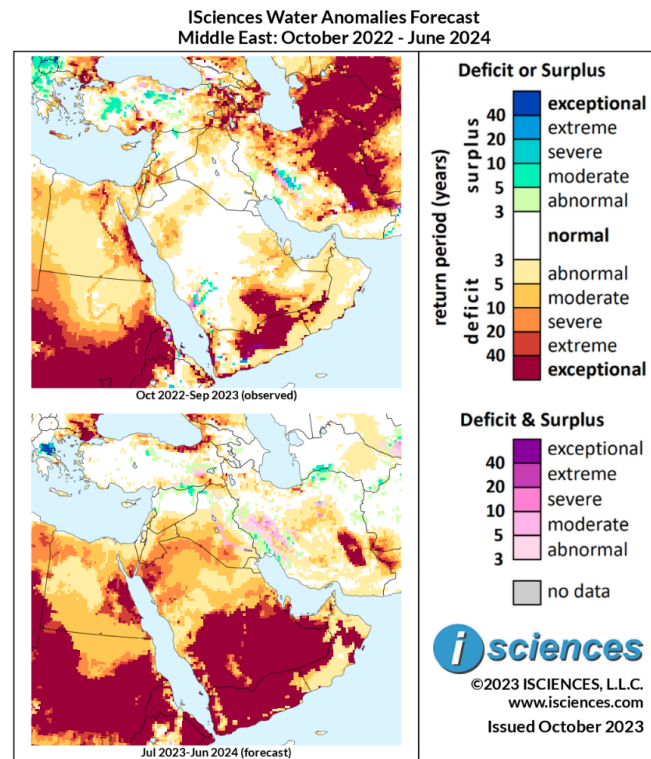
Extreme to exceptional deficits are expected in the following areas:

- Southern **Saudi Arabia**, throughout the majority of central to southern areas of the Riyadh Province, Al Ahsa, Al Udeid, and the Aseer Province. These deficits continue into western and central regions of the **United Arab Emirates**.
- Northeastern **Saudi Arabia**, within the Tabuk Principality.
- **Yemen**, covering the majority of the country, and in northern **Oman**, in central regions of the Ad Dakhiliyah Governorate.
- Eastern **Iran**, in eastern regions of the South Khorasan Province.
- Northeastern coastal regions of **Turkey** along the Black Sea.

Moderate to severe deficits are anticipated in:

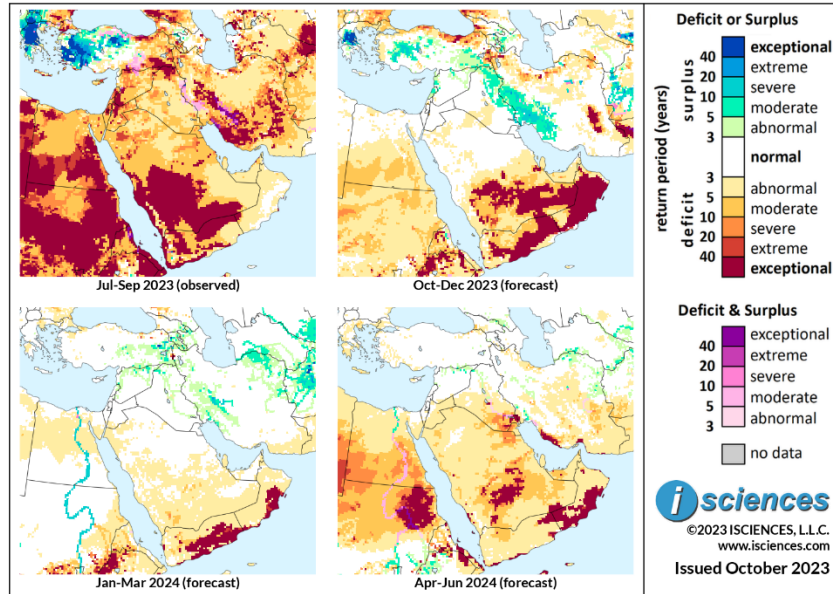
- Southern **Iraq**, in the Al-Salman District.

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



Based on observed data through September 2023 and forecasts through June 2024

**ISciences Water Anomalies Forecast  
Middle East: July 2023 - June 2024**



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates widespread exceptional deficits throughout southern Saudi Arabia, particularly in the Riyadh Province, as well as throughout Yemen and Oman. Further north, much of the Kurdistan Region of Iraq can expect moderate to severe surplus, which continues east into southwestern regions of Iran. Eastern regions of Iran’s South Khorasan Province can expect isolated exceptional deficits, while northern coastal regions along the Caspian Sea can anticipate extreme to exceptional deficits.

From January through March 2024, exceptional deficits are expected to persist throughout Yemen and in central Oman. Western and northeastern regions of Iran can expect isolated pockets of moderate to severe surplus, as well as eastern regions of Turkey near Van Lake. The majority of other Middle Eastern countries can anticipate near-normal conditions. Moderate to severe surpluses are expected to occur along the Nile River.

The forecast for the final months – April 2024 through June 2024 – indicates that some exceptional deficits will arise in south-central Saudi Arabia, as well as throughout eastern to southern Oman and isolated areas of Yemen. Severe to extreme deficits are anticipated in southeastern Iraq and southwestern coastal regions of Iran.

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

## Central Asia and Russia

The 12-month forecast ending in June 2024 expects intense deficits to persist in southwestern regions of Russia, as well as northern and southeastern regions. Surplus is also anticipated in northern Russia, in regions near the Putorana State Natural Reserve, as well as in southern Russia, near Lake Baikal.

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

Extreme to exceptional deficits are expected in the following areas:

- Northern **Russia**, widespread throughout northern coastal regions of the Yamalo-Nenets Autonomous Okrug.
- Southwest **Russia**, in the region of Komi, as well as in regions near the city of Omsk.
- Southeastern **Russia**, with pockets of intense deficits throughout northern and central regions of Zabaykalsky Krai.

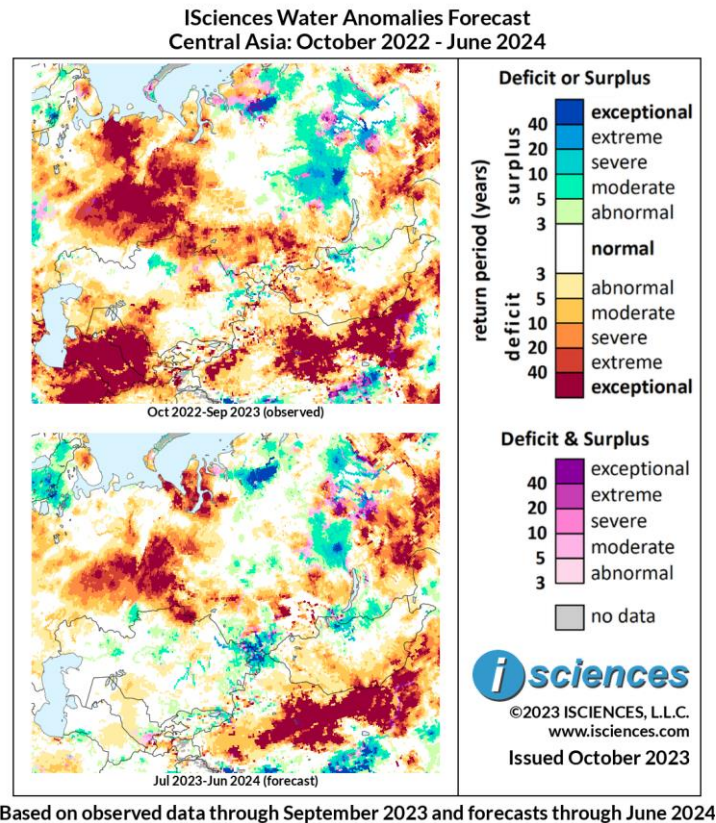
Severe to exceptional surpluses are anticipated in:

- Northern **Russia**, in areas near the Putorana State Natural Reserve.
- Northeastern **Russia**, in northern regions of the Sakha Republic, within the Olenyoksky District.
- Southern **Russia**, in areas north of Lake Baikal, as well as near the city of Rubtsovsk, which continues into **Kazakhstan's** East Kazakhstan Region.

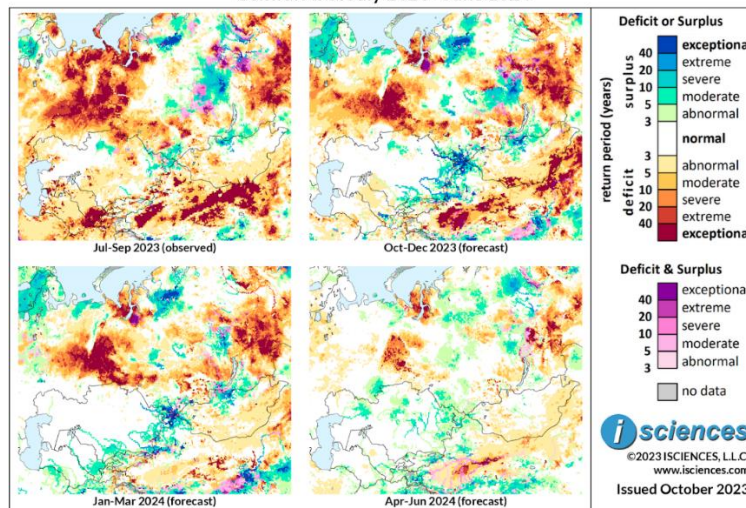
Transitional conditions are expected in:

- Northeastern **Russia**, in areas within the Mirninskiy Ulus District.

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



ISciences Water Anomalies Forecast  
Central Asia: July 2023 - June 2024



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates widespread exceptional deficits in southwest Russia, particularly in the region of Komi and near the city of Omsk to persist, as well as in coastal regions of the Yamalo-Nenets Autonomous Okrug. Nearby, exceptional transitional conditions are expected to appear in the Nadymy District. Exceptional surplus in northern Russia is also expected to persist near the Putorana State Natural Reserve. Southernmost regions of the Sakha Republic, north of Lake Baikal, can anticipate severe to exceptional surplus to continue, as well as widespread exceptional deficits in Aldanskiy Ulus. Mostly normal conditions are expected in Kazakhstan, with the exception of eastern regions forecast to observe extreme to exceptional surplus which occurs in the Katonkaragay District and continues far southwest into regions near the city of Almaty.

From January through March 2024, intense deficits are expected to continue in southwestern Russia, near the region of Komi and the city of Omsk. Exceptional deficits are expected to mostly cease in northern coastal regions of the Yamalo-Nenets Autonomous Okrug, though will still continue in regions near the settlement of Novy Port. Surplus in northern Russia near the Putorana State Natural Reserve is expected to continue, as are similarly intense surpluses north of Lake Baikal. Further east, exceptional deficits are expected to persist in regions near Aldanskiy Ulus. Intense surplus in eastern Kazakhstan is expected to continue, still spreading further southwest into regions near the city of Almaty. Southeastern regions of Uzbekistan should anticipate moderate surplus to emerge.

The forecast for the final months – April 2024 through June 2024 – anticipates most regions to experience near normal conditions, with some extreme to exceptional deficits persisting in coastal regions of the Yamalo-Nenets Autonomous Okrug, areas near the Beloyarsky District of the Khanty-Mansi Autonomous Okrug, and in eastern areas of the Mamsko-Chuysky District in the Irkutsk Oblast.

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

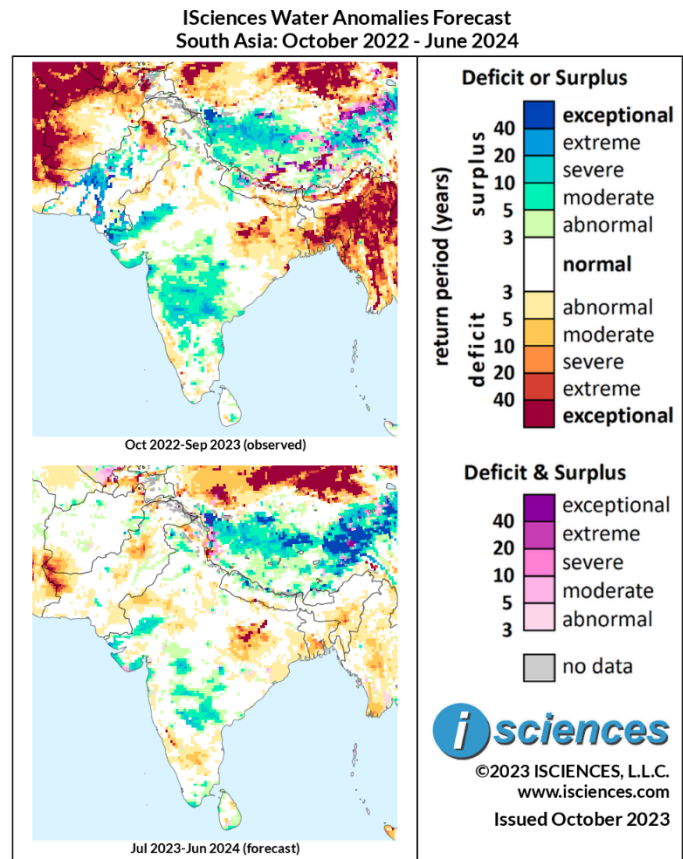
## South Asia

The 12-month forecast ending in June 2024 anticipates mostly normal conditions throughout South Asia, with pockets of moderate to severe surplus appearing in western and central India, as well as extreme deficits in east-central India and western Pakistan.

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

Moderate to severe surpluses are expected in the following regions:

- South-central **India**, in western regions of Andhra Pradesh, eastern Karnataka, and southern Telangana.
- Northern regions of **India**, within the state of Punjab, as well as western coastal regions of the state of Gujarat.
- **Nepal**, along the country's northern border.



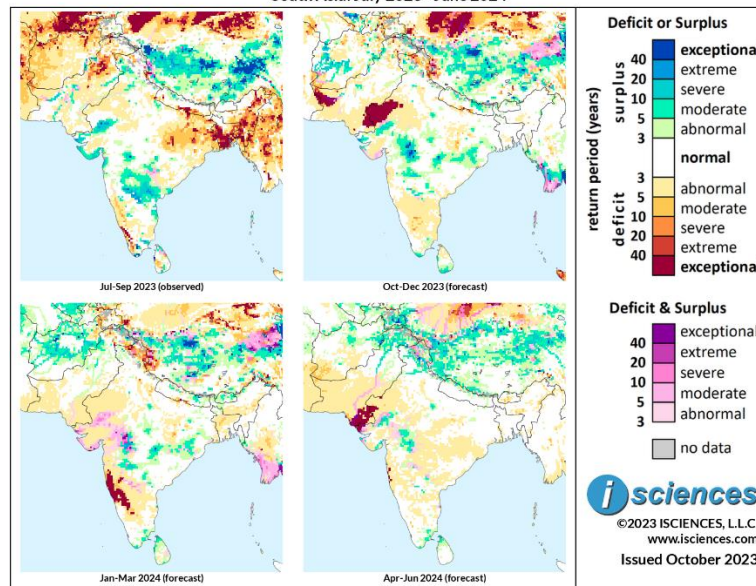
Based on observed data through September 2023 and forecasts through June 2024

Deficits of varying intensity are expected in the following areas:

- East-central **India**, with severe to exceptional deficits in western areas of the state of Jharkhand.
- Western **Pakistan**, in northwestern regions of the Balochistan province.
- Southwestern **Afghanistan**, in areas west of the Chahar Burjak.
- Southern **Bangladesh**, in western regions of the Chandpur District.

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

ISciences Water Anomalies Forecast  
South Asia: July 2023 - June 2024



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates exceptional deficits to arise in western Rajasthan in regions along the shared border of Pakistan. Similarly intense deficits are expected to appear in the Taftan region of western Pakistan. In central India, pockets of severe to extreme surplus are expected to occur in western and eastern regions of Madhya Pradesh. Isolated instances of severe surpluses are expected to appear in western coastal regions of the Indian state of Gujarat, as well as in the Herat, Helmand, and Uruzgan provinces of Afghanistan.

From January through March 2024, intense deficits are expected to appear in coastal regions of Goa, Karnataka, and regions near the city of Mysuru. Isolated pockets of severe to extreme surplus are expected to persist further north in western and eastern regions of Madhya Pradesh, with some instances of moderate to severe transitional conditions. Similarly intense surpluses are expected to continue and expand throughout the majority of Afghanistan, though central regions of the country in the Yakawlang District are expected to experience normal conditions. Some moderate to severe deficits are anticipated in northernmost regions of India, particularly in Himachal Pradesh.

The forecast for the final months – April 2024 through June 2024 – anticipates exceptional deficits to arise in western India, in coastal regions of the state of Gujarat, which continue north into southeastern regions of Pakistan. Northern Pakistan is expected to observe mostly moderate surpluses, which spread into northern India and northeastern Afghanistan. Most other regions can expect near-normal conditions.

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

## Southeast Asia and the Pacific

The 12-month forecast ending in June 2024 anticipates near-normal conditions throughout most of Mainland and Maritime Southeast Asia, but isolated pockets of deficits are expected in western Thailand and some Indonesian islands. Surpluses are anticipated in eastern Thailand and Cambodia.

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

Severe to extreme surpluses are expected in the following regions:

- Eastern **Thailand**, in areas near the city of Sakhon Nakhon.
- Northern **Cambodia**, in areas north of Tonlé Sap.
- Northeastern **Papua**, in much of the Tolikara Regency.

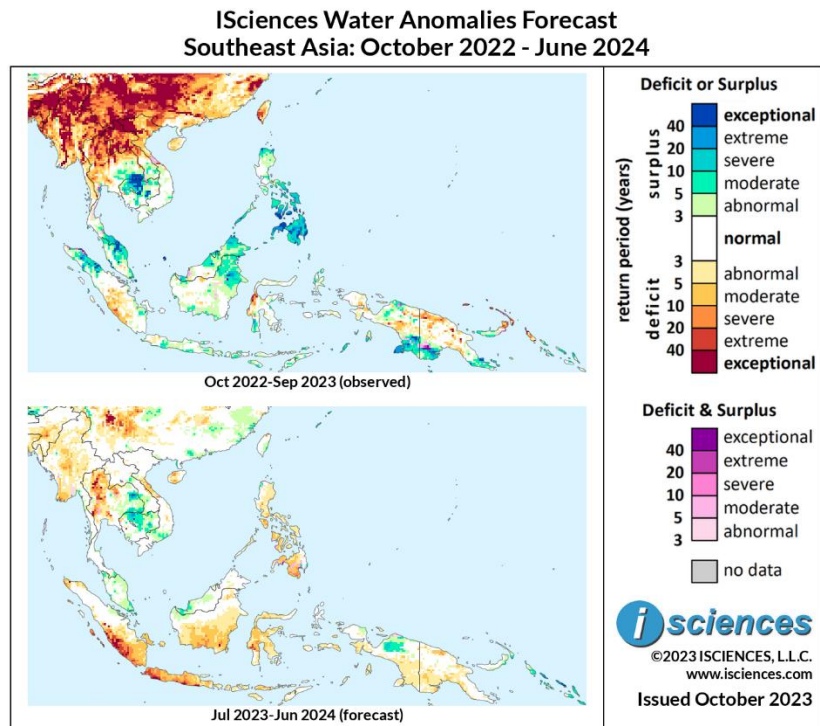
Deficits of severe to exceptional intensity are expected in:

- Western **Thailand**, appearing in the state of Lamphun and continuing in pockets down to areas of the Kanchanaburi Province.
- The **Indonesian** island of Sumatra, primarily in southeastern coastal regions. Similarly intense deficits are expected throughout much of Java.

Moderate to severe deficits are anticipated in:

- The **Philippines**, primarily in the southern island of Mindanao.

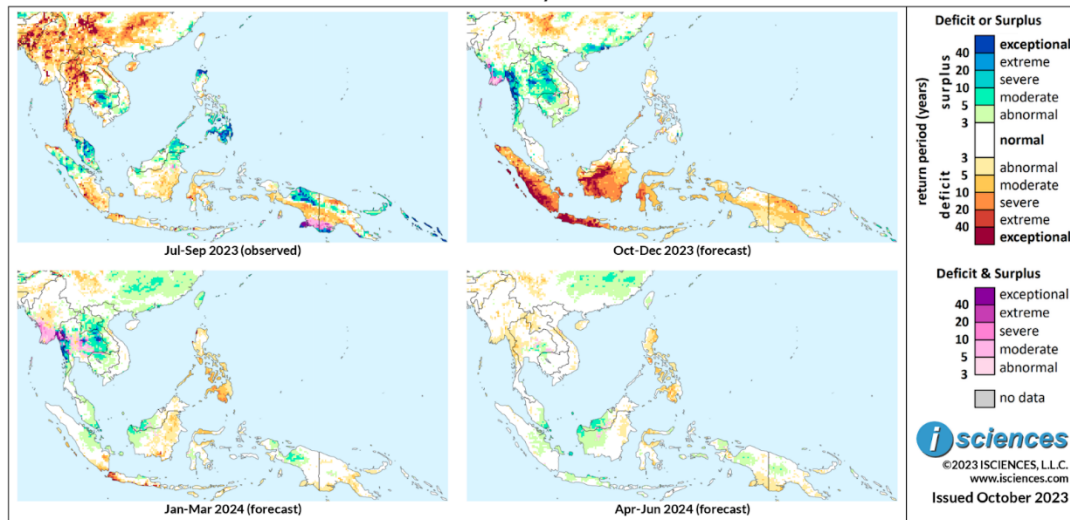
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through September 2023 and forecasts through June 2024



ISciences Water Anomalies Forecast  
Southeast Asia: July 2023 - June 2024



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 indicates that much of Maritime Southeast Asia will experience severe to exceptional deficits, with the highest concentrations appearing in the Indonesian islands, particularly along the coasts of Sumatra, throughout Java, western to northern Kalimantan, and central Sulawesi. Western coastal regions of Thailand are expected to observe extreme to exceptional surplus, as well as its provinces of Khon Kaen and Mukdahan. Further south, regions of northern Cambodia, northeast of the Tonlé Sap, will experience severe to extreme surplus.

From January through March 2024, moderate to severe deficits are expected to occur throughout most southern islands of the Philippines. Extreme to exceptional deficits are expected to continue in Java, but are expected to downgrade in magnitude considerably, isolating into western coastal regions of the island and coastal regions of the Malang Regency. Extreme to exceptional surplus is expected in western coastal regions of Thailand, as well as in the provinces of Khon Kaen and Mukdahan. Moderate to severe transitional conditions are also expected in isolated areas of Thailand’s western coastal regions, which continue into southern Myanmar.

The forecast for the final months – April 2024 through June 2024 – anticipates near-normal conditions for most of Maritime and Mainland Southeast Asia, though moderate surplus is expected to continue in the Malaysian state of Sarawak, and moderate deficit occurring throughout the majority of the Philippines.

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

## East Asia

The 12-month forecast ending in June 2024 anticipates most exceptional deficits in southern China to dissipate, becoming mostly near-normal conditions. Southwestern China is expected to experience continued surplus, while northern China is expected to observe widespread exceptional deficits.

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

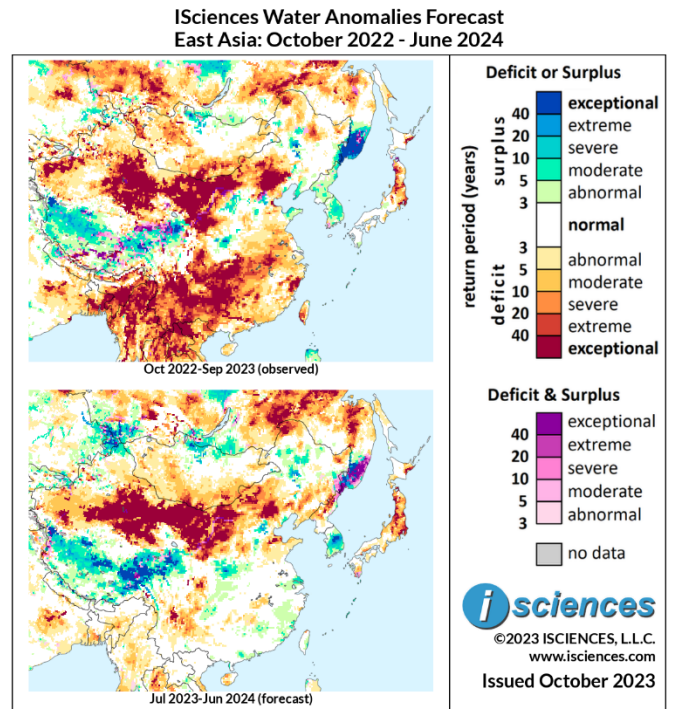
Extreme to exceptional deficits are expected in the following areas:

- Northern **China**, throughout central to western Inner Mongolia, northern Gansu, and eastern regions of Xinjiang.
- Southwestern **China**, in isolated areas of Yunnan.
- **Japan**, in the central to northern areas of the island of Honshu. Similarly intense deficits are anticipated in eastern coastal regions of the island of Sapporo, near the town of Hamanaka.
- Northeastern **North Korea**, in the Ryanggang province.

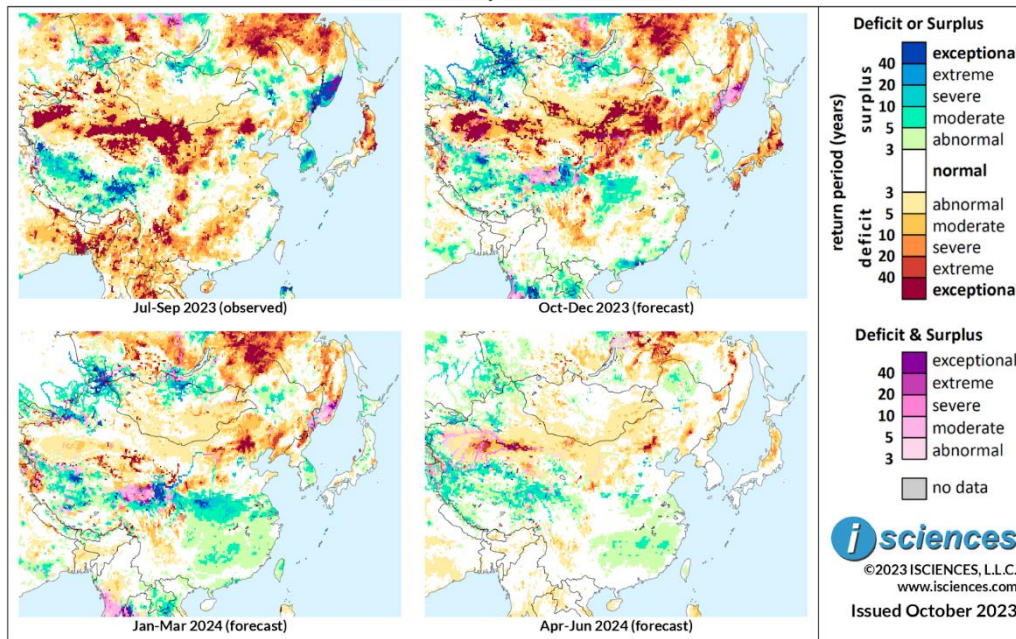
Severe to extreme surpluses are anticipated in:

- Southeastern **China**, throughout most of Tibet.
- **South Korea**, with surpluses present throughout the majority of the country.

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



**ISciences Water Anomalies Forecast  
East Asia: July 2023 - June 2024**



Based on observed data through September 2023 and forecasts through June 2024

The forecast through December 2023 anticipates that exceptional deficits will be widespread throughout Inner Mongolia, but lessen in western portions of the region. Deficits of lesser intensity, ranging from moderate to severe, will continue east into Liaoning and Jilin. Further west, central regions of Xinjiang are expected to endure continued exceptional deficits. In southwestern China, Tibet is expected to observe continued surplus of severe to extreme intensity, as well as eastern regions of Sichuan and Hubei.

From January through March 2024, deficits in northern China are expected to mostly dissipate, though will still continue in eastern regions of Inner Mongolia and eastern Xinjiang. Nearby, northeastern North Korea is expected to observe continued severe deficits in the Ryanggang province. Tibet is expected to experience pockets of severe to exceptional surplus. Further east, central regions of Sichuan can expect a mixture of severe to exceptional surplus and moderate to severe transitional conditions. Severe to exceptional surpluses continue east into southern Hubei and northern Hunan.

The forecast for the final months – April 2024 through June 2024 – anticipates near-normal conditions for most areas, though moderate to severe surplus is expected to continue in Tibet, as is exceptional deficits in isolated areas of eastern and central Xinjiang. In Japan, moderate to severe deficits are anticipated in central and northern regions of the island of Honshu.

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

## Australia and New Zealand

The 12-month forecast ending in June 2024 anticipates existing widespread surpluses to subside in most regions, though surpluses of lesser intensity will remain in northeastern and northwestern Australia.

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

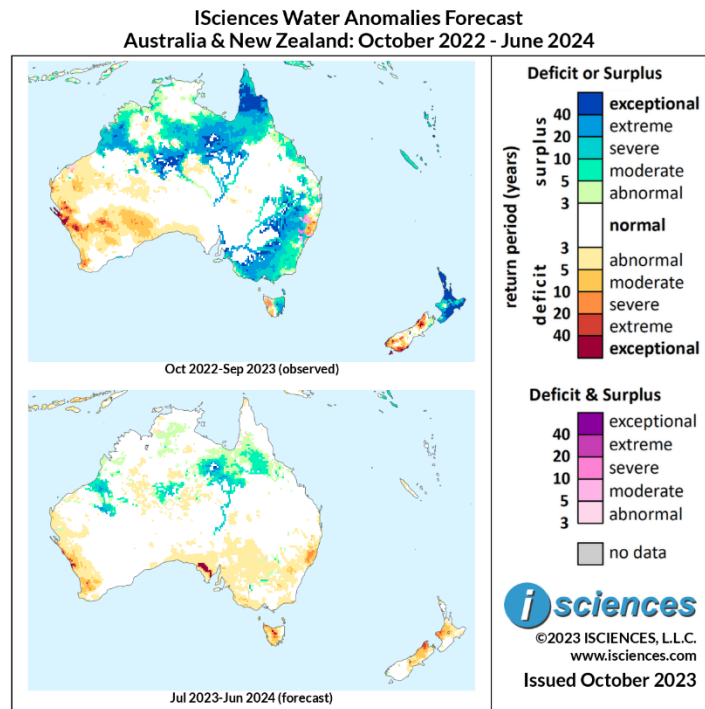
Moderate to severe surpluses are expected in the following regions:

- Eastern and southwestern **Northern Territory**, in regions south of the Barkly Tableland and northwest of the MacDonnell Ranges.
- Western **Queensland**, in areas surrounding the Selwyn Range, as well as further south into southwestern regions of the Shire of Diamantina.
- Northern regions of the Great Sandy Desert in **Western Australia**.

Deficits of varying intensity are expected in the following areas:

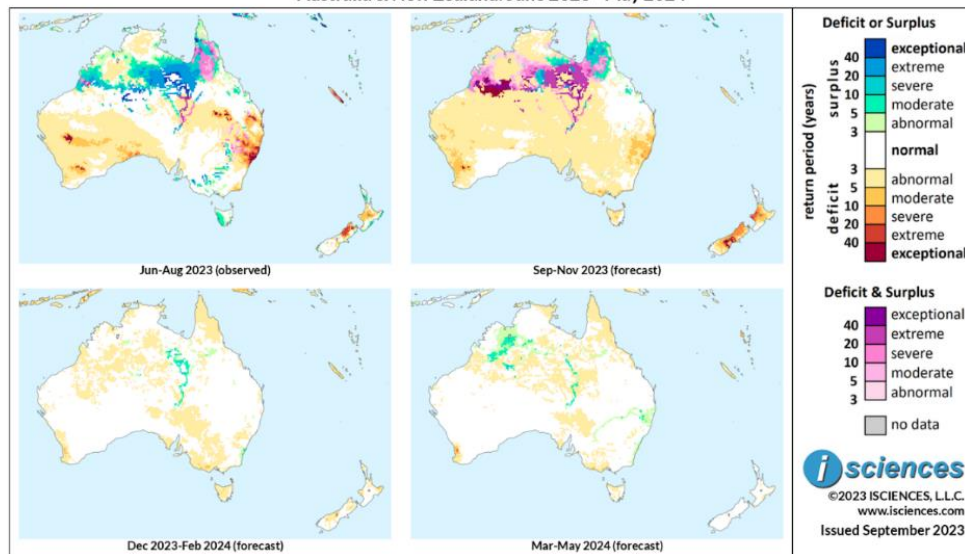
- Western coastal regions of **Western Australia**, with moderate to severe deficits appearing near the city of Geraldton.
- Southern **South Australia**, with isolated pockets of exceptional deficits in eastern coastal regions of the Spencer Gulf.
- Eastern coastal regions of **New South Wales**, with moderate to severe deficits occurring near the Great Sandy National Park.
- Northernmost regions of the South Island in **New Zealand**, with severe to extreme anomalies, as well as western coastal areas of the Taranaki region in the country's North Island.

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



Based on observed data through September 2023 and forecasts through June 2024

ISciences Water Anomalies Forecast  
Australia & New Zealand: June 2023 - May 2024



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

The forecast through December 2023 anticipates surplus across western Queensland, eastern and eastern Northern Territory, and northern Western Australia to continue. Specifically, southwestern to central areas of the Yorke Peninsula, into the Shire of Burke, and across central Northern Territory into areas of Western Australia near Eighty Mile Beach. Deficits are expected to persist in Western Australia near the Toolonga Nature Reserve, as well as in New South Wales, north of Sydney. Tasmania can expect moderate to severe deficits to emerge in its western and central regions, as well as northern areas in the North Island of New Zealand.

From January through March 2024, water anomalies are expected to considerably diminish across much of Australia. Severe to extreme surpluses are expected to continue in areas near the Eighty Mile Beach in Western Australia, as well as in southwestern regions of Queensland, in the Shire of Diamantina. Further north, southern regions of the Yorke Peninsula are expected to observe continued surplus, but will downgrade to moderate intensity. Moderate to severe deficits are expected to appear across Tasmania.

The forecast for the final months – April 2024 through June 2024 – anticipates anomalies to further subside, with near normal conditions throughout much of the area. Small pockets of intense surplus are anticipated to continue near the Eighty Mile Beach, as well as further inland in the company town of Telfer.

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