

Global Water Monitor & Forecast Watch List

June 16, 2023

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Introduction

The ISciences Water Security Indicator Model (WSIM) monitors and forecasts water anomalies on a global basis. Each month we produce data and a report that document current conditions and provide forecasts with lead times from 1 to 9 months. WSIM has been run continuously since April 2011 and has been validated against subsequently observed data.

ISciences also provides assessments of the impacts of water anomalies on people, agriculture, and electricity generation. Detailed data and reports are available for purchase. Additional information and pricing are available upon request.

We have recently completed the latest Water Security Indicator Model (WSIM) analysis of global water anomalies using observed temperature and precipitation through May 2023 and an ensemble of forecasts issued the last week of May 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 report uses results from WSIM Version 2. Visit <https://wsim.isciences.com> for details.

All maps have half-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 judgement on the legal status of any territory, or any endorsement or acceptance of disputed boundaries on the part of ISciences or our data providers.

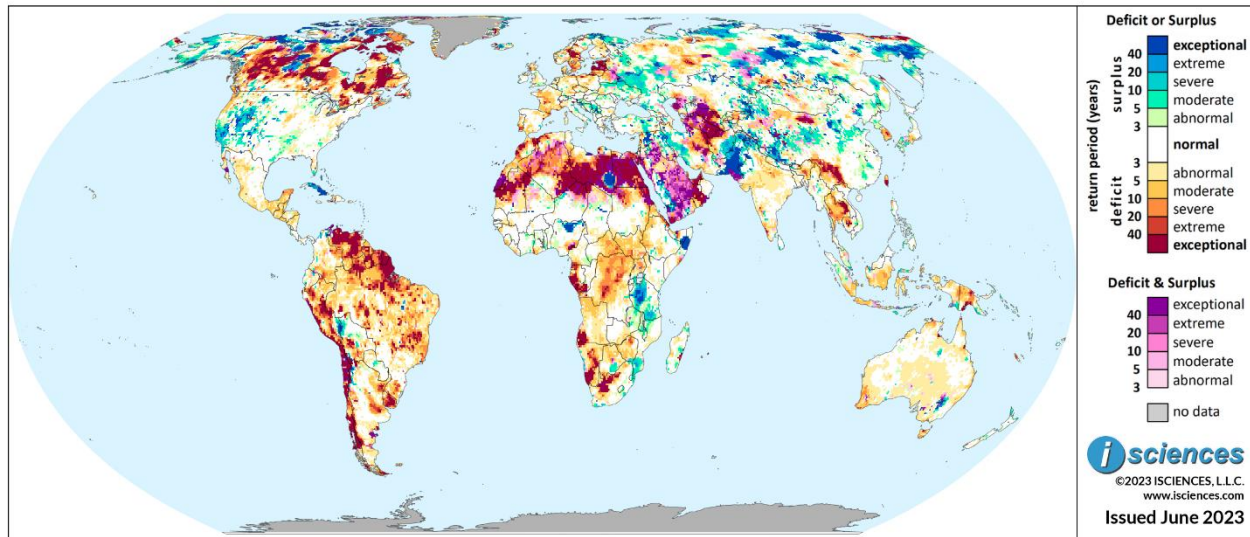
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Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: March 2023 - February 2024



Based on observed data through May 2023 and forecasts through February 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: The forecast indicates that intense surplus will continue throughout western and southwestern states until November 2023 or longer.

Canada: Widespread, intense deficits are anticipated to continue throughout most provinces until August 2023 or longer.

Mexico, Central America, and the Caribbean: The forecast indicates that extreme to exceptional surplus will continue near the Yucatan Peninsula until August 2023 or longer.

South America: Exceptional deficits are expected throughout the continent until November 2023 or longer, with most areas in the Southern Cone expected to transition to mostly normal conditions.

Europe: Deficits are expected to be widespread throughout Continental Europe until August 2023 or longer, with surpluses arising in some Balkan countries.

Africa: The forecast indicates that exceptional deficits are expected to arise in southern countries around August 2023.

Middle East: Intense transitional conditions are expected to continue in central countries of the Middle East, persisting until November 2023 or longer.

Central Asia and Russia: The forecast indicates anomalies of varying intensity across the region, with surpluses primarily in northern and central regions continuing until November 2023 or longer.

South Asia: Intense surplus and transitional conditions are expected to continue in Pakistan throughout February 2024 or longer.

Southeast Asia and the Pacific: The forecast indicates moderate to severe deficits to be widespread throughout much of the region until November 2023 or longer.

East Asia: Intense surplus throughout northwestern China is expected to continue throughout November 2023 or longer.

Australia & New Zealand: The forecast indicates mostly mild deficits across Australia, with exceptional surplus persisting in its southeastern regions until February 2024 or longer.

Watch List: Regional Details

United States

The 12-month forecast ending in February indicates widespread surpluses throughout western and southwestern states to continue, with isolated deficits intensifying in the Pacific Northwest. Similarly intense anomalies are expected in various areas of the noncontiguous U.S.

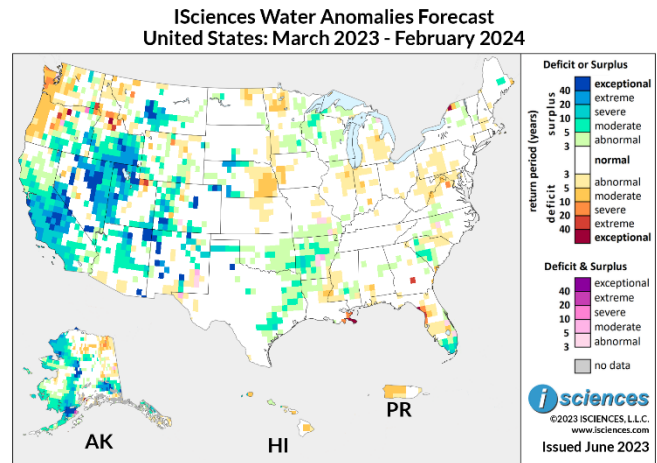
Extreme to exceptional surpluses are expected to occur in the following areas:

- Central to southern **California**, throughout much of the southern Sierra Nevada region, spreading west into coastal regions near the Salinas River. These surpluses spread across much of the state’s southwestern areas.
- **Nevada**, widespread throughout much of the state’s central to northeastern regions. These anomalies continue in southern **Idaho**, in areas near the Snake River, and northwestern **Utah**, in most areas near the Great Salt Lake.
- Northeastern **Arizona**, appearing in pockets, crossing the border into nearby regions of western **Colorado** and **New Mexico**.
- Central **Montana**, east of the Helena-Lewis and Clark National Forest.
- **Alaska**, widespread throughout the state’s western regions, as well as in southeastern areas near the Copper River.

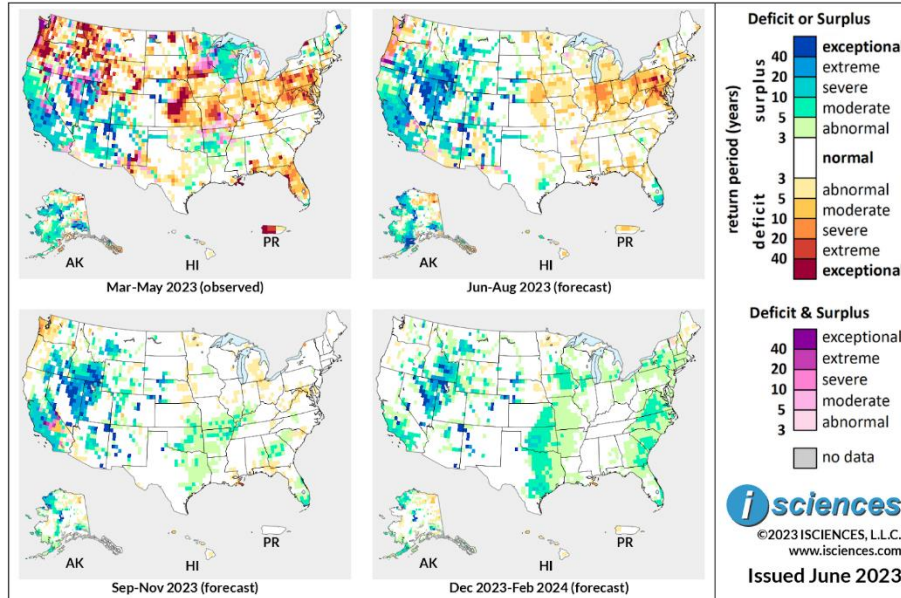
Severe to extreme deficits are anticipated in several areas, including:

- **Washington** and **Oregon**, in western regions of the Coast Ranges.
- Central **Idaho**, in the Salmon River Mountains.
- Southeast **Louisiana**, with exceptional deficits appearing in the Mississippi Delta.
- Western **Florida**, near the St. Martins Marsh Aquatic Preserve.

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



**ISciences Water Anomalies Forecast
United States: March 2023 - February 2024**



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

The forecast through August 2023 anticipates widespread deficits, of mostly severe to extreme intensity, to arise throughout the northeast. Affected areas include Indiana, Ohio, Pennsylvania, northern Virginia, and Maryland. Extreme to exceptional surpluses are expected to continue in central to southern California, central to northeastern Nevada, and southern Idaho. Other lingering surplus anomalies include central Montana, western Colorado, and Alaska.

From September through November 2023, deficits in the northeast are expected to subside. Intense surplus is expected to continue in western and southwestern states, with surplus appearing in eastern Oregon, as well as small pockets of severe deficit and transitional conditions appearing in San Bernardino County.

The forecast for the final months – December 2023 through February 2024 – expects surplus in California to lessen into moderate intensity, with extreme to exceptional surplus continuing in Nevada, Idaho, and Utah. Moderate surplus is expected to appear in east-central Texas and Oklahoma, as well as throughout most of the East Coast.

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

Canada

The 12-month forecast ending in February for **Canada** anticipates widespread deficits to continue across most provinces, with some isolated instances of exceptional surplus in northwestern and central provinces.

Exceptional deficits are expected to occur in:

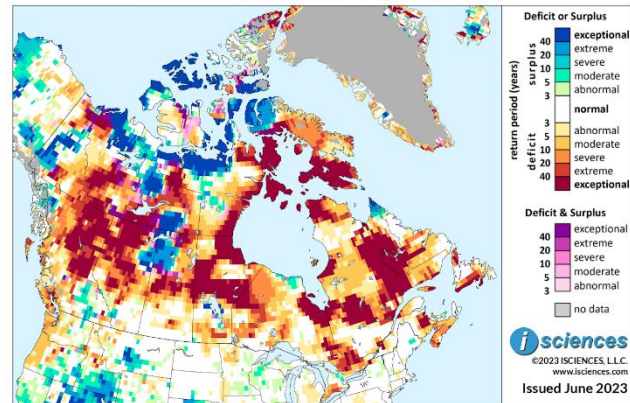
- Central to northeastern **British Columbia**, in regions surrounding Williston Lake, and moving northeast into areas along the country's northern border.
- Northwestern and southwestern **Alberta**, throughout Mackenzie and Clearwater County, continuing in pockets throughout central **Saskatchewan**, in areas nearby and directly south of Lac La Ronge.
- Central and northern **Manitoba**, appearing in areas north of Lake Winnipeg and into northeastern coastal regions of the Hudson Bay.
- Western **Ontario**, in areas near Sachigo Lake First Nation, as well as northeastern areas along the coast of the Hudson Bay. These deficits continue into **Quebec**, appearing in pockets across coastal regions along the Hudson Bay, throughout areas near and southwest of Lake Mistassini, northern coastal regions of the Baie-d'Hudson, and across much of the Rivière-Koksoak. These anomalies continue into western Newfoundland.
- Western **Northwestern Territories**, appearing in southwestern areas of the Inuvik Region, as well as coastal regions of the Inuvialuit Lands. In southern regions of the province, areas south of Great Slave Lake can expect deficits of similar intensity.
- **Nunavut**, in eastern coastal regions along the Hudson Bay, as well as throughout the Baffin and Southampton islands.

Exceptional surplus is forecast in the following areas:

- Northwest **Saskatchewan**, surrounding areas north and south of Lake Athabasca and into **Alberta's** Peace River Regional District.
- Southeast **Northwest Territories**, within the Fort Smith region, southeast of Great Bear Lake. North of the lake, areas of the Tlicho Lands can expect similarly intense surplus.
- Northern areas of **Nunavut**, throughout most coastal regions along the Northwestern Passage and the Queen Elizabeth Islands.
- Southwestern to central **Yukon**, near the Selkirk First Nation.

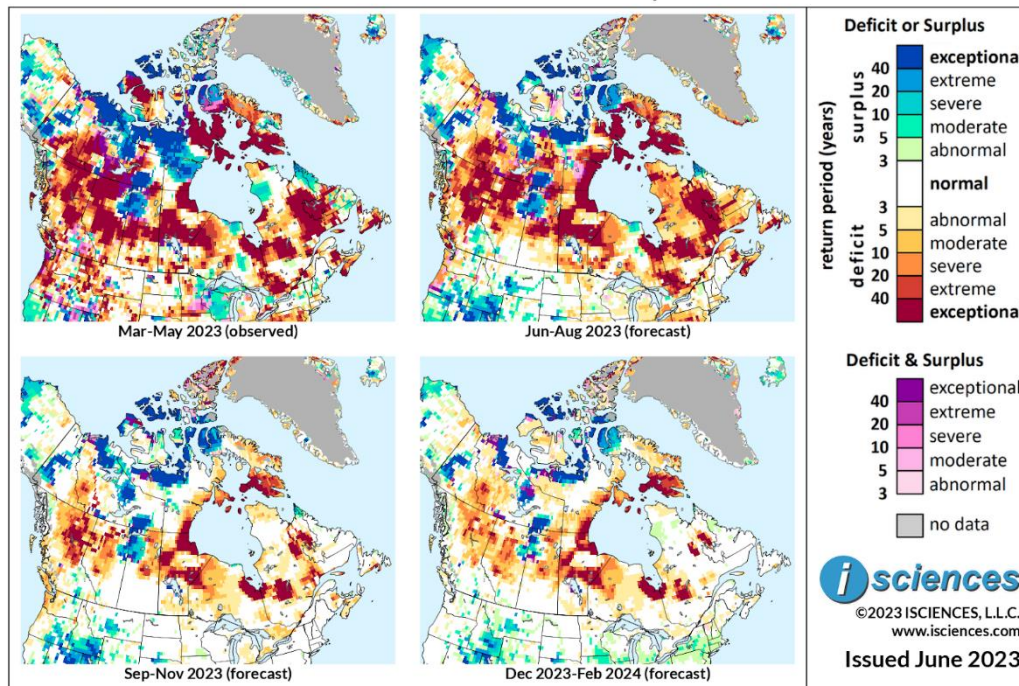
The 3-month maps (below) show the evolving conditions in more detail.

ISciences Water Anomalies Forecast
Canada: March 2023 - February 2024



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

**ISciences Water Anomalies Forecast
Canada: March 2023 - February 2024**



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

The forecast through August 2023 predicts that most of the existing deficits will remain widespread throughout Canada. Central and northeastern British Columbia, northern Alberta, and central Saskatchewan will observe lingering exceptional deficits, as well as central and northern Manitoba, Ontario, and Quebec. Further north, Southwestern Northwest Territories and coastal regions of Nunavut can expect lingering deficits. Northern areas of Northwestern Territories, Nunavut, and northwestern Saskatchewan can expect existing exceptional surpluses to continue. Baffin and Southampton Islands can anticipate lingering exceptional deficits, while areas further north and throughout the Northwest Passage can expect equally intense surpluses.

From September through November 2023, the continent’s widespread deficits are expected to lessen in area, with exceptional deficits remaining in northeastern British Columbia, central Manitoba, and coastal regions along the Hudson Bay in eastern Ontario and western Quebec. In the northern provinces, mostly normal conditions and exceptional surpluses are expected, primarily in western to central Yukon, northern to central Northwestern Territories, and islands of Nunavut north of the Northwestern Passages.

The forecast for the final months – December 2023 through February 2024 – expects exceptional deficits in Manitoba, eastern Quebec, and Baffin Island to remain, with exceptional surplus lingering in west-central Yukon, northern and central Northwest Territories, and coastal regions in Nunavut along the Northwestern Passages.

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

Mexico, Central America, and the Caribbean

The 12-month forecast ending in February anticipates deficits of varying intensity to persist throughout regions of Mexico and Central America, with intense surplus appearing in areas of the Caribbean.

Deficits of moderate to severe intensity are expected in the following regions:

- Central **Baja California**, with extreme to exceptional deficits in central regions of the San Quintin municipality.
- Throughout southern **Mexico**, with moderate deficits appearing in southern areas of the states of Chihuahua and Nayarit. These anomalies continue further east into Guerrero, eastern Veracruz, and Chiapas. Additionally, severe to extreme deficits are expected in the state of Yucatan, as well as throughout the Yucatan Peninsula.
- Throughout **Guatemala, Belize, and El Salvador**.
- **Haiti**, with the exceptional anomalies appearing throughout the Sud-Est and Ouest departments.

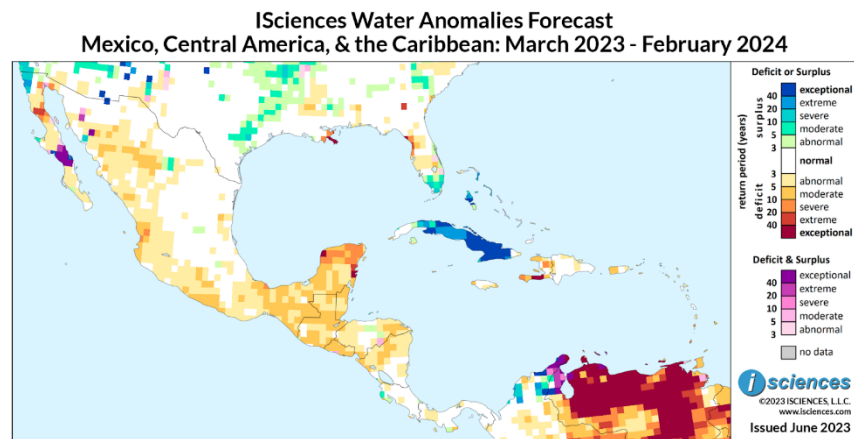
Small areas of transitional conditions are expected in:

- Central **Baja California Sur**, throughout southern regions of the Mulegé Municipality.
- Northwest **Mexico**, isolated in central areas of the state of Sonora.

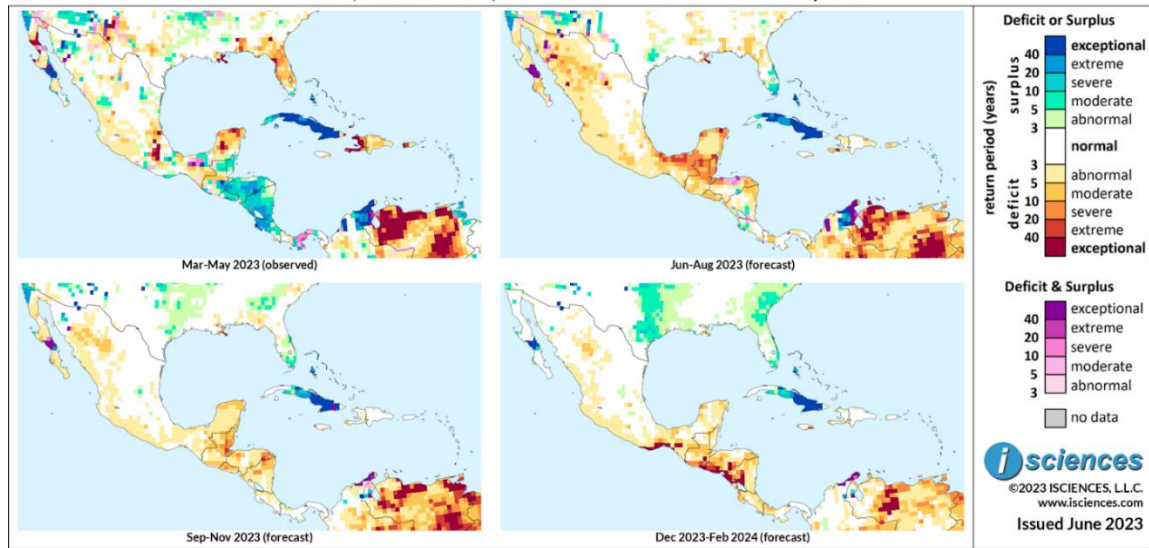
Exceptional surplus is forecast in:

- Throughout the **Bahamas**, appearing throughout the island of Andros.

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



ISciences Water Anomalies Forecast
Mexico, Central America, & the Caribbean: March 2023 - February 2024



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

The forecast through August 2023 anticipates anomalies of severe intensity to appear in regions of Veracruz, Tabasco, Campeche, and northern coastal regions of the Yucatan Peninsula. These deficits continue south, crossing into northern Guatemala and throughout Belize. Northern Honduras can expect a combination of severe deficit and mild transitional conditions. Transitional conditions are expected to continue in central Baja California Sur and northwestern Mexico, as is exceptional surplus in the Bahamas.

From September through November 2023, deficits throughout Mexico and Central America are expected to weaken, becoming mostly mild deficits. However, severe to extreme deficits are anticipated to linger in southern Belize and El Salvador. Similarly intense deficits are expected to appear in eastern Honduras.

The forecast for the final months – December 2023 through February 2024 – anticipates deficits across Mexico to further lessen in intensity, with exception to southern coastal regions of the state of Oaxaca, where exceptional deficits are expected to emerge. Similarly intense anomalies are expected in southern Guatemala, western Honduras, and throughout El Salvador. Exceptional surplus in the Bahamas are expected to continue, with similarly intense surplus appearing in central Baja California Sur.

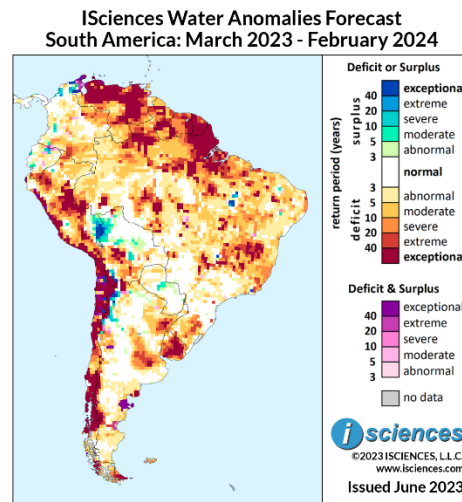
Please note that WSIM forecast skill declines with longer lead times.

South America

The 12-month forecast ending in February indicates widespread deficits of varying intensity throughout much of South America. Deficits of the highest intensity are expected across the Guianas, Bolivarian Nations, Chile, and in pockets throughout Brazil.

Extreme to exceptional deficits are expected in the following areas:

- **Venezuela**, throughout much of the northern and eastern regions of the country. These intense deficits continue further east throughout the **Guianas**.
- Central to southern **Peru**, along the country's western coast, as well as near the Isconahua Indigenous Reserve. Similarly intense deficits appear further south in west-central **Bolivia**, near the city of Cochabamba.
- **Chile**, widespread throughout the entire country. Central areas near the city of Santiago can anticipate moderate to severe deficits, while the rest of the country is expected to endure exceptional deficits.
- East-central and northeastern **Argentina**, near the cities of Buenos Aires and throughout the province of Corrientes. Nearby, much of **Uruguay** can expect similarly intense anomalies.
- **Brazil**, with the northern states of Roraima and Amapa experiencing exceptional deficits, with widespread pockets appearing in the state of Minas Gerais. These pockets continue throughout the country, appearing in the states of Mato Grosso, Rondônia, and Para.

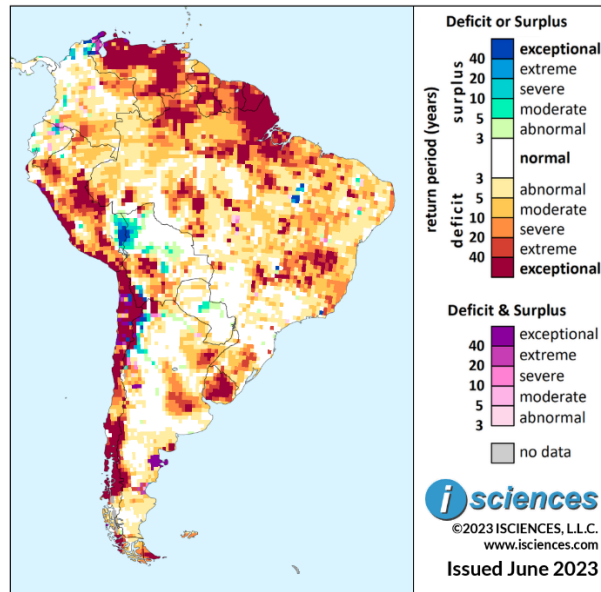


Severe to exceptional surplus is anticipated in:

- Southeast **Peru**, throughout the Sandia Province and into **Bolivia's** La Paz Department.
- North **Colombia**, throughout the La Guajira department.
- Northeastern **Argentina**, along the western border of the Catamarca Province.

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

ISciences Water Anomalies Forecast South America: March 2023 - February 2024



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

The forecast through August 2023 anticipates widespread deficits to continue throughout the continent, appearing throughout the Guianas, Bolivarian Nations, and eastern regions of the Southern Cone. Exceptional deficits are expected to continue throughout northwestern and eastern Venezuela, central and southern Colombia, Peru, Uruguay, and Chile. Pockets of intense deficit are expected to linger throughout much of Brazil, as well as exceptional surplus in southeastern Peru, northwestern Bolivia, and northwestern Argentina.

From September through November 2023, most of the deficits in central to southern Brazil are expected to dissipate. Intense deficit anomalies are expected to continue in the northern regions of the country, as well as throughout the Guianas. These anomalies continue throughout Venezuela, Colombia, and Peru. Nearby, exceptional deficits are anticipated to persist in northern Chile, as are exceptional deficits in northwestern Argentina.

The forecast for the final months – December 2023 through February 2024 – anticipates most intense anomalies to subside throughout the country. However, exceptional deficits are expected to persist in northern Chile and west-central Venezuela, as well as moderate to severe deficits throughout the Guianas.

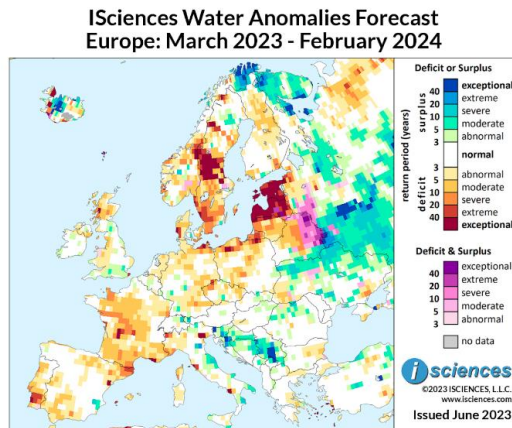
Please note that WSIM forecast skill declines with longer lead times.

Europe

The 12-month forecast ending in February for **Europe** anticipates widespread deficits across much of Continental Europe, as well as some non-contiguous countries in the region.

Exceptional deficits are expected in the following areas:

- Central **Sweden**, in the provinces of Dalarna, southern Jamtland, Vasterbotten, and Gavleborg.
- Northern coastal regions of **Poland, Germany**, and western coastal regions of Denmark's Syddanmark region.
- Southwestern **France**, north of the Dordogne River.
- Southern **Portugal**, in the cities of Lisbon, southern Evora, and Beja.
- Throughout the **Baltics**.



Severe to extreme deficits are anticipated in:

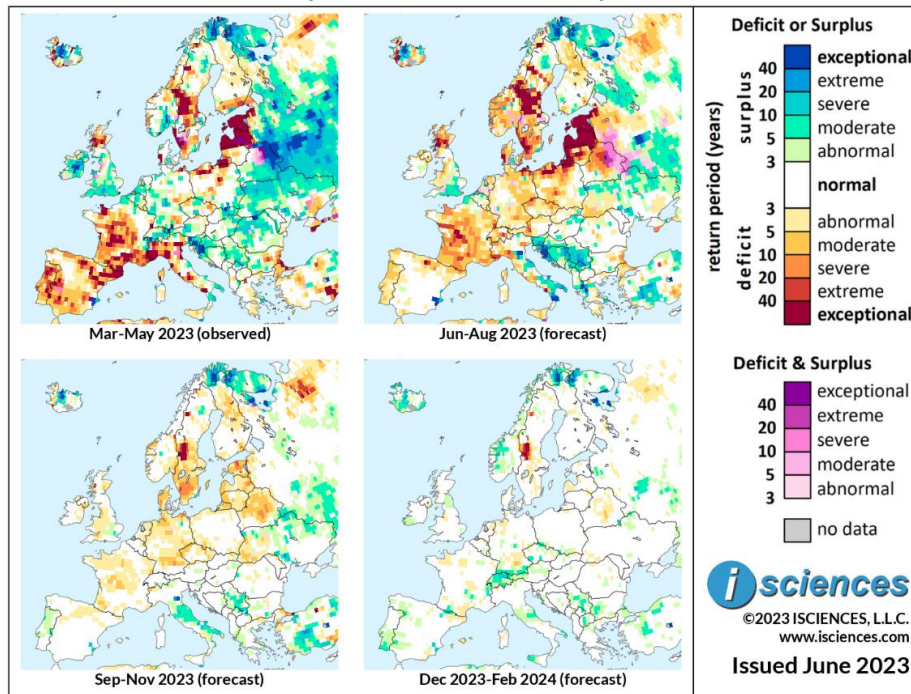
- Southwestern **France**, in the Limousin region.
- Northeastern **Spain**, in eastern coastal regions of Catalonia.
- Northern **United Kingdom**, throughout regions near the Caledonian Canal.

Severe to exceptional surplus is forecast in:

- Northern **Ukraine**, along much of the country's northern border.
- Northernmost **Finland**, near Lake Inari, moving north into the Norwegian region of Troms og Finnmark.
- Southeast **Serbia**, crossing over into northern Kosovo.
- Throughout northern **Croatia** and **Slovenia**.
- Eastern **Italy**, along the coast of the Adriatic Sea.

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

ISciences Water Anomalies Forecast Europe: March 2023 - February 2024



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

The forecast through August 2023 anticipates exceptional deficits to persist in central Sweden, the Baltics, northern United Kingdom, and west-central France. In Spain, deficits are expected to somewhat lessen into mostly severe deficits with some central areas observing extreme to exceptional deficits. Much of the remaining regions of France are expected to endure severe to extreme deficits, which continue nearby in western coastal regions of Italy. Further south in Italy, eastern coastal regions, as well as areas along the coast of the Italian Peninsula. Northern coastal regions of Germany, Poland, and Lithuania can anticipate similarly intense deficits. Severe to exceptional surplus is expected to persist further south in the western Balkans, specifically in Croatia, Slovenia, and Serbia.

From September through November 2023, deficits in Continental Europe are expected to lessen in intensity, with most regions experiencing mild deficits to normal conditions. Some areas can expect moderate deficits, such as the Baltics, Belarus, and southern Sweden. Widespread, moderate surplus is expected to continue throughout Italy and Serbia.

The forecast for the final months – December 2023 through February 2024 – expects most intense anomalies throughout Europe to subside, with exceptional deficits continuing in central Sweden and moderate surplus appearing in Switzerland.

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

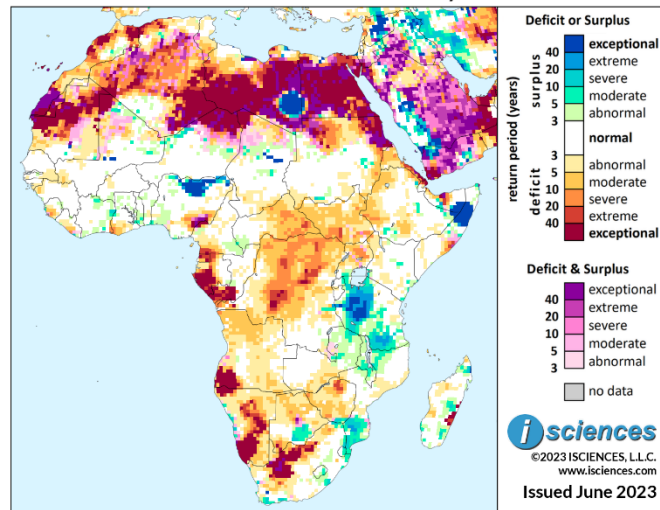
Africa

The 12-month forecast ending in February for **Africa** indicates widespread deficits throughout much northern and central Africa. Some pockets of intense, isolated surplus are expected in southeastern and central regions.

Exceptional deficits are expected in the following areas:

- Southeastern **Algeria**, in the Djanet District.
- Central to northern **Mauritania**, throughout the Fderik and Atar departments into northern regions of **Mali's** Salam area.
- Northern **Morocco**, in the Marrakesh province and coastal regions of the Berkane province.
- Southwestern **Gabon**, throughout the Ogooue-Maritime province. Nearby, southwestern **Angola** will also be affected, covering southwestern areas of the city of Tombua.
- Southwestern **Namibia**, in southern areas of the Karas Region, with similar deficits occurring nearby, in areas south of **South Africa's** Molopo River.

ISciences Water Anomalies Forecast
Africa: March 2023 - February 2024



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

Severe to extreme deficits are forecast in:

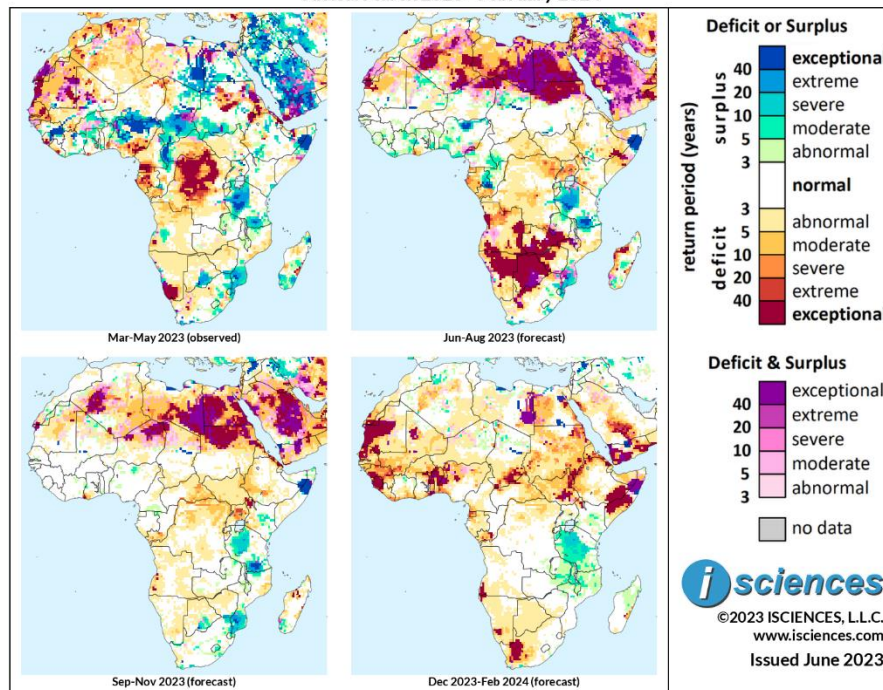
- Central regions of **Democratic Republic of the Congo (DRC)**, appearing in pockets throughout the central and northern areas of the country.
- Southwestern **Republic of Congo**, throughout the Zanaga department and southern regions of the Djambala District, moving into **Equatorial Guinea**.
- Northern **Zimbabwe**, in northern regions of the Guruve district.

Surplus is forecast in the following regions:

- Northern **Nigeria**, spreading along the country's northern border shared with Niger.
- West-central **Tanzania**.
- **Somalia**, in the region of Nugal.
- Southeastern **Libya**, near the Kufra District.

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

ISciences Water Anomalies Forecast
Africa: March 2023 - February 2024



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

The forecast through August 2023, exceptional deficits are expected to arise in northwestern and eastern Algeria, carrying over east into southeastern Libya, Egypt, and northern Sudan, with exceptional transitional conditions mixing in. Southern countries such as Namibia, Botswana, and Zambia, are each expected to endure widespread exceptional deficits. Pockets of intense surplus are anticipated in pockets throughout Tanzania, southern Mozambique, northern Nigeria, and central regions of the Republic of Congo.

From September through November 2023, exceptional deficits in Namibia, Botswana, and Zambia are expected to disappear, becoming mostly mild deficits and normal conditions. Pockets of surplus are expected to continue in the continent's eastern areas, such as southern Mozambique, Tanzania, and Somalia. Exceptional deficits are expected to somewhat lessen, but continue in western Algeria, northeastern Niger, southeastern Libya, Egypt, and northern Sudan.

The forecast for the final months – December 2023 through February 2024 – anticipates most exceptional deficits to disappear, instead becoming mostly mild deficits. Exceptional deficits are still expected to persist in South Africa, western Mauritania, and in pockets across central countries, while Tanzania can expect moderate surplus throughout.

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

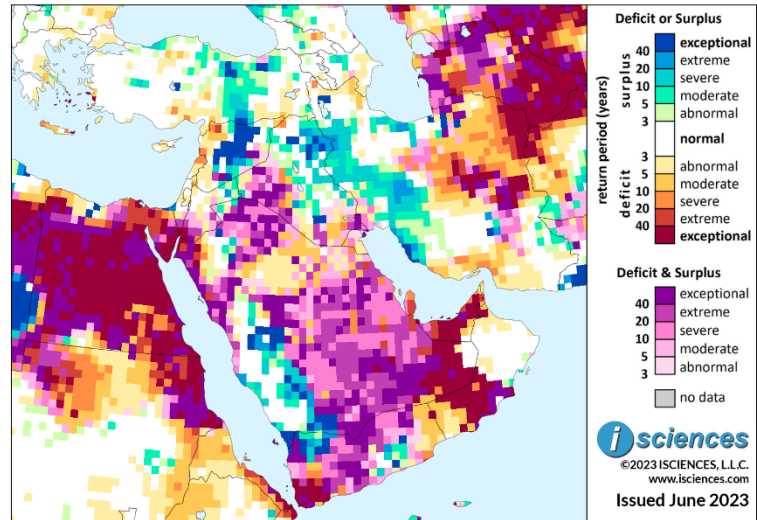
Middle East

The 12-month forecast ending in February for the **Middle East** anticipates widespread transitional conditions throughout most of the central regions, with intense surplus appearing in northern areas, as well as isolated deficits of varying intensity.

Transitional conditions are expected to appear in:

- **Saudi Arabia** and **Yemen**, widespread throughout both countries.
- Western **Iraq**, in regions west of the Euphrates River.
- East-central **Iran**, in the Kerman Province.

ISciences Water Anomalies Forecast
Middle East: March 2023 - February 2024



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

Exceptional deficits are forecast in the following areas:

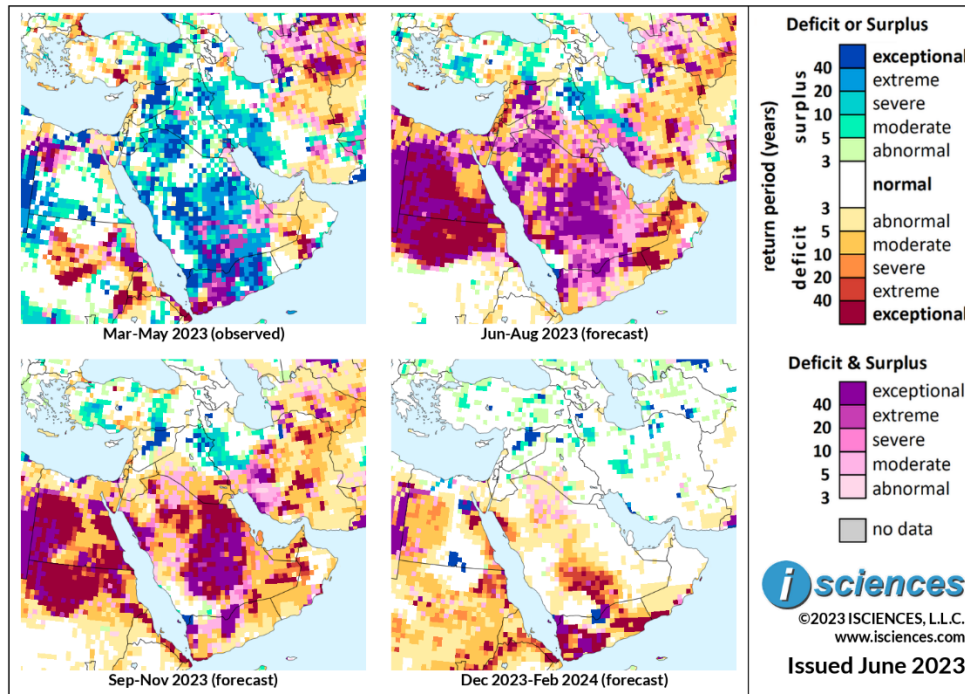
- West-central **Oman**, within the Dhofar Governorate.
- Southeastern **Saudi Arabia**, in the Al Uheid region, crossing into most of the **United Arab Emirates**.
- Central to northeastern **Iran**, in the South Khorasan Province.

Instances of exceptional surplus are anticipated in:

- **Syria**, in most central regions of the country.
- Eastern **Turkey**, in areas surrounding the Firat River.
- Western **Iran**, in regions west of the Karkheh River.
- Northern **Iraq**, surrounding the city of Erbil and other areas north of the Tigris River.

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

**ISciences Water Anomalies Forecast
Middle East: March 2023 - February 2024**



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

The forecast through August 2023 anticipates extreme to exceptional transitional conditions to continue spreading throughout Saudi Arabia, as well as in northeastern Yemen. Transitional conditions are expected to similarly intensify in western Iraq and southwestern Iran. Exceptional surplus in central Syria is expected to shift into exceptional transitional conditions, with similar conditions emerging in southern Jordan. Exceptional deficits are expected to continue in northeastern Yemen and western Oman, and appear in Lebanon and Israel.

From September through November 2023, exceptional transitional conditions throughout Saudi Arabia are expected to somewhat shrink in size, becoming relatively isolated into the country’s south-central regions. Exceptional deficits are expected to reappear in Saudi Arabia’s central to northeastern areas, as is exceptional surplus in central Syria and northern Iraq.

The forecast for the final months – December 2023 through February 2024 – anticipates transitional conditions in Saudi Arabia to dissipate, leaving exceptional deficits in south-central areas of the country. Similar deficits are expected to emerge throughout southwestern and southeastern Yemen, as well as southwestern coastal regions of Oman. While central Syria can expect extreme to exceptional surpluses to continue, most other Middle Eastern regions can anticipate normal conditions to mild anomalies.

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

Central Asia and Russia

The 12-month forecast ending in February for Central Asia indicates anomalies of varying intensity across the region, with surpluses primarily in northern and central regions, and pockets of deficit in western and southern regions.

Exceptional surplus is expected in the following areas:

- Central and northern **Russia**, in southern regions of the federal subject Krasnoyarsk Krai, as well as in the Tazovsky District.
- Eastern **Russia**, throughout northern regions of the Irkutsk Oblast, in central regions of the Olenyoksky District, and throughout central areas of the federal subject Zabaykalsky Krai.
- Southern **Russia**, north of the city of Omsk and in northeastern areas of the federal subject of Altai Krai.
- Southeastern **Kazakhstan**, in areas east of Lake Balkhash. Southwestern **Kazakhstan** can expect similar anomalies throughout the Karakiya District.
- Western **Russia**, near the Republic of Bashkortostan.

Deficits of varying intensity are expected to occur in:

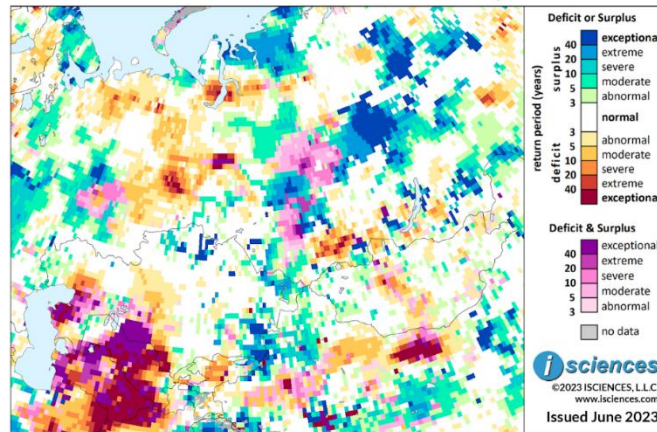
- **Northwest Russia**, with exceptional deficits near the settlement of Novy Port, and northern areas of the Nadymy and Purovsky districts. Further southeast in the Komi Republic and southern areas of the Kondinsky District.
- Southern **Russia**, in the central regions of the Buryatia Republic, south of Lake Baikal. Similarly intense deficits are expected further west, in the Tuva Republic.
- **Uzbekistan** and **Turkmenistan**, widespread throughout most areas of both countries.
- **Kazakhstan**, in the Mangystau District.

Transitional conditions are anticipated in:

- Eastern **Russia**, throughout the Evenkiysky District.
- North-central **Uzbekistan**, throughout the Uchkuduk District.

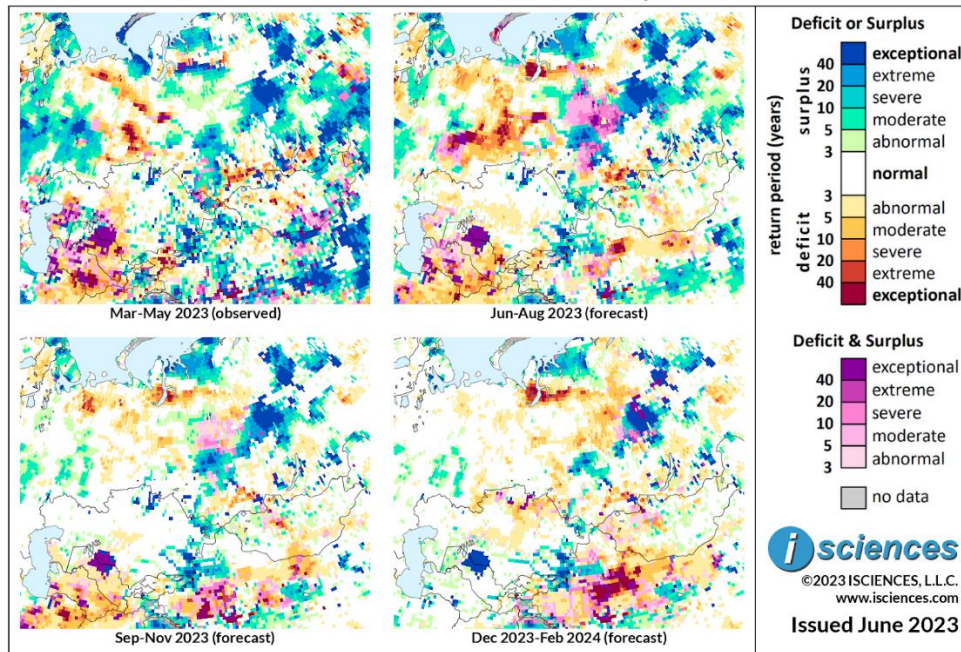
The 3-month maps (below) show the evolving conditions in more detail.

Isciences Water Anomalies Forecast
Central Asia: March 2023 - February 2024



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

**ISciences Water Anomalies Forecast
Central Asia: March 2023 - February 2024**



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

The forecast through August 2023 anticipates intense surplus in coastal regions of northern Russia along the Karas Sea to continue, as well as in southern and northeastern areas of Krasnoyarsk Krai. Further south, central regions of the Buryatia Republic, south of Lake Baikal, are expected to endure exceptional surplus. Intense deficits are expected further west in the Tuva Republic, and in southern Krasnoyarsk Krai. Nearby, small areas of mild to moderate transitional conditions are expected to appear further north in central regions of Irkutsk Oblast.

From August through November 2023, most deficits in western Russia are expected to disappear, though exceptional deficits will continue near Novy Port, as will pockets of severe deficits in Nenets Autonomous Okrug. Exceptional surplus in coastal regions of northern Russia along the Karas Sea are predicted to persist, with small areas of mild to moderate transitional conditions further south. Surplus in southern regions of the federal subject Krasnoyarsk Krai are expected to continue, as well as in the Tazovsky District.

The forecast for the final months – December 2023 through February 2024 – anticipates some exceptional deficits to linger near Novy Port and the Nadymsky and Purovsky districts, and similar intensity surpluses further north in the Tazovsky District. Exceptional surpluses are also expected in central Olenyoksky District and Zabaykalsky Krai.

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

South Asia

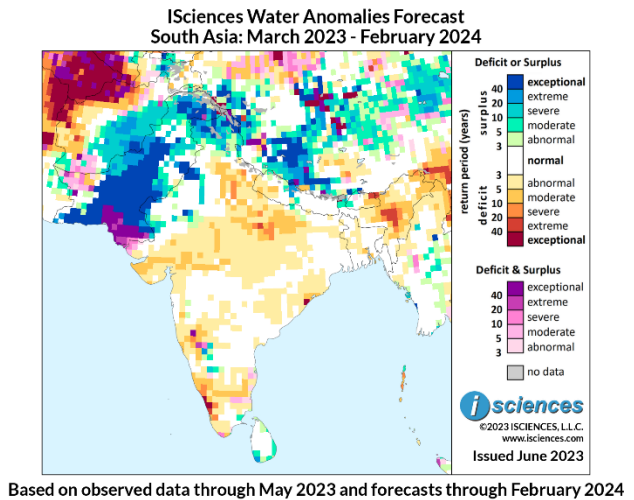
The 12-month forecast ending in February anticipates intense surplus to persist throughout most of the region’s northwestern areas. Widespread, mostly mild deficits are expected to persist across the majority of the remaining areas.

Exceptional surplus is expected in the following areas:

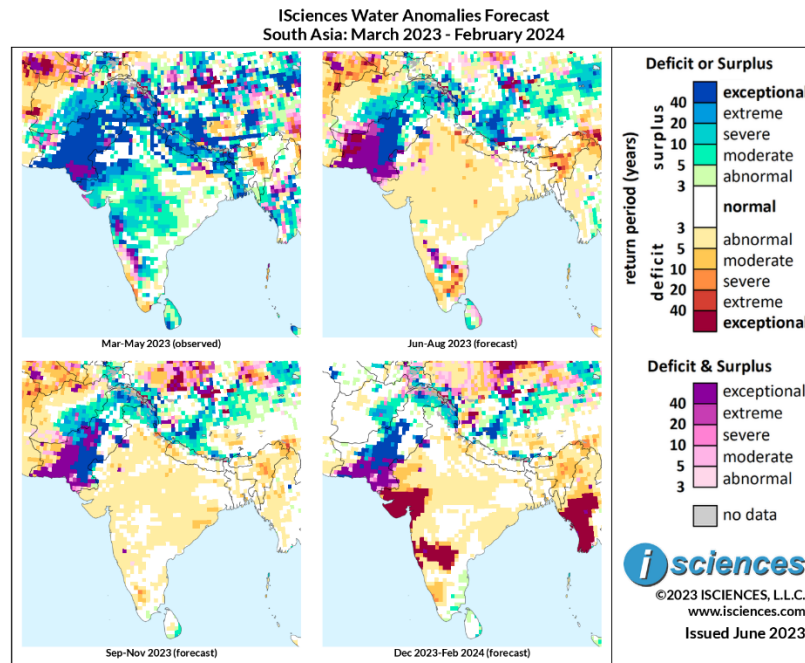
- **Pakistan**, throughout much of the country.
- Central to eastern **Afghanistan**, stretching from the central province of Uruzgan into the provinces of Zabul, Paktika, and Wardak.
- Northern **India**, throughout the region of Jammu and Kashmir.
- Central **Nepal**, near the Dhaulagiri Mountain Range.
- Southern coastal regions of **Sri Lanka**.

The forecast predicts notable deficits to occur in:

- Southern and northern **India**, with extreme to exceptional deficits occurring in the state of Kerala. Similarly intense deficits are expected in southern Uttar Pradesh, near the Yamuna River, and southern regions of the state of Orissa.
- Northeastern **India**, with severe to extreme deficits in the state of Assam.



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



The forecast through August 2023 anticipates a mix of exceptional surplus and transitional conditions in much of Pakistan, with some exceptional deficits appearing in the southwestern province of Baluchistan. Existing surplus anomalies throughout Pakistan spread across the country's border into much of eastern Afghanistan. Transitional conditions will persist in southern India, near the Tungabhadra River, with severe to extreme deficits appearing in the state of Tamil Nadu. Severe to extreme deficits are expected to continue in the eastern Indian state of Assam.

From September through November 2023, a mixture of exceptional surplus and transitional conditions are expected to continue throughout Pakistan. In eastern Afghanistan, severe to extreme surplus is expected to persist, carrying over into northern India. Most intense anomalies throughout India are anticipated to disappear, with mild deficits continuing across much of the country.

The forecast for the final months – December 2023 through February 2024 – expects exceptional surplus and transitional conditions to continue in Pakistan, and exceptional deficits to occur in western and south-central India. Severe to extreme surplus is expected to continue in eastern Afghanistan and northern India.

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

Southeast Asia and the Pacific

The 12-month forecast ending in February anticipates widespread deficits throughout much of Mainland Southeast Asia, with mixtures of moderate deficits and surplus also appearing across most Indonesian islands.

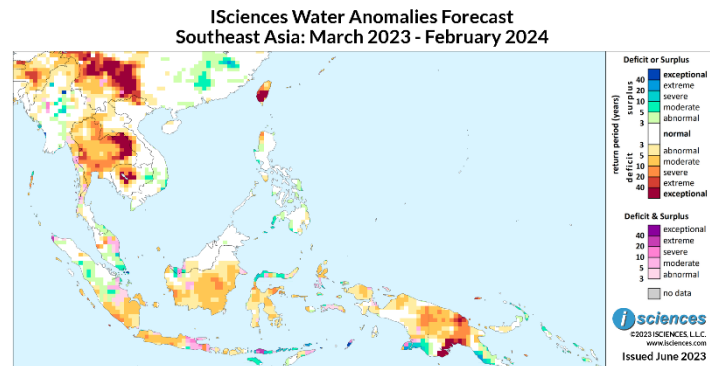
Extreme to exceptional deficits are expected in:

- Eastern **Thailand**, throughout the provinces of Nakhon Phanom, Mukdahan, Bueng Kan, and Sakon Nakhon.
- Central **Cambodia**, appearing in surrounding areas of the Tonlé Sap.
- **Indonesia**, appearing in southern Sumatra, western Java, throughout Kalimantan, North Maluku, and central to southern Sulawesi.
- East-central **Papua**, in the Pegunungan Bintang Regency.
- Southern coastal regions of **Papua New Guinea** along the Coral Sea, as well as in the northeastern city of Madang.

Moderate to severe surplus is anticipated in the following areas:

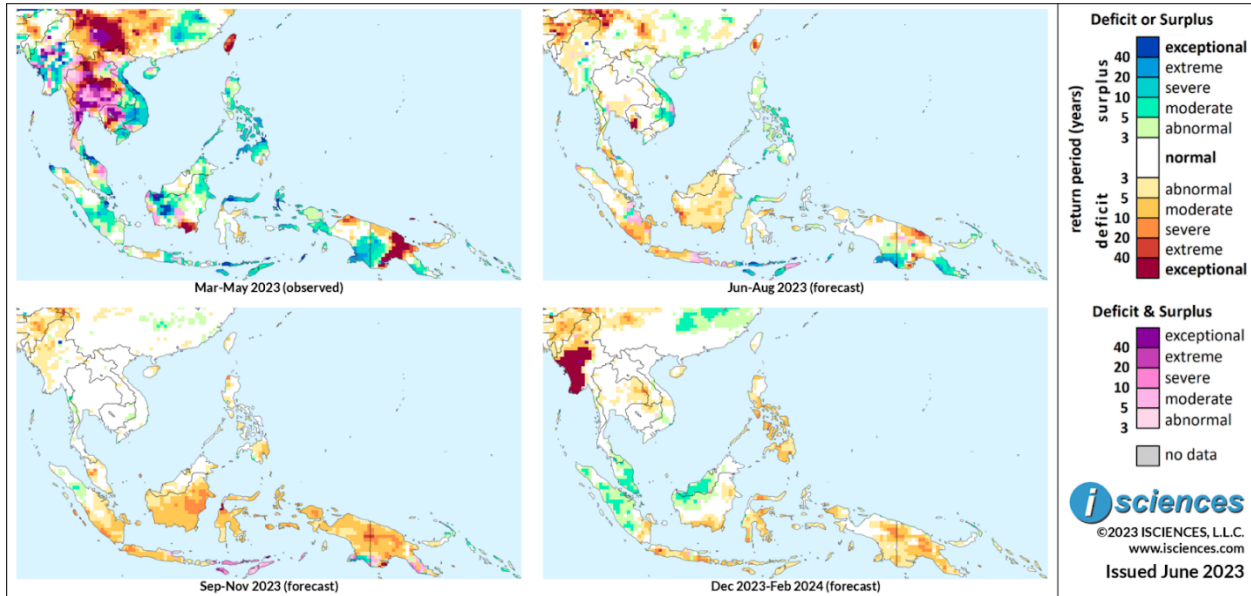
- **Indonesia**, appearing in northern Sumatra, northern Sulawesi, and the Lesser Sunda Islands.
- Throughout most of **Singapore**.
- Southern **Papua**, spread through much of the Merauke Regency.
- Southeastern **Papua New Guinea**, near Port Moresby.

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



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

ISciences Water Anomalies Forecast
Southeast Asia: March 2023 - February 2024



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

The forecast through August 2023 indicates that much of the region’s intense deficit anomalies will subside, becoming mostly mild to moderate. Some areas will experience continued exceptional deficits, such as Cambodian regions southwest of Tonle Sap, and coastal regions of Papua New Guinea. Various islands of Indonesia can also expect persistent deficits, such as southern Sumatra, western Java, and much of Kalimantan. Exceptional surplus is expected in the Lesser Sunda Islands, southern Papua and Papua New Guinea, the Philippines, and central Vietnam.

From September through November 2023, moderate to severe deficits are expected to be widespread throughout most of Maritime Southeast Asia, with the most intense anomalies appearing in northern Sulawesi, eastern Kalimantan, Java, southern Sumatra, and throughout Papua and Papua New Guinea. Much of Mainland Southeast Asia can expect normal conditions, except western Malaysia, which can expect moderate to severe deficits around the state of Perak.

The forecast for the final months – December 2023 through February 2024 – expects some moderate deficits in islands of Indonesia to subside, with mild to moderate surplus appearing throughout Sumatra, as well as mainland Malaysia and the island of Borneo. Widespread moderate to severe deficits are still expected in Papua, Papua New Guinea, Java, Sulawesi, and the Philippines.

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

East Asia

The 12-month forecast ending in February anticipates pockets of intense surplus throughout southwestern and northeastern provinces, with some southern and central areas experiencing intense deficits.

Exceptional surplus is expected in the following areas:

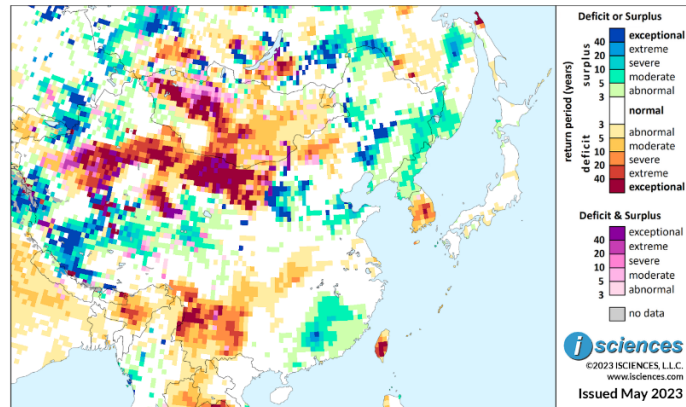
- Southwestern to northeast **China**, appearing in pockets which span across much of the southwestern border of Tibet into areas along the Shandong Peninsula, as well as western regions of the Liaoning, Jilin, and Heilongjiang provinces.
- Northwestern **China**, along the country's border in Xinjiang.

Deficits of varying intensity are expected to occur in:

- Western **Inner Mongolia**, with exceptional deficits appearing in the Alxa Right Banner.
- Southern **China**, with exceptional deficits throughout western regions of the Yunnan province, into southwestern areas of the Sichuan province.
- South Korea, with mostly extreme deficits occurring in central areas of the country.
- Central and southern **Taiwan**, of exceptional intensity.

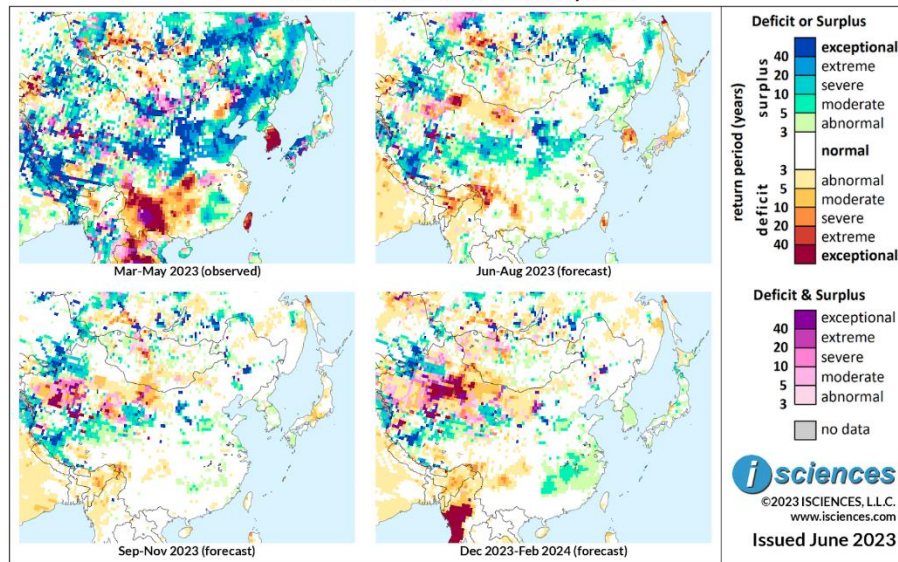
The 3-month maps (below) show the evolving conditions in more detail.

**ISciences Water Anomalies Forecast
East Asia: February 2023 - January 2024**



Based on observed data through April 2023 and forecasts through January 2024

ISciences Water Anomalies Forecast
East Asia: March 2023 - February 2024



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

The forecast through August 2023 anticipates intense surplus to spread from southwestern Tibet into northeastern provinces of China, including Shanxi and western Heilongjiang. Northwestern Xinjiang is expected to experience similarly intense surplus, with the province’s central areas forecast to observe isolated areas of exceptional deficits. Further south, western regions of Yunnan should anticipate intense deficits. Eastern countries such as South Korea and Taiwan are predicted to endure extreme deficits, throughout most areas of both countries.

From September through November 2023, anomalies across the country are expected to further lessen in intensity, with southeastern to central Tibet and northwestern Xinjiang experiencing severe to exceptional surplus. Central Xinjiang can anticipate a mixture of extreme to exceptional transitional conditions and deficits. Deficits in Taiwan and South Korea are expected to lessen into mostly normal conditions.

The forecast for the final months – December 2023 through February 2024 – expects normal conditions and mild anomalies to continue, with some exceptions in northwestern China. Southwestern to northeastern Tibet and northwestern Xinjiang can anticipate a belt of moderate to exceptional surplus, while central Xinjiang is expected to endure exceptional deficits.

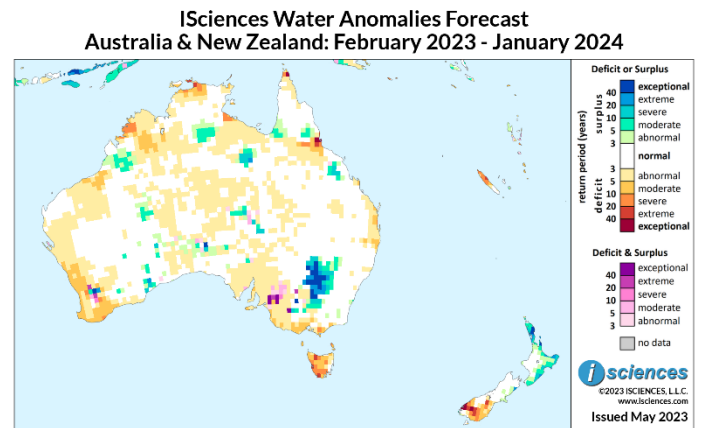
Please note that WSIM forecast skill declines with longer lead times.

Australia and New Zealand

The 12-month forecast ending in February indicates that Australia will experience widespread mild deficits, with small pockets of more intense anomalies scattered throughout the continent. Non-contiguous areas of the region are expected to observe intense deficits.

Extreme to exceptional deficits are expected in the following regions:

- Northern **Queensland**, in pockets within the Yorke Peninsula, north of the Burdekin River and near Heathlands Regional Park.
- Northern areas of **Northern Territory**, in coastal regions north of the town of Borroloola and northern areas of West Arnhem.
- Northern coastal regions of **Tasmania**.



Severe to extreme deficits are forecast in:

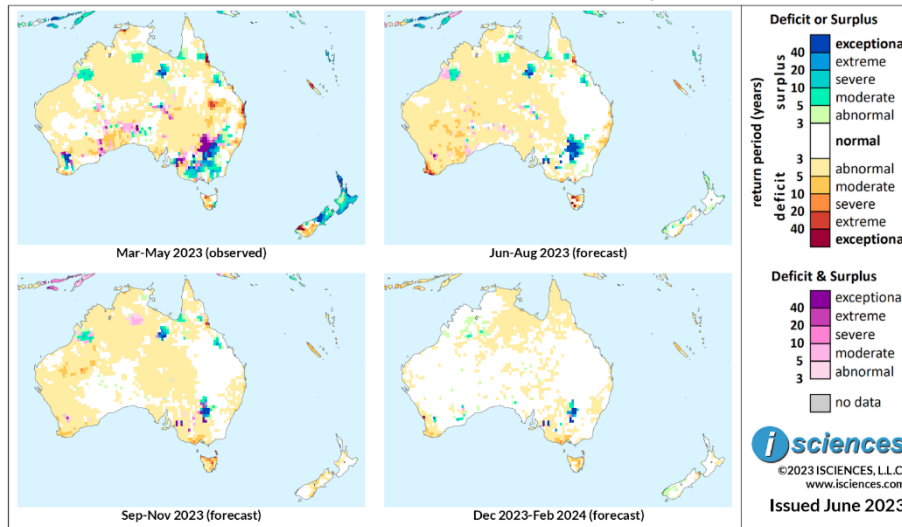
- Southwestern **Western Australia**, throughout coastal regions near the Blackwood and Swan rivers.
- Southern **Tasmania**, in areas surrounding Lake Gordon and Lake Pedder.
- Eastern coastal regions of **New South Wales**.
- Throughout **New Caledonia**.

Areas expected to observe extreme to exceptional surplus include:

- Central **New South Wales**, surrounding regions both north and south of the Lachlan River. Small areas of intense transitional conditions are expected to emerge in the same territory.
- Northwestern **Victoria**, south of the Murray River.
- East-central **Northern Territory**, crossing over into west-central **Queensland**.
- Northern **New Zealand**, throughout much of the Northland region and continuing in pockets in northern coastal regions of Auckland and the Bay of Plenty.

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

**iSciences Water Anomalies Forecast
Australia & New Zealand: March 2023 - February 2024**



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

The forecast through August 2023 anticipates widespread mild deficits across the continent, with exceptional surplus persisting in central New South Wales, as well as in northern Western Australia, eastern Northern Territory, and northeastern Queensland. Deficits in southwestern coastal regions of Western Australia near the Blackwood and Swan rivers are expected to intensify into exceptional severity. In non-contiguous areas, exceptional deficits in northern Tasmania are expected to expand in size, reaching some southern coastal areas of the country. New Zealand should observe mostly normal conditions.

From September through November 2023, exceptional surpluses in northern Western Australia, eastern Northern Territory, and northeastern Queensland are expected to continue. Surplus in central New South Wales is expected to shrink in size but remain in exceptional intensity. Deficits in Tasmania are expected to lessen in intensity, returning to moderate to severe deficit. Small, isolated areas of central and southern New Zealand can anticipate mild to moderate deficits.

The forecast for the final months – December 2023 through February 2024 – anticipates most anomalies across Australia to disappear, with exceptional surplus still lingering in New South Wales. Tasmania can expect mild to moderate deficits to endure across the country.

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