

# Global Water Monitor & Forecast Watch List

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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 1-9 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 July 2020 and an ensemble of forecasts issued the last week of July 2020. 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 in a given month. 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 anomaly. For example, a return period of 10 years indicates an anomaly that would occur, on average, once every ten years. Higher return periods indicate more extreme and, therefore, more disruptive anomalies. 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. Return period is computed by comparison to cell-specific distributions of data from 1950 through 2009.

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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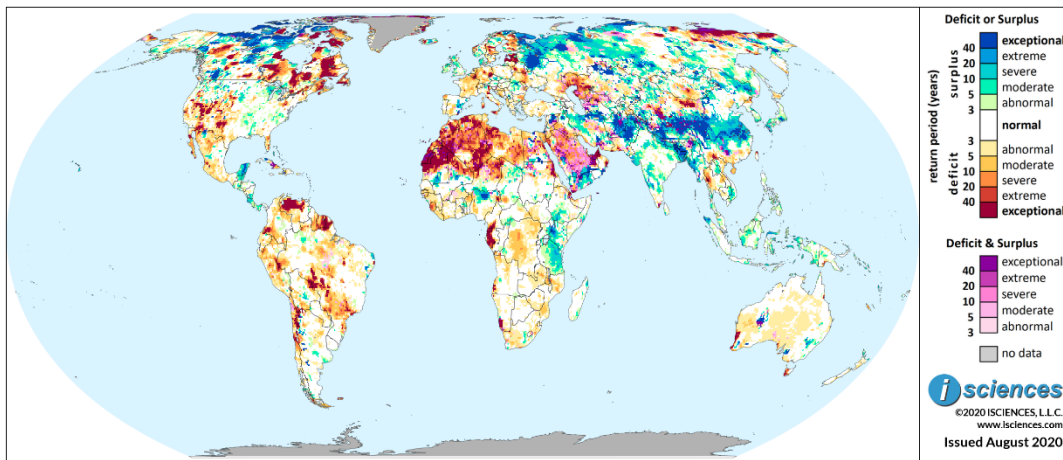
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## Worldwide Water Watch List

This map presents a selection of regions likely to encounter significant water anomalies during the one-year period beginning in May 2020 and running through April 2021 using 3 months of observed temperature and precipitation data and 9 months of forecast data.

ISciences Water Anomalies Forecast: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

### 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 through October indicates that water surpluses from the Lower Mississippi region east to the Virginia coasts will shrink considerably, leaving anomalies primarily in Mississippi. Surpluses elsewhere include South Dakota, Nebraska, and western Montana. Deficits will downgrade in the Southwest and Northeast and persist in Florida.

**Canada:** The forecast through October for Canada’s most populated areas indicates water deficits near Montreal, Ottawa, and Winnipeg; and surpluses in Calgary and Edmonton. Widespread deficits are forecast in the eastern half of the country. Surpluses will downgrade in southeastern British Columbia.

**Mexico, Central America, and the Caribbean:** The forecast through October indicates that water deficits will downgrade in Mexico but persist from Chihuahua into Durango and along the Coatzacoalcos and Papaloapan Rivers in Veracruz. Areas of surplus include the Yucatan and pockets in Central America.

**South America:** The forecast through October indicates widespread water deficits reaching exceptional intensity in Peru, northern Chile, the eastern and southern Amazon Basin, and French Guiana. Intense deficits are also forecast on the Paraguay River. Surpluses will shrink in eastern Brazil.

**Europe:** The forecast through October indicates a pattern of water anomalies similar to May through July though the intensity will downgrade in some regions. Areas of deficit include Finland, the Baltics through Ukraine, and France through Germany. Areas of surplus include Russia, Spain, and the U.K.

**Africa:** The forecast through October indicates that intense water deficits will shrink in Morocco but emerge in western Algeria. Widespread surpluses will persist in East Africa. Exceptional deficits will disappear from the Horn of Africa and will nearly disappear from southern Africa.

**Middle East:** The forecast through October indicates that water surpluses will shrink as transitions begin but will persist in northern Syria, northeastern Iraq, and western Iran. Deficits will emerge in central Iran, western and southern Iraq, and Kuwait. Mixed conditions are expected in Saudi Arabia.

**Central Asia and Russia:** The forecast through October indicates that water surpluses in Russia from the Northern European Plain through the Western Siberian Plain will shrink but remain widespread. Deficits will increase east of the Lower Yenisei River, and deficits in the Caspian Basin will retreat.

**South Asia:** The forecast through October indicates that water surpluses will shrink but persist in India's Deccan Plateau, and increase from Gujarat into Uttar Pradesh. Surpluses will moderate in Bangladesh but remain intense and widespread in Pakistan and Afghanistan.

**Southeast Asia and the Pacific:** The forecast through October indicates that water surpluses will shrink and downgrade but persist in many areas, particularly Indonesia. Deficits will shrink considerably in Southeast Asia, persisting primarily in western Thailand.

**East Asia:** The forecast through October indicates that water surpluses in China will shrink and downgrade but remain widespread and intense in the Yellow and Yangtze River Basins. Deficits will moderate in the south, except in Yunnan, and will emerge north of the Bohai Sea.

**Australia & New Zealand:** The forecast through October indicates the emergence of exceptional water deficits in the northern reaches of Australia. Surpluses in the southeast will shrink, persisting mainly in the central Murray-Darling Basin. In New Zealand, deficits will shrink considerably.

## Watch List: Regional Details

### United States

The 12-month forecast ending April 2021 indicates deficits throughout the West, Southwest, and Southern Rockies, including exceptional deficits. Deficits are also forecast for parts of the U.S. Northeast and in Florida. The Great Lakes Region can expect surpluses, as can South Dakota and north central Nebraska, pockets of the Northwest, states along the Lower Mississippi River, and the Blue Ridge Mountains Region.

In the western U.S., deficits will be especially intense in the San Francisco Bay Area, Nevada, Utah, the Gila River Watershed in Arizona, and the Pecos River Watershed in New Mexico. In Texas, moderate to exceptional deficits are expected in the west and moderate deficits between Austin and San Antonio. Moderate deficits are also forecast on the Arkansas River through western Kansas and the Canadian River through western Oklahoma and the Texas Panhandle.

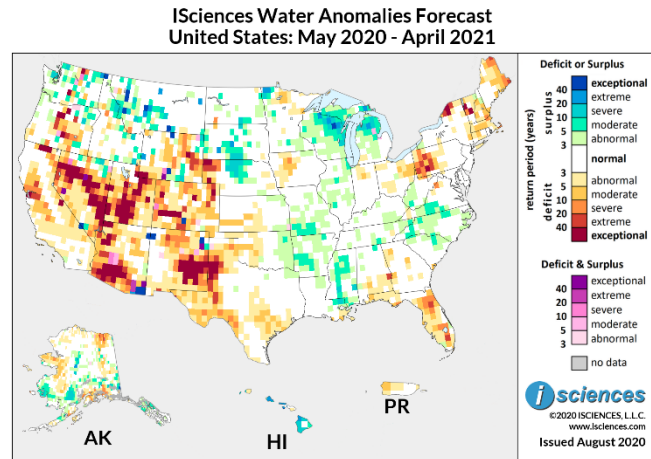
In the Northeast, intense deficits are forecast for western Pennsylvania, the border region of northern New York along the St. Lawrence River, and northwestern Vermont. Deficits of lesser intensity are predicted for Ohio, Maine, New Hampshire, Massachusetts, and Connecticut. In Florida, deficits of varying intensity are expected, and in a few pockets Georgia and Alabama. Deficits are also forecast in Iowa in the central Des Moines River Watershed.

Surpluses will be moderate to extreme in northern Michigan and northeastern Wisconsin, and moderate to severe in a central column from South Dakota into Nebraska. Surpluses of varying intensity are expected in other pockets of the Upper Midwest, western Montana, Idaho, and the Pacific Northwest, though deficits are also forecast in central Oregon and a few small pockets in Washington.

Other areas with a forecast of surplus, primarily moderate, include southern Missouri, southwestern Arkansas, Mississippi, southern Virginia, and pockets of the Carolinas.

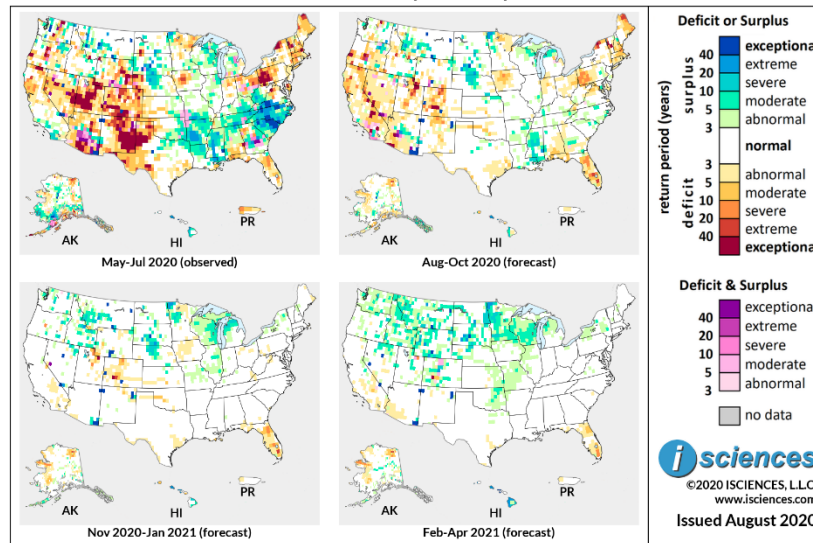
Outside the contiguous U.S., surpluses are forecast for much of Hawaii. Alaska can expect deficits from Anchorage past Valdez, on the Seward Peninsula, and in the northeast. Surpluses are forecast west of Bethel, north of Iliamna Lake, in the center of the state, and pockets in the southeast. In Puerto Rico, moderate deficits are expected in the west.

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



Based on observed data through July 2020 and forecasts through April 2021

**ISciences Water Anomalies Forecast  
United States: May 2020 - April 2021**



Based on observed data through July 2020 and forecasts through April 2021

From August through October the overall forecast indicates that widespread prior surpluses from the Lower Mississippi River region through the southern portion of the Ohio River Basin and the Virginias will shrink considerably, leaving normal conditions in many areas. Moderate to severe surpluses will persist in much of Mississippi and into southeastern Louisiana. A column of surplus will persist from South Dakota into Nebraska. Surpluses are also forecast in pockets of North Dakota, and in northwestern Minnesota, northern Wisconsin, and northern Michigan. Western Montana can expect surpluses of varying intensity and pockets are forecast in Idaho and the Pacific Northwest. Moderate surpluses will increase in a belt across Arizona; exceptional surpluses will persist in the southeast.

Deficits in the Southern Rockies and the Southwest will shrink and downgrade considerably but will persist in Colorado, northern New Mexico, pockets of Utah, southwestern Arizona, and Nevada. Deficits will increase in California, moderate or more intense in the north and the southeast, but generally mild in much of the Central Valley. In the northeastern U.S., deficits will downgrade in some areas but will be extreme to exceptional along New York’s northern border and surrounding Lake Champlain in Vermont, and severe in western Pennsylvania. Other areas of the country with a forecast of deficit include Florida, south central Alabama, north central Iowa, and along the Canadian River in Oklahoma.

From November 2020 through January 2021, normal water conditions will return to much of the country. Surpluses will persist in northern Michigan, Wisconsin, and northwestern Minnesota; from central South Dakota into Nebraska; western Montana and pockets of Idaho and the Pacific Northwest; and a few isolated pockets in the Southwest. Deficits will shrink and downgrade in Florida and persist in pockets of Colorado and northern Utah.

The forecast for the final months – February through April 2021 – indicates that surpluses will increase in the Great Lakes Region, Upper Midwest, Rockies, and the Pacific Northwest. Some deficits will linger in Florida. Please note that WSIM forecast skill declines with longer lead times.

## Canada

The 12-month outlook for Canada through April 2021 indicates vast areas of water deficit in the eastern half of the nation. Exceptional deficits are forecast in a wide path on Quebec’s eastern border and into western Labrador, a large block west of Lake Mistassini, and a column spanning the Quebec/Ontario border.

Deficits of varying intensity including exceptional deficits are forecast for

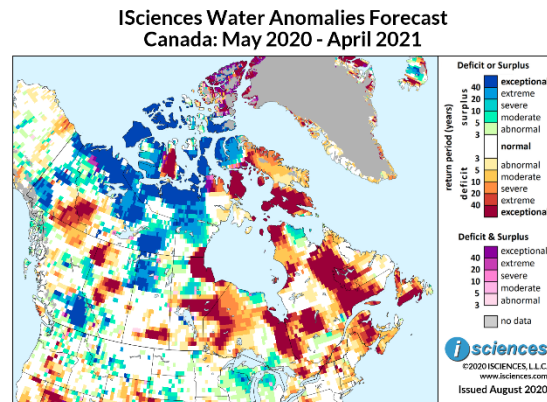
Newfoundland, New Brunswick, Quebec’s

Gaspé Peninsula and Southern Quebec, Southern Ontario, and much of Northern Ontario. Surpluses are predicted in Ontario east of Lake Superior and in the northeast along Hudson Bay.

In Manitoba, exceptional deficits are forecast in the northeast Hudson Bay, a belt across the center of the province north of Lake Winnipeg reaching into Ontario, and around Winnipeg. Large pockets of severe surplus are forecast in north central and northwestern Manitoba. Deficits will be exceptional in other areas of the country including a belt in southern Saskatchewan reaching through Regina, the Middle Reaches of the Athabasca River Watershed in central Alberta, and Alberta’s northwest corner. Deficits are forecast for northern British Columbia, intensifying as they reach well into the Yukon and Northwest Territories.

Much of northern Saskatchewan can expect conditions of extreme to exceptional surplus leading north well past Lake Athabasca into the Northwest Territories and west past Fort McMurray, Alberta. Surpluses are also expected around Calgary, Alberta. In British Columbia, severe surpluses are expected around Fort St. John and exceptional surpluses in the southeast.

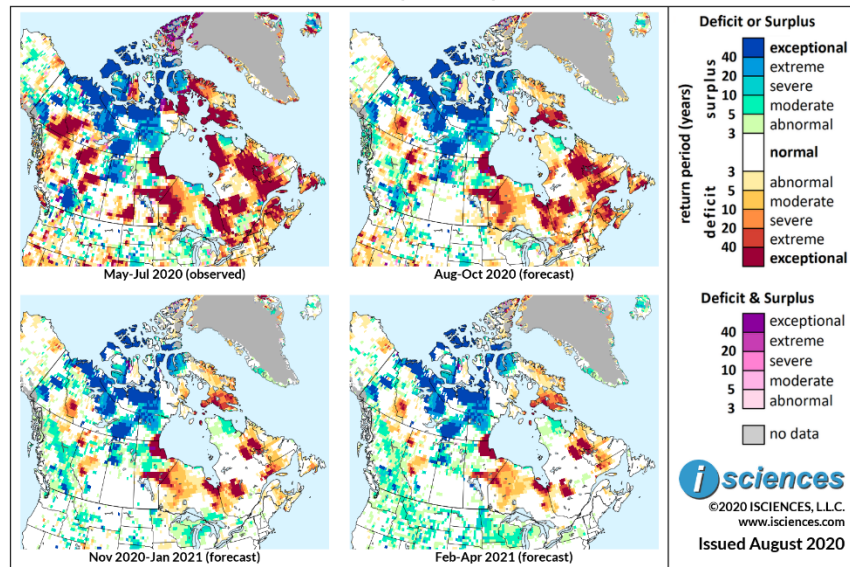
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through July 2020 and forecasts through April 2021



Isciences Water Anomalies Forecast  
Canada: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October for Canada’s most populated areas indicates nearly normal water conditions for Québec City, Toronto, Regina, Saskatoon, and Vancouver; deficits near Montreal, Ottawa, and Winnipeg; and surpluses in Calgary and Edmonton. Though deficits will shrink slightly overall, deficits are forecast in eastern Canada including vast blocks of exceptional deficit in eastern Quebec (QC), at the mouth of the St. Lawrence River, and west of Lake Mistassini. Deficits of varying intensity are forecast for Newfoundland and Labrador, the Maritimes, and Southern QC from Montreal through the Gaspé Peninsula. Intense deficits will persist spanning the Quebec/Ontario border and in much of Northern Ontario (ON), with deficits of varying intensity in Southern ON.

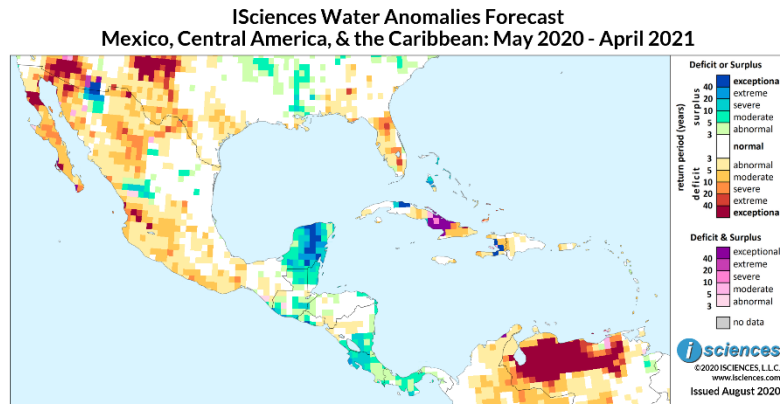
In the Prairie Provinces, exceptional deficits will persist along Hudson Bay in Manitoba (MB) and in a belt across central MB, with surpluses increasing between. Normal conditions will return to southern Saskatchewan (SK) while intense surpluses persist in the north. Surpluses are forecast in Alberta (AB) near Calgary, Edmonton, and Fort McMurray; intense deficits will persist in the Middle Athabasca River Watershed and in northwestern AB. In British Columbia (BC), surpluses in the southeast will downgrade somewhat, as will those around Fort St. John in the north, while surpluses in the Upper Peace River will increase. Deficits on Vancouver Island will diminish.

From November 2020 through January 2021, deficits in the nation will decrease overall, though blocks of intense deficit will persist in QC, southern James Bay in ON, and several aforementioned areas of MB. Moderate surpluses will emerge in ON north of Georgian Bay. Anomalies in SK and AB will downgrade but moderate surpluses will increase along the Peace River well into northern BC.

The forecast for the final three months – February through April 2021 – indicates conditions similar to the November through January forecast. Please note that WSIM forecast skill declines with longer lead times.

## Mexico, Central America, and the Caribbean

The 12-month forecast ending April 2021 indicates deficits of varying severity in much of western Mexico. In the nation's northwest quadrant, deficits will be widespread from Baja into northern Coahuila. Anomalies will reach exceptional intensity around the northern Gulf of California in pockets of Baja and northwestern Sonora and will be extreme from central Chihuahua into northern Durango.



Surpluses are expected in northeastern Sonora at the confluence of the Batepito, Bavispe, and Yaqui Rivers; from southern Durango into western Zacatecas; and a few pockets elsewhere in the north.

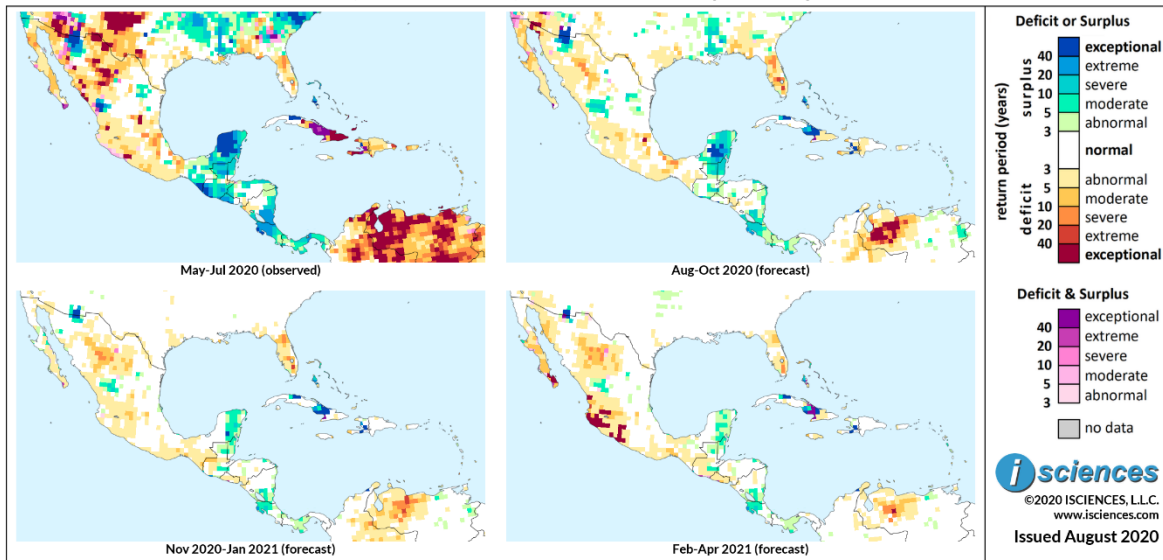
Deficits will follow the Pacific Coast states from Nayarit through Oaxaca in the south, reaching into the center of the country as well. Anomalies will be exceptional in Nayarit and in Jalisco's capital of Guadalajara. Intense surpluses are forecast for the Yucatan Peninsula.

In Central America, moderate to severe surpluses are expected in Belize and in pockets of Guatemala, El Salvador, Honduras, and southern Nicaragua. Surpluses of equal intensity are forecast for Costa Rica and western Panama.

Moderate deficits are expected in eastern Cuba and Haiti, extreme deficits in Turks and Caicos, and surpluses in the central Bahamas.

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

**ISciences Water Anomalies Forecast**  
**Mexico, Central America, & the Caribbean: May 2020 - April 2021**



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that water deficits will downgrade in Mexico, but leave severe deficits from central Chihuahua into northern Durango and in pockets of southern Veracruz, particularly along the Coatzacoalcos and Papaloapan Rivers. Moderate deficits are forecast for Baja. Other areas with a forecast of deficit include central Puebla, Hidalgo, and southern Guanajuato.

Surpluses of varying intensity will persist in northeastern Sonora in the region of the Batepito, Bavispe, and Yaqui Rivers. Moderate to severe surpluses are forecast from southern Durango into western Zacatecas and along the San Juan River through Nuevo Leon. Surpluses reaching exceptional intensity will persist in the Yucatan Peninsula.

In Central America, surpluses will shrink and downgrade but persist, particularly in Belize, Guatemala, southern Nicaragua, and Costa Rica. Deficits in the Caribbean will be generally mild, and some surpluses are forecast.

From November 2020 through January 2021, normal conditions are expected in many parts of Mexico as anomalies shrink, but moderate to severe deficits will persist from Chihuahua into Durango, moderate deficits will emerge in neighboring Coahuila, and surpluses will persist in Sonora, southern Durango, and the Yucatan. Conditions in many parts of Central America and the Caribbean will normalize though pockets of surplus are forecast.

The forecast for the final three months – February through April 2021 – indicates that deficits will persist in north-central Mexico and exceptional deficits will emerge along the central Pacific Coast. Pockets of surplus are expected in the Yucatan, Central America, and the Caribbean.

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

## South America

The 12-month forecast through April 2021 indicates nearly normal water conditions in roughly half of the continent's extent though deficits of varying intensity are forecast in nearly every nation.

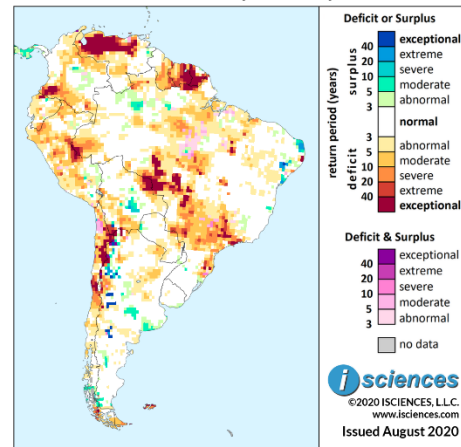
Pockets of deficit are forecast across the northern arc and will be exceptional in southwestern Colombia, northern Venezuela, Suriname, and French Guiana.

Deficits of varying intensity will dominate Brazil's central and southern states of Mato Grosso, Mato Grosso do Sul, São Paulo, Paraná, and Santa Catarina. Exceptional anomalies will be especially widespread in Mato Grosso, spilling over the border into eastern Bolivia. Moderate to severe deficits are expected in pockets of central Brazil and surpluses in pockets of the eastern states and northern Amazonas. In Bolivia, intense deficits are forecast in the east, as previously mentioned, and in the south; severe surpluses are expected in the center of the nation. The bulk of central Peru will see deficits of varying intensity with exceptional anomalies in the east from Ucayali into Acre in western Brazil.

In the southern portion of the continent, deficits are forecast throughout much of Chile north of Santiago, reaching across the northern border into Argentina. Anomalies will be severe in Valparaiso and Santiago. The forecast for Argentina includes surpluses in the northwestern province of La Rioja, northern La Pampa Province, southern Buenos Aires Provinces, and the Southern Patagonian Ice Fields. Moderate deficits are expected in the Gran Chaco area of northeastern Argentina and in Santa Fe Province. The continent's southernmost tip will see some intense deficits.

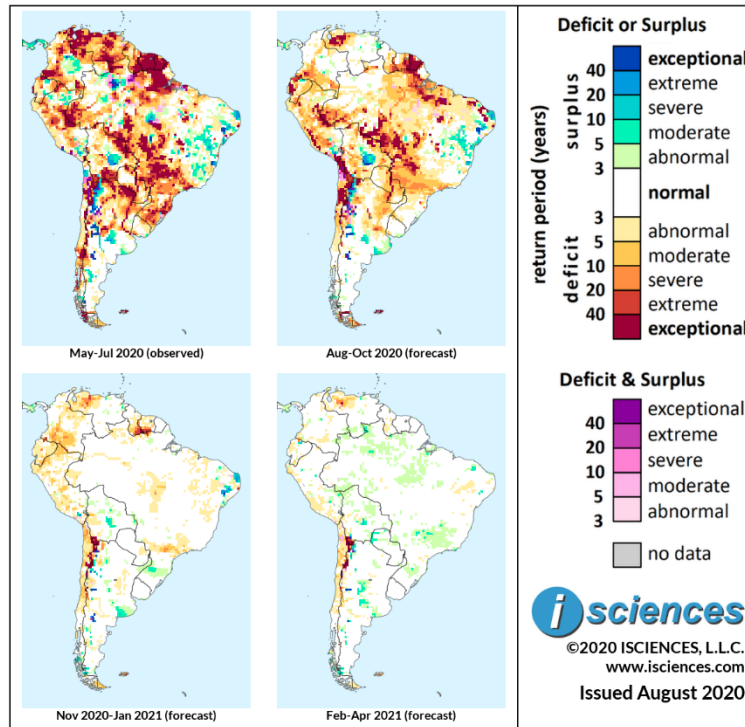
The 3-month maps (below) for the same 12-month period show the evolving conditions in greater detail.

ISciences Water Anomalies Forecast  
South America: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

ISciences Water Anomalies Forecast  
South America: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that, though deficits will shrink, many areas of significant deficit are expected. Nearly normal conditions will return to some areas in the northern nations, the northern Brazilian Amazon, southern Brazil, Uruguay, and Chile's southern half. In Brazil, intense deficits are expected in the eastern Amazon Basin, moderating through central Brazil, then intensifying again in the far western and southern reaches of the Basin. Moderate to severe deficits are expected from Mato Grosso through São Paulo. Surpluses will shrink but persist in eastern Brazil and some pockets of exceptional deficit will emerge in the northeast.

Across the northern arc of the continent, deficits are expected in Ecuador, southern Colombia, northeastern Venezuela, Guyana, Suriname, and French Guiana, and will include exceptional deficits. Much of Peru will be in deficit with exceptional deficits emerging in the central Cordillera Occidental Range and some surpluses persisting in the southeast. Surpluses are also forecast in central Bolivia with deficits of varying intensity in much of the remainder of the nation. Intense deficits are forecast in Chile's northern half and along the Paraguay River through the center of its namesake. Argentina can expect moderate to severe deficits in the northeast and some pockets of surplus in the Pampas.

From November 2020 through January 2021, water conditions will normalize on much of the continent, most notably in Brazil. Some pockets of surplus will persist in Brazil's eastern tip and will emerge in Rio Grande do Sul. Intense deficits will persist in southern Guyana and southern Suriname. Deficits will downgrade in northwestern Venezuela and southern Colombia, and will shrink considerably in Ecuador and Peru, becoming generally mild. Deficits will downgrade in Chile and nearly disappear in remaining

central and southern nations. Moderate surpluses are forecast for central Bolivia and southern Buenos Aires Province in Argentina.

In the final quarter – February through April 2021 – normal conditions are forecast for much of the continent with some deficits persisting in northwestern Venezuela and northern Chile. Surpluses will nearly disappear in Brazil’s eastern tip, but mild anomalies will emerge in scattered pockets elsewhere, and some surpluses are forecast in Bolivia, Paraguay, and Argentina.

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

## Europe

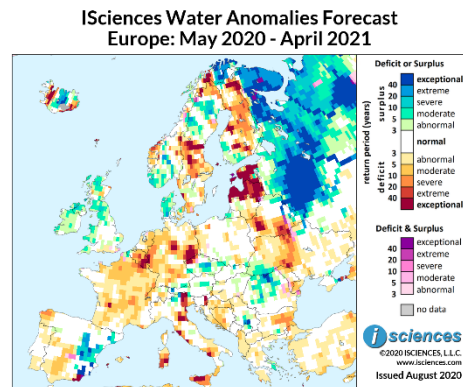
The 12-month forecast through April 2021 indicates water deficits of varying intensity in many regions of Europe. Deficits will be especially intense in Estonia and Latvia and widespread in much of Finland and central Sweden.

Deficit conditions are also expected in southern Lithuania and southern Belarus, reaching south through Ukraine including Kiev into pockets of Moldova, sparing Romania but present in eastern Bulgaria. Anomalies will be extreme to exceptional in Belarus and severe through Ukraine and in Bulgaria.

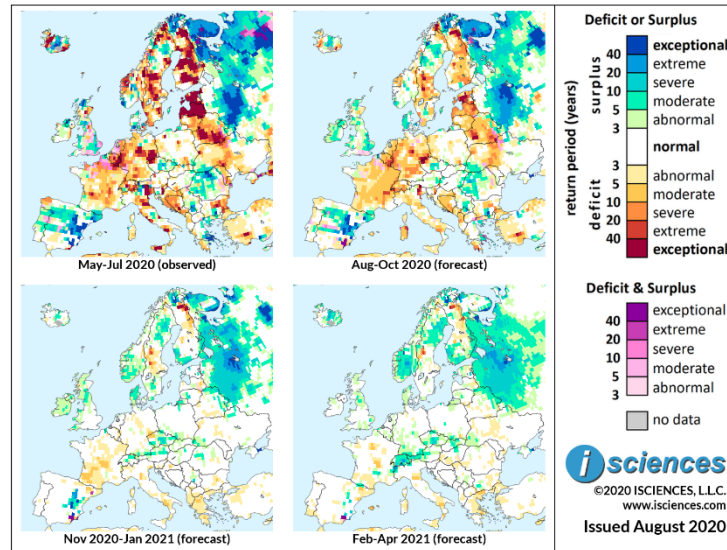
Widespread deficits, primarily moderate, are forecast from France through Belgium, the Netherlands, and Germany. However, anomalies will be intense in southern Belgium, southern Bremen in Germany, and surrounding Dresden. In Italy, deficits will be exceptional in the Dolomite Mountains, Venice, Bologna, Rome, Sicily, and Sardinia. Intense deficits are forecast for eastern Slovenia and moderate deficits in Croatia, Bosnia and Herzegovina, and northern Albania. In Spain, moderate deficits are forecast from Madrid to Cordoba, but more intense pockets are expected in the nation's northwest and southeast corners in Galicia and Andalucía. Surpluses are forecast for eastern Spain.

Widespread surpluses are expected in European Russia including vast areas of exceptional surplus. Other areas of surplus include Ireland and the U.K., Denmark, Czech Republic, Austria, southwestern Ukraine, Romania, southern Serbia into Kosovo, and pockets of Scandinavia.

The 3-month composites (below) for the same 12-month period show the evolving conditions.



**ISciences Water Anomalies Forecast  
Europe: May 2020 - April 2021**



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates a distribution pattern of anomalies similar to the prior three months of observed data though the intensity of anomalies will downgrade somewhat. Deficits are forecast in central Sweden and much of Finland, from the Baltics through Ukraine, from France through Germany, pockets around the Adriatic Sea, and eastern Bulgaria. Areas of intense deficit include Lapland, Estonia, western Belarus, southern Belgium, near Dresden (Germany), the Dolomite Mountains (Italy), and many sections of the Rhine and Danube Rivers. Deficits will increase in France but will be primarily moderate.

Surpluses will downgrade in European Russia but remain widespread and intense. Moderate surpluses will increase in Ireland and the U.K.; persist in Czech Republic, southwestern Ukraine, western Romania and from southern Serbia into Kosovo; and emerge in eastern Austria and eastern Hungary. On the Iberian Peninsula, surpluses will remain widespread in Spain but retreat from Portugal. Some moderate surpluses will persist in pockets along Greece's northern Aegean Sea coast and near Athens.

From November 2020 through January 2021, deficits will shrink considerably and downgrade, leaving many areas of Europe with nearly normal conditions. Intense deficits will persist in Finland's Lapland, severe deficits in central Sweden, and moderate deficits in central and southwestern France and pockets in Italy and the Balkans. Surpluses will remain widespread in European Russia but the extent of extreme to exceptional surplus will shrink. Surpluses will shrink in eastern Spain, the U.K., and Central and Eastern Europe, but will increase in Scandinavia.

The forecast for the remaining months – February through April 2021 – indicates nearly normal conditions throughout much of Europe, and surpluses from Switzerland through Slovakia, large pockets in Scandinavia, and a vast expanse of European Russia.

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



## Africa

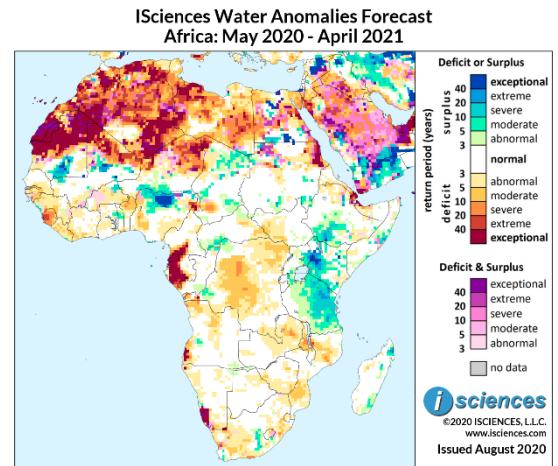
The 12-month forecast through April 2021 indicates intense water deficits across much of western North Africa including exceptional anomalies, and mixed conditions in Egypt. Exceptional deficits are also forecast from southern Cameroon through Equatorial Guinea into western Gabon; in southwestern coastal areas of Angola and Namibia; and on Sudan's Red Sea Coast. Intense deficits are forecast for Djibouti.

Some areas of surplus are forecast in the Sahel reaching into northern Nigeria where anomalies will be exceptional. Scattered mild to moderate deficits are expected in West Africa but anomalies will be extreme in Sierra Leone.

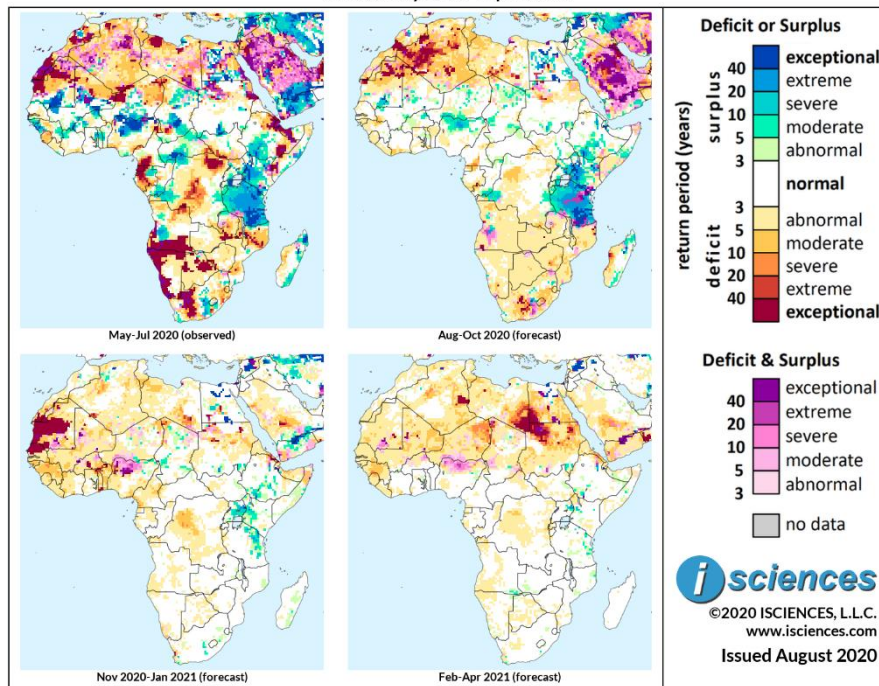
Widespread surpluses are expected in East Africa from southern Ethiopia through Tanzania. Surpluses will be exceptional in a pocket of western Kenya and moderate to extreme elsewhere in the region. A pocket of surplus is forecast in northeastern Madagascar and a few small pockets elsewhere on the island.

Deficits, primarily moderate, are forecast for the central Congo River Basin and northeastern Democratic Republic of the Congo as well as pockets in northern Angola, northern Zambia, northern Malawi, and northern and southwestern Mozambique. In South Africa, some scattered deficits are forecast but moderate surpluses are expected from southern Orange Free State into Eastern Cape.

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



ISciences Water Anomalies Forecast  
Africa: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that intense deficits will shrink in Morocco but emerge in western Algeria, with deficits of varying intensity in the remainder of western North Africa. Surpluses are forecast in Egypt. Water surpluses in the southern Sahara and Sahel will shrink and downgrade, though remain widespread in northern Nigeria. Deficits in Sierra Leone will become merely mild.

Deficit and surplus anomalies in central Africa will shrink and downgrade but widespread surpluses will persist in the East with exceptional surpluses in southern Tanzania. Exceptional deficits will disappear from the Horn of Africa and will nearly disappear from the southern half of the continent, persisting in pockets of central South Africa. In Madagascar, surpluses in the northeast and southeast will shrink and downgrade; deficits will intensify in a small pocket on the central west coast.

From November 2020 through January 2021, anomalies throughout most of the continent will shrink considerably, leaving nearly normal conditions in much of southern Africa. Exceptional deficits will emerge in Mauritania, southern Morocco, and northern Senegal, and moderate deficits in Guinea, Guinea Bissau, and other nations in West Africa. Surpluses in northern Nigeria will transition as intense deficits emerge. Intense deficits will emerge in eastern Eritrea and moderate deficits will persist in the central Congo Basin. Surpluses in East Africa will shrink and downgrade considerably.

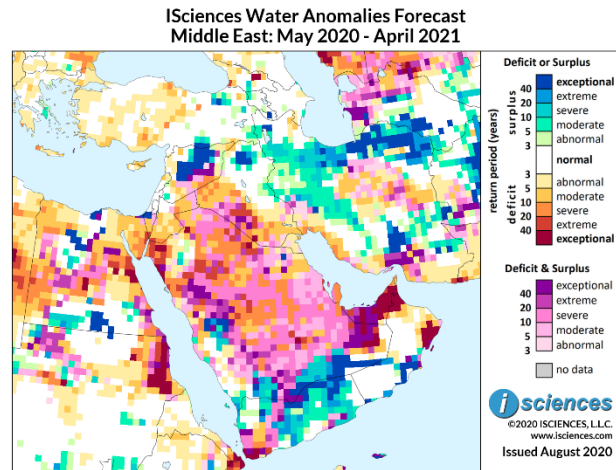
The forecast for the final quarter – February through April 2021 – indicates some significant deficits at the conjoined borders of Libya, Egypt, and Sudan, and primarily moderate deficits elsewhere in North Africa. Surpluses in East Africa will nearly disappear.

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

## Middle East

The forecast for the 12-month period ending April 2021 indicates persistent water surpluses in northern Syria, northern Iraq, and western, northeastern, and southeastern Iran.

Anomalies will be exceptional in Syria and surrounding Mosul, Iraq. In Iran, moderate to severe surpluses are forecast in much of the western region of the country with more intense anomalies reaching east around the Caspian Coast and along the Turkmen border. Surpluses will also be intense in southern Kerman Province in the south.



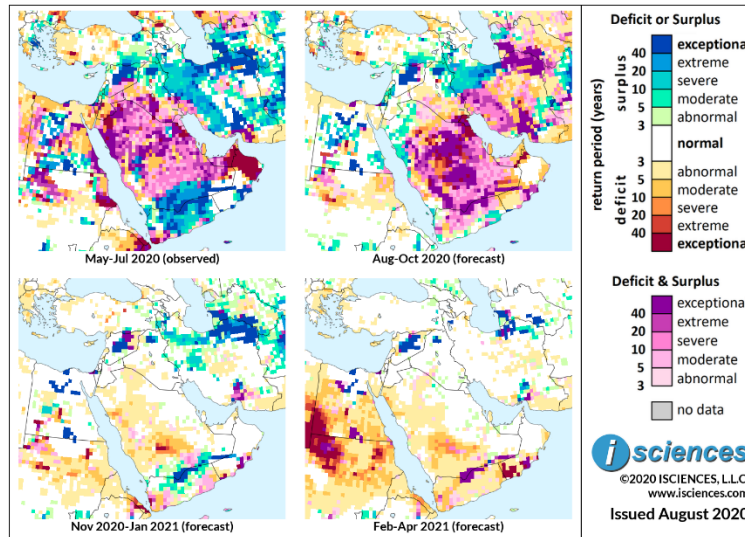
Deficits are forecast for central Iran and along the Persian Gulf Coast. In Iraq, deficits of varying intensity are expected west of the Euphrates along with mixed conditions of both deficit and surplus (pink/purple) as transitions occur.

On the Arabian Peninsula, Jordan can expect deficits, and a patchwork of deficits and transitional conditions is forecast for much of Saudi Arabia with severe to extreme deficits in northern and central regions and exceptional deficits in the nation's southeast corner. Deficits will be exceptional as well in the United Arab Emirates and severe in Qatar. Surpluses are expected along the southwestern Saudi border and in much of Yemen, though intense deficits are expected in southwestern Yemen near the Bab al-Mandab Strait. In Oman, deficits are forecast in the east and some surpluses in the central region.

Turkey can expect primarily mild deficits in its western half and a few pockets of surplus in the east. Intense deficits are predicted north of Tbilisi, Georgia.

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

ISciences Water Anomalies Forecast  
Middle East: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that widespread surpluses in the region will shrink as transitions begin. Exceptional surpluses will persist in northern Syria and surrounding Mosul, Iraq. Surpluses of varying intensity will persist in eastern Iraq and well into western Iran. Moderate deficits will emerge west of the Euphrates in Iraq and exceptional deficits in the south and throughout Kuwait. In Iran, deficits of varying intensity are forecast to emerge in the center of the nation and near the southeastern border with Pakistan while transitional conditions are predicted in the northeast and southwest. Moderate surpluses will persist spanning the border of Kerman Province and Sistan and Baluchestan Province in the south.

The forecast for the Arabian Peninsula is complicated. Surpluses will persist in northern Israel and conditions in Jordan will normalize. Deficits will intensify in central Saudi Arabia but much of the nation will be in transition; surpluses will emerge in the northwest. Moderate deficits are forecast for Qatar and the United Arab Emirates. Yemen will begin transitioning from surplus with some moderate deficits emerging in the west. In Oman, deficits will shrink and downgrade significantly in the east but emerge in the west. Pockets of deficit will persist in western Turkey, and surpluses in the east will shrink slightly.

From November 2020 through January 2021, deficits will shrink considerably - leaving normal conditions in many parts of the region - but will persist in southern Riyadh Province, Saudi Arabia, and Medina Province on the Red Sea. Surpluses will persist in central Syria, northern Iraq, and western Iran, and will re-emerge in northeastern Iran. Surpluses are also forecast from southern Saudi Arabia into Yemen.

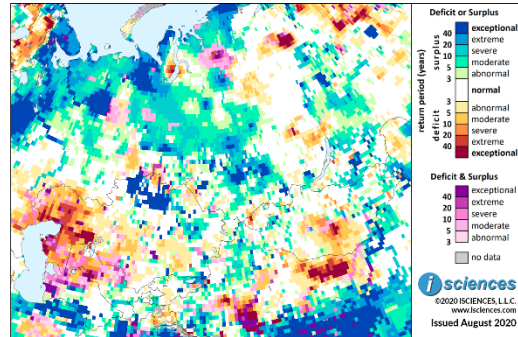
In the final quarter – February through April 2021 – surpluses are forecast for northern Syria, around Mosul, in northeastern Iran and in the south reaching from the Strait of Hormuz into Kerman Province. Deficits are forecast for Riyadh Province, Saudi Arabia.

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

## Central Asia and Russia

The 12-month forecast through April 2021 indicates that surplus anomalies will dominate a large region in Russia from the Northern European Plain across the Urals through the Western Siberian Plain. Anomalies will be exceptional in the Vychegda Lowland west of the Urals, along the Severnaya Dvina River, and in the tundra region near the Pechora Sea.

ISciences Water Anomalies Forecast  
Central Asia: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

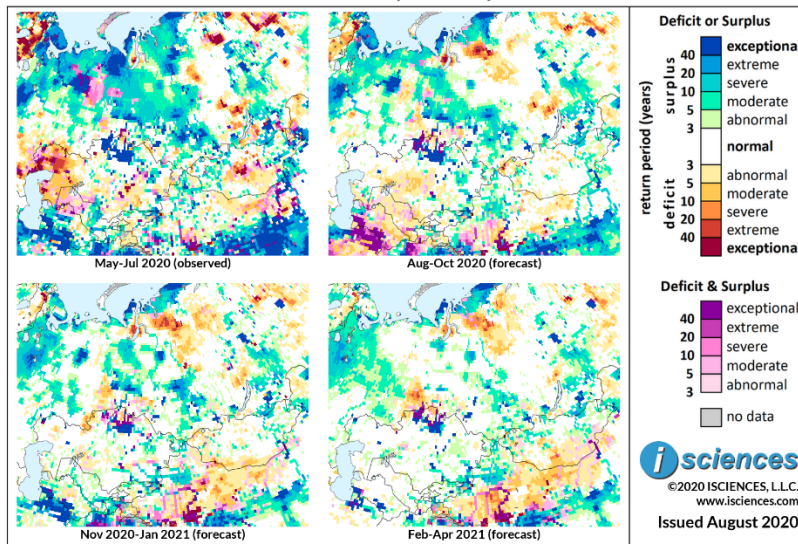
Surpluses are also forecast in parts of the Volga River Basin and will be exceptional in the upper basin and moderate to severe in Trans Volga.

Intense deficits are expected on the central banks of the Gulf of Ob; between the Bolshaya Kuonamka and Olenyok Rivers in northern Siberia; in the Lena River Delta (not shown); and along the East Siberian Sea (not shown).

Intense deficits are forecast in the northern portion of the Caspian Basin in southern Russia, western Kazakhstan, and western Uzbekistan. Intense surpluses are expected in northern Kazakhstan and spanning the Iran-Turkmen border. Surpluses of varying intensity are forecast in southern Uzbekistan, eastern Kyrgyzstan, and central Tajikistan. Moderate deficits are predicted for eastern Tajikistan.

The 3-month composites (below) for the same 12-month period show the evolving conditions in more detail.

ISciences Water Anomalies Forecast  
Central Asia: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that surpluses in Russia from the Northern European Plain through the Western Siberian Plain will shrink and downgrade but remain widespread. Exceptional anomalies will persist in the Vychegda Lowland and on parts of the Severnaya Dvina River. Surpluses are also forecast on the Upper Volga and Oka Rivers. In the Ob and Tom River Basins, surpluses will shrink but remain widespread. Intense deficits are expected to increase on the central shores of the Gulf of Ob and in the region just east of the Lower Yenisei River around Norilsk. Deficits will persist northwest of Lake Baikal and will downgrade somewhat in the Lena Delta and near the East Siberian Sea.

Nearly normal conditions will return to the northern region of the Caspian Basin, transitioning from prior deficit, but moderate deficits will emerge in western Karagandy Region, Kazakhstan. Intense surpluses will persist in northern Kazakhstan but transitional conditions are also expected. Mild to moderate deficits will increase in Turkmenistan and Uzbekistan as surpluses retreat. Some surpluses are forecast for eastern Kyrgyzstan and central Tajikistan.

From November 2020 through January 2021, surpluses will diminish in the Northern European Plain though persist with intensity in the Vychegda Lowland. In the Volga River Basin, surpluses will increase along the Lower River, in the middle of the basin, and in Trans Volga, and will remain intense in the upper portion of the basin. In the Ob River Basin, surpluses will shrink somewhat but will increase on the Taz River to the east. And in the Yenisei region, much of the lower basin will remain in deficit but surpluses will emerge along the river between the two Tunguska Rivers. Deficits northwest of Lake Baikal will shrink. In Central Asia, deficits will retreat, intense surpluses will re-emerge along the Iran-Turkmen border, and moderate surpluses will emerge on the Amu Darya River in Uzbekistan. Surpluses are also forecast from southern Uzbekistan into western Tajikistan, and in northern and eastern Kyrgyzstan. In Kazakhstan, surpluses will persist in the north around the capital Nur-Sultan (Astana) and in pockets of the east and southeast, increasing along the Ile River near Lake Balkhash.

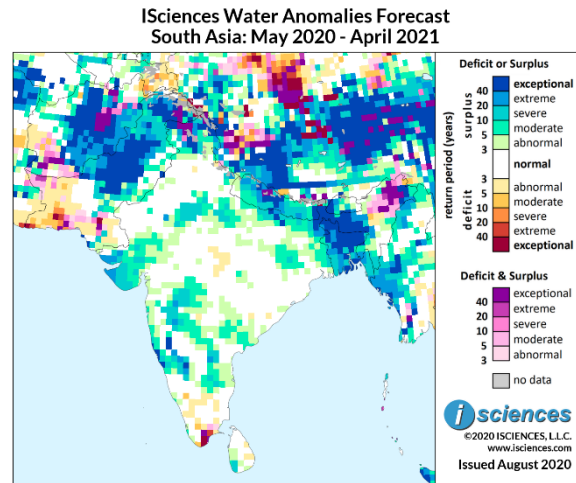
The forecast for the final months – February through April 2021 – indicates that surpluses will persist in European Russia, shrink in the Ob River Basin, and downgrade in the Yenisei Basin. Deficits will persist in the Lower Yenisei region and will increase around Tyumen, Russia just north of Kazakhstan. Normal conditions are forecast for much of Central Asia along with pockets of surplus.

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

## South Asia

The 12-month forecast through April 2021 indicates water surpluses in India from Gujarat in the west leading into northeastern Rajasthan and Uttar Pradesh. Surpluses are also expected in the Deccan Plateau in south-central India, extending into Maharashtra, Goa, Karnataka, Telangana, and Andhra Pradesh.

The eastern states of Jharkhand and West Bengal and parts of the Far Northeast including Meghalaya and western Assam will also experience surplus. Anomalies will be exceptional in Meghalaya and Assam.



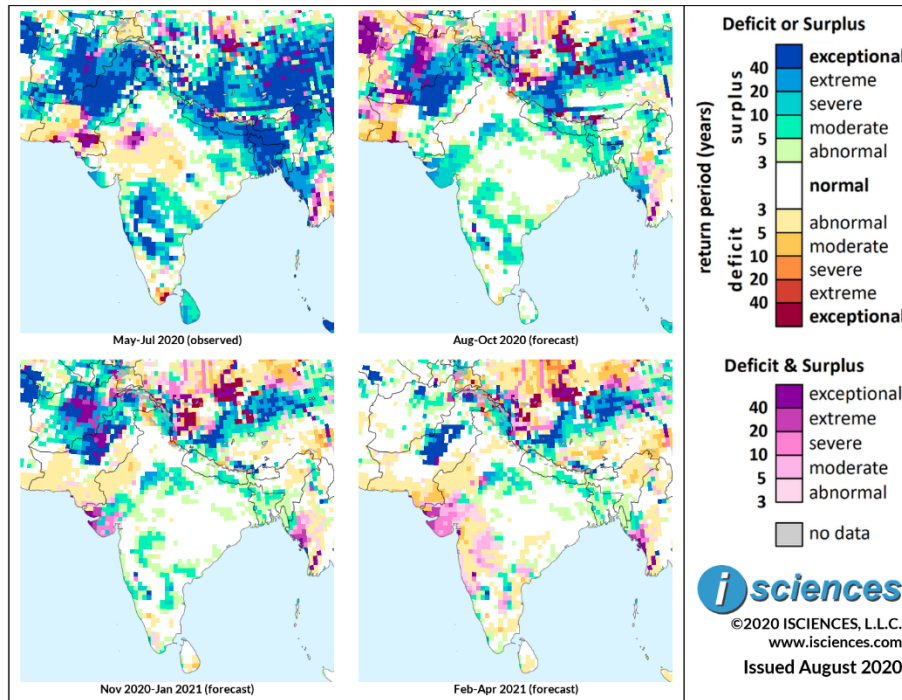
Mixed water conditions are forecast in India's Far North, and intense deficits are expected in the nation's southern tip in Tamil Nadu. In Sri Lanka, some moderate surpluses are forecast in the southeast.

Extreme to exceptional surpluses are predicted for much of Pakistan's northern two-thirds. Deficits are forecast in the southwest and mixed conditions along the Lower Indus River on its approach to the Arabian Sea. Surpluses will be extreme to exceptional in much of Afghanistan as well, encompassing Kandahar, Kabul, Mazar-e Sharif, and along the Harirud River and middle course of the Helmand River. Some areas of both deficit and surplus (pink/purple) are forecast as transitions occur.

Throughout Bangladesh surpluses will be extreme to exceptional, and surpluses of varying intensity are expected in Nepal and Bhutan including exceptional anomalies on the Gandak River through the center of Nepal leading into India.

The 3-month composites (below) show the evolving conditions in greater detail.

ISciences Water Anomalies Forecast  
South Asia: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that surpluses will persist in India’s Deccan Plateau and nearby regions but will shrink and downgrade. Surpluses will increase substantially in Gujarat and leading northeast through Rajasthan, re-emerging around Jaipur and reaching into Uttar Pradesh. Surpluses in eastern states and the Far Northeast are expected to shrink and downgrade. In Bangladesh, surpluses will remain widespread but will moderate, and surpluses will shrink and downgrade in Nepal and Bhutan and nearly disappear in Sri Lanka.

In Pakistan, widespread, intense surpluses will persist in much of the nation’s northwestern two-thirds but will diminish in the east past the Chenab River. Moderate surpluses will emerge in pockets of the southeast and in the Indus River Delta; mild deficits in the southwest will intensify somewhat, becoming moderate. While surpluses will remain intense in many areas of Afghanistan transitional conditions will increase as deficits emerge.

From November 2020 through January 2021, the distribution pattern of surpluses in India will persist as in the prior three months but anomalies will shrink. Transitional conditions are predicted for Gujarat. Deficits in Tamil Nadu will nearly disappear. Surpluses will shrink and downgrade in Bangladesh, Nepal, Bhutan, and Sri Lanka, leaving some areas of moderate surplus. In Pakistan, surpluses will shrink and downgrade somewhat, with transitional conditions forecast as well. Transitional conditions are also expected in central Afghanistan though intense surpluses will persist, and surpluses of varying intensity will emerge in the southwest as deficits disappear.



The forecast for the final months – February through April 2021 – indicates surpluses in several regions of India including Rajasthan and Uttar Pradesh, and transitional conditions in Gujarat. Intense surpluses are forecast for central Pakistan; surpluses in Afghanistan will shrink considerably.

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

## Southeast Asia and the Pacific

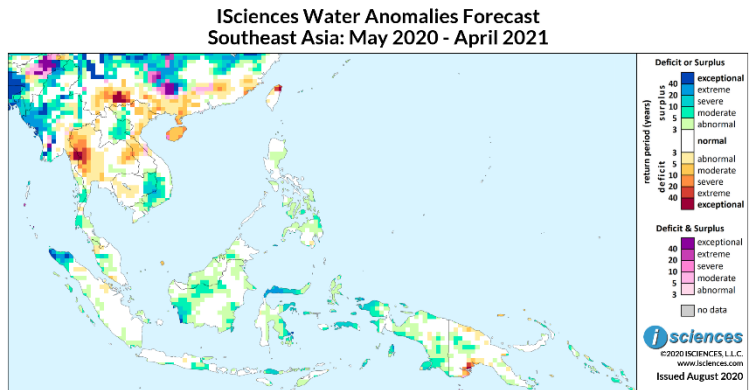
The 12-month forecast through April 2021 indicates moderate to exceptional deficits in western Thailand reaching across the border into southern Myanmar. Moderate deficits are forecast for eastern Thailand spanning the Mekong River into central Laos, and in northeastern Vietnam.

Surpluses of varying intensity are forecast for many regions in Myanmar and will be particularly intense west of the Irrawaddy River.

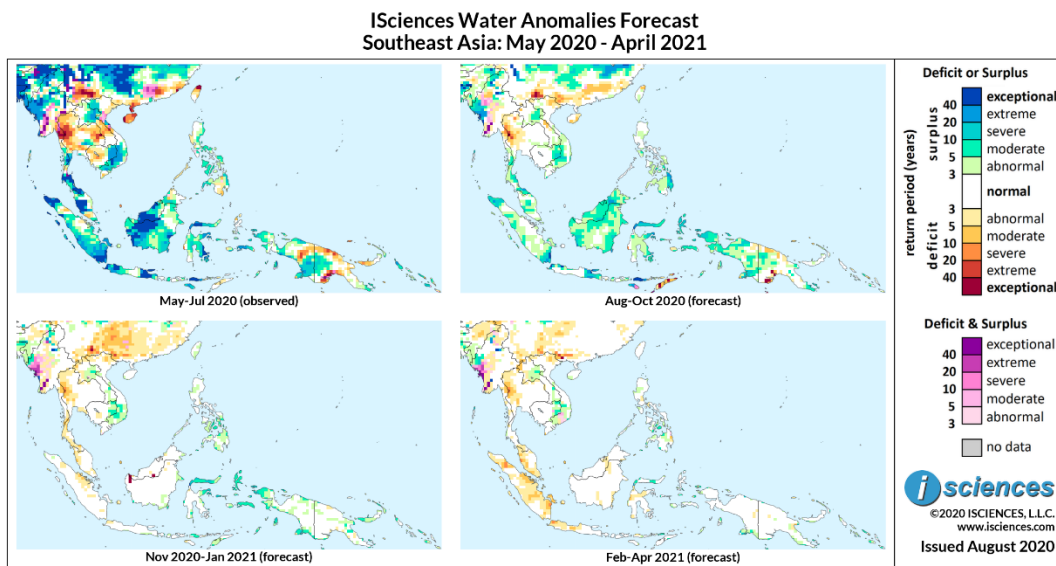
Severe surpluses are expected in eastern Cambodia and well into Vietnam as far south as Ho Chi Minh City. Primarily moderate surpluses are forecast for northeastern Laos and pockets in the peninsular regions of Thailand and Myanmar.

Surpluses are also forecast in a few pockets in Malaysia and many pockets in Indonesia. Anomalies will be intense in Aceh Province in northern Sumatra and in northern Sulawesi. Other areas with a forecast of surplus include pockets of Borneo, eastern Java, Flores Island, eastern Sulawesi, many small Indonesian islands, and the Bird's Head Peninsula (Doberai Peninsula) and other areas in Papua, Indonesia. In Papua New Guinea, intense deficits are expected along the western shore of the Gulf of Papua and moderate surpluses in the central Highlands. Nearly normal conditions are forecast for the Philippines with a few pockets of moderate surplus

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



Based on observed data through July 2020 and forecasts through April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that surpluses will shrink and downgrade overall but persist in many areas, particularly Indonesia. In Southeast Asia, surpluses are forecast for western and northern Myanmar; pockets in the Malay Peninsula; northeastern Laos; and from eastern Cambodia into southeastern Vietnam. Deficits will shrink considerably in Southeast Asia, persisting primarily in western Thailand and reaching into Myanmar's Kayin State. Normal conditions are expected in western Cambodia as deficits retreat.

Surpluses are forecast in many parts of Malaysia and Indonesia. Anomalies will be exceptional on Flores Island and intense at each end of Sumatra and Java and in northern Sulawesi. Intense deficits will emerge on Timor Island. Deficits will shrink and downgrade on New Guinea, nearly disappearing in the west (Papua, Indonesia) but will remain intense along the western shore of the Gulf of Papua in Papua New Guinea and moderate along the central north shore of the nation. Surpluses are forecast for many other regions on the island but will be most widespread in the west, particularly in the Bird's Head Peninsula. In the Philippines, moderate to extreme surpluses are forecast for eastern Mindanao, mild surpluses in the central islands, and nearly normal conditions in Luzon.

From November 2020 through January 2021, water conditions in many parts of the region will normalize. Moderate deficits are expected in western Thailand and northeastern Vietnam and moderate surpluses from eastern Cambodia into southeastern Vietnam, and a few isolated pockets in Laos. In Myanmar, surpluses of varying intensity will persist in pockets of the north, moderate surpluses in the southwest border area, and both deficits and surpluses (pink/purple) in the southwest and along the Irrawaddy in the Delta. Surpluses, primarily moderate, are forecast for northeastern Sulawesi, Flores Island, and other small islands in Indonesia; the Bird's Head Peninsula on New Guinea and some other pockets of the island; and the central islands of the Philippines. A few small, isolated pockets of exceptional deficit are forecast in northwestern Borneo and Sarawak in Malaysian Borneo.

The forecast for the final months – February through April 2021 – indicates mild to moderate deficits in western Thailand and a few other pockets in Southeast Asia and in Peninsular Malaysia, Sumatra, and Java. Small pockets of surpluses will persist in Myanmar and Southeast Asia.

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

## East Asia

The 12-month forecast for East Asia through April 2021 indicates widespread, intense surpluses in the Yellow (Huang He) and Yangtze River Basins. Conditions will include exceptional anomalies in the upper basin of the Yellow River and the northern stretch on the Ordos Loop, as well as Anhui Province in the Yangtze Basin and along nearly all of the Yangtze's path and in its upper basin.

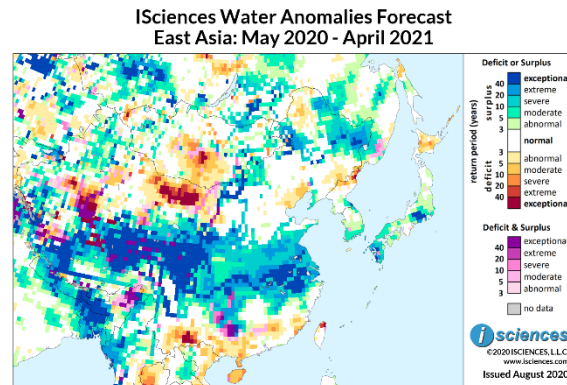
In Tibet (Xizang), intense surpluses are forecast along the Yarlung River (Brahmaputra) and in the western and northeastern regions of the province.

Deficits are forecast for China's southern provinces from Yunnan through southern Guangxi and Hainan and pockets reaching Fujian and northern Taiwan. Deficits will be intense in Yunnan and Taiwan. Some northern tributaries in the Pearl River (Zhujiang) Basin can expect surpluses along with conditions of both deficit and surplus (pink/purple) as transitions occur.

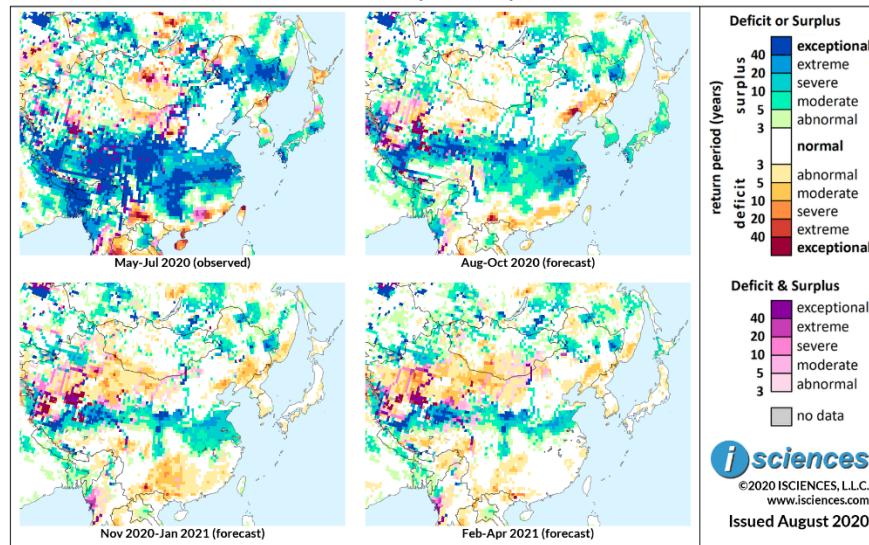
In the north, Western Inner Mongolia will see severe to exceptional deficits, conditions that will reach west into Xinjiang and the Taklimakan Desert. Some conditions of both deficit and surplus are also expected in Xinjiang as transitions occur. Deficits of varying intensity are forecast for central Mongolia and pockets of surplus in the nation's west and far east. Northeast China can expect surpluses of varying intensity and some moderate deficits near the Bohai Sea.

On the Korean Peninsula, deficits are expected in the northeast and surpluses along the peninsula's central east coast and in the south. Surpluses are also forecast for central and southern Japan and will be exceptional west of Tokyo. Deficits are predicted for Hokkaido.

The 3-month time series maps below show the evolving conditions in more detail.



ISciences Water Anomalies Forecast  
East Asia: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates that surpluses in China will shrink and downgrade overall but will remain widespread in both the Yellow and Yangtze River Watersheds. The extent of exceptional surplus will shrink considerably though large pockets are forecast in Anhui, southern Gansu, Qinghai, western Tibet, and along the upper reaches of the Yangtze. Surpluses will moderate in Guizhou, Hunan, and much of Hubei, and surpluses in Northeast China will shrink and downgrade.

In southern China, moderate deficits are expected from southern Guangxi through Guangdong, Fujian, Hainan, and northern Taiwan. Deficits in Yunnan, while shrinking, will remain intense.

In the north, deficits will nearly disappear in Mongolia, but widespread deficits of varying intensity will emerge in China along the northern Bohai Sea through the extreme northern areas of North Korea. Moderate surpluses are predicted for the southern portion of the peninsula, and surpluses are also forecast in Japan from Kyushu through much of Honshu but anomalies will be more intense. Moderate deficits are expected in central Hokkaido.

From November through January, surpluses in China will continue to shrink and downgrade but will persist in a vast stretch across the breadth of the nation from the northern Tibetan Plateau and upper reaches of the Yangtze through the North China Plain to the Yellow Sea. Surpluses will be exceptional in parts of Tibet, western Qinghai, and southern Gansu, and moderate to extreme farther east in Shaanxi, Hubei, Henan, Anhui, Jiangsu, and Shandong. Deficits will moderate north of the Bohai Sea, become merely mild in Southeast China, increase in the south in Yunnan, Guangxi, Guizhou, and emerge in pockets of Sichuan. Nearly normal conditions are forecast for the Korean Peninsula and Japan.

The forecast for the final three months – February through April 2021 – includes persistent surpluses from Tibet to the Yellow Sea. Areas of deficit include northwestern China and pockets of the south.

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

## Australia & New Zealand

The 12-month forecast through April 2021 indicates surpluses in the central region of the Murray-Darling Basin in southeastern Australia and at the mouth of the Murray. Surpluses will be severe to exceptional in New South Wales between the Lachlan and Macquarie Rivers and exceptional in South Australia between the Murray River and the Victoria border.

Tasmania can expect intense deficits in the west, exceptional around Lakes Pedder and Gordon. Some pockets of intense deficit are also forecast on South Australia's Kangaroo Island and along the state's central coast.

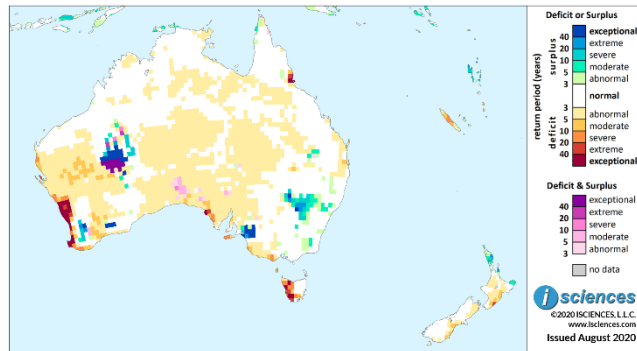
In Queensland, some moderate surpluses are forecast in the northwest corner of the Darling Downs and a small pocket of intense deficit is expected on the northeast coast south of Cairns.

Along the southwest coast of Western Australia, severe to exceptional deficits are forecast, including in the region's capital, Perth. Surpluses and transitional conditions are expected in the Gibson Desert with moderate deficits to the west.

In New Zealand, surpluses are expected north of Auckland and deficits northeast of Wellington on North Island. Some moderate deficits are expected along South Island's coast between Christchurch and Dunedin. Severe deficits are forecast for New Caledonia.

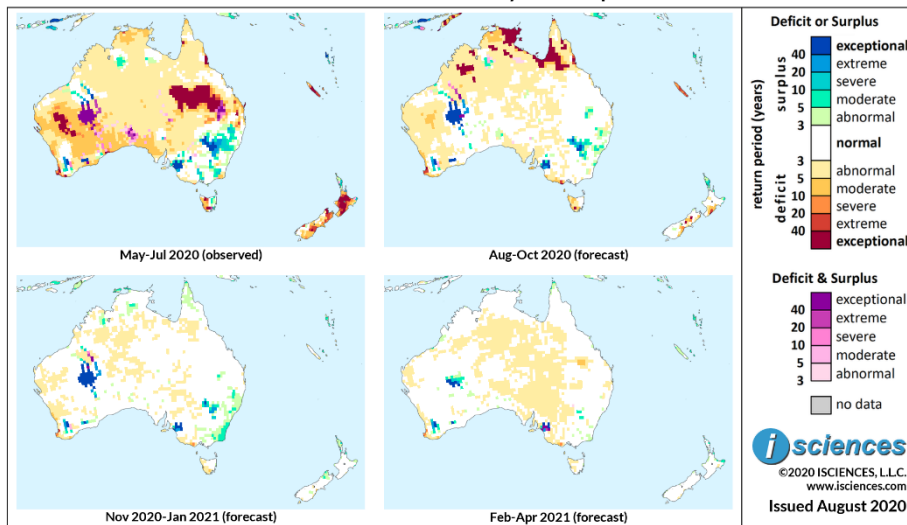
The 3-month maps (below) show the evolving conditions in greater detail.

ISciences Water Anomalies Forecast  
Australia & New Zealand: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

ISciences Water Anomalies Forecast  
Australia & New Zealand: May 2020 - April 2021



Based on observed data through July 2020 and forecasts through April 2021

The forecast through October indicates the emergence of exceptional deficits in large pockets across the northern reaches of Australia including Far North Queensland (QLD); Arnhem Land in Top End, Northern Territory (NT); and parts of the Kimberley Plateau in the northern portion of Western Australia (WA). Moderate surpluses will linger in the upper reaches of the Victoria River in NT. A vast area of exceptional deficit in central QLD will retreat completely and surpluses will re-emerge in the northwest Darling Downs.

Surpluses in southeastern Australia will shrink, persisting mainly in the central Murray-Darling Basin in New South Wales (NSW), and will be extreme to exceptional between the Lachlan and Macquarie Rivers. Intense surpluses will persist between the mouth of the Murray in South Australia (SA) and the Victoria (VIC) border. Northeastern Tasmania will normalize, and deficits elsewhere will shrink considerably but persist with intensity around Lakes Pedder and Gordon. A small pocket of exceptional deficit will emerge on VIC's western coast.

In SA and WA, areas of prior deficit will normalize or downgrade to mild deficit, though intense anomalies will persist around Busselton in WA's southwestern tip, moderating as they reach north to Perth. Some pockets of surplus will persist in southwestern WA in the Upper Swan River area and in the center of the state on seasonal rivers leading from the Gibson Desert where exceptional surpluses will re-emerge.

In New Zealand, deficits will shrink considerably but remain intense in pockets. Surpluses are forecast north of Auckland. Deficits will downgrade but will be extreme in New Caledonia.

From November 2020 through January 2021, much of Australia will return to normal conditions. Surpluses will persist in the central Murray-Darling Basin, downgrading slightly, and will persist with intensity at the mouth of the Murray. Moderate surpluses are expected to emerge along Australia's southeast coast from Sydney. Nearly normal conditions are forecast for Tasmania. In the nation's western half, surpluses will persist near the Gibson Desert and along ephemeral rivers leading away. Surpluses will also persist in pockets of southwestern WA including in the Upper Swan River area. In New Zealand and New Caledonia, conditions are expected to be nearly normal.

The forecast for the final months – February through April 2021 – indicates that surpluses will shrink, moderate deficits will emerge in the Buckland Tableland of QLD, and mild deficits will emerge down the center of Australia. Nearly normal conditions are expected in Tasmania, New Zealand, and New Caledonia.

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