

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 May 2020 and an ensemble of forecasts issued the last week of May 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.

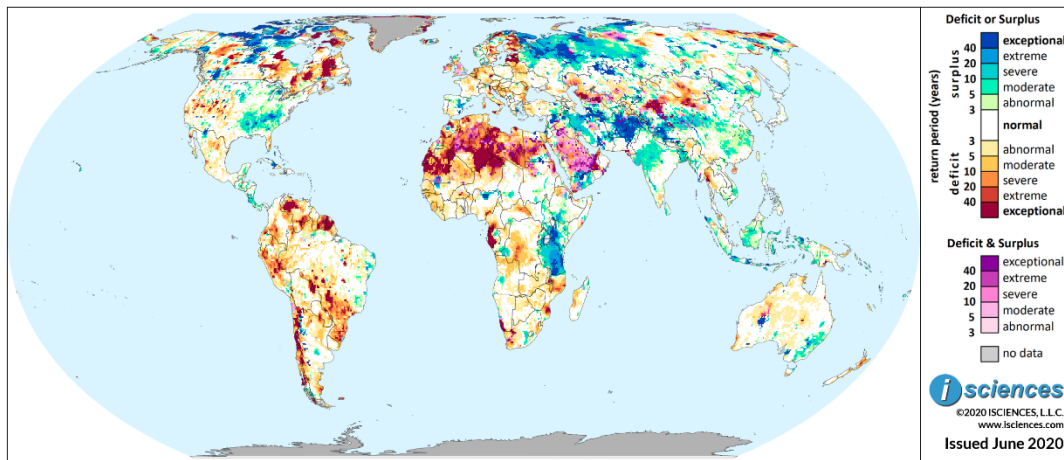
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Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 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 August indicates that water surpluses will shrink and downgrade considerably but will persist from South Dakota into Nebraska, and in the South from Arkansas through the Carolinas. Areas of deficit include northern California, Utah, and Colorado.

Canada: The forecast through August indicates water surpluses near Toronto, Edmonton, and Calgary; and deficits near Montreal, Ottawa, and Winnipeg. Deficits will retreat from southern Saskatchewan. Intense deficits will persist in northern Quebec. Surpluses will increase in southeastern British Columbia.

Mexico, Central America, and the Caribbean: The forecast through August indicates that water conditions will normalize in much of Mexico though intense surpluses will persist in northeastern Sonora and moderate deficits will emerge in Baja. Surpluses are forecast in Central America.

South America: The forecast through August indicates that water deficits will shrink and downgrade overall but widespread deficits are forecast from western Amazonas, Brazil through São Paulo State and in much of Peru. Surpluses are forecast for eastern Brazil.

Europe: The forecast through August indicates water deficits around the Baltic Sea, Central Europe, Ireland and the U.K., the northern Balkans, and Italy. Anomalies will be exceptional in Finland, Estonia, and Latvia. Areas of surpluses include the Iberian Peninsula and northern European Russia.

Africa: The forecast through August indicates that water deficits will increase and intensify across northern Africa; nearly normal conditions are forecast in the Sahel. Surpluses in East Africa will remain widespread, particularly in Tanzania. Intense deficits will emerge in south-central Botswana.

Middle East: The forecast through August indicates that widespread water surpluses in the region will shrink on the Arabian Peninsula as transitions occur but persist in Iran, northern Iraq, and from northern Syria into Turkey. Areas of deficit include central Iran; Riyadh Province, Saudi Arabia; and Oman.

Central Asia and Russia: The forecast through August indicates that water surpluses from northern European Russia through the Western Siberian Plain will shrink. Deficits are forecast for the Taz, Lower Yenisei, and Tunguska River regions in Russia and in western Kazakhstan and Turkmenistan.

South Asia: The forecast through August indicates that water surpluses will shrink in India, leaving a broad path from Gujarat into the Gangetic Plain. Surpluses will moderate in Bangladesh, but remain widespread and intense in Pakistan and Afghanistan. Conditions in Tamil Nadu will normalize from prior deficit.

Southeast Asia and the Pacific: The forecast through August indicates that water deficits will shrink and downgrade leaving surpluses as the predominant anomaly, particularly in Indonesia. Surpluses will be intense in Aceh Province, Sumatra. Deficits in Thailand and Cambodia will nearly disappear.

East Asia: The forecast through August indicates that water surpluses will persist in the Yellow River Basin, downgrade in the Yangtze, and retreat from the Pearl. Deficits will moderate in Yunnan and emerge in Hainan. Near-normal conditions are forecast for Taiwan, the Korean Peninsula, and Japan.

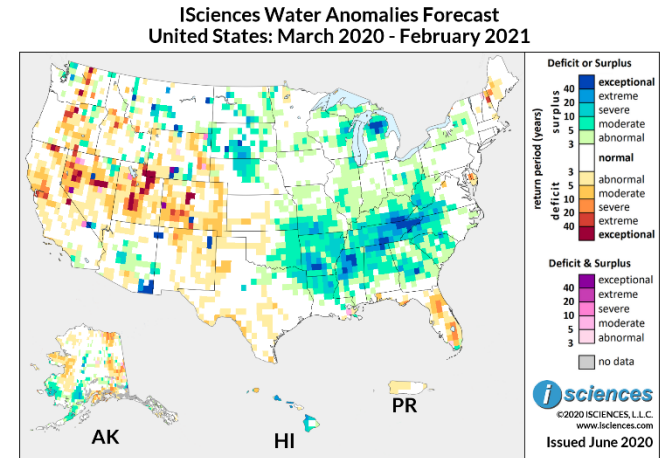
Australia & New Zealand: The forecast through August indicates that widespread water surpluses will persist in the Murray-Darling Basin, and exceptional deficits will emerge across northern Australia. Intense deficits are forecast for North Island, New Zealand, particularly in the Waikato River region.

Watch List: Regional Details

United States

The 12-month forecast ending February 2021 indicates water surpluses of varying intensity in a vast block from the southeastern corner of Kansas into the lower Ohio River Basin and well into the Deep South. Surpluses will be exceptional in Tennessee and pockets of Kentucky, Arkansas, Mississippi, Alabama, and Georgia.

Intense surpluses are also forecast for the northern half of Michigan's Lower Peninsula with surpluses of lesser intensity in other parts of the state and in Wisconsin, Illinois, and Ohio.



Based on observed data through May 2020 and forecasts through February 2021

Surpluses of varying intensity are forecast for the Dakotas in a checkerboard pattern. Anomalies will be more prevalent in South Dakota where some relatively small areas will reach exceptional intensity, and surpluses will reach into north-central Nebraska. Some pockets of surplus are also forecast for Montana. Scattered pockets of anomalies, surplus and deficit, are forecast in Wyoming, but deficits will be the dominate anomaly in Nevada, Utah, and Colorado, reaching exceptional intensity in pockets of each state. Moderate deficits will reach into north-central New Mexico. Some surpluses are forecast in southeastern Arizona and near Phoenix.

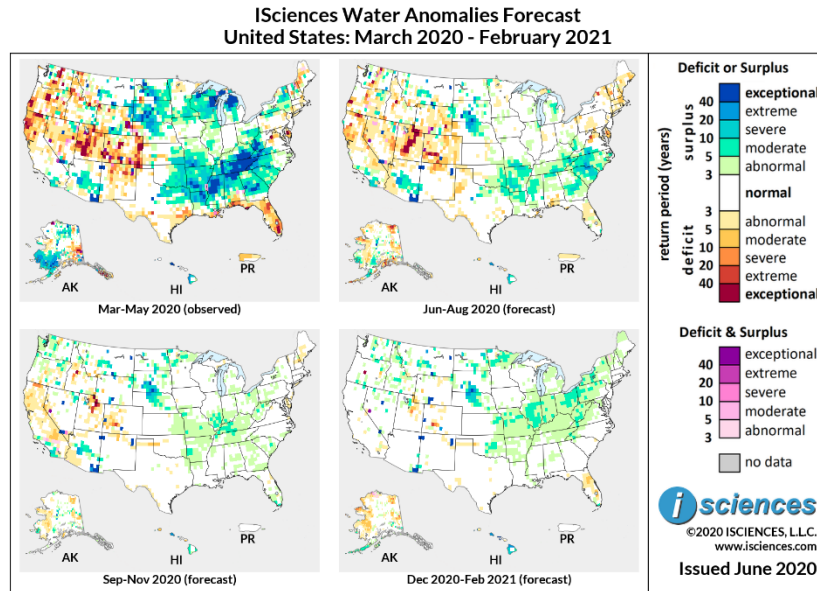
Deficits of varying intensity are forecast in pockets of Northern California and will be extreme in the San Francisco Bay Area. The Pacific Northwest will see deficits in the central regions of Oregon and Washington with some scattered surpluses elsewhere. Deficits are expected in Idaho's Salmon River Mountains.

Texas can expect some moderate deficits in the northwest region of the state and along the Rio Grande through Amistad Reservoir, while pockets of moderate to severe surplus are forecast in the northeast. Severe deficits are forecast in several large pockets of Florida: the Ocala National Forest and surrounding Lake Okeechobee.

Nearly normal conditions are expected in the U.S. Northeast and Mid-Atlantic with some surpluses in Upstate New York, and deficits from northern Vermont into Maine and in the Delmarva Peninsula.

Outside the contiguous U.S., surpluses are forecast for much of Hawaii. Alaska can expect surpluses from the base of the Alaska Peninsula leading inland to the center of the state and in the southwest near Bethel. Deficits are forecast on the Seward Peninsula, from Anchorage past Valdez, east of Fairbanks, and in the far northeast.

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



From June through August, surpluses will shrink and downgrade considerably in the U.S. with nearly normal conditions returning to many parts of the Upper Midwest, Central Plains, and northern Ohio River Basin. However, severe to exceptional anomalies will persist from South Dakota into north-central Nebraska, and though downgrading, surpluses will remain widespread in the South. Anomalies could reach extreme intensity in southern Virginia and the Carolinas but will be primarily moderate in Arkansas and surrounding states, through the Tennessee River region, and in central Georgia. A pocket of moderate surplus is forecast for central Michigan. Small pockets of deficit are forecast for northern Virginia, the Delmarva Peninsula, and scattered across the U.S. Northeast.

In the West, deficits will diminish slightly from the prior three months. Pockets of moderate to severe deficit are forecast for the Southern Rockies, Nevada, northern and eastern California and the Pacific Northwest. Deficits will be exceptional in Utah, Colorado, and some smaller pockets elsewhere. The Pacific Northwest can also expect some scattered, small pockets of moderate surplus. Surpluses will persist in central and southeastern Arizona and will increase somewhat in southern California from Santa Barbara to the Mexican border.

From September through November, normal water conditions will return to much of the country east of the Rockies. However, severe to exceptional surpluses will persist from South Dakota into Nebraska, and moderate surpluses will emerge from southern Illinois into western Kentucky with mild surpluses in a broad swath through surrounding states. Moderate surpluses will also emerge in northern Minnesota. Moderate deficits will increase on the Canadian River across the Oklahoma/Texas border. In the West, deficits will shrink and downgrade overall, though mild to moderate deficits will increase somewhat in California. Deficits will be intense in northeastern Utah, southwestern Colorado, and the Salmon River

Mountains in Idaho. Surpluses will increase slightly in the Pacific Northwest and will persist in central and southeastern Arizona and pockets of southwestern California.

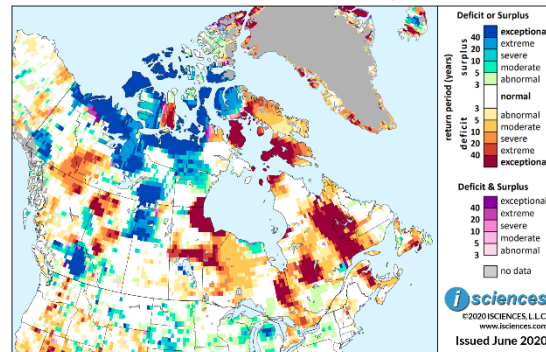
The forecast for the final months – December through February – indicates moderate surpluses in the Ohio River Valley and Upper Midwest and intense surpluses from South Dakota into Nebraska. In the West, some scattered pockets of surplus are forecast and small pockets of persistent deficit in Utah and Colorado.

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

Canada

The 12-month outlook for Canada through February 2021 indicates vast areas of exceptional water deficit in Quebec west of Lake Mistassini and in a wide path on the eastern border. Intense deficits are also forecast for western Labrador, southern Newfoundland, eastern New Brunswick into Quebec's Gaspé Peninsula, and a column along Ontario's northeastern border. Deficits of varying intensity are forecast for most of Southern Ontario and the western half of Northern Ontario.

ISciences Water Anomalies Forecast
Canada: March 2020 - February 2021



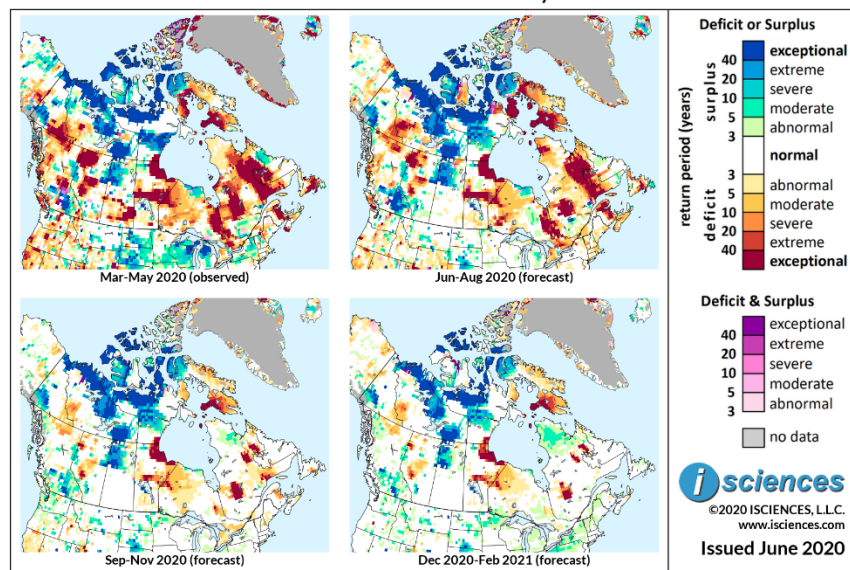
Based on observed data through May 2020 and forecasts through February 2021

Deficits will be exceptional in other areas of the country including the southwest corner of Hudson Bay, a belt across central Manitoba north of Lake Winnipeg reaching into Ontario, the Middle Reaches of the Athabasca River Watershed in central Alberta and the province's northwest corner.

A large block of extreme to exceptional surplus is forecast surrounding Churchill Lake in northern Saskatchewan leading north well past Lake Athabasca and west past Fort McMurray, Alberta. Severe surpluses are expected around Fort St. John in northern British Columbia, and exceptional surpluses in the southern Columbia Mountains.

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

ISciences Water Anomalies Forecast
Canada: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August for Canada's most populated areas indicates nearly normal water conditions for Québec City and Vancouver; surpluses near Toronto, Edmonton, and Calgary; and deficits near Montreal, Ottawa, and Winnipeg.

Intense deficits will shrink in Newfoundland, increase in Quebec's Gaspé Peninsula, and downgrade slightly in New Brunswick (NB). Exceptional deficits will persist in vast blocks of Quebec (QC) west of Lake Mistassini and along the eastern border into Labrador. Deficits of varying intensity are forecast for much of Southern Ontario (ON) except near Toronto where moderate surpluses are expected, and deficits are also forecast in much of the western half of Northern Ontario. Exceptional deficits will persist along the Ontario-Quebec border corridor, the southwest corner of Hudson Bay, and a belt across central Manitoba (MB). Deficits in the southern portion of the Prairie Provinces will nearly disappear. Intense deficits in central and northern regions of Alberta (AB) and British Columbia (BC) will shrink somewhat. Deficits will persist on Vancouver Island. Surpluses will persist from northern Saskatchewan (SK) into AB, along the central border of AB and BC, and will increase in southeastern BC and southwestern AB.

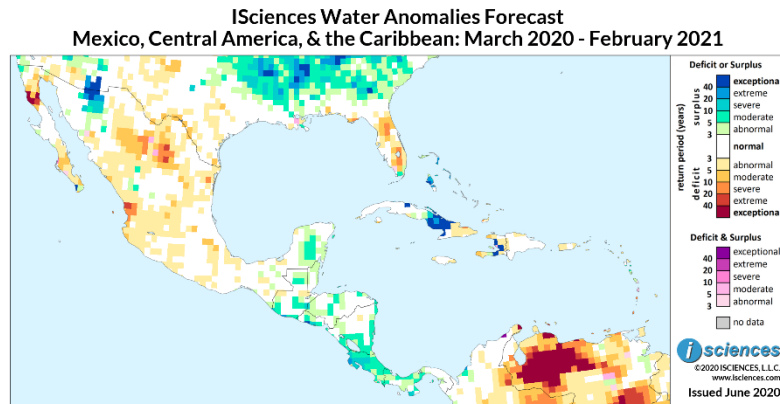
From September through November, deficits will decrease overall, particularly in Quebec, but will remain exceptional in a few areas including west of Lake Mistassini, north of Lake Winnipeg and along Hudson Bay in MB, and a few pockets in AB. Moderate deficits are forecast in Southern Ontario and surpluses near Toronto will nearly disappear. Surpluses will remain widespread in northern SK but will downgrade in southeastern BC. Conditions on Vancouver Island will normalize.

The forecast for the final three months – December through February – indicates conditions similar to the September through November forecast. Conditions in Southern Ontario will normalize, transitioning from moderate deficit.

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

Mexico, Central America, and the Caribbean

The 12-month forecast ending February 2021 indicates water deficits of varying intensity in Mexico's north-central states of Chihuahua and Coahuila. Anomalies will be severe to extreme in Coahuila, and anomalies of similar intensity are forecast in Nayarit on the central Pacific Coast.

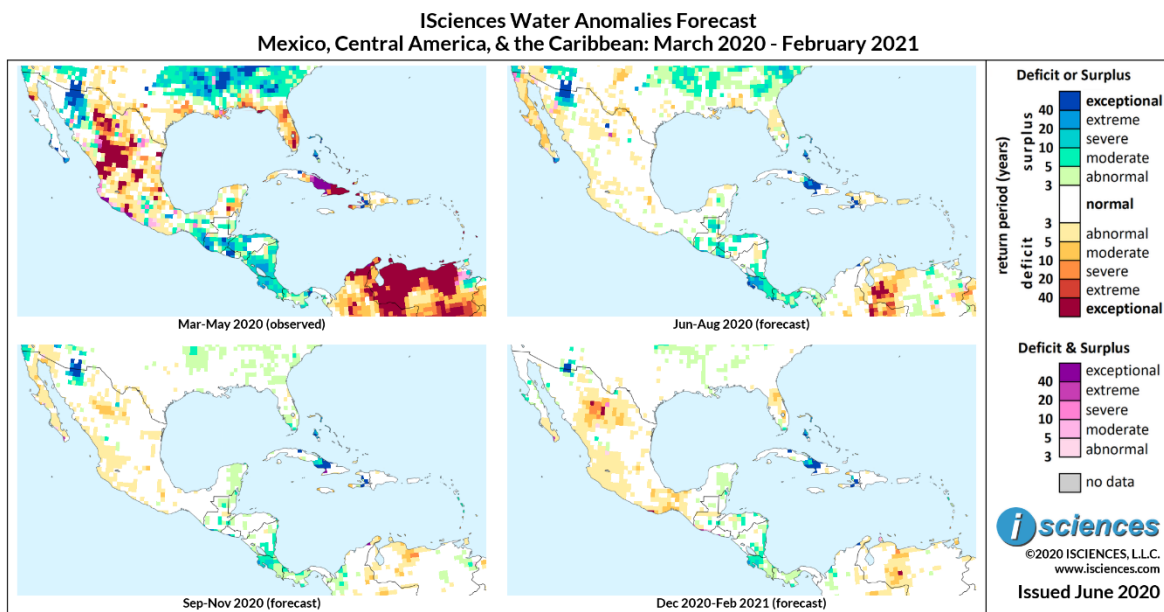


Deficits in central Baja California are expected to reach exceptional intensity while moderate deficits are forecast farther south on the Peninsula. Surpluses are forecast near Tijuana in Baja's northwestern extreme and also in a large pocket on the mainland in northeastern Sonora where anomalies will reach exceptional intensity. Generally mild deficits are expected in central Mexico. Moderate surpluses are forecast in the center of the Yucatan Peninsula.

In Central America, surpluses of primarily moderate intensity are expected in pockets of Guatemala, Honduras, El Salvador, and western Panama. Surpluses in Costa Rica will be moderate to severe.

Surpluses are also expected in central Cuba, Port-au-Prince Bay in Haiti, and the central Bahamas.

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



The forecast through August indicates that water anomalies will shrink and downgrade considerably in Mexico with conditions normalizing in much of the country. Surpluses of varying intensity will persist in northeastern Sonora in the region of the Bavispe and Yaqui Rivers. Moderate deficits will emerge in the Baja Peninsula.

In Central America, surpluses will shrink leaving moderate to severe pockets in Guatemala, El Salvador, Honduras, Nicaragua, and Panama. Surpluses will remain widespread in Costa Rica and will intensify north of San Jose, becoming extreme. Deficits in the Caribbean will nearly disappear and some surpluses are forecast.

From September through November, normal conditions are forecast for much of Mexico with surpluses persisting in northeastern Sonora and moderate deficits emerging in southern Chihuahua. Moderate surpluses will re-emerge near Tijuana in the northeastern corner of Baja, with mild deficits elsewhere on the Peninsula. In Central America, surpluses will shrink overall and downgrade in Costa Rica. Surpluses will persist in the Bahamas and pockets of Cuba and Haiti. Some moderate deficits will emerge in Jamaica and in Haiti's western tip.

The forecast for the final three months – December through February – indicates that deficits will intensify in Chihuahua, Mexico, and moderate deficits will emerge in Coahuila, Oaxaca, and southern Veracruz. Surpluses will retreat from Tijuana and will shrink in Sonora. Pockets of surplus will persist in Central America and the Caribbean.

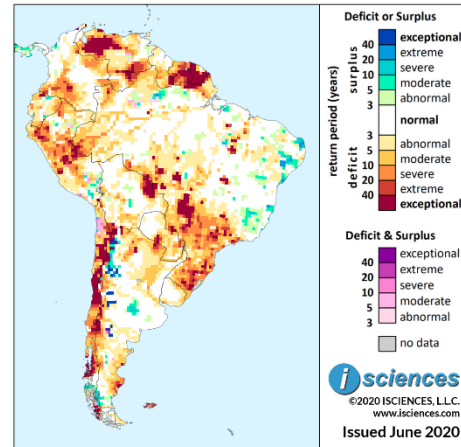
Please note that WSIM forecast skill declines with longer lead times.

South America

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

Across the northern arc of the continent, exceptional deficits are expected in French Guiana and into Suriname where anomalies will downgrade, moderating through southern Guyana. Deficits will be extreme to exceptional in northwestern and southern Venezuela, and severe in Colombia's eastern and southwestern reaches. Deficits of varying intensity are expected throughout the bulk of central Peru.

ISciences Water Anomalies Forecast
South America: March 2020 - February 2021



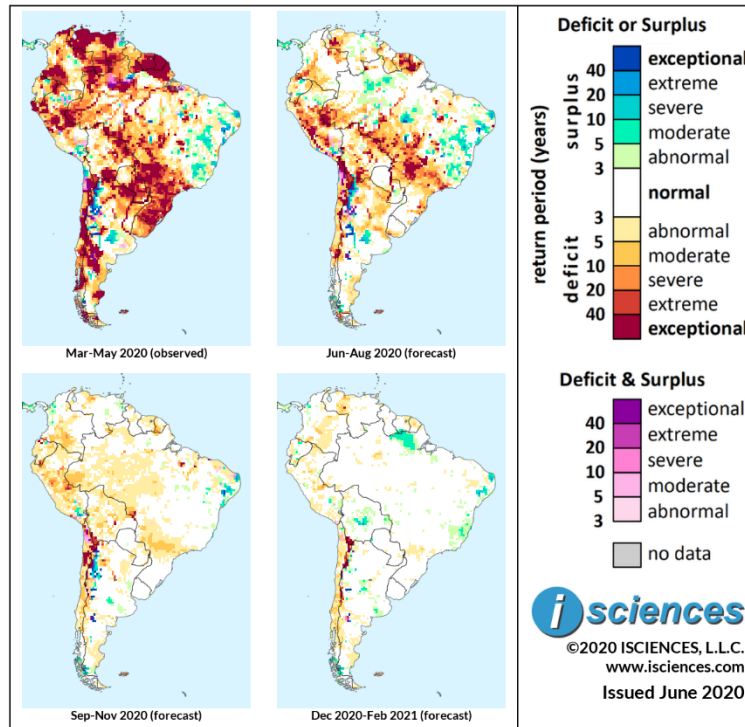
Based on observed data through May 2020 and forecasts through February 2021

In Brazil, scattered surpluses are forecast in the east and normal conditions in much of the eastern Amazon Basin. Deficits of varying intensity will dominate the central and southern states of Mato Grosso, Mato Grosso do Sul, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul. Exceptional anomalies will be especially widespread in Mato Grosso do Sul. Deficits are also forecast in the western Amazon Basin.

In the southern half of the continent, deficits are forecast throughout much of Chile and will be exceptional in many regions including Valparaiso and Santiago. Deficits will also be exceptional in eastern Bolivia and its southernmost tip. Deficits of varying intensity are expected in central and eastern Paraguay and into much of northern Argentina. Conditions in the Argentine Pampas will be relatively normal with surpluses in northern La Pampa Province. Surpluses are also forecast for Argentina's northwestern provinces of La Rioja and Catamarca, deficits in much of Patagonia, and surpluses in the Southern Patagonian Ice Field.

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

ISciences Water Anomalies Forecast
South America: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that deficits will shrink and downgrade overall. Significant areas of deficit are forecast in western and northeastern Colombia, northwestern Venezuela, Suriname, and French Guiana. The northern portion of the Amazon Basin in Brazil will transition from deficit to moderate surplus or normal conditions. Surpluses will increase in eastern Brazil and emerge in southern Pará. Deficits reaching exceptional intensity are forecast in western Amazonas and Acre, and from Rondônia through Mato Grosso, southern Goiás, Mato Grosso do Sul, São Paulo, and south through coastal Santa Catarina. Deficits will be intense in central Peru and through the Peruvian Andes. Bolivia can expect deficits of varying intensity, and the extent of exceptional deficits in Chile will shrink. Deficits on the Paraguay River through its namesake will remain exceptional, downgrading past the border, and conditions on the Paraná River will normalize. Surpluses will persist in the central Argentine Pampas and the country's northwestern provinces; deficits in the north and south will downgrade.

From September through November, anomalies will shrink and downgrade considerably. Deficits will remain widespread in the bulk of central Peru. Areas with a forecast of generally moderate deficit include southern French Guiana; a pocket in north-central Venezuela; southern Columbia; western Amazonas, Acre, and the intersection of Mato Grosso do Sul, São Paulo, and Paraná in Brazil; and central Chile. Deficits in northern Chile will be intense. Some surpluses will persist in Brazil's eastern tip, normalizing elsewhere in the country, and surpluses are also forecast for a pocket in southern Peru, northwestern Argentina, and the Southern Patagonian Ice Field.

In the final quarter – December through February – normal conditions are forecast for much of the continent with some areas of moderate surplus in eastern and northern Brazil and central Bolivia. Mild to moderate deficits are expected in many regions of Chile and scattered pockets of other western nations. Exceptional deficits will persist in southernmost Bolivia, continuing along the northern border of Chile and Argentina.

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

Europe

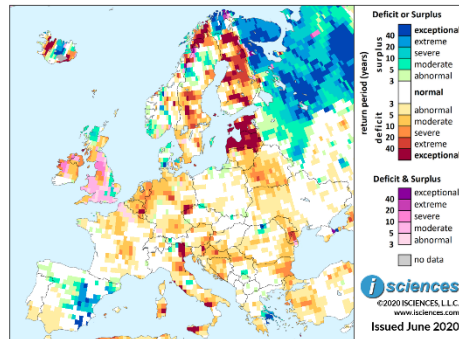
The 12-month forecast through February 2021 indicates water deficits of varying intensity in many regions of Europe. Deficits will be especially widespread and intense in Northern Europe including Estonia, Latvia, Finland, and central Sweden. Deficits will be exceptional in much of Estonia and Latvia.

Primarily moderate to severe deficits are expected from Lithuania through Belarus, western Ukraine, Moldova, Romania, and Bulgaria. Deficits will also be moderate to severe throughout the Netherlands and Belgium, many parts of Germany, and from southern Austria through the northern Balkan nations. The forecast for southern Peloponnese, Greece is for moderate deficits though intense surpluses are forecast nearby in Athens. Deficits of varying intensity are forecast for many regions in Italy and anomalies will be exceptional in the Dolomite Mountains, south of Naples, and pockets of Sicily and Sardinia. Northern and central France can expect primarily moderate deficits.

In Ireland and the U.K., deficits may be severe and conditions will include transitional areas. Some surpluses are forecast in the Scottish Highlands and the East Midlands and Essex regions of England. Eastern Spain will also see surpluses which will be exceptional in the Region of Murcia. Widespread surpluses are expected in northern European Russia.

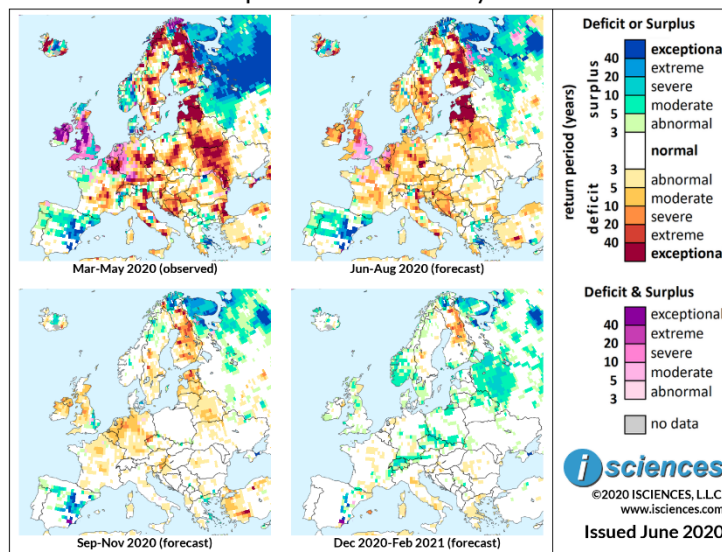
The 3-month composites (below) for the same 12-month period show the evolving conditions.

ISciences Water Anomalies Forecast
Europe: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

ISciences Water Anomalies Forecast
Europe: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that intense deficits will persist around the Baltic Sea but deficits will shrink and downgrade in Eastern Europe. Moderate to severe deficits are forecast in Central Europe, the northern Balkan nations, and Italy, with a few small pockets of greater intensity. In Ireland and the U.K., widespread severe to extreme deficits will emerge as the region transitions from surplus. Surpluses in northern European Russia will shrink and downgrade but exceptional anomalies will persist on the Severnaya Dvina River. Surpluses will persist in central and eastern Spain and will increase in northern Portugal. Anomalies will be extreme to exceptional in Spain's Murcia Region, near Barcelona, and from the Upper Tagus River Basin to Valencia on the coast. Surpluses are also forecast along Greece's Aegean Sea coast and will be intense near Athens.

From September through November deficits will shrink and downgrade, leaving many areas of Europe with nearly normal conditions. Severe to extreme deficits will persist in Finland and Latvia, and primarily moderate to severe deficits in Latvia, Belarus, Netherlands, Belgium, Germany, Ireland and the northern U.K., central France, and eastern Slovenia. Surpluses will shrink somewhat in northern European Russia and on the Iberian Peninsula, and will shrink and downgrade near Athens.

The forecast for the remaining months – December through February – indicates nearly normal water conditions for much of the region with surpluses in southern Norway, central Europe, northern European Russia, and pockets of eastern Spain. Severe deficits will linger in northern Finland.

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

Africa

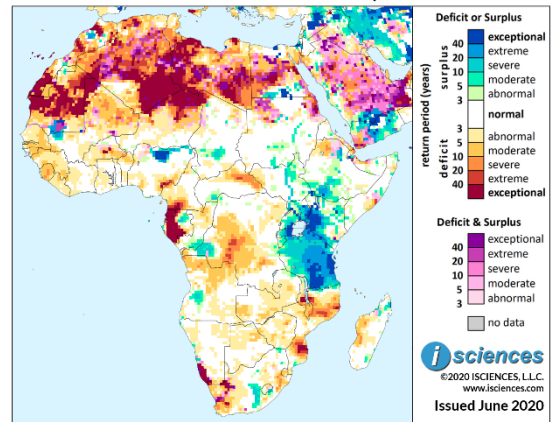
The 12-month forecast through February 2021 indicates intense water deficits across northern Africa including widespread exceptional anomalies. Exceptional deficits are also forecast for Equatorial Guinea and western Gabon, southwestern Namibia, central Malawi, and southern Mozambique.

Deficits of varying intensity are forecast in West Africa; south of the Benue River in Nigeria; eastern Central African Republic; northwestern Ethiopia; the central Congo River Basin; northern Angola; southern Zambia; Zimbabwe; Malawi; Mozambique; Madagascar's west-central coast; Swaziland; and Northern Cape, Western Cape, and KwaZulu Natal in South Africa.

Widespread surpluses are expected in East Africa and will be especially intense in Tanzania, western Kenya, and along the Victoria Nile through Uganda. Intense surpluses are also forecast for northern Nigeria. Surpluses elsewhere include southern Ethiopia, the White Nile, capital regions of the Congos, west-central Angola, and South Africa from southern Orange Free State into Eastern Cape.

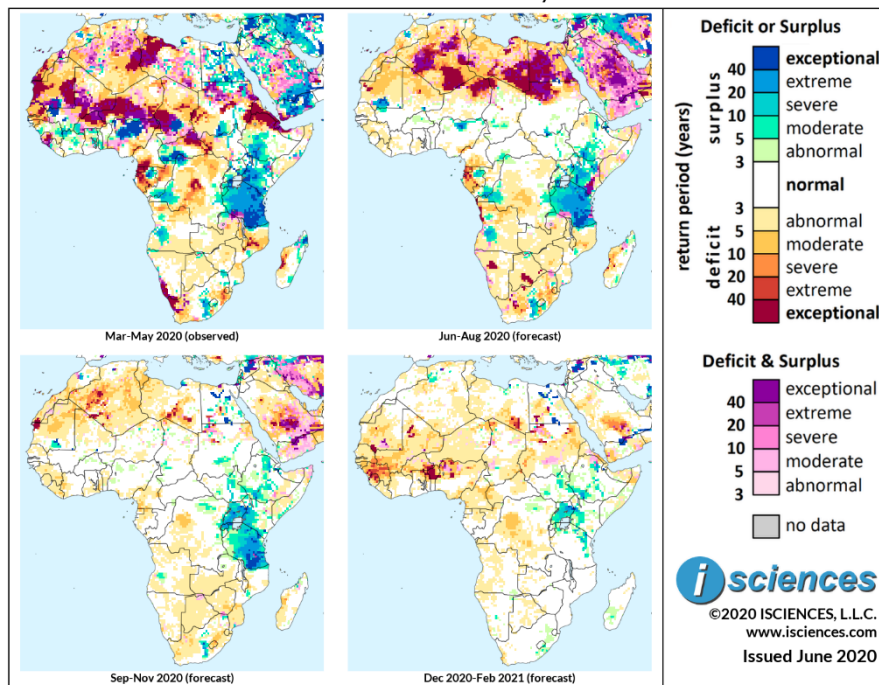
The 3-month maps (below) show the evolving conditions in greater detail.

ISciences Water Anomalies Forecast
Africa: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

ISciences Water Anomalies Forecast
Africa: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that deficits will increase and intensify across northern Africa and will include large regions with exceptional anomalies. Nearly normal conditions are forecast across the Sahel though a few areas of surplus are expected nearby including northern Nigeria. Surpluses in East Africa will remain widespread, particularly in Tanzania where anomalies will be extreme to exceptional. In Ethiopia and Eritrea, exceptional deficits will retreat; surpluses will downgrade slightly in southern Ethiopia but emerge in the north and nearby in southern Eritrea. Other areas of surplus include northeastern Gabon, the capital regions of the Congos, west-central Angola, and South Africa from southern Orange Free State through Lesotho and central Eastern Cape.

Exceptional deficits will retreat from southwestern Namibia but emerge in the north-central region and along Angola's northern coast near Luanda; exceptional deficits will also emerge in south-central Botswana. Deficits from southern Cameroon through Equatorial Guinea into western Gabon, though downgrading, will be intense. Deficits are also forecast in Northern Cape, South Africa where anomalies will reach exceptional intensity, and in eastern regions of the nation through Swaziland. Deficits along Madagascar's west-central coast will downgrade.

From September through November, deficits across North Africa will shrink considerably and moderate, with pockets of surplus re-emerging in Egypt. Widespread surpluses will persist in East Africa, shrinking somewhat in Kenya but increasing in Uganda. Surpluses will persist in Ethiopia and along the White Nile in South Sudan and will emerge in a pocket of southern Sudan and along the Nile near Khartoum. Surpluses in northern Nigeria will nearly disappear. In South Africa, surpluses will persist from southern Orange Free State into Eastern Cape and deficits in the nation will moderate.

The forecast for the final quarter – December through February – indicates that normal conditions will return to much of northern Africa and the continent's south. Some intense deficits will emerge in West Africa and in Togo, Benin, and northwestern Nigeria. Surpluses in East Africa will shrink considerably, persisting primarily in Uganda.

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

Middle East

The forecast for the 12-month period ending February 2021 indicates widespread persistent water surpluses from Syria into eastern Turkey, and through northern Iraq and many regions of Iran.

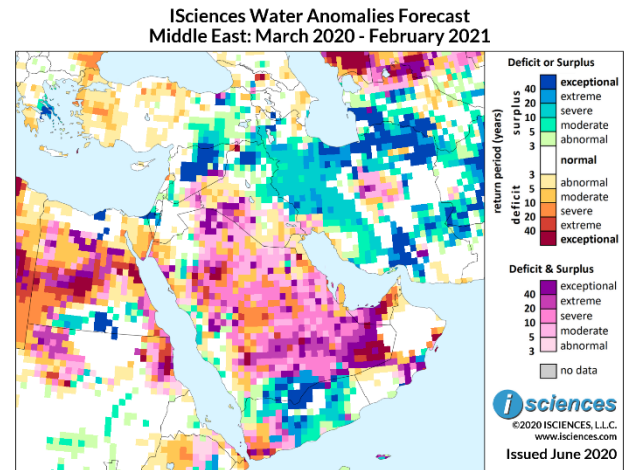
Anomalies in Iran will encompass most of the western region of the country, reaching east around the Caspian Coast and along the Turkmen border, and south to the Gulf of Oman. Surpluses are also forecast in northern Sistan and Baluchestan Province in the southeast. Areas with a forecast of exceptional surplus include northern Syria; around Mosul, Iraq; northeastern Iran; and southern Iran reaching inland from the Strait of Hormuz. Surpluses are also forecast for Israel and Gaza.

The forecast for Iraq west of the Euphrates indicates moderate deficits in the northwest and south and mixed conditions of both deficit and surplus (pink/purple) as transitions occur.

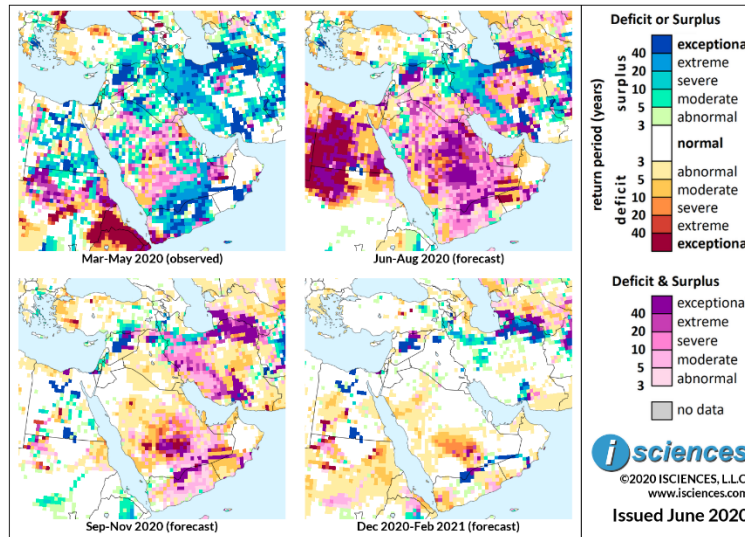
On the Arabian Peninsula, a patchwork of deficits or transitional conditions is forecast for much of Saudi Arabia with severe deficits in Riyadh Province and exceptional deficits in the nation's southeast corner. Deficits will be also be intense in the eastern half of United Arab Emirates. Surpluses are expected in southwestern Saudi Arabia and much of central Yemen though intense deficits are expected in southwestern Yemen near the Bab al-Mandab Strait.

Turkey can expect moderate to severe deficits in the west, north-central region, and in Eastern Thrace (European Turkey). Intense deficits are forecast in Georgia north of Tbilisi.

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



**ISciences Water Anomalies Forecast
Middle East: March 2020 - February 2021**



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that widespread surpluses in the region will shrink on the Arabian Peninsula as transitions occur but persist in Iran and northern Iraq.

In Iran, exceptional surpluses will persist near the Turkmen border. Severe to extreme anomalies are expected along Iran’s Caspian Sea coast and from Lake Urmia leading south through Fars Province, though areas along the Persian Gulf will be in transition. Surpluses are also forecast in Kerman and Sistan and Baluchestan Provinces; deficits will emerge in the center of the nation. In Iraq, persistent surpluses are forecast east of the Euphrates River and will be exceptional around Mosul. Exceptional surplus anomalies are also forecast for northern Syria along with transitional conditions. Turkey can expect moderate surpluses near the Syrian border and some deficits along the central Black Sea coast and in the southwest. Much of the Arabian Peninsula will be in transition with some intense deficits in Riyadh Province in central Saudi Arabia and in southern Oman.

From September through November, surpluses will continue to shrink but intense anomalies will re-emerge in greater extent in northern Syria. Moderate surpluses will persist in Turkey bordering Syria and in pockets of northwestern Iran, and will emerge in Israel. Deficits in western Turkey will increase while those on the central Black Sea coast shrink. Other areas of prior surplus in Iran will be in transition; deficits are forecast in the nation’s east-central region and in the south. Intense deficits are forecast in much of southern Saudi Arabia with some areas in transition. Deficits in southern Oman will moderate.

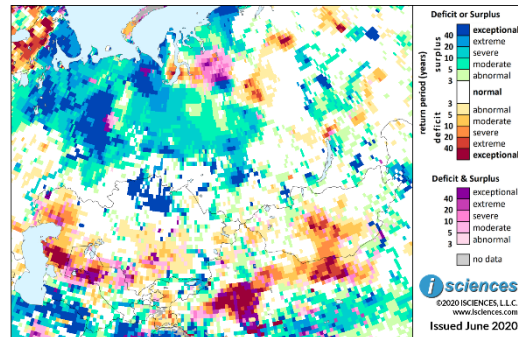
In the final quarter – December through February – deficits will shrink and downgrade, persisting in southern Riyadh, Saudi Arabia. Surpluses will persist in northern Syria and around Mosul, will increase in western Iraq, and will re-emerge in northeastern Iran, near the Strait of Hormuz, and across Saudi Arabia’s southern border.

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

Central Asia and Russia

The 12-month forecast through February 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 and along the Severnaya Dvina River. Intense deficits are forecast along the Gulf of Ob; in the region of the Nizhnyaya Tunguska River, a northern right tributary of the Yenisei River; north of Lake Baikal; and along the East Siberian Sea (not shown in image).

ISciences Water Anomalies Forecast
Central Asia: March 2020 - February 2021

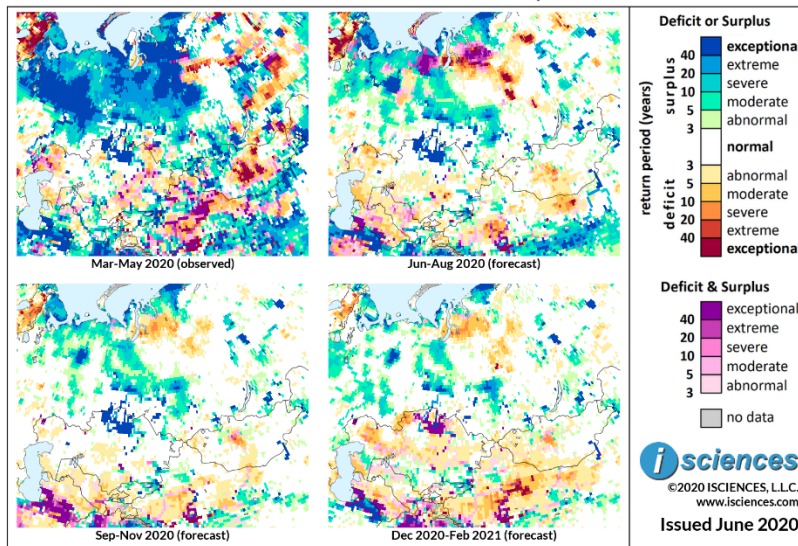


Based on observed data through May 2020 and forecasts through February 2021

Deficits are forecast in western Kazakhstan and some pockets in the south; the western half of Uzbekistan; northernmost Turkmenistan; the eastern Fergana Valley from Uzbekistan into Kyrgyzstan; and eastern Tajikistan. Anomalies will be exceptional on the northeastern Caspian coast. Intense surpluses are expected in northern Kazakhstan and along the Turkmen-Iran border. Surpluses of varying intensity are forecast from southern Uzbekistan into western Tajikistan and in eastern Kyrgyzstan.

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

ISciences Water Anomalies Forecast
Central Asia: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that surpluses in Russia from the Northern European Plain through the Western Siberian Plain will shrink and downgrade. Exceptional anomalies will persist in the Vychegda Lowland, along the Severnaya Dvina River, and in the tundra region near the Kara Sea. Conditions on the Lower Volga River will normalize, transitioning from intense surplus. Intense deficits

will emerge across the Gulf of Ob and in the Taz River region nearby. The Lower Yenisei region will begin to transition to deficit as deficits persist in its eastern tributary, the Nizhnyaya Tunguska River, and emerge in the Podkamennaya Tunguska River region.

In Kazakhstan, intense surpluses will persist in the north and moderate deficits in the west. Mild to moderate deficits will emerge in Turkmenistan and Uzbekistan. Surpluses will diminish in western Tajikistan and moderate deficits will emerge in the east. Some surpluses are expected in eastern Kyrgyzstan.

From September through November, surpluses will moderate on the Severnyaya Dvina River in Russia and persist in the Vychegda Lowland and in the Ob River Watershed. Moderate to severe deficits are forecast in the regions of the Lower Yenisei River, Taz River, and Tunguska Rivers. Deficits in western Kazakhstan will downgrade to mild or normal conditions. A pocket of moderate deficit is forecast in the south, and intense surpluses will persist in the north. Mild to moderate deficits or transitional conditions are expected in Turkmenistan, Uzbekistan, and Tajikistan, and surpluses in eastern Kyrgyzstan.

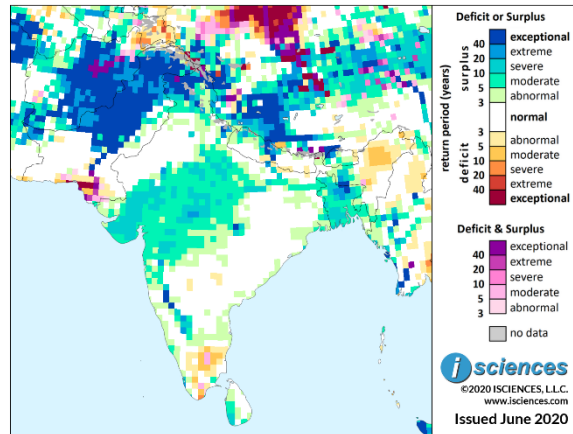
The forecast for the final months – December through February – indicates a forecast similar to the prior three months with deficits emerging in northwestern and central Kazakhstan and moderate surpluses emerging on the Volga River.

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

South Asia

The 12-month forecast through February 2021 indicates moderate to severe water surpluses for India in a vast area from Gujarat in the west reaching northeast into the Gangetic Plain, encompassing much of Maharashtra, Madhya Pradesh, eastern Rajasthan, and Uttar Pradesh. Surpluses will also reach south in a narrow path down the center of Karnataka, becoming more intense. Moderate surpluses will follow the Ganges River through Bihar. Moderate deficits are expected in Tamil Nadu at India's southern tip and in the nation's Far Northeast.

ISciences Water Anomalies Forecast
South Asia: March 2020 - February 2021

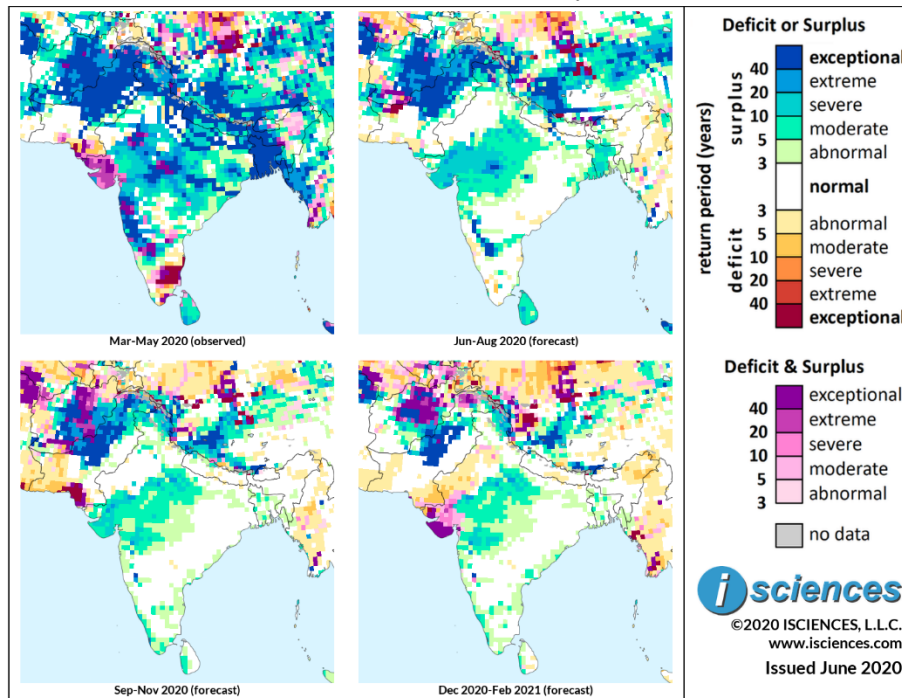


Based on observed data through May 2020 and forecasts through February 2021

Surpluses will be intense through the center of Nepal along the Gandaki River, downgrading as it joins the Ganges in India. Surpluses are also forecast for nearly all of Bangladesh, and in western Bhutan and western Sri Lanka. Extreme to exceptional surpluses are expected in much of Pakistan's northern two-thirds. Similar surplus anomalies are expected in much of Afghanistan, encompassing Kandahar, Kabul, Mazar-e Sharif, and tracing the paths of the Helmand and Harirud Rivers. Exceptional deficits are forecast north of Karachi, Pakistan.

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

ISciences Water Anomalies Forecast
South Asia: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

Surplus anomalies observed across the breadth of the India in prior months will shrink June through August, leaving nearly normal conditions in many regions. However, widespread surpluses are forecast from Gujarat into the Gangetic Plain. Anomalies will be severe in Gujarat and southern Rajasthan, moderate to exceptional in Madhya Pradesh and moderate to severe in Uttar Pradesh. Surpluses will also reach south into Maharashtra and cut a path down the center of Karnataka, becoming exceptional before moderating to the east through Andhra Pradesh. India's far north can expect intense surpluses, and conditions in Tamil Nadu in the nation's southern tip will normalize, transitioning from intense deficit.

In Nepal, surpluses will be intense on the Gandaki River through the center of the nation, downgrading as it joins the Ganges in India. Surpluses in Bangladesh will downgrade from exceptional but will remain widespread. Primarily moderate surpluses are expected in Sri Lanka. Surpluses will remain widespread and intense in Pakistan's northern two-thirds and in the bulk of eastern Afghanistan with moderate anomalies in the west. Transitional conditions are expected near Afghanistan's southern border and exceptional deficits will emerge across the border in Pakistan while deficits near Karachi retreat.

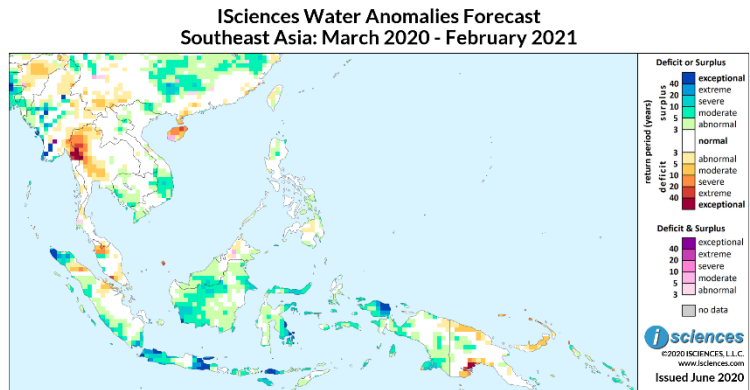
From September through November, surpluses will downgrade but persist in India from Gujarat into the Gangetic Plain, retreating from central Karnataka while emerging along its coast and to the south. Nearly normal conditions are forecast for the Ganges River in Bihar, India's Far Northeast, Nepal, and Bhutan. Surpluses will shrink considerably in Bangladesh and Sri Lanka. In Pakistan, surpluses will shrink slightly but remain intense; exceptional deficits will emerge in the south near Karachi and moderate deficits in the southwest. Transitional conditions are forecast for Afghanistan though extreme to exceptional surpluses will persist in many areas including Kandahar, Kabul, and Peshawar.

The forecast for the final months – December through February – indicates that surpluses will persist in India in a distribution pattern similar to the prior three months but with transitional conditions in Gujarat as deficits emerge and reach into southeastern Pakistan. Intense surpluses will persist in central Pakistan, and surpluses along with transitional conditions are forecast for Afghanistan.

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

Southeast Asia and the Pacific

The 12-month forecast through February 2021 indicates moderate to extreme deficits in western Thailand, becoming exceptional across the border in a pocket of southern Myanmar. Surpluses of varying intensity are forecast in pockets of central, western, and southern Myanmar, and will reach exceptional intensity on the Irrawaddy as it approaches the Delta. Moderate surpluses are expected in the Central Highlands of Vietnam and small pockets along the eastern coast of the Gulf of Thailand.

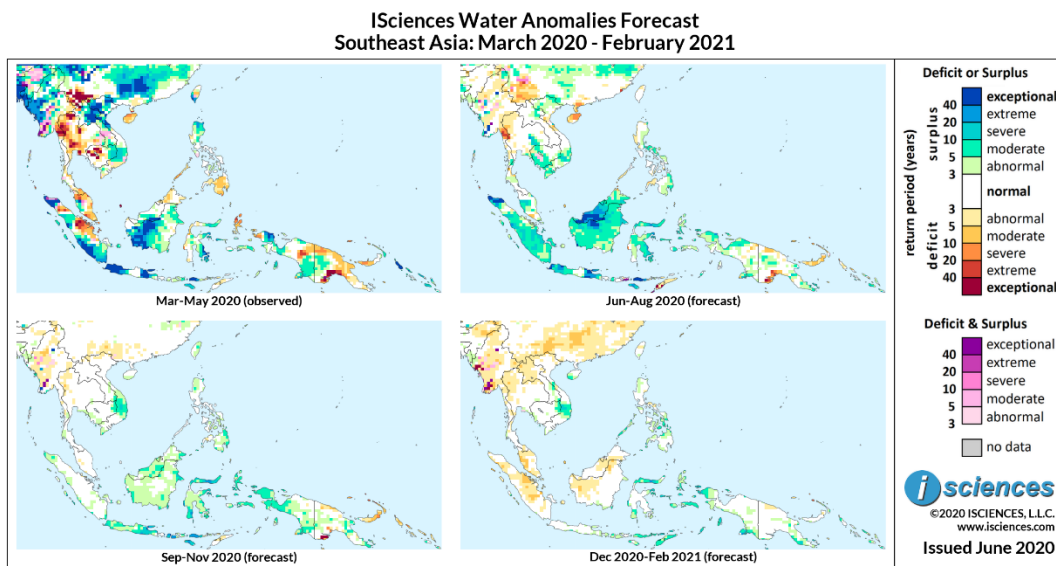


Based on observed data through May 2020 and forecasts through February 2021

Surpluses are also forecast in many regions of Indonesia. Anomalies will be intense in Aceh Province in northern Sumatra, Java, Flores Island, southeastern Sulawesi, and the Bird's Head Peninsula (Doberai Peninsula) of New Guinea. Moderate anomalies are forecast for western Borneo, Sumatra's western shore, many small islands in Indonesia, and pockets of Papua, Indonesia.

Pockets of deficit are expected in Peninsular Malaysia, northeastern Sumatra, and in Papua New Guinea along its northern coast and around the Gulf of Papua where anomalies will be exceptional. Nearly normal conditions are forecast for the Philippines.

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



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that deficits will shrink and downgrade in the region, leaving surpluses as the predominant anomaly, particularly in Indonesia. In Southeast Asia, deficits in Thailand

and Cambodia will nearly disappear, leaving primarily mild anomalies in western Thailand. However, a pocket of extreme deficits will emerge nearby in Myanmar's Kayin State. Surpluses will emerge in the Mun River Watershed in eastern Thailand. In Cambodia, surpluses will shrink in the east, along with those in the Central Highlands of Vietnam, and emerge in the west. Moderate surpluses will increase somewhat in the Mekong Delta and intense surpluses will re-emerge along the Lower Irrawaddy River in Myanmar.

Surpluses of varying intensity are forecast throughout much of Malaysia and Indonesia with extreme to exceptional anomalies forecast for Aceh Province in Sumatra's northern tip, eastern Java, Malaysian Borneo, and Flores Island. Deficits will emerge in the western half of Timor Island but will shrink and downgrade in Papua New Guinea, persisting mainly along the western shore of the Gulf of Papua. In the Philippines, surpluses will retreat from most of Luzon but emerge in eastern Mindanao.

From September through November, water conditions in many parts of Southeast Asia will normalize though generally mild deficits are expected in western Myanmar and northwestern Thailand, and moderate surpluses will increase in Vietnam's Central Highlands. Surpluses will shrink and downgrade in Malaysia and Indonesia leaving normal conditions in mainland Malaysia and Sumatra. Extreme surplus anomalies are forecast for many of the Lesser Sunda Islands and Sulawesi's northern peninsula, and surpluses will increase in western New Guinea. Deficits will shrink along the western shore of the Gulf of Papua but will be exceptional.

The forecast for the final months – December through February – indicates that deficits, generally mild to moderate, will increase and surpluses will decrease.

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

East Asia

The 12-month forecast for East Asia through February 2021 indicates widespread surpluses in the Yellow River Basin (Huang He River), primarily moderate in the lower and middle regions but more intense in the upper portion of the watershed.

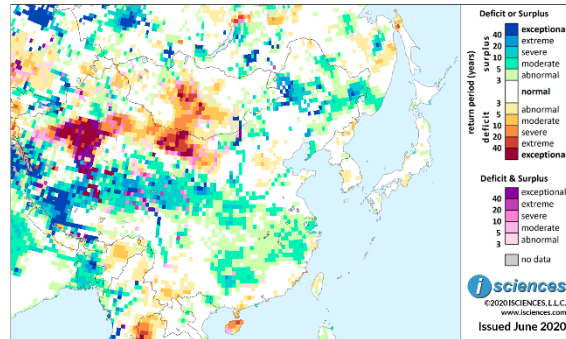
In the Yangtze River Basin, surpluses will be moderate in the lower watershed and east of Nanchang, while surpluses along the upper reaches of the river itself will be moderate to exceptional. Surpluses are also expected in the Pearl River Basin (Zhujiang River) in southern China and will be severe to extreme in northern Guangxi. Farther south in Hainan, however, intense deficits are forecast and moderate deficits are expected in southern Yunnan. Northeast China can expect surpluses as well, as can western Tibet (Xizang) where anomalies will be exceptional including along much of the Yarlung (Brahmaputra) River.

Western Inner Mongolia will see severe to exceptional deficits, conditions that will reach north well into the center of Mongolia and west through the Taklimakan Desert in Xinjiang. Some conditions of both deficit and surplus (pink/purple) are also expected in Xinjiang as transitions occur.

Nearly normal conditions are forecast for the Korean Peninsula and Japan with some pockets of moderate deficit in northeastern North Korea.

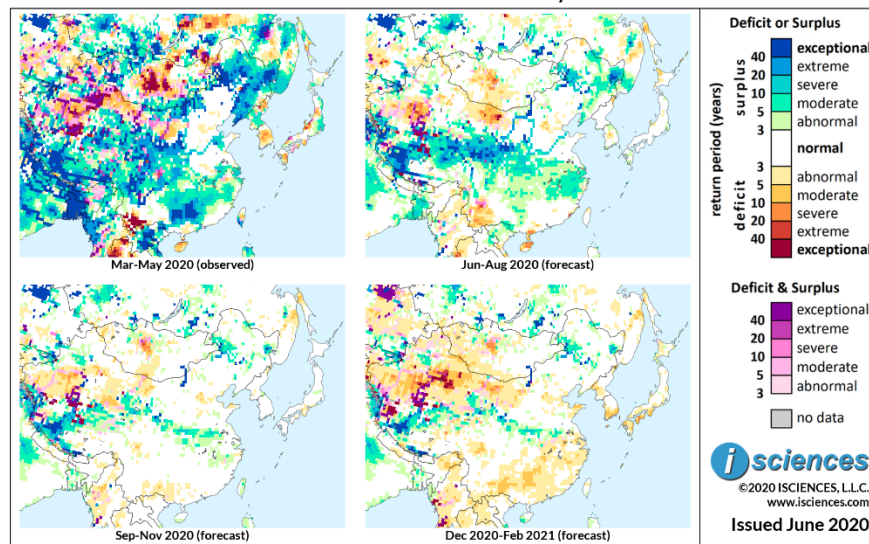
The 3-month time series maps below show the evolving conditions in more detail.

ISciences Water Anomalies Forecast
East Asia: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

ISciences Water Anomalies Forecast
East Asia: March 2020 - February 2021



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that surpluses will persist in the Yellow River Basin, downgrade in the Yangtze, and retreat from the Pearl River Basin with conditions returning to near-normal. Anomalies will be severe in the region of the Lower Yellow River and will reach exceptional intensity in the upper region. In the Yangtze Basin, moderate surpluses will increase in the lower portion, downgrade to mild in the middle region and primarily moderate in the river's upper basin. Some pockets of moderate surplus will linger in the Pearl River Basin in Guangxi. Surpluses in Northeast China will shrink. Intense surpluses will persist in western Tibet.

In southern China, deficits in Yunnan will moderate overall. Severe deficits will increase in Hainan and nearby on the mainland in southern Guangdong. Across the north, deficits will re-emerge in western Inner Mongolia and persist in the Taklimakan Desert of Xinjiang amid transitions. Deficits in central Mongolia will shrink and moderate. Nearly normal water conditions are forecast for Taiwan, the Korean Peninsula, and Japan.

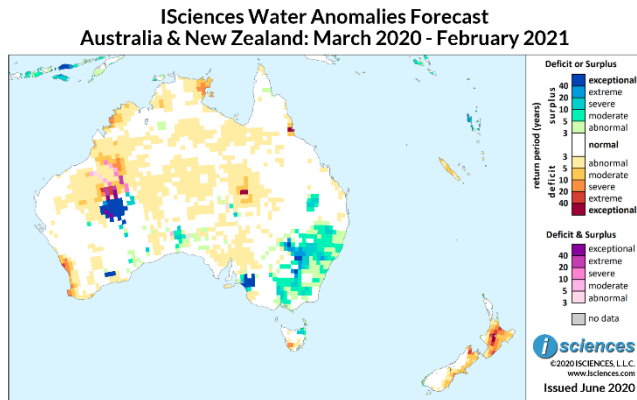
From September through November, near-normal conditions are forecast for many regions in East Asia. Surplus anomalies will form a path from the Han River Basin, a tributary of the Yangtze at Wuhan, leading northwest into Gansu and eastern Qinghai. Moderate deficits in the middle of Qinghai will connect to a wide path of intense surpluses reaching into western and southern Tibet. Moderate deficits and transitional conditions are expected in Xinjiang. In Northeast China, surpluses will persist in Inner Mongolia but shrink in Heilongjiang and Jilin. In Mongolia, severe deficits are forecast in the north-central province of Arhangay. A pocket of moderate surplus is forecast in northern Taiwan. Conditions on the Korean Peninsula and in Japan will be nearly normal.

The forecast for the final three months – December through February – indicates that mild to moderate deficits will emerge in southern and southeastern China and the Shandong Peninsula, and in pockets of Korea and southern Japan. Deficits will increase and intensify in Xinjiang and western Inner Mongolia. Surpluses are forecast in a pattern similar to the prior three months.

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

Australia & New Zealand

The 12-month forecast through February 2021 indicates surpluses of varying intensity in the Murray-Darling Basin in southeastern Australia and at the mouth of the Murray in South Australia. Surpluses will reach exceptional intensity in South Australia between the Murray River and the Victoria border and in the Riverina area of New South Wales, particularly around Griffith. Tasmania can expect some surpluses in the northeast, but severe deficits are forecast in the southwest around Lakes Pedder and Gordon.

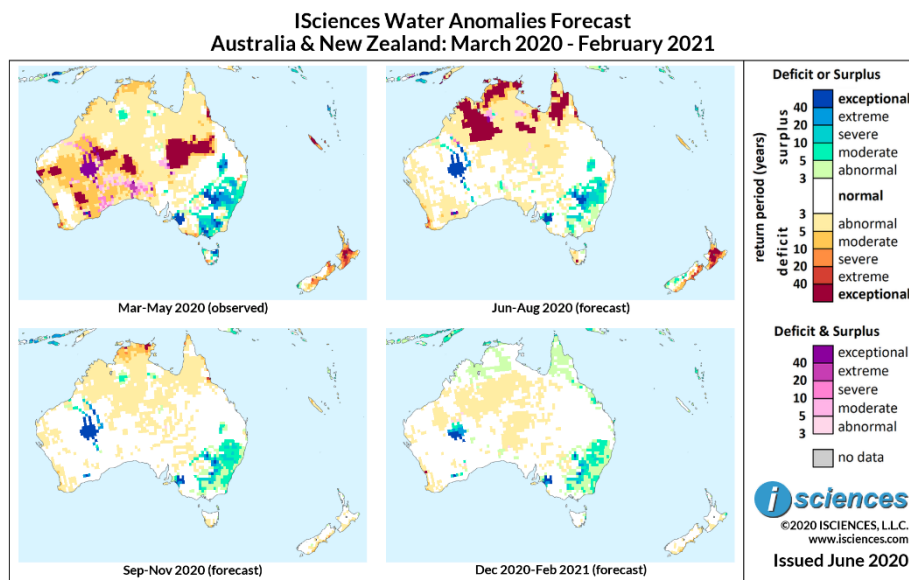


Based on observed data through May 2020 and forecasts through February 2021

In Queensland, surpluses are forecast in the northwest corner of the Darling Downs. A small pocket of intense deficit is expected in Channel Country and also on the northeast coast. Moderate to severe deficits are forecast in Arnhem Land, Northern Territory. In Western Australia, exceptional surpluses are forecast in the southwest corner of the Gibson Desert, intense deficits in the northwest corner, and severe deficits in the Great Sandy Desert, coastal Kimberley, and in the coastal southwest. Some surpluses are expected in western South Australia.

Intense deficits are expected in North Island, New Zealand, particularly around Lake Taupo. Moderate deficits are forecast along much of the east coast of South Island but deficits will be more intense in the northern portion of the island. Moderate deficits are forecast for New Caledonia.

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



Based on observed data through May 2020 and forecasts through February 2021

The forecast through August indicates that widespread surpluses will persist in southeastern Australia, and vast pockets of exceptional deficit will emerge across the northern reaches of the nation. Surpluses will persist in the Murray-Darling Basin though the extent will shrink in Victoria. Anomalies will be extreme to exceptional in the central Macquarie River Catchment and from the mouth of the Murray in South Australia (SA) to the Victoria (VIC) border. Surpluses in the northwest corner of the Darling Downs in Queensland (QLD) will downgrade. In Tasmania (TAS), surpluses will nearly disappear, though moderate anomalies are forecast on Flinders Island and deficits will intensify around Lakes Pedder and Gordon, becoming exceptional.

Exceptional deficits will emerge in the north in Far North QLD; in Top End, Northern Territory (NT); and a vast block spanning the northern border of Western Australia (WA) and NT from the Kimberley Plateau through the Tanami Desert. Prior widespread deficits in the west and in Channel Country in the east will nearly disappear, though moderate to extreme anomalies will persist in the nation's southwestern tip from Perth past Busselton. Exceptional surpluses will re-emerge in the western Gibson Desert in WA, as will surpluses of varying intensity along rivers leading north and a broken path to the south.

In New Zealand, deficits will remain widespread on North Island and exceptional anomalies will increase in the Waikato River region. Deficits in South Island will shrink slightly but will persist on the east coast. Some pockets of moderate surplus will emerge on the west coast in the Southern Alps and Fiordland. Deficits in New Caledonia will moderate.

From September through November, surpluses will persist in the Murray-Darling Basin, east of Adelaide, and in the west around the Gibson Desert and nearby rivers. Mild deficits are forecast across northern Australia with moderate anomalies in Top End, NT and a small, exceptional pocket in Arnhem Land. Moderate surpluses will emerge in the Upper Victoria River region of NT and in pockets of the Barkly Tableland in the eastern part of the state. A small pocket of intense deficit will persist on the northeast coast of QLD south of Cairns. Conditions in TAS and New Zealand will become nearly normal with some lingering deficits.

The forecast for the final months – December through February – indicates persistent surpluses in southeastern Australia and in the Gibson Desert of the northwest, mild surpluses across the north, and mild deficits in the center of the nation. Nearly normal conditions are expected in TAS, New Zealand, and New Caledonia.

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