

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

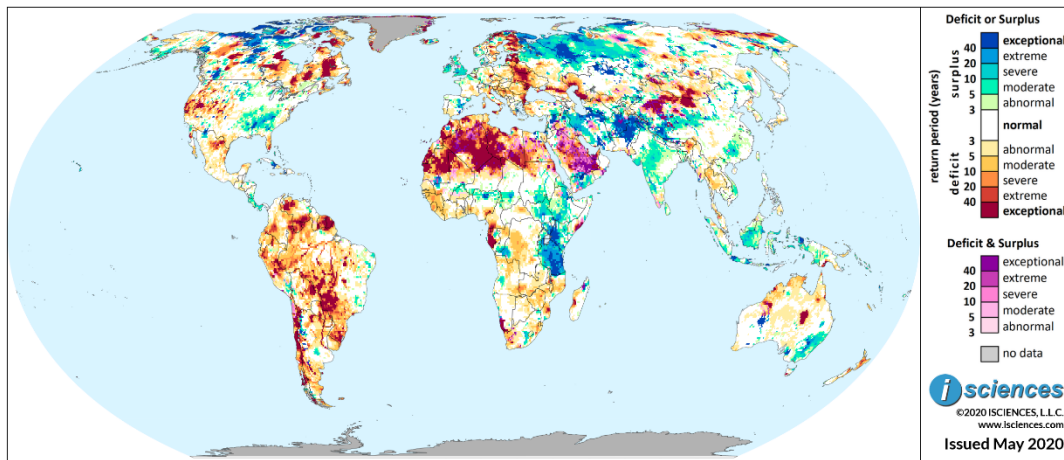
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Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: February 2020 - January 2021



Based on observed data through April 2020 and forecasts through January 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 July indicates that water surpluses will shrink considerably but anomalies will persist in the Dakotas, Nebraska, Tennessee, Mississippi, Alabama, and Georgia. Deficits will increase in the West, Southwest, and Pacific Northwest, but will generally spare southern California.

Canada: The forecast through July indicates that exceptional water deficits in northern Quebec will shrink though vast areas will persist. Moderate surpluses are forecast in the Gatineau River Watershed north of Ottawa. Deficits will increase in Southern Ontario but a pocket of moderate surplus will persist west of Toronto. Surpluses will increase in southeastern British Columbia and will be exceptional.

Mexico, Central America, and the Caribbean: The forecast through July indicates that water anomalies will shrink considerably throughout the region but intense deficits will persist in Chihuahua, Mexico and surpluses will persist in Sonora. Surpluses are also forecast in pockets of Central America.

South America: The forecast through July indicates that deficits will shrink and downgrade, particularly in the north. However, intense deficits are expected in Brazil, French Guiana, Suriname, and Peru. Surpluses will increase in pockets of eastern Brazil.

Europe: The forecast through July indicates that exceptional water deficits will increase in Finland, the Baltics, Belarus, and Ukraine, and deficits of varying intensity will increase in Eastern Europe, many pockets of Central Europe, Italy, and the northern Balkans. Surpluses will shrink considerably in the U.K.

Africa: The forecast through July indicates water deficits in North Africa with exceptional deficits emerging in eastern regions. Deficits will retreat from the Horn of Africa. Surpluses will remain widespread in East Africa and will increase in Ethiopia, South Sudan, and southern Sudan.

Middle East: The forecast through July indicates that water surpluses in the region will shrink overall, but persist in Syria, northern Iraq, and many regions in Iran. Exceptional deficits will emerge in eastern United Arab Emirates.

Central Asia and Russia: The forecast through July indicates that water surpluses in the Northern European Plain of Russia will shrink and downgrade. Intense surpluses are forecast for northern Kazakhstan and the Turkmen-Iran border. Moderate deficits are expected in the northern Caspian Basin.

South Asia: The forecast through July indicates that water surpluses will shrink considerably overall but remain widespread and intense in Pakistan and Afghanistan. Areas of surplus in India include the Far North, central Rajasthan, and Karnataka. Deficits will intensify in India's Far Northeast and emerge in coastal Maharashtra.

Southeast Asia and the Pacific: The forecast through July indicates that anomalies will shrink and downgrade in Southeast Asia, leaving surpluses in northern and central Vietnam. Surpluses are also forecast for many parts of Indonesia and will be intense in southwestern Sumatra and Flores Island.

East Asia: The forecast through July indicates that water surpluses will retreat from the Yangtze River Basin, shrink in Northeast China and the Pearl River Basin, but persist along the Lower Yellow River and in the upper watershed. Exceptional deficits in southern Yunnan will disappear.

Australia & New Zealand: The forecast through July indicates that widespread water surpluses reaching exceptional intensity will persist in the Murray-Darling Basin and south to Melbourne. Intense deficits will persist in northern New Zealand and emerge in pockets of northern Australia.

Watch List: Regional Details

United States

The 12-month forecast ending January 2021 indicates water surpluses of varying intensity in a vast block bounded by eastern Oklahoma into North Carolina and southern Illinois through most of Mississippi. Surpluses will be extreme to exceptional in Mississippi, Tennessee, and pockets of central Georgia.

Surpluses are also forecast in the Northern Plains and parts of the Upper Midwest. Moderate to extreme surpluses are expected in the Dakotas in a checkerboard pattern interspersed with normal conditions.

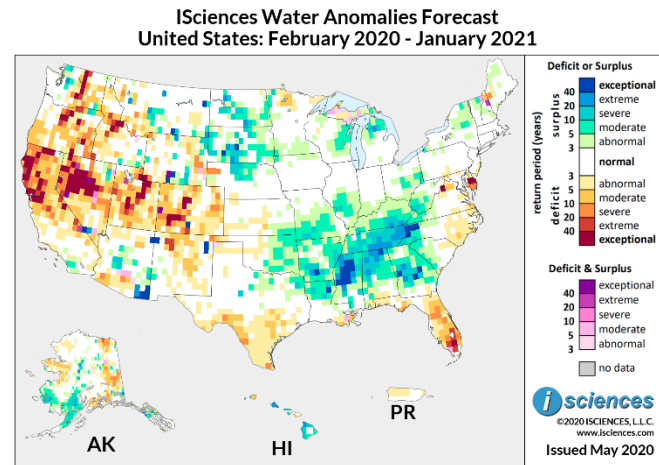
Anomalies will be more prevalent in South Dakota where some relatively small areas will reach exceptional intensity and surpluses will reach into north-central Nebraska. Some pockets of surplus are also forecast for Montana, but scattered deficits are expected in western regions of the state. Scattered pockets of anomalies, surplus and deficit, are forecast in Wyoming. In the Upper Midwest, moderate surpluses are expected in eastern Wisconsin and moderate to extreme surpluses in the northern portion of Michigan's Lower Peninsula.

In the West, deficits of varying intensity are forecast for much of California from Fresno north, most of Nevada, Utah, Colorado, Oregon, central and eastern Washington, and central Idaho. Areas of exceptional deficit include the San Francisco Bay Area, the Columbia River region in central Washington, and the Salmon River Mountains of Idaho. Some isolated pockets of surplus are forecast in the Pacific Northwest. Deficits are expected in northern and central New Mexico. Surpluses are forecast for southeastern Arizona and near Phoenix, with deficits in the southwest.

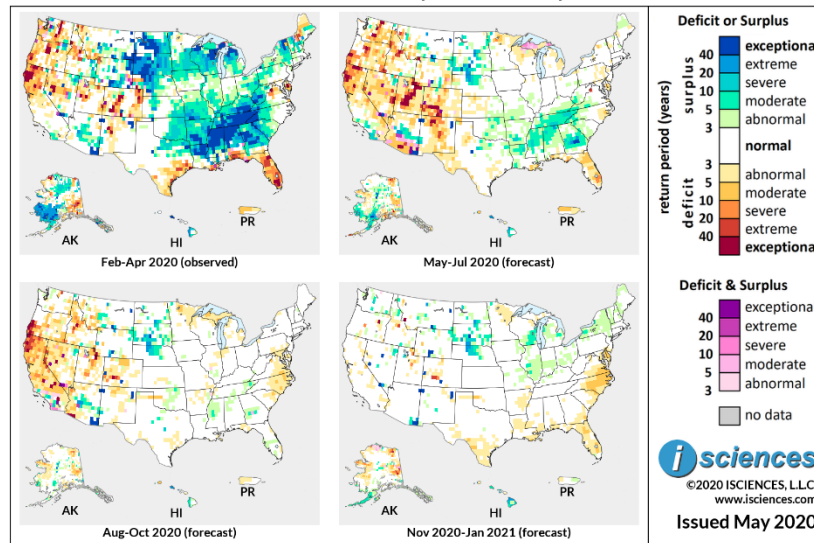
Southern Texas can expect some deficits, while pockets of moderate surplus are expected in the northeast. Deficits are forecast for much of peninsular Florida and will be especially intense south of Lake Okeechobee. Nearly normal conditions are expected in the U.S. Northeast and Mid-Atlantic with some deficits in northern Virginia and severe to exceptional deficits 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.



**ISciences Water Anomalies Forecast
United States: February 2020 - January 2021**



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

From May through July, surpluses will shrink considerably in the U.S. with nearly normal conditions returning to many parts of the Upper Midwest, Central Plains, northern Ohio River Basin, and the Northeast. However, moderate to extreme anomalies will persist in the Dakotas and north-central Nebraska, and moderate anomalies in Tennessee, Mississippi, northern Alabama, and pockets to the west. Surpluses will also persist across central Georgia but will be more intense.

Deficits of varying intensity are forecast in many areas of the U.S. West, Southwest, and Pacific Northwest, though southern California will be largely spared and can expect some surpluses around San Diego. Areas with a forecast of severe to exceptional deficit include northwestern California into Oregon, central Utah, and Colorado's southwest quadrant. Deficits will shrink and downgrade in Florida, northern Virginia, and the Delmarva Peninsula. Relatively mild anomalies are forecast for Texas: some surpluses in the northeast and deficits in the west.

From August through October, normal water conditions will return to much of the country east of the Rockies, but surpluses will persist from South Dakota into north-central Nebraska and in pockets of North Dakota, and relatively mild deficits will emerge in the upper Great Lakes region and Mid-Atlantic. In the West, deficits will shrink and downgrade overall in the Rockies, Southwest, and Pacific Northwest, but increase in California, covering much of the state north of Santa Barbara. Deficits will remain intense in the state's northwest corner and into Oregon. Surpluses will persist in central and southeastern Arizona and pockets of southwestern California.

The forecast for the final months – November through January – indicates normal water conditions for much of the country including the West; surpluses in the Dakotas, Nebraska, and southern Wisconsin; and moderate deficits in Delaware, Virginia, North Carolina, and pockets of Florida.

(It should be noted that forecast skill declines with longer lead times.)

Canada

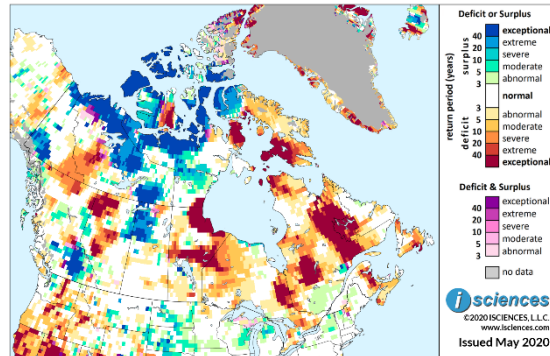
The 12-month outlook for Canada through January 2021 indicates a forecast of deficits for many regions of Quebec north of the Gouin Reservoir in the Mauricie region of the province. Vast areas of exceptional deficit are forecast west of Lake Mistassini and in a wide path on Quebec's eastern border.

Exceptional deficits are also forecast for western Labrador, a column along Ontario's northeastern border, the southwest corner of Hudson Bay, a belt across central Manitoba north of Lake Winnipeg reaching into Ontario, central Alberta west of Edmonton 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. Moderate to severe surpluses are expected around Fort St. John in northern British Columbia, and exceptional surpluses in the southern Columbia Mountains.

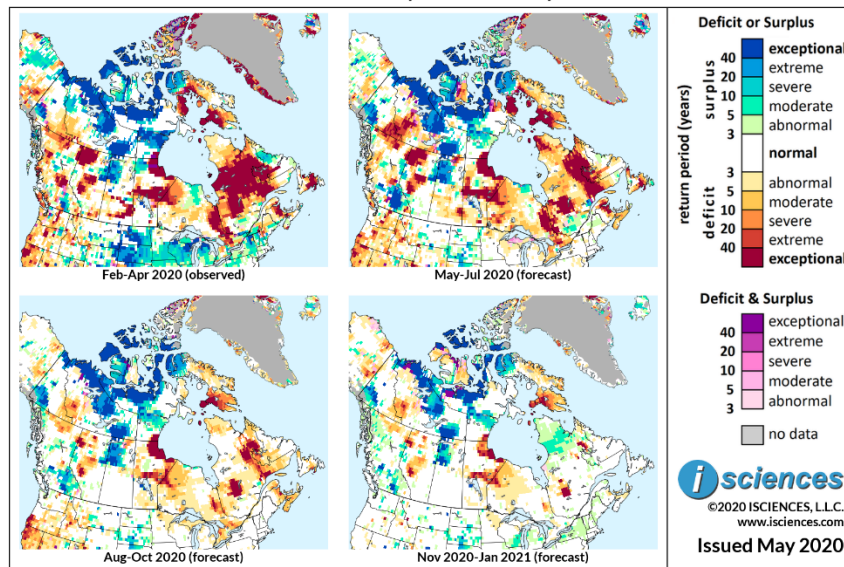
The 3-month maps (below) show the evolving conditions in more detail.

ISciences Water Anomalies Forecast
Canada: February 2020 - January 2021



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

ISciences Water Anomalies Forecast
Canada: February 2020 - January 2021



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

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

around Winnipeg; and mild deficits near Regina and Saskatoon. Mild deficits are also forecast for Vancouver though deficits will be more intense on Vancouver Island.

Deficits will shrink and downgrade somewhat in Newfoundland and New Brunswick, though exceptional anomalies are forecast. Moderate deficits will emerge in Nova Scotia. The extent of exceptional deficits in Quebec (QC) will shrink considerably though vast areas will persist along the eastern border and west of Lake Mistassini. Moderate surpluses are forecast in the Gatineau River Watershed north of Ottawa. Deficits will increase in Southern Ontario (ON) but a pocket of moderate surplus will persist west of Toronto. Deficits will emerge north of Lake Superior and will increase in the western half of the province. Surpluses will shrink but persist in the north on Hudson Bay.

In the Prairie Provinces, exceptional deficits will persist in a wide band north of Lake Winnipeg, Manitoba (MB), in the northeast along Hudson Bay, and a small pocket around Winnipeg. Surpluses in northwestern MB will nearly disappear. In Saskatchewan (SK) exceptional deficits will persist in the Upper Assiniboine River region and mild to moderate deficits will emerge in pockets of southern SK. A vast block of intense surplus will persist in northwestern SK reaching across the border past Fort McMurray, Alberta (AB).

Exceptional deficits are forecast to persist in northwestern AB and the Middle Reaches of the Athabasca River Watershed in the center of the province. Surpluses will increase along the central border of AB and British Columbia (BC) in the Peace River region, reaching Fort St. John, BC. Surpluses will increase in southeastern BC and will be exceptional; deficits will shrink on Vancouver Island.

From August through October, deficits will decrease in eastern Canada though vast pockets of intense deficit will persist in eastern QC and west of Lake Mistassini. Conditions in southern QC will normalize. Surpluses west of Toronto will nearly disappear. Normal conditions will return to southern SK and southern AB. Deficits in central and northern AB will shrink somewhat and downgrade. Widespread surpluses are expected to persist in southeastern BC but the extent of exceptional anomalies will shrink. Conditions in southwestern BC will normalize.

The forecast for the final three months – November through January – indicates that deficits will shrink overall, particularly in QC as normal conditions return to much of the province and surpluses emerge in the far north. Southern Ontario will return to normal as well and near-normal conditions are expected in the southern regions of the Prairie Provinces.

(It should be noted that forecast skill declines with longer lead times.)

Mexico, Central America, and the Caribbean

The 12-month forecast ending January 2021 indicates deficits of varying intensity in Mexico's north-central and northeastern states of Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. Anomalies will be exceptional in Coahuila.

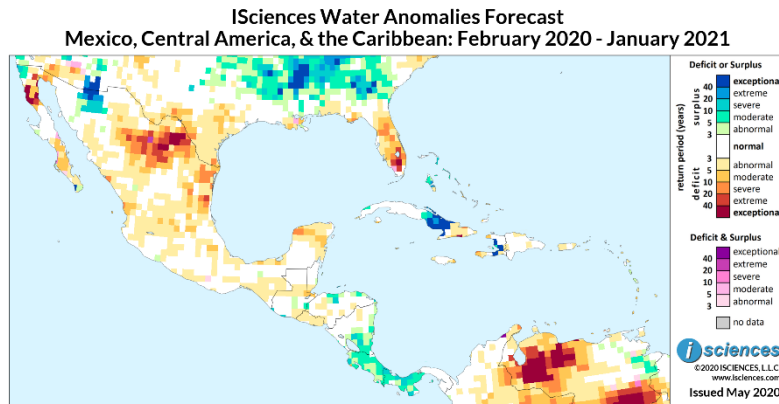
Intense deficits are also forecast in central Baja California and moderate deficits farther south on the Baja Peninsula.

Surpluses are expected in the Peninsula's northwestern extreme and also on the mainland in northeastern Sonora where anomalies will reach exceptional intensity.

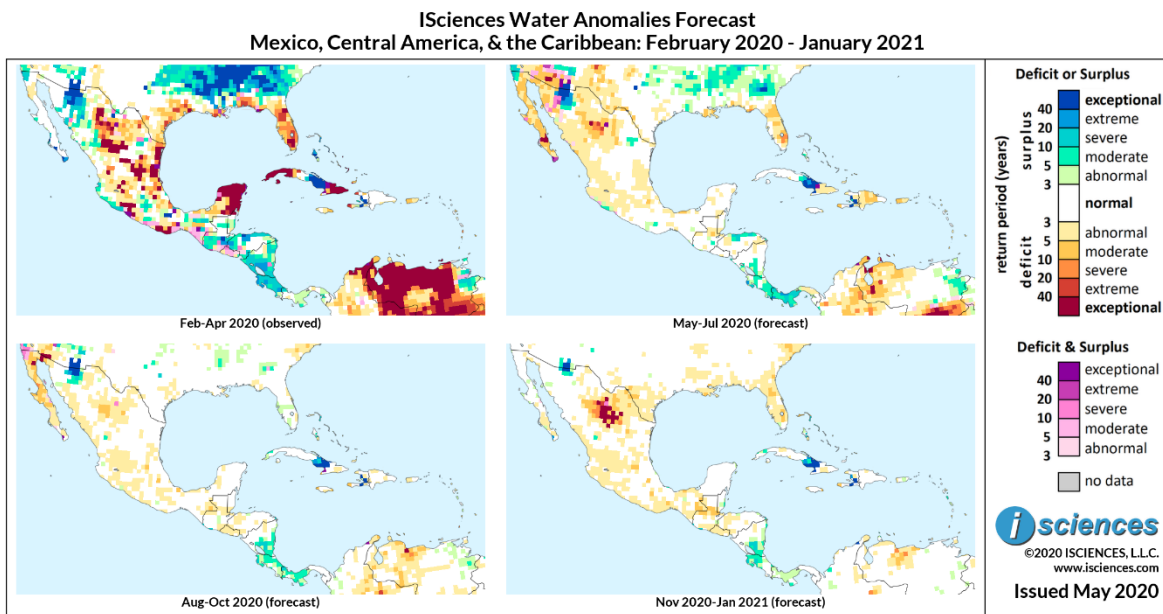
Generally mild deficits are expected across a band of central Mexico, and moderate to severe deficits in Yucatan and Quintana Roo States in the Yucatan Peninsula.

In Central America, surpluses will be primarily moderate along Honduras' Caribbean coast, in southern Nicaragua, Costa Rica, and western Panama. 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.



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



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

The forecast through July indicates that water anomalies will shrink and downgrade in Mexico with conditions normalizing in the northeast, south, and Yucatan, and generally mild anomalies expected in most other regions of the country. However, a pocket of intense deficit will persist in southeastern Chihuahua and moderate deficits will emerge in western Sonora and much of the Baja Peninsula. Surpluses will persist in northeastern Sonora, maintaining severe to exceptional intensity, but will retreat directly south. Surpluses in Baja's northwestern corner will moderate.

In Central America, surpluses will shrink, leaving moderate to severe anomalies along Honduras' Caribbean Coast and in southern Nicaragua and pockets of Costa Rica. Mild surpluses in western Panama will intensify, becoming moderate to severe. Deficits will nearly disappear in Cuba, and moderate deficits will emerge in Dominican Republic.

From August through October, mild deficits or normal water conditions are expected in most of Mexico, reaching south through northern Nicaragua. Surpluses will persist in northeastern Sonora and deficits in Chihuahua will moderate. Moderate deficits are forecast for the Baja Peninsula's northern two-thirds. Moderate surpluses are expected from southern Nicaragua through western Panama and surpluses will persist in central Cuba and Port-au-Prince Bay.

The forecast for the final three months – November through January – indicates that intense deficits will re-emerge from Chihuahua into Coahuila and surpluses in Central America will shrink.

(It should be noted that forecast skill declines with longer lead times.)

South America

The 12-month forecast through January 2021 indicates deficits of varying intensity and extent in parts of every nation with large pockets of exceptional anomalies in many regions, most notably Brazil, French Guiana, and Chile.

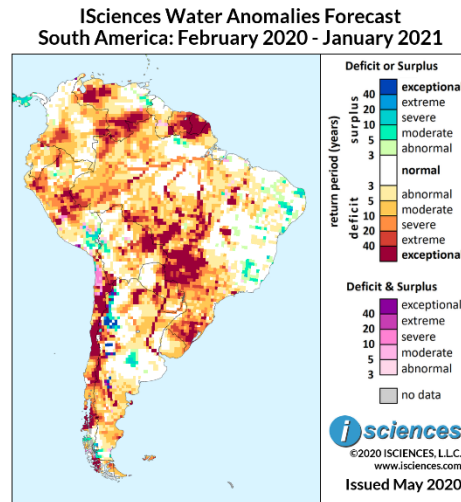
Though eastern Brazil will be largely spared, deficits are forecast for much of the remainder of the country and will include widespread exceptional deficits in Mato Grosso do Sul, southern Mato Grosso, and Rio Grande do Sul. Intense deficits are forecast along many rivers including the Amazon, Purus, Tapajos, and Xingu. In the east, pockets of surplus are forecast in Rio Grande do Norte, central Pernambuco, and central Minas Gerais curving to the coast.

Across the northern arc of the continent, exceptional deficits are expected in French Guiana, becoming somewhat less intense through Suriname. Severe to exceptional deficits are expected in northwestern and southern Venezuela, Colombia's eastern and southwestern reaches, and the bulk of central Peru. Moderate surpluses are forecast for southeastern Peru into Bolivia.

In the continent's center, deficits will be exceptional in eastern Bolivia and along the Paraguay River through its namesake nation and through Argentina as the river makes its way to the Atlantic. Severe deficits are forecast on the Paraná River that forms Paraguay's eastern border.

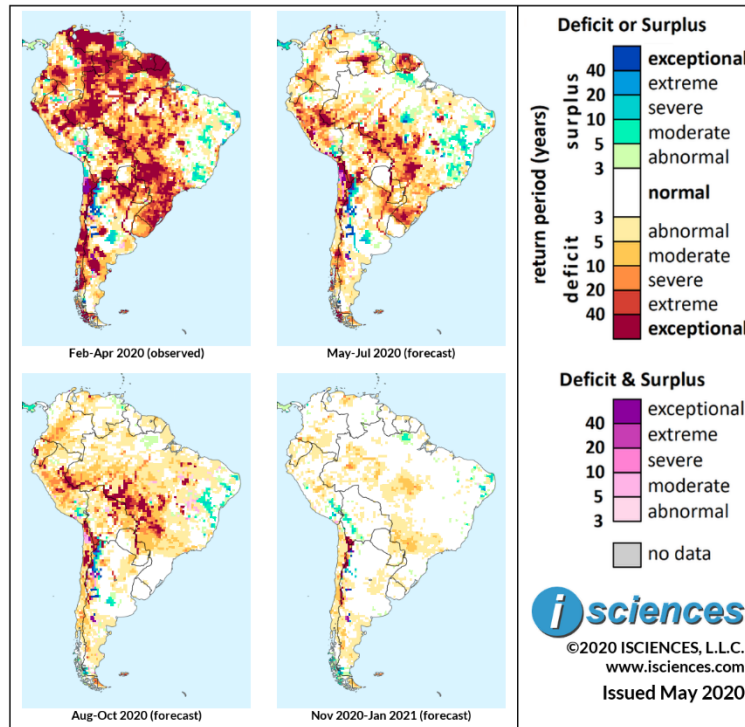
Conditions in the Argentine Pampas will be relatively normal with surpluses in northern La Pampa Province. Surpluses are also forecast for Argentina's northwestern provinces of La Rioja and Catamarca, deficits in the northeast, and deficits in much of Patagonia. The forecast for Chile indicates deficits throughout much of the nation which will be exceptional in many regions including Valparaiso and Santiago.

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



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

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



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

The forecast through July indicates that deficits will shrink and downgrade throughout the region, bringing nearly normal conditions to northern regions of Brazil and parts of Colombia and Venezuela. Deficits of varying intensity are forecast in Brazil from southern Amazonas through the West Central Region and southern states. Anomalies are expected to be exceptional in many pockets including central Mato Grosso, eastern Mato Grosso do Sul, and central Rio Grande do Sul. Surpluses will increase in pockets of eastern Brazil and will emerge in south-central Pará State and in the state's northern corner. Deficits will shrink in French Guiana and Suriname, downgrading slightly from exceptional. Deficits will increase in Peru's vast central bulk, persist in many parts of Bolivia, shrink in Paraguay while remaining exceptional along the Paraguay River, and will transition to normal water conditions in Uruguay. In Chile, deficits will downgrade, leaving Santiago and Valparaiso with mild anomalies. Surpluses will persist in the central Argentine Pampas and the country's northwestern provinces; deficits in the north and south will downgrade.

From August through October, conditions in nations forming the northern arc of the continent will normalize overall though moderate deficits will increase in Colombia. Deficits will increase in Ecuador as well and will be exceptional along the central coast including Guayaquil. In Brazil, deficits will persist in southern Amazonas and in Brazil's West Central Region but will retreat from southern states. Anomalies will be exceptional in Rondônia, Mato Grosso, and Mato Grosso do Sul. Surpluses will shrink in eastern Brazil persisting primarily in central Pernambuco and central Bahia. Deficits will remain widespread in central Peru. Bolivia can expect mild deficits in the west and more intense anomalies in the east. Exceptional deficits will persist along the northern portion of the Paraguay River in Paraguay but water

conditions will normalize on the river through Argentina. Surpluses will persist in Argentina's northwestern provinces and in a pocket of the central Pampas; deficits will shrink and moderate in the north and south. Moderate deficits are forecast for much of Chile with some exceptional anomalies in the north.

In the final quarter – November through January – moderate deficits are forecast in much of Chile with some exceptional deficits along the northern half of its border. Brazil can also expect moderate deficits in large pockets; small pockets are forecast scattered throughout other nations. Moderate surpluses will follow the Cordillera Oriental Range in southern Peru into western Bolivia, and some surpluses will linger in easternmost Brazil and re-emerge in northern Pará.

(It should be noted that forecast skill declines with longer lead times.)

Europe

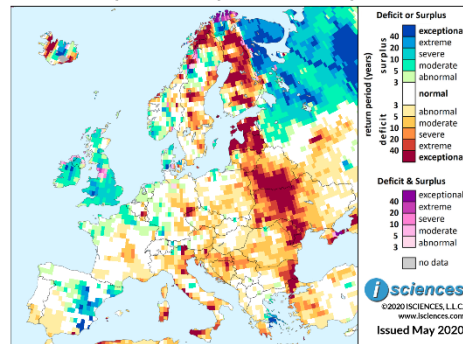
The 12-month forecast through January 2021 indicates water deficits in a broad column from northern Finland past the Baltics and south through eastern Romania. Deficits will be exceptional in Finland, Estonia, Latvia, southern Belarus, western Ukraine, southern Moldova, and eastern Romania.

Deficits of generally lesser intensity are forecast for many pockets in Central and Eastern Europe, central France, Italy, the northern Balkans, and southern Peloponnese, Greece. Areas with a forecast of exceptional deficit include southern Belgium; southwest of Dresden, Germany; and Sicily, Sardinia, and pockets of mainland Italy. A pocket of exceptional deficit is also forecast south of Moscow with deficits of varying intensity east and south.

Widespread surpluses are expected in northern European Russia, Ireland, the United Kingdom, and eastern Spain. Anomalies will reach exceptional intensity in many regions of Russia including the Kola Peninsula, east of Rybinsk Reservoir, the Severnaya Dvina River, and the Vychegda Lowlands. Surpluses in Spain will be of varying intensity and will include exceptional anomalies in the Region of Murcia. Other areas of surplus include northern France and Athens, Greece.

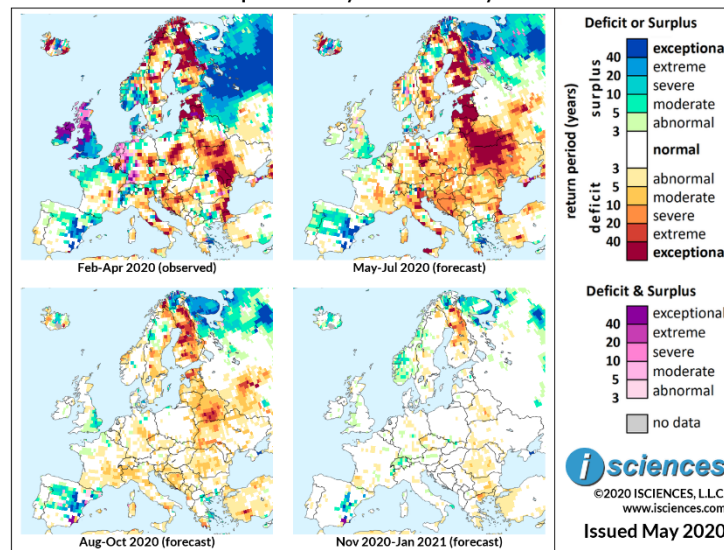
The 3-month composites (below) for the same 12-month period show the evolving conditions.

ISciences Water Anomalies Forecast
Europe: February 2020 - January 2021



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

ISciences Water Anomalies Forecast
Europe: February 2020 - January 2021



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

The forecast through July indicates that deficits will increase considerably, and surpluses will diminish. Exceptional deficits will increase in Finland, the Baltics, southern Belarus, and western Ukraine, and widespread deficits of varying intensity will emerge in Eastern Europe and many pockets of Central Europe. Deficits will increase in Italy and severe deficits will increase in central France and in northern nations of the Balkan Peninsula.

Surpluses will shrink and downgrade in Ireland, the U.K., and Denmark with moderate anomalies persisting in eastern England and in a few pockets across the English Channel in France. Surpluses in Athens, Greece will remain intense. On the Iberian Peninsula, moderate surplus anomalies will increase in western Spain and emerge in northern Portugal. Extreme to exceptional anomalies will persist east of Madrid including Barcelona, Valencia, and Murcia. Surpluses in northern European Russia will shrink but will remain intense in the Kola Peninsula, Severnaya Dvina River, and Vychegda Lowlands.

From August through October both surpluses and deficits will shrink but anomalies will persist in many areas. In Finland the extent of exceptional deficit will shrink considerably but deficits will remain widespread and intense in much of the nation. Deficits will shrink and downgrade from the Baltics through Bulgaria, but severe to extreme anomalies are expected in Estonia and southern Belarus. Deficits will be severe on the Dniester River in Ukraine and moderate on the Dnipro. Deficits of varying intensity will persist in Russia around Moscow and to the south. Pockets of primarily moderate deficit are forecast in central Germany leading into Czechia, and in southeastern France, Switzerland, Italy, and Balkan nations along the northern Adriatic Sea. Severe deficits are expected in Peloponnese, Greece. Surpluses will shrink and downgrade slightly in Northern European Russia; shrink in England, persisting in the East of England region; and shrink in Portugal while persisting in a wide belt across central Spain. Surpluses in Athens will moderate, and small pockets of moderate surplus will persist in Macedonia, Greece.

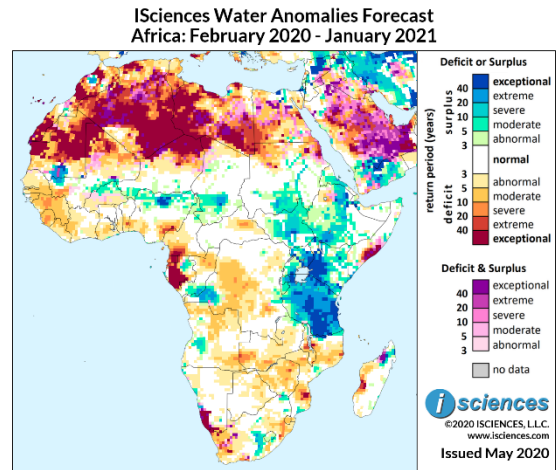
The forecast for the remaining months – November through January – indicates nearly normal water conditions for much of the region with severe deficits lingering in northern Finland and generally milder deficits scattered from southern Belarus through Greece, though severe deficits will emerge in Macedonia, Greece. Surpluses will persist in Spain between Madrid and Valencia and will emerge in Switzerland and Norway.

(It should be noted that forecast skill declines with longer lead times.)

Africa

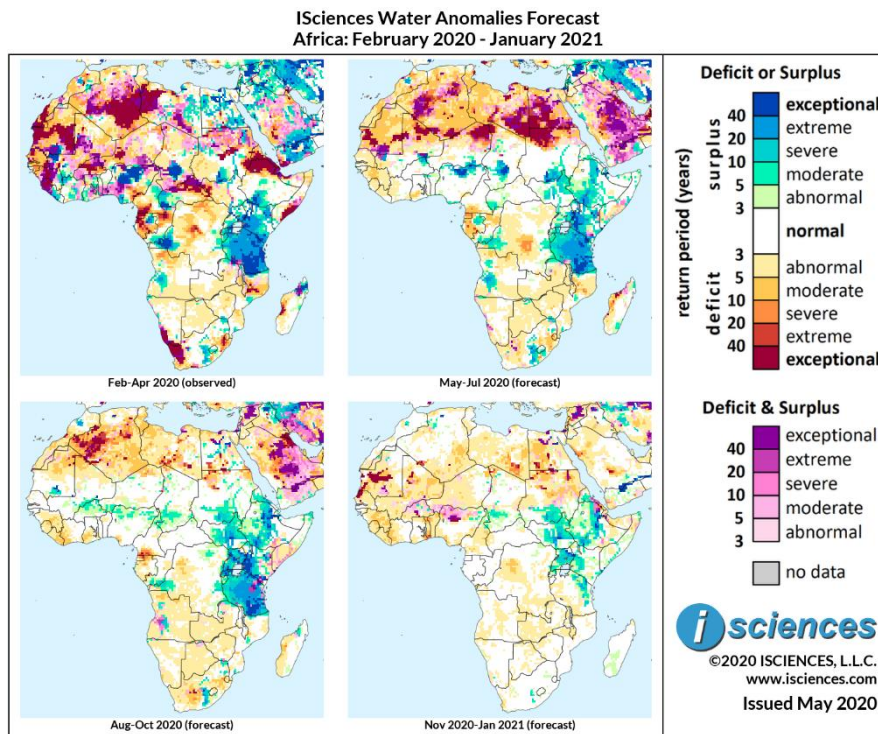
The 12-month forecast through January 2021 indicates intense water deficits across northern Africa including widespread exceptional anomalies. Exceptional deficits are also forecast for Equatorial Guinea through western Gabon, southwestern Namibia, and coastal Somalia near Mogadishu where water conditions may be in transition as well.

Deficits of varying intensity are forecast in pockets of coastal West Africa and in nations along the Gulf of Guinea; the central Congo River Basin; southern Zambia; Zimbabwe; Malawi; parts of Mozambique; Madagascar's west-central coast; Swaziland; and Northern Cape, Western Cape, and KwaZulu Natal in South Africa.



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

Widespread surpluses are expected in East Africa and will especially intense in Tanzania; western Kenya; and along the Victoria Nile through Uganda. Widespread surpluses of generally lesser intensity are forecast in Ethiopia, Eritrea, South Sudan, southern Sudan and along the White Nile. Other areas of surplus include a band south of the Sahel; the capital regions of the Congos; west-central Angola; South Africa from southern Orange Free State into Eastern Cape; and Madagascar's northern tip. The 3-month maps (below) show the evolving conditions in greater detail.



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

The forecast through July indicates that deficits will moderate in western North Africa, though exceptional pockets are forecast; will emerge in eastern North Africa, transitioning from scattered surpluses; and will retreat from the Horn of Africa. Normal conditions will return to many areas of the Sahel and to the south, but pockets of exceptional surplus are forecast in northern Nigeria and south-central Chad. Surpluses in East Africa will remain widespread and surpluses will increase in Ethiopia, South Sudan, and southern Sudan. 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. Other areas of deficit include Equatorial Guinea reaching north into Cameroon and south through western Gabon; south-central Democratic Republic of the Congo (DRC); pockets of northern Mozambique; Swaziland and nearby regions in South Africa; and much of Madagascar's western coast where anomalies could be intense.

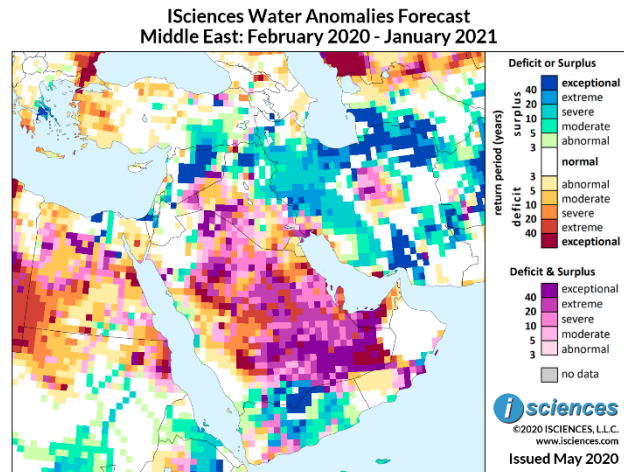
From August through October, deficits across North Africa will shrink and moderate, with pockets of surplus re-emerging in Egypt. Some moderate deficits are forecast in coastal West Africa and deficits in southern Cameroon will intensify. Generally moderate deficits will persist in South Africa near Swaziland but deficits emerging in Northern Cape will be more intense. Surpluses will persist in a vast region from southern Sudan and Eritrea through Tanzania. Moderate surpluses are forecast in a band south of the Sahel and in westernmost DRC, and surpluses in western Angola will begin to transition. Surplus anomalies will persist in Orange Free State and Eastern Cape, South Africa.

The forecast for the final quarter – November through January – indicates that surpluses will shrink and downgrade in the east but remain widespread. Deficits will decrease in western North Africa, increase in eastern North Africa and West Africa, and conditions in the south will normalize.

(It should be noted that forecast skill declines with longer lead times.)

Middle East

The forecast for the 12-month period ending January 2021 indicates widespread persistent water surpluses from Syria into southeastern Turkey and in 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 central Syria; around Mosul, Iraq; northeastern Iran; and southern Iran reaching inland from the Strait of Hormuz.



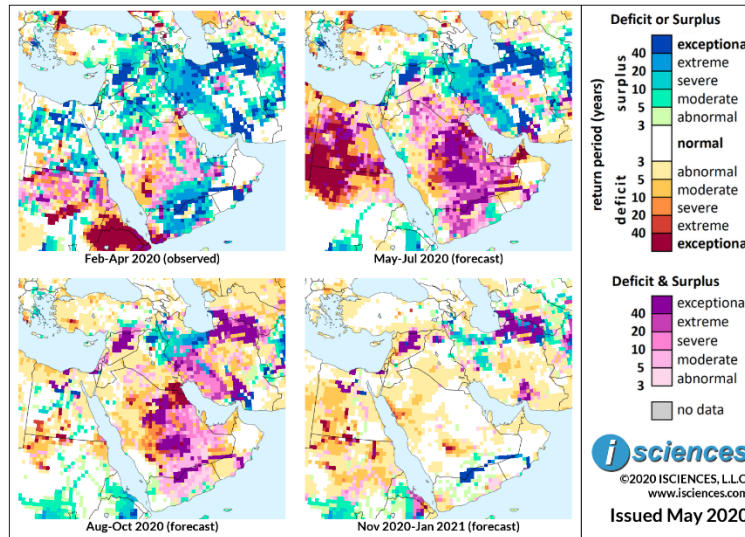
Yemen, too, can expect surpluses of varying intensity, and surpluses are also forecast for Israel and Gaza.

The forecast for Iraq west of the Euphrates indicates deficits in the northwest and south and mixed conditions of both deficit and surplus (pink/purple) as transitions occur. Saudi Arabia and United Arab Emirates will also see deficits, though they will be more intense, along with transitional conditions. Severe to extreme deficits are forecast for Qatar.

Turkey can expect deficits in the west, north-central region, and in Eastern Thrace (European Turkey). Anomalies in Eastern Thrace will be exceptional. 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: February 2020 - January 2021**



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

The forecast through July indicates that widespread surpluses in the region will shrink, though many areas of surplus will persist, particularly in Iran. Surpluses are expected in Israel and Gaza, central and northern Syria into Turkey, northern and eastern Iraq, western Iran, around Iran’s Caspian Sea Coast, and southern Iranian provinces near the Persian Gulf. Anomalies will be exceptional in central and northern Syria, surrounding Mosul in Iraq, along Iran’s Caspian Coast and through northeastern Iran, and near the Strait of Hormuz in southern Iran leading well into Kerman Province.

On the Arabian Peninsula, conditions of both deficit and surplus (pink/purple) are forecast for much of Saudi Arabia and Yemen as transitions occur, but intense deficits are expected as well. Exceptional deficits are forecast in eastern United Arab Emirates and moderate deficits in Qatar. Deficits are also forecast for Eastern Thrace and southwestern and north-central Turkey, and Georgia north of Tbilisi.

From August through October, surpluses will continue to shrink, though anomalies are forecast for northeastern Iraq, northwestern Iran and the central Caspian Coast, and southern Iran east of the Strait of Hormuz. Surpluses will be exceptional around Mosul and near the Strait of Hormuz. Many areas of prior surplus will begin to transition with conditions of both surplus and deficit indicated (pink/purple). Deficits will remain intense in pockets of Saudi Arabia but will moderate in United Arab Emirates; moderate deficits will persist in Qatar. Exceptional deficits will emerge in southern Iraq and Kuwait. Deficits will moderate in Eastern Thrace and north of Tbilisi. Moderate deficits will emerge in central Iran and will re-emerge in pockets of Iraq west of the Euphrates.

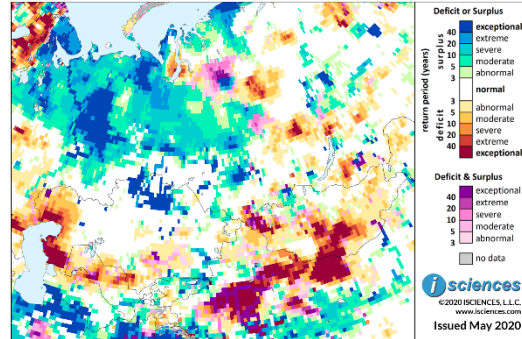
In the final quarter – November through January – deficits will shrink and downgrade, though a few pockets are forecast in Saudi Arabia. Surpluses will persist in western Iran and will re-emerge in Yemen and Oman near the Saudi border.

(It should be noted that forecast skill declines with longer lead times.)

Central Asia and Russia

The 12-month forecast through January 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 Vychedga Lowlands west of the Urals and along the Severnaya Dvina River. Intense deficits are forecast in the region of the Nizhnyaya Tunguska River, a northern right tributary of the Yenisei River, and in central Irkutsk Oblast at the southward bend in the Angara River, another tributary farther south.

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

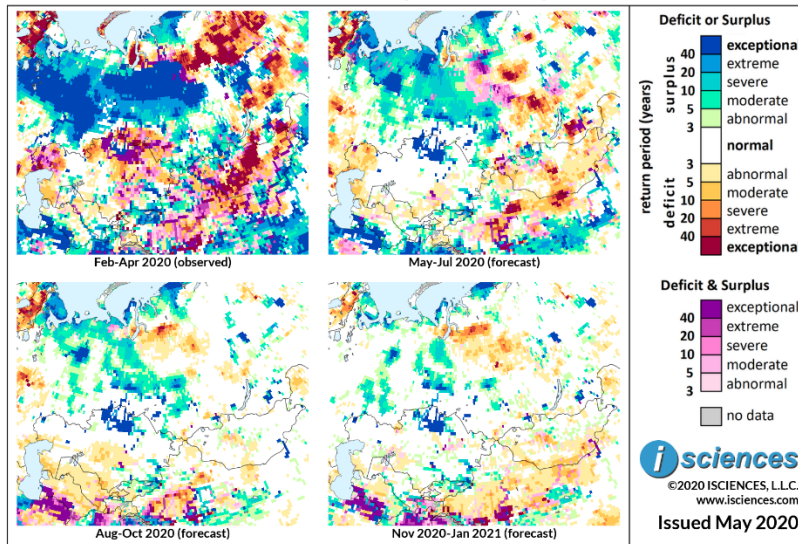


Based on observed data through April 2020 and forecasts through January 2021

Deficits are forecast in western Kazakhstan and its southern tip, and in western and central Uzbekistan, northernmost Turkmenistan, and eastern Tajikistan. Anomalies will be exceptional on the northern and northeastern Caspian coast and extreme in pockets of Uzbekistan and South Kazakhstan Province. Intense surpluses are expected in northern Kazakhstan and along the border of Turkmenistan and Iran. 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: February 2020 - January 2021



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

The forecast through July 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

Vycheгда Lowland, along the Severnaya Dvina River, and in the tundra region near the Kara Sea. Widespread, intense deficits in the northern region of the Central Siberian Plateau will shrink considerably. Intense deficits are expected to emerge at the confluence of the Nizhnyaya Tunguska River, a right tributary of the Yenisei, and the Taymura River, and also at the southward bend of the Angara River, another Yenisei tributary. Conditions of both deficit and surplus (pink/purple) are forecast where the Western Siberian Plain and the Central Siberian Plateau meet as transitions occur.

Anomalies in Kazakhstan, deficits and surpluses, will shrink, leaving normal conditions in much of the country. Exceptional surpluses will re-emerge in the north, however, and surpluses in the southeast near Lake Balkhash, while downgrading, will be severe; moderate deficits are expected in the west near the Caspian Sea. Exceptional surpluses will persist along Turkmenistan's southern border. Surpluses of lesser intensity are forecast in eastern Uzbekistan including the Zarafshon River, and in western Tajikistan and eastern Kyrgyzstan.

From August through October, surpluses in Russia from the Northern European Plain into the Western Siberian Plateau will continue to shrink, leaving exceptional surpluses in the Vycheгда Lowland, normal conditions in the Urals, and generally moderate to severe surpluses in the Ob River Watershed. Deficits will downgrade in the region of the Nizhnyaya Tunguska River but will emerge northwest between the Taz River and the Yenisei. In Kazakhstan, exceptional surpluses will persist in the north and severe surpluses in the southeast; deficits will continue to emerge along the northeastern Caspian Coast while those north of the Caspian will shrink. Moderate deficits will increase in South Kazakhstan and will emerge in the center of the country. Mild to moderate deficits will emerge in Turkmenistan and Uzbekistan, and surpluses will persist in eastern Kyrgyzstan.

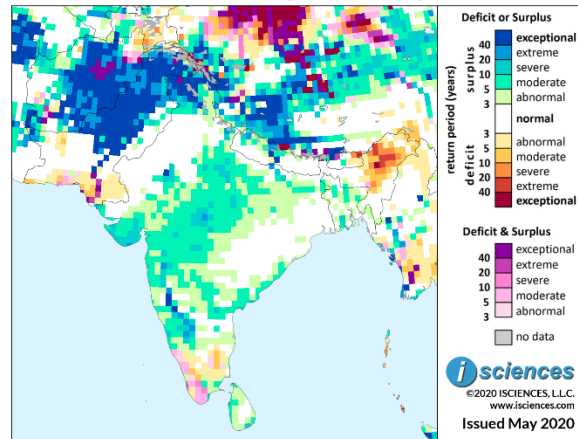
The forecast for the final months – November through January – indicates that anomalies in the region will diminish and moderate surpluses will emerge along the Amu Darya River in Uzbekistan and Turkmenistan.

(It should be noted that forecast skill declines with longer lead times.)

South Asia

The 12-month forecast through January 2021 indicates that moderate to severe water surpluses will dominate much of India from Gujarat through Madhya Pradesh, Maharashtra, and eastern Rajasthan into Uttar Pradesh in the Gangetic Plain and along the Ganges. Surpluses will also reach south through Karnataka and east through Andhra Pradesh to the Indian Ocean. Anomalies will be severe to exceptional in a path from Pune in Maharashtra leading southeast through central Karnataka, and in a pocket of central Rajasthan. Severe deficits are forecast for India's Far Northeast.

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

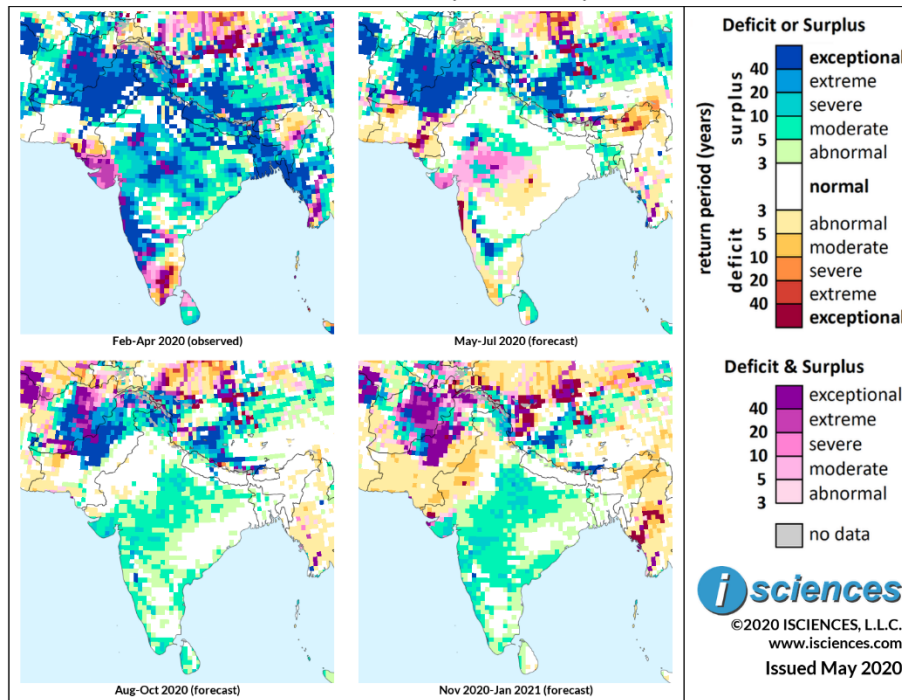


Based on observed data through April 2020 and forecasts through January 2021

Surpluses will be intense through the center of Nepal along the Gandaki River, downgrading as it joins the Ganges in India. 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. Some moderate deficits are forecast near Karachi, Pakistan.

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

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



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

Widespread surplus anomalies observed across the breadth of the India in prior months will shrink May through July, leaving nearly normal conditions in many regions. However, surpluses reaching exceptional intensity are forecast in the Far North, a pocket in central Rajasthan, and along a path through western Maharashtra into Karnataka, veering northeast into Andhra Pradesh. Moderate anomalies are forecast from eastern Rajasthan through northern Madhya Pradesh into Uttar Pradesh. Transitional conditions (pink/purple) are expected in much of the remainder of Madhya Pradesh along with severe surpluses in the west. Gujarat, too will see transitional conditions. A band of exceptional deficit will emerge in coastal Maharashtra including Mumbai. Deficits will intensify in the Far Northeast and will emerge in Chhattisgarh near Bilai. Moderate deficits are forecast for Kerala. In Sri Lanka, moderate surpluses will emerge in the north, retreating in the southwest.

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. Intense deficits will increase somewhat north of Karachi, Pakistan and will emerge in a pocket of the southwest. Surpluses in Nepal, Bhutan, and Bangladesh will shrink considerably and downgrade.

From August through October, moderate surpluses will emerge in much of central India and parts of the south, and deficits will nearly disappear. Surpluses are expected from Gujarat through Madhya Pradesh into the Gangetic Plain, and south through Maharashtra, Karnataka, and into India's southern tip and western Sri Lanka. Moderate surpluses are also forecast Andhra Pradesh. Surpluses in Far North India will include exceptional anomalies. Relatively normal water conditions are forecast for Bangladesh and much of Nepal, with intense surpluses on the Gandaki River and a few pockets of moderate surplus in Bangladesh.

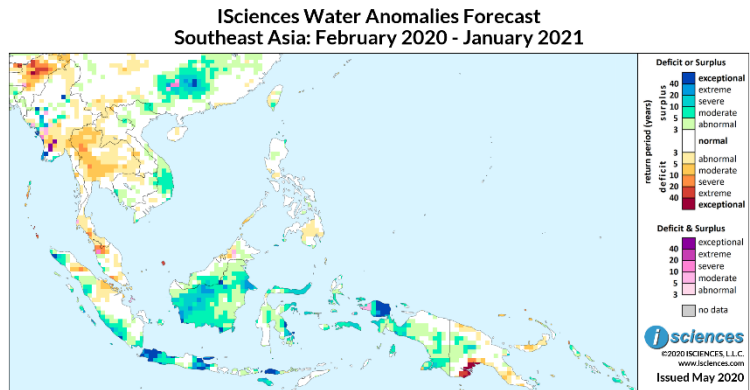
In Pakistan, conditions will begin to normalize on the lower Indus River and along some of its tributaries to the north but surplus anomalies will remain extreme to exceptional in vast areas to the west and north. Conditions will begin to transition in parts of Afghanistan though extreme to exceptional surpluses are expected around Kandahar and Kabul.

The forecast for the final months – November through January – indicates primarily moderate surpluses increasing in India covering much of the nation's bulk; moderate deficits emerging in Rajasthan and the Far Northeast; and a pocket of exceptional deficit in Gujarat on the Gulf of Khambhat. Surpluses and transitional conditions are forecast for Afghanistan and Pakistan, and mild to moderate deficits in southern and eastern Pakistan.

(It should be noted that forecast skill declines with longer lead times.)

Southeast Asia and the Pacific

The 12-month forecast through January 2021 indicates moderate water deficits in central and western Thailand and moderate surpluses in Vietnam’s Central Highlands. Some small pockets of surplus are expected in west-central Myanmar and mixed conditions in the south. Nearly normal conditions are forecast for the remainder of Southeast Asia.

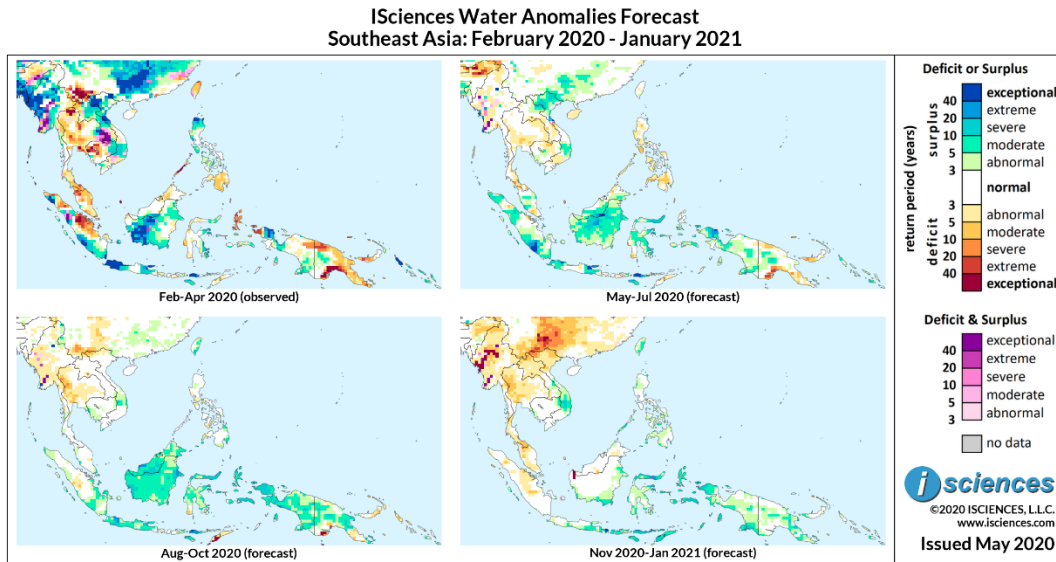


Based on observed data through April 2020 and forecasts through January 2021

The Philippines, too, can expect nearly normal water conditions.

Surpluses will be the predominant anomaly in Indonesia and will reach exceptional intensity in Java, Flores Island, and New Guinea’s Bird’s Head Peninsula (Doberai Peninsula). Surpluses of varying intensity are forecast for Sumatra’s western coast, while pockets of primarily moderate deficit are expected in the northeast. Surpluses of varying intensity are also forecast for much of Borneo, eastern Sulawesi and many of the smaller islands, and Papua, Indonesia. Intense deficits are expected around the western shore of the Gulf of Papua in Papua New Guinea, some moderate deficits in the southeast, and surpluses in the country’s Western Highlands region.

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



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

The forecast through July 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 shrink and downgrade, leaving primarily mild anomalies. Widespread surpluses in

Myanmar will nearly disappear, as will anomalies in much of Laos. Some moderate to severe surpluses are forecast for northeastern Laos and through northern Vietnam; moderate surpluses will persist in Vietnam's Central Highlands. In the Philippines, moderate deficits will increase on Mindanao and scattered, relatively mild deficits are forecast for the remainder of the nation, transitioning from surplus in the northern regions. Surpluses of varying intensity are forecast for many parts of Indonesia and will be extreme to exceptional in southwestern Sumatra, a few pockets of Java, and the eastern Bird's Head Peninsula in New Guinea. Deficits in Papua New Guinea around the western shore of the Gulf of Papua will downgrade but will be severe to extreme, and moderate surpluses are forecast for the nation's Western Highlands region.

From August through October, water conditions in many parts of Southeast Asia will normalize, though moderate deficits will emerge in western Thailand and Vietnam's northwestern corner, and some surpluses will persist in Vietnam's Central Highlands. Conditions in the Philippines will be nearly normal with some surpluses emerging in the extreme northeastern and southeastern points of Mindanao. Surpluses, primarily moderate, are forecast throughout Borneo and much of the remainder of Indonesia, increasing in Java, many small islands, and in New Guinea but decreasing in northern and central Sumatra. Exceptional deficits will emerge in the western half of Timor Island. Deficits will shrink around the Gulf of Papua.

The forecast for the final months – November through January – indicates that deficits will increase in Southeast Asia and surpluses will decrease in Indonesia.

(It should be noted that forecast skill declines with longer lead times.)

East Asia

The 12-month forecast for East Asia through January 2021 indicates surpluses in the Pearl River Basin (Zhujiang River) in South China that will be severe to exceptional in Hunan near the border with Guangxi.

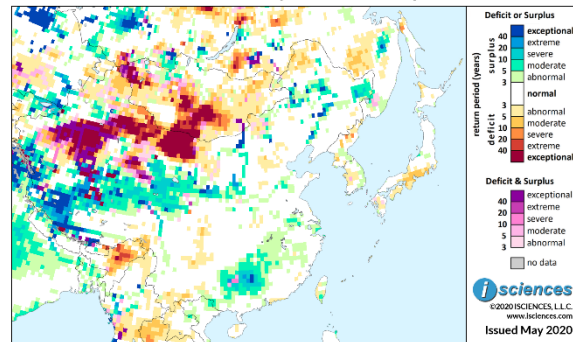
Widespread surpluses of varying intensity are forecast in the upper portion of the Yellow River Basin (Huang River). Severe surpluses will follow the path of the Tongtian River as it flows south from Qinghai through the western border of Sichuan. Surpluses will be exceptional in western Tibet (Xizang) and along much of the Yarlung River (Brahmaputra River). Northeast China can also expect some pockets of surplus varying in intensity and some pockets of moderate deficit in far northern Inner Mongolia.

Exceptional deficits will form a vast band across much of the breadth of Xinjiang in western China beginning in the Taklimakan Desert and connecting to deficits of equal intensity in western Inner Mongolia, continuing well into Mongolia. Some conditions of both deficit and surplus (pink/purple) are also expected in Xinjiang as transitions occur.

On the Korean Peninsula, a few scattered, small pockets of deficit are forecast in North Korea, including moderate anomalies around Pyongyang. In Japan, moderate deficits are forecast in southeastern Honshu from Osaka reaching almost to Tokyo.

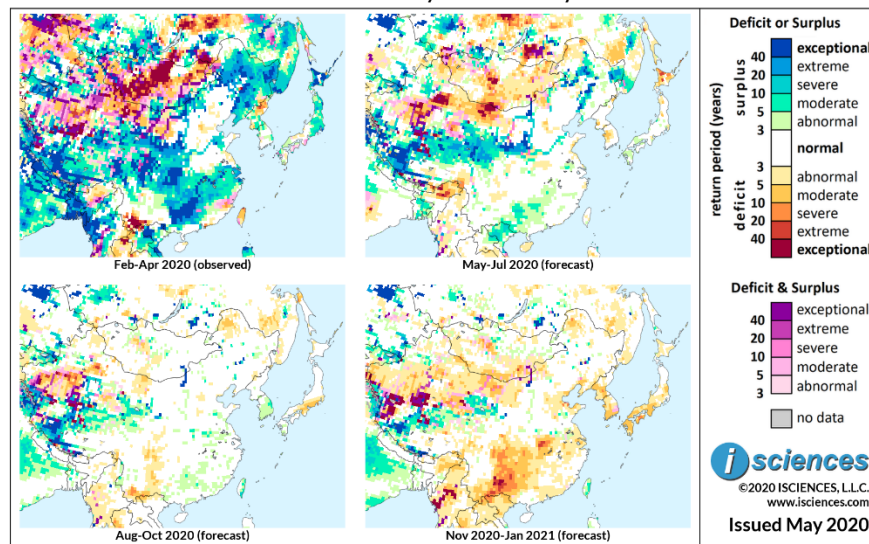
The 3-month time series maps below show the evolving conditions in more detail.

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



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

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



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

The forecast through July indicates that surpluses in the Yangtze River Basin will retreat as conditions return to normal. Severe surpluses will persist along the path of the Lower Yellow River and surpluses of varying intensity in the vast expanse of the river's upper watershed. Surpluses will shrink and downgrade considerably in the Pearl River Basin leaving moderate anomalies primarily in Guangxi. Widespread surpluses in Northeast China will also shrink considerably. Extreme to exceptional surpluses will persist in western Tibet and along the Yarlung River.

Deficits will shrink and downgrade in Mongolia, and deficits of varying intensity will persist from Xinjiang through western Inner Mongolia and will include exceptional anomalies as well as transitional conditions. Exceptional deficits in southern Yunnan will disappear and conditions in Taiwan will normalize, transitioning from moderate deficit. Nearly normal conditions are also forecast for much of the Korean Peninsula and Japan. Some moderate deficits will persist near Pyongyang and will emerge south of Seoul. Moderate to extreme deficits are expected to emerge in Hokkaido.

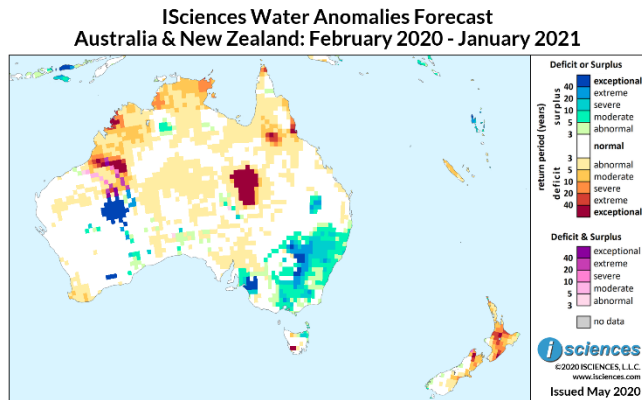
From August through October, conditions in many regions of East Asia will normalize though anomalies are forecast, primarily in western China. Moderate surpluses are forecast in the Upper Yellow River Basin and intense surpluses will persist in western Tibet and along the Yarlung River. Deficits will shrink and downgrade in Xinjiang and some moderate deficits will persist in western Inner Mongolia and emerge in far northeastern Inner Mongolia. Moderate to severe deficits will emerge in southern Yunnan and mild to moderate deficits from central Sichuan through western Guizhou. Moderate surpluses are expected to emerge in eastern Taiwan and along South Korea's central east coast. In Japan, deficits will nearly disappear in Hokkaido but moderate deficits will emerge in southeastern Honshu from Osaka reaching nearly to Tokyo.

The forecast for the final three months – November through January – indicates that widespread deficits will emerge in the Lower and Middle Yangtze Basin, dipping south into the western portion of the Pearl River Basin where anomalies may be intense. Moderate deficits will emerge around the Bohai Sea, on the Korean Peninsula, and in Japan. In western China, anomalies are expected to persist in a pattern similar to the forecast for August through October with an increase in mild to moderate deficits in southern Mongolia and across the border into China.

(It should be noted that forecast skill declines with longer lead times.)

Australia & New Zealand

The 12-month forecast through January 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, including Flinders Island, but exceptional deficits are forecast in the southwest around Lakes Pedder and Gordon.

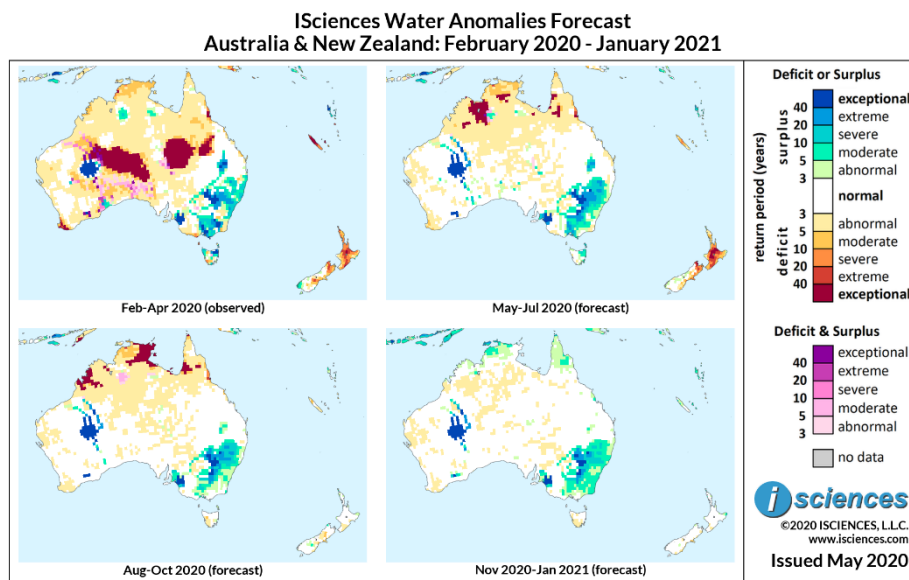


Based on observed data through April 2020 and forecasts through January 2021

In Queensland, surpluses are forecast in the northwest corner of the Darling Downs; exceptional deficits in west Queensland's Channel Country; and severe to exceptional deficits in the Gregory Range in Far North Queensland and coastal areas to the east, as well as the tip of the Cape York Peninsula. In Northern Territory, moderate to severe deficits are forecast for Top End and moderate surpluses in the upper basin of the Victoria River. In Western Australia, exceptional surpluses are forecast in the western Gibson Desert, and intense deficits in the Great Sandy Desert and coastal areas of the Kimberley region.

Moderate deficits are forecast in New Zealand along much of the east coast of South Island, but deficits will be more intense in the northern portion of the island and through North 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 April 2020 and forecasts through January 2021

The forecast through July indicates that widespread surpluses of varying intensity will persist in the Murray-Darling Basin of southeastern Australia, extending south to the coast at Melbourne. Surpluses will be primarily moderate along the paths of the Murray and Darling Rivers but will reach extreme to exceptional intensity in the central Macquarie River Catchment; near Griffith in the Riverina area; and from the mouth of the Murray in South Australia (SA) to the Victoria (VIC) border. Surpluses will shrink and downgrade in Tasmania and deficits will nearly disappear. In Queensland (QLD), surpluses in the northwest corner of the Darling Downs will downgrade.

Conditions in the center of the country will become nearly normal as intense deficits disappear but exceptional deficits will emerge in the north in pockets of Far North Queensland; in Top End, Northern Territory (NT) between the Katherine and Roper Rivers; and spanning the northern border of Western Australia (WA) and NT in the Ord River region. Some moderate surpluses will emerge nearby in the upper Victoria River region. Exceptional surpluses will persist in the western Gibson Desert in WA and surpluses will re-emerge along rivers leading north and along a broken path to the south.

In New Zealand, deficits will remain widespread on North Island and will reach exceptional intensity in the Waikato River region. Deficits in South Island will shrink slightly but will persist on the east coast and in the north. Deficits in New Caledonia will moderate overall.

From August through October, surpluses will persist in the Murray-Darling Basin, shrinking in VIC but increasing near Adelaide. Surpluses will persist with intensity in the western Gibson Desert in WA, shrink in the northwest corner of the Darling Downs in QLD, and nearly disappear in Tasmania. Exceptional deficits remain in the forecast for pockets of Far North Queensland; will increase in Top End, NT, emerging throughout Arnhem Land; and will retreat from the Ord River region of WA but emerge in western Kimberley. Water conditions will normalize in much of New Zealand, leaving a few areas with moderate anomalies. Deficits will continue to shrink in New Caledonia with some relatively mild anomalies lingering.

The forecast for the final months – November through January – indicates that surpluses will persist in southeastern Australia and in WA in a pattern and with intensity similar to the forecast through October. Deficits across northern Australia will disappear and moderate surpluses will emerge in Top End, NT and Far North Queensland. Nearly normal conditions are forecast for New Zealand and New Caledonia.

(It should be noted that forecast skill declines with longer lead times.)