

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

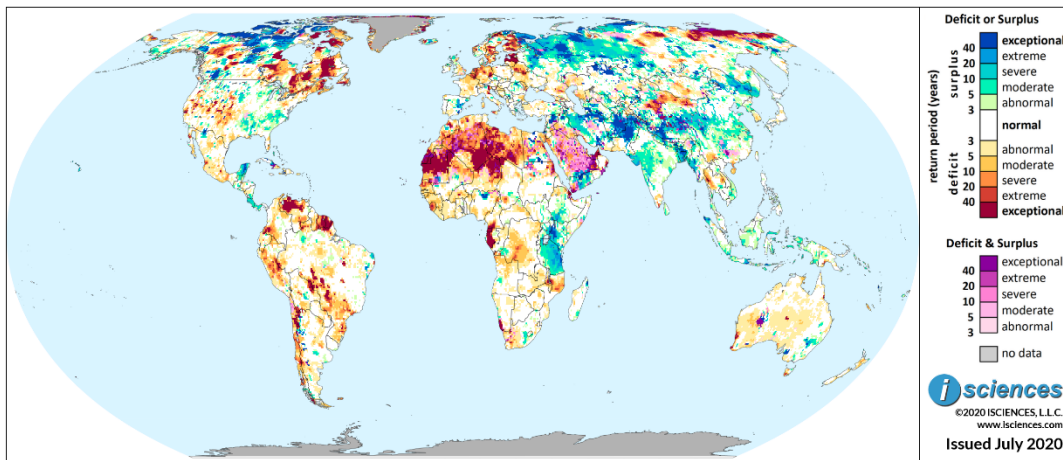
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Worldwide Water Watch List

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

ISciences Water Anomalies Forecast: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 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 September indicates that water surpluses will shrink and downgrade in the South, Southeast, and Upper Midwest. Deficits will persist in Northern California, shrink and downgrade in the Rockies and Southwest, and increase in the Northeast.

Canada: The forecast through September indicates nearly normal water conditions for Toronto, Regina, and Vancouver; surpluses for Calgary and Edmonton; and deficits in Québec City, Montreal, Ottawa, and Winnipeg. Deficits will disappear from southern Saskatchewan and increase in southern Quebec.

Mexico, Central America, and the Caribbean: The forecast through September indicates water surpluses in Sonora and the Yucatan and deficits from Mexico City through southern Veracruz. Surpluses will shrink in Central America and deficits will nearly disappear in the Caribbean.

South America: The forecast through September indicates significant water deficits in Peru, Mato Grosso and Mato Grosso do Sul in Brazil, Suriname, French Guiana, northern Chile, and on the Paraguay River. Moderate deficits will emerge in central Brazil and surpluses will persist in the east.

Europe: The forecast through September indicates a distribution pattern of water anomalies similar to the prior three months. Widespread deficits are expected in Central Europe and around the Baltic and Adriatic Seas. Areas of surplus include the Iberian Peninsula, the eastern Balkans, and Russia.

Africa: The forecast through September indicates water deficits across northern Africa, nearly normal conditions in the Sahel and central African nations, intense surpluses in East Africa, and generally mild deficits in the south.

Middle East: The forecast through September indicates that widespread water surpluses will shrink as transitions occur but will persist in northern Syria, northern Iraq, and northwestern Iran. Deficits will emerge in central Iran, shrink in Oman, and intensify in Riyadh Province, Saudi Arabia.

Central Asia and Russia: The forecast through September indicates that water surpluses from northern European Russia through the Western Siberian Plain and in the Volga Basin will shrink. Deficits will increase in the Yenisei River Basin and shrink in Kazakhstan.

South Asia: The forecast through September indicates that water surpluses will shrink but remain widespread. Surpluses will persist in western and central India, increase in Gujarat, remain intense in Pakistan and Afghanistan, and downgrade in Bangladesh. Deficits in southern India and southern Pakistan will nearly disappear.

Southeast Asia and the Pacific: The forecast through September indicates that water surpluses will shrink and downgrade overall but persist in many areas of Indonesia and large pockets in Southeast Asia. Areas of deficit include west-central and northeastern Thailand and Timor Island.

East Asia: The forecast through September indicates that water surpluses will retreat from the Pearl River Basin, downgrade in the Yellow River Basin, and moderate in the lower and middle regions of the Yangtze. Deficits will shrink in Mongolia and Xinjiang but intensify in Yunnan and Guangdong. Surpluses will increase in North Korea.

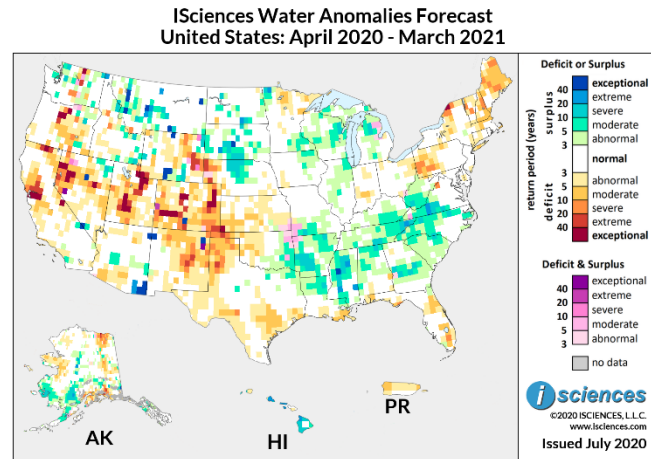
Australia & New Zealand: The forecast through September indicates exceptional water deficits across northern Australia. Widespread surpluses in the southeast will shrink, persisting in the central Murray-Darling Basin. Intense deficits will shrink in New Zealand.

Watch List: Regional Details

United States

The 12-month forecast ending March 2021 indicates moderate water surpluses in the lower Ohio River Basin and into the Deep South and lower Mississippi River region. Surpluses will be more intense in some pockets including western Virginia, Tennessee's northeastern corner, central Mississippi, and Arkansas' southwest quadrant.

Around the Great Lakes, surpluses are forecast for pockets of northern Michigan, Wisconsin, and northeastern Illinois. Surpluses are also expected from southeastern Minnesota into northeastern Iowa.



In the northern Plains States, severe surpluses are forecast for north-central Nebraska and well into South Dakota, while anomalies of varying intensity are predicted in other pockets of the Dakotas including the Black Hills region. Montana's western half can expect surpluses of varying intensity.

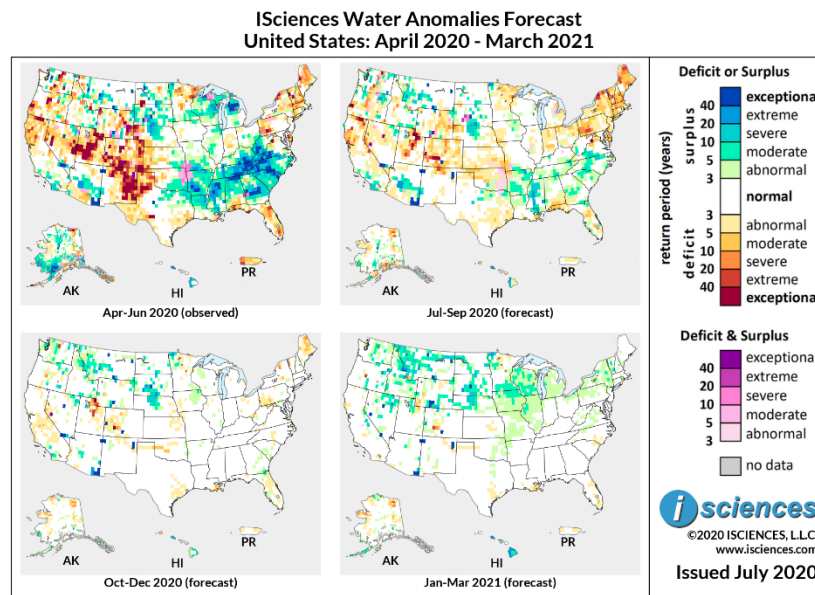
Some isolated pockets of surplus and of deficit are forecast for Idaho. In Wyoming, deficits will reach extreme intensity east of Casper, but surpluses are expected in the south-central region of the state. Deficits are predicted throughout most of Utah and Colorado and will be exceptional in some areas. Deficits of varying intensity will reach into northern and eastern New Mexico, the panhandles of Texas and Oklahoma, and will follow the path of the Arkansas River through western Kansas. Moderate surpluses are forecast from eastern Oklahoma into Texas, and moderate deficits east of San Antonio. Some surpluses are forecast in southeastern Arizona and near Phoenix.

In Northern California, intense deficits will lead from San Francisco to Sacramento, downgrading as they reach further north. Deficits will also be intense near the Oregon border and from Lake Tahoe into western Nevada. Surpluses are expected in northeastern Nevada and west of Las Vegas, and a small pocket of surplus is forecast near San Diego, California. In the Pacific Northwest, deficits are forecast for a large part of central Oregon and some small pockets down the center of Washington, with scattered surpluses elsewhere in the region.

Deficits of varying intensity are forecast in pockets of U.S. Northeast and will be widespread in Maine. Western Pennsylvania can expect severe deficits. Surpluses are forecast in parts of Virginia, the Carolinas, and in central Georgia. Moderate deficits are forecast in Florida from Jacksonville to Orlando, a few isolated pockets in the panhandle, and north of Lake Okeechobee. Deficits south of the lake will be severe.

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 from Anchorage past Valdez, east of Fairbanks, on the Seward Peninsula, and in the far northeast of the state. In Puerto Rico, moderate deficits are forecast.

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



From July through September the overall forecast indicates that surpluses will shrink and downgrade considerably in the South, Southeast, and Upper Midwest; deficits will shrink and downgrade in the Rockies and Southwest; and deficits will increase in the Northeast.

In the South and Southeast, pockets of surplus will persist, with greatest extent in Arkansas, Mississippi, southern Virginia, and the Carolinas. Surpluses will be severe to extreme in Mississippi. Deficits will shrink and moderate in Florida. In the Great Lakes Region, nearly normal conditions will return to Michigan, Wisconsin, and Illinois though some mild deficits will emerge. Some pockets of moderate deficit will emerge in the northern portion of the Ohio River Basin, and deficits will increase from Pennsylvania through the Northeast and will include intense anomalies.

Deficits in northern Minnesota will shrink and moderate. Surpluses will persist in north-central Nebraska and into South Dakota, pockets of North Dakota, and in western Montana. Though deficits will shrink and downgrade in Wyoming, Nevada, Utah, and Colorado, and retreat considerably from New Mexico, some intense pockets will persist.

In California, deficits of varying intensity will persist in the north, diminishing slightly, and surpluses will persist in the southwest. The Pacific Northwest can expect both surpluses and deficits.

From October through December, normal water conditions will return to much of the country. Some pockets of deficit will persist in the Northeast, particularly in Maine. Surpluses will persist in north-central Nebraska, central South Dakota, and pockets of North Dakota and northwestern Minnesota. Surpluses will also persist in western Montana, increasing slightly across the border into Idaho. Deficits will nearly disappear in the West, persisting with intensity in northern Utah and a small pocket in south-central Colorado. Pockets of surplus will persist in the Pacific Northwest, northeastern and southern Nevada, north of San Diego, and southeastern Arizona and near Phoenix. Some moderate deficits will persist along the Canadian River through western Oklahoma and south of New Orleans, Louisiana.

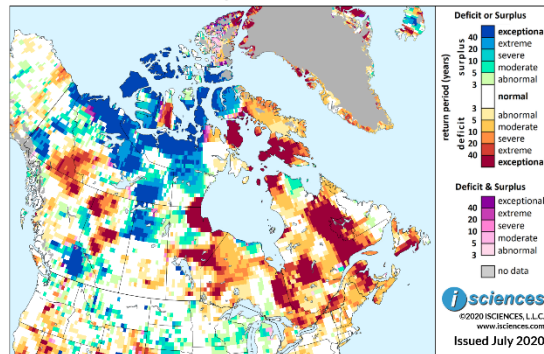
The forecast for the final months – January through March 2021 – indicates nearly normal conditions in the southern half of the U.S. and surpluses in many parts of the northern half, particularly the Upper Midwest, northern Plains States, and northern Rockies. Surpluses will emerge on the Missouri and North Platte Rivers and persist from central South Dakota into north-central Nebraska.

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

Canada

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

ISciences Water Anomalies Forecast
Canada: April 2020 - March 2021



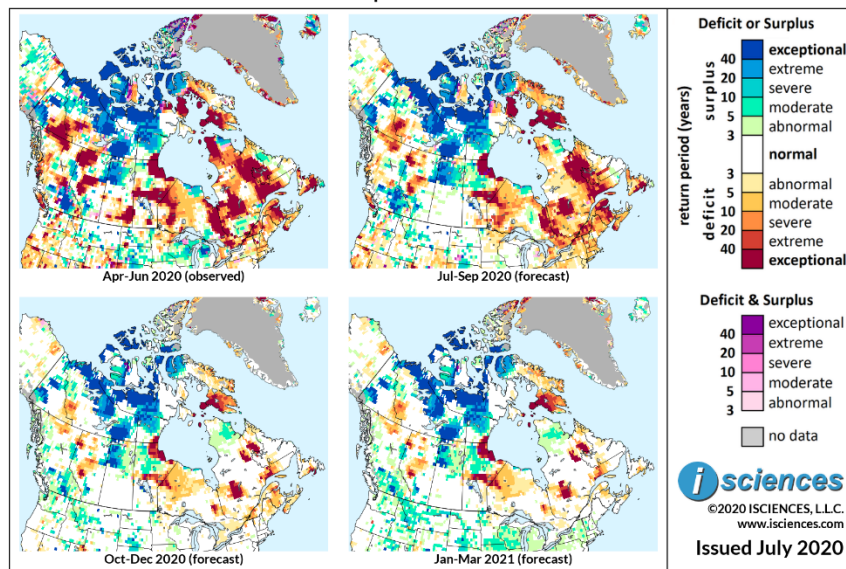
Based on observed data through June 2020 and forecasts through March 2021

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 Alberta's northwest corner. Intense deficits are also forecast for northwestern British Columbia leading well into the Yukon. Relatively small pockets of deficit will surround Winnipeg, Manitoba and Regina, Saskatchewan.

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

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

ISciences Water Anomalies Forecast
Canada: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 2021

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

The distribution pattern of anomalies forecast nation-wide through September is expected to be much like observed conditions of the prior three months with the following exceptions. Deficits in southern Saskatchewan will disappear and deficits around Winnipeg, Manitoba will downgrade but will be severe. Surpluses will increase in northwestern Manitoba. In Quebec, areas of prior surplus south of the Gouin Reservoir will transition to deficit. The extent of exceptional deficit in central and northern Alberta will shrink, and southern British Columbia surpluses will increase slightly.

From October through December, deficits will decrease overall, particularly in Quebec. Exceptional deficits will persist in some areas of the province including west of Lake Mistassini and at the mouth of the St. Lawrence River. Deficits south of the St. Lawrence in Quebec will downgrade and deficits in provinces to the east will shrink and downgrade. Deficits around Winnipeg will nearly disappear. In Alberta, deficit and surplus anomalies will shrink. In BC, deficits will disappear from Vancouver Island, nearly disappear in the center of the province, and shrink in the north. Surpluses in the southeast will downgrade.

The forecast for the final three months – January through March 2021 – indicates conditions similar to the October through December forecast.

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

Mexico, Central America, and the Caribbean

The 12-month forecast ending March 2021 indicates intense water surpluses in northeastern Sonora, Mexico at the confluence of the Batepito, Bavispe, and Yaqui Rivers, and in the Yucatan Peninsula.

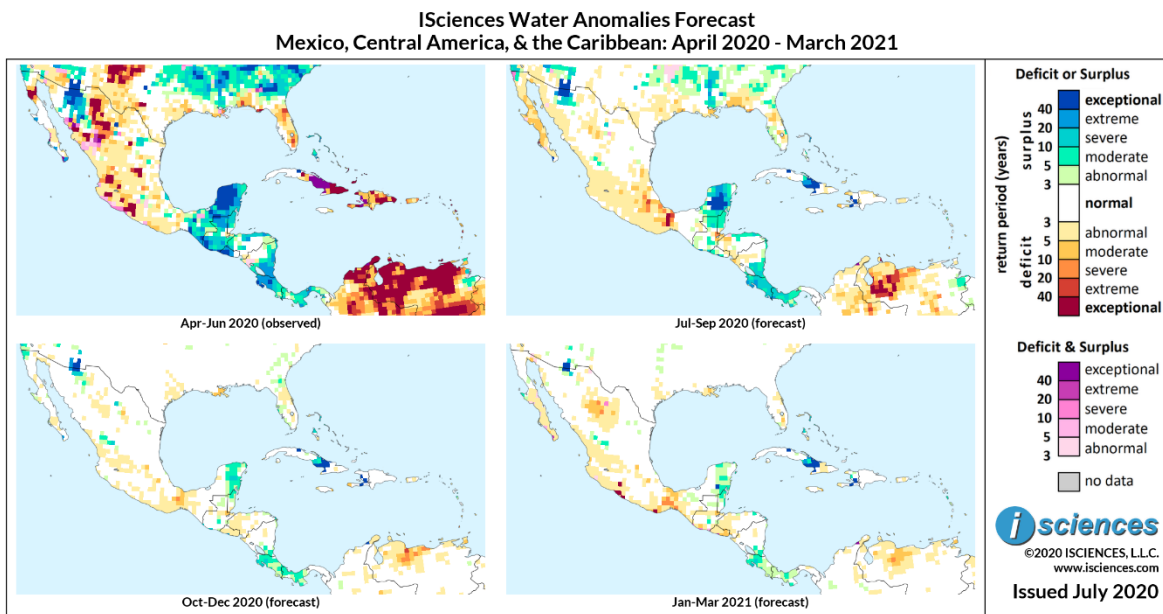
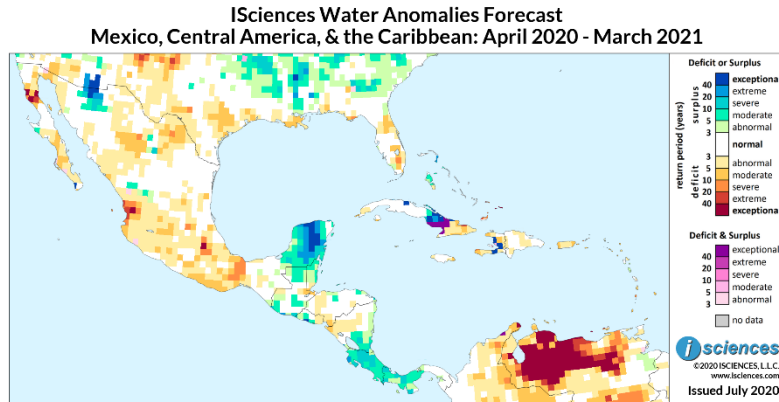
Deficits are forecast for parts of the Baja Peninsula, intense in the north and moderate in the south. Deficits are also forecast in the

north-central states of Chihuahua and Coahuila, and from Nayarit on the Pacific Coast through Oaxaca in the south. Deficits will reach exceptional intensity in Nayarit and Puebla and will be severe in Oaxaca and along the Coatzacoalcos River nearby in southern Veracruz State.

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

Deficits are expected in eastern Cuba and Turks and Caicos, surpluses in the central Bahamas.

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



The forecast through September indicates that water deficits will shrink and downgrade considerably in Mexico with conditions normalizing in much of the country's northern breadth. Surpluses of varying intensity will persist in northeastern Sonora in the region of the Batepito, Bavispe, and Yaqui Rivers. Moderate deficits will emerge in the Baja Peninsula, and deficits of varying intensity in southern Mexico from Mexico City through Oaxaca and southern Veracruz State. Deficits will be especially intense along the Coatzacoalcos River in Veracruz and nearby in Oaxaca. Surpluses reaching exceptional intensity will persist in the Yucatan Peninsula.

In Central America, surpluses will shrink leaving pockets of moderate intensity in Guatemala, Belize, El Salvador, and northern Honduras. Severe surpluses are forecast for southern Nicaragua, Costa Rica, and western Panama. Deficits in the Caribbean will nearly disappear, and some surpluses are forecast.

From October through December, normal conditions are forecast for much of Mexico. Surpluses will shrink in northeastern Sonora, shrink and moderate in the Yucatan, and intensify in a pocket of southern Durango into Zacatecas. Moderate to severe deficits will linger in a small pocket of Oaxaca, and deficits will moderate along the Coatzacoalcos River in Veracruz. Conditions in much of Central America and the Caribbean will normalize though moderate surpluses will persist in Costa Rica, western Panama, and a few other pockets in the region.

The forecast for the final three months – January through March 2021 – indicates that deficits will emerge in southern Chihuahua, Mexico, and pockets along the Pacific Coast north of Acapulco; and will increase in Oaxaca. Some pockets of surplus will persist in Sonora, Zacatecas, the Yucatan, Central America, and the Caribbean. Moderate deficits will emerge in El Salvador.

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

South America

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

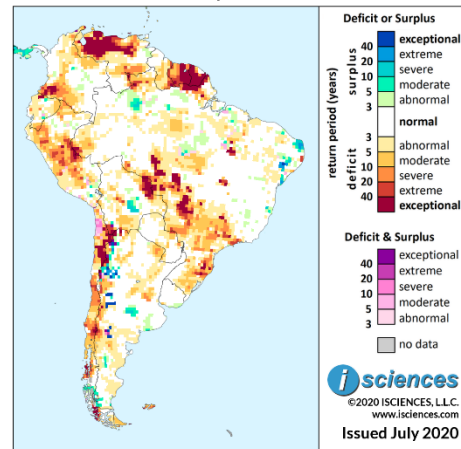
Pockets of deficit are forecast across the northern arc and will be exceptional in southwestern Colombia, northern Venezuela, Suriname, and French Guiana.

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

In the southern portion of the continent, deficits are forecast throughout much of Chile, reaching across the border into Argentina in many areas. Anomalies will be severe in Valparaiso and Santiago, Chile. The forecast for Argentina also includes surpluses in the northwestern province of La Rioja, northern La Pampa Province, and the Southern Patagonian Ice Fields. Moderate to severe deficits are expected in the Gran Chaco area of northeastern Argentina and in Córdoba and Santa Fe Provinces in the Pampas.

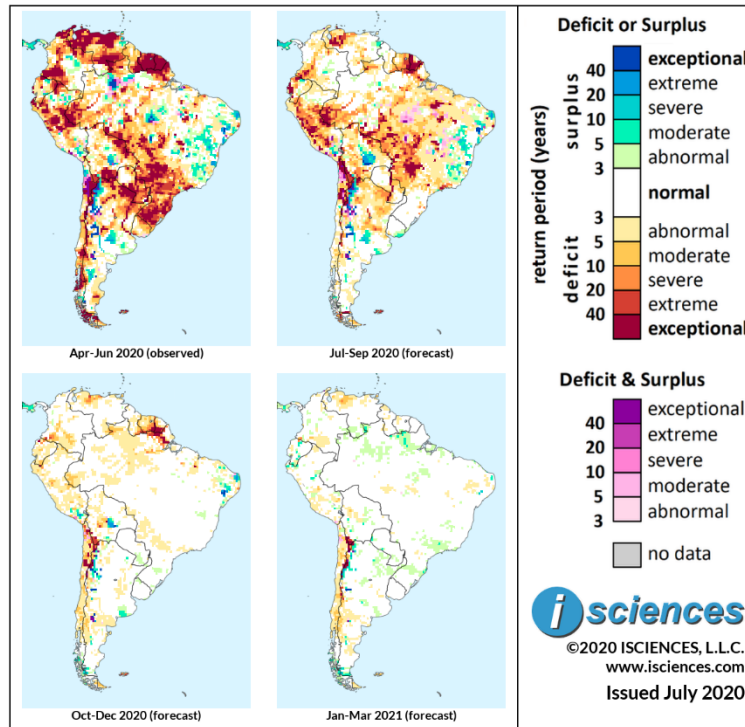
The 3-month maps (below) for the same 12-month period show the evolving conditions in greater detail.

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



Based on observed data through June 2020 and forecasts through March 2021

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



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that, though deficits will shrink, many areas of significant deficit are expected. Nearly normal conditions will return to some areas in the northern nations, the northern Brazilian Amazon, southern Brazil, Paraguay, Uruguay, and Chile's southern two-thirds. Vast areas of deficit are forecast, however, throughout much of Peru, in the western and southern Amazon Basin in Brazil and the states of Mato Grosso and Mato Grosso do Sul, and northern Chile. Anomalies will be severe to exceptional in many of these regions. Surpluses will persist in eastern Brazil but diminish in the center of the country as widespread, primarily mild to moderate deficits emerge.

Intense deficits are also forecast for western Ecuador, northwestern Venezuela, Suriname, French Guiana, and along the Paraguay River through its namesake. Deficits in northern Argentina will downgrade. Surpluses will increase in central Bolivia, persist in the central Argentine Pampas and the country's northwestern provinces, and emerge in southern Buenos Aires Province and in coastal Uruguay.

From October through December, water conditions will normalize on much of the continent. Intense deficits are forecast, however, for Suriname, French Guiana, and nearby Amapá in Brazil, as well as pockets of northern Chile and Bolivia's southern tip. Deficits of lesser intensity are predicted for north-central Venezuela, southern Colombia, pockets of Ecuador and Peru, Acre (Brazil), Cochabamba (Bolivia), and central Chile. Some surpluses will persist in Brazil's eastern tip and surpluses are also forecast for a pocket in southern Peru, central Bolivia, northwestern Argentina, and southern Buenos Aires Province.

In the final quarter – January through March 2021 – normal conditions are forecast for much of the continent. Intense deficits will persist in southern Bolivia, moderate deficits in pockets of Chile and in northwestern Venezuela. Surpluses will nearly disappear in Brazil’s eastern tip but will emerge in scattered, small pockets in the north and south, and elsewhere on the continent.

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

Europe

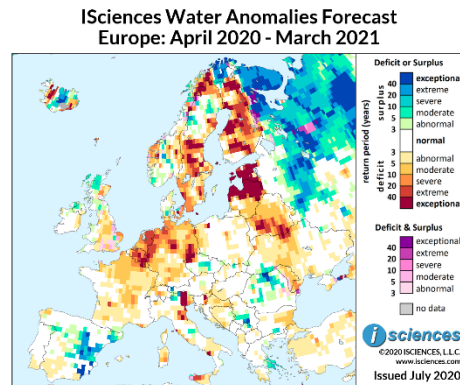
The 12-month forecast through March 2021 indicates water deficits of varying intensity in many regions of Europe. Deficits will be especially widespread and intense around the Baltic Sea including Estonia, Latvia, Finland, and Sweden.

From the Baltic Sea, a broad path of deficit conditions is expected from Lithuania through Belarus, Ukraine, and Moldova, sparing Romania but present in eastern Bulgaria. Anomalies will be moderate overall but much more intense in Belarus' southern half and severe in the southern tip of Ukraine.

Widespread deficits are forecast from France through Belgium, the Netherlands, and Germany and will include severe to exceptional anomalies in Belgium, Netherlands, and many pockets in northern Germany. Deficits are also forecast for central Switzerland, eastern Slovenia, and eastern Croatia. In Italy, deficits will be exceptional near Venice and in the Dolomite Mountains, and of varying intensity around Bologna, south of Naples, and pockets of Sicily and Sardinia.

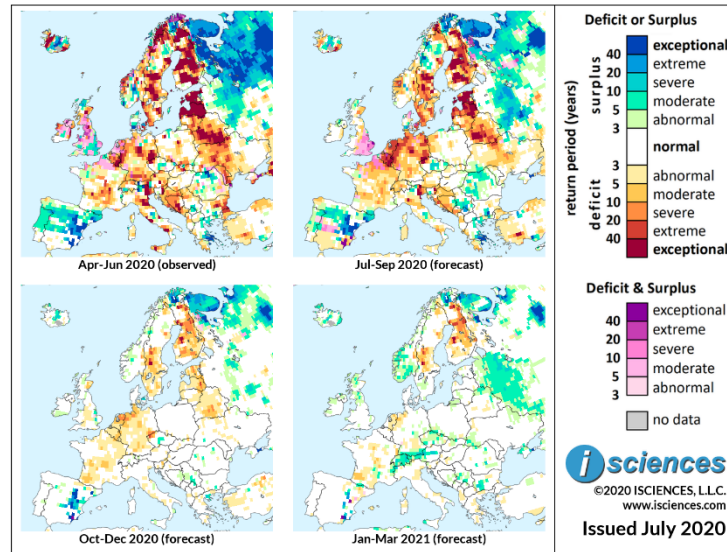
In the U.K., some primarily moderate deficits are forecast in England along with transitional conditions. Surpluses are forecast in the Scottish Highlands. Other areas of surplus include central Czech Republic, Romania into Ukraine, southern Serbia into Kosovo, southeastern Greece around Athens, and much of eastern Spain. Widespread surpluses are expected in northern European Russia.

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



Based on observed data through June 2020 and forecasts through March 2021

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



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates a distribution pattern of anomalies similar to the prior three months of observed data. Intense deficits will persist around the Baltic Sea and with slightly lesser intensity through Belarus but will shrink and downgrade in Ukraine and nearly disappear from Moldova. Deficits will increase in France but will be primarily moderate, while anomalies will intensify in Belgium, Netherlands, and northern Germany. Other areas of deficit include Switzerland, Austria, Balkan nations along the northern Adriatic Sea, and several pockets in Italy. Transitional conditions are predicted for northern France and England. Surpluses will downgrade in European Russia; shrink on the Iberian Peninsula; increase in Czech Republic, Romania, and southern Serbia; intensify in Kosovo; and persist along Greece’s Aegean Sea coast, remaining intense near Athens.

From October through December deficits will shrink considerably and downgrade, leaving many areas of Europe with nearly normal conditions. Severe to extreme deficits will persist in Finland and central Sweden, and primarily moderate to severe deficits in Estonia, Latvia, Belarus, Netherlands and nearby in Germany. Some mild to moderate deficits will linger in France and Belgium. Surpluses will shrink and downgrade, too, leaving fairly intense anomalies in eastern Spain and northern European Russia. Some scattered, small pockets of moderate surpluses are forecast in Czech Republic, Serbia, and a few other areas.

The forecast for the remaining months – January through March 2021 – indicates deficits in Finland and central Sweden, and surpluses in Russia, southern Norway, Switzerland and surrounding regions, and pockets in the northern Balkan Peninsula and eastern Spain.

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

Africa

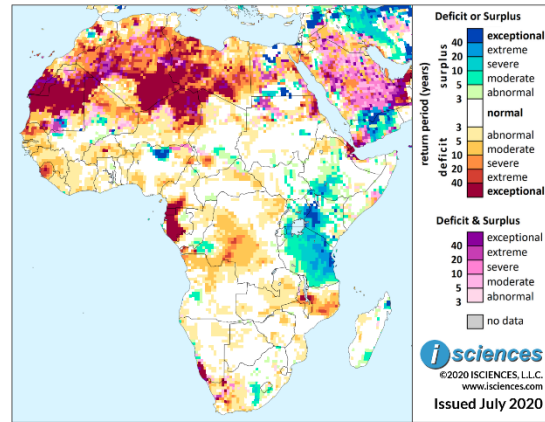
The 12-month forecast through March 2021 indicates intense water deficits across much of North Africa, including exceptional anomalies, and mixed conditions in Egypt. Exceptional deficits are also forecast from Equatorial Guinea into southeastern Cameroon and western Gabon, and in southwestern Namibia, central Malawi, and Djibouti.

Deficits of varying intensity are expected in parts of West Africa and will be extreme in Senegal and Guinea. Deficits elsewhere include eastern Central African Republic, northwestern Ethiopia, the central Congo River Basin, northern Angola, northern Mozambique, and Northern and Western Cape in South Africa.

Widespread surpluses are expected in East Africa that will be especially intense in western Kenya, and surpluses are forecast for southern Ethiopia and the White Nile. Elsewhere, surpluses are expected in northern Nigeria, the capital regions of the Congos, west-central Angola, South Africa from southern Orange Free State into Eastern Cape, and a few pockets in eastern Madagascar.

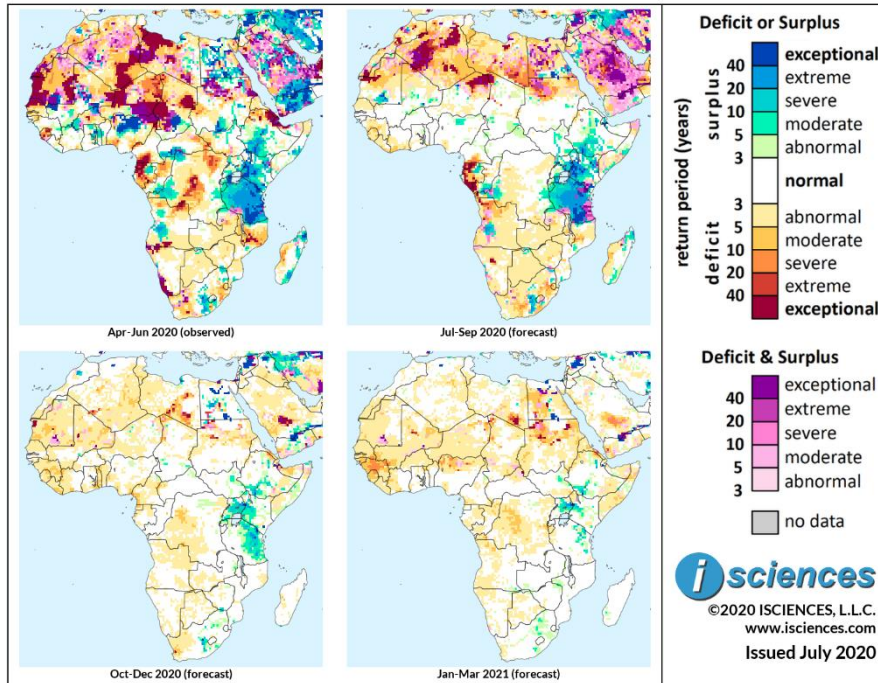
The 3-month maps (below) show the evolving conditions in greater detail.

ISciences Water Anomalies Forecast
Africa: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 2021

ISciences Water Anomalies Forecast
Africa: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that deficits in North Africa will shrink and downgrade from Mauritania through Chad but persist in nations to the north with exceptional deficits in Algeria, severe deficits emerging in southeastern Libya, and transitional conditions in Egypt. Nearly normal conditions, along with some pockets of surplus, are forecast for the Sahel and in central African nations.

Exceptional deficits are forecast in Equatorial Guinea and western Gabon, downgrading as they reach into neighboring countries to the north and south. Severe deficits are expected in northern Angola, in Swaziland and nearby regions of South Africa, and parts of Eastern and Northern Cape. Relatively mild deficits are predicted for coastal West Africa, much of southern Africa, and western Madagascar.

Surpluses in East Africa will remain widespread, particularly in Tanzania and western Kenya where anomalies will be extreme to exceptional. Surpluses will downgrade slightly in southern Ethiopia but emerge in the north and in Djibouti while exceptional deficits retreat from northern Ethiopia and 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 into central Eastern Cape.

From October through December, anomalies will shrink and downgrade, leaving many parts of Africa with nearly normal conditions. Surpluses of reduced extent and intensity will persist in Tanzania, Kenya, Uganda, and Ethiopia. Some surpluses will also persist from Orange Free State into Eastern Cape, South Africa, and surpluses will re-emerge in pockets of Egypt. Generally mild deficits are forecast for West Africa and deficits of greater intensity are expected in southeastern Libya. Deficits will emerge in southern Eritrea and a pocket north of Cape Town, South Africa.

The forecast for the final quarter – January through March 2021 – indicates some significant deficits in southeastern Libya, Egypt, Sudan, Eritrea, Guinea Bissau, Guinea, Sierra Leone, and northern Nigeria. Surpluses in East Africa will continue to shrink, persisting primarily in Uganda.

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

Middle East

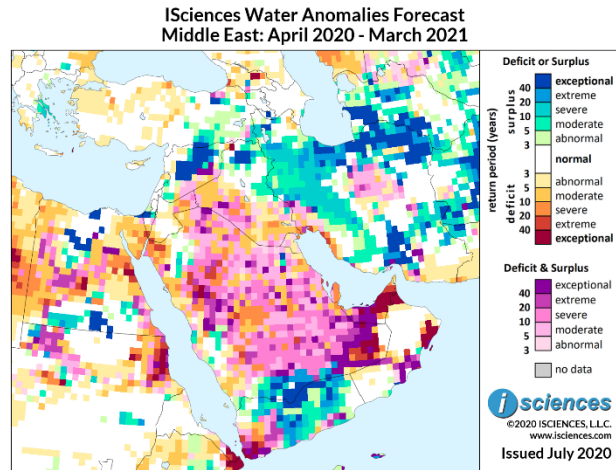
The forecast for the 12-month period ending March 2021 indicates widespread persistent water surpluses from Syria through northern Iraq and many regions of Iran.

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, though deficits will trace the northeastern coast of the Persian Gulf. 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. 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.

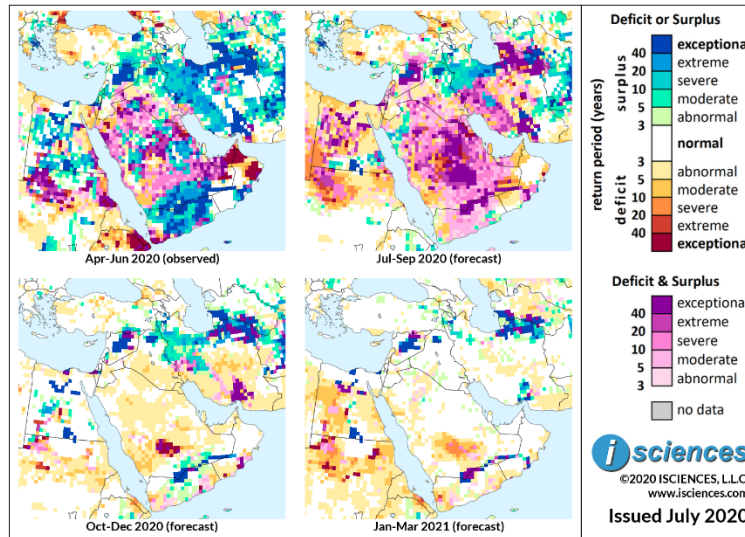
On the Arabian Peninsula, a patchwork of deficits or transitional conditions is forecast for much of Saudi Arabia with severe deficits in central Riyadh Province and exceptional deficits in the nation's southeast corner. Deficits will be also be intense in the eastern half of United Arab Emirates. Surpluses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

Turkey can expect primarily mild deficits in its western half and pockets of surplus in the east. 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: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that widespread surpluses in the region will shrink as transitions begin. Conditions in Syria will be transitional with some surpluses persisting in the north. Surpluses will persist in Iraq east of the Euphrates, across northwestern Iran and around the Caspian Coast. Anomalies will remain exceptional around Mosul and extreme to exceptional around Tehran. Deficits will emerge in the vast bulk of central Iraq, leaving areas of former surplus in transition, but surpluses will persist in pockets of Isfahan, Kerman, and Sistan and Baluchestan Provinces.

The forecast for the Arabian Peninsula is complicated. Deficits will emerge in Saudi Arabia but much of the nation will be in transition. Deficits will moderate in the United Arab Emirates, and moderate deficits will emerge in Qatar. Yemen will begin transitioning from surplus, with moderate deficits emerging in the west. In Oman, deficits will shrink and downgrade in the east and emerge in the west. Deficits are forecast for Georgia and pockets of central and western Turkey, while transitions are forecast in southeastern Turkey.

From October through December, widespread transitional conditions will resolve into normalcy or mild to moderate deficit in much of Saudi Arabia, Iraq west of the Euphrates, and in the bulk of central Iran. However, deficits will be exceptional in southern Riyadh Province, Saudi Arabia. Surpluses will increase in northern Syria, persist with intensity around Mosul, shrink and downgrade somewhat in northwestern Iran, and re-emerge in the northeast. Surpluses are also expected to re-emerge along the border of Saudi Arabia, Yemen, and Oman, and will be exceptional. Deficits in Georgia will moderate.

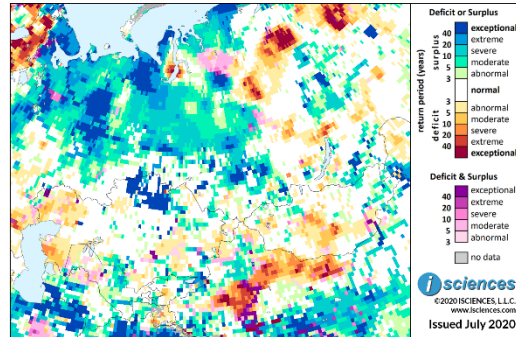
In the final quarter – January through March 2021 – deficits will downgrade in southern Riyadh. Surpluses will persist in northern Syria and around Mosul, continue to shrink in northwestern Iran, and continue to re-emerge in northeastern Iran. Surpluses will also re-emerge near the Strait of Hormuz.

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

Central Asia and Russia

The 12-month forecast through March 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. Surpluses are forecast in the Volga River Basin that will be moderate along the lower course of the river and in the middle region of the basin but intense in Trans Volga and the upper basin.

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



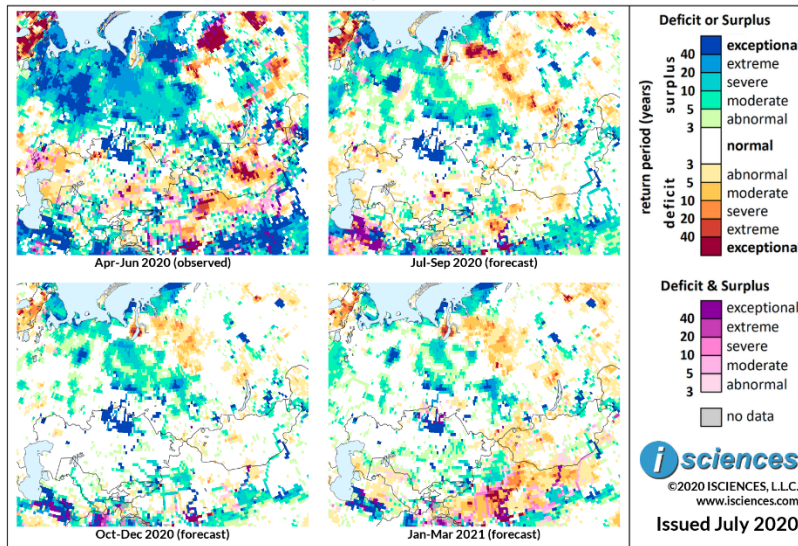
Based on observed data through June 2020 and forecasts through March 2021

Intense deficits are forecast on the central banks of the Gulf of Ob; in the region of the Nizhnyaya Tunguska River, a northern right tributary of the Yenisei River; surrounding the Bolshaya Kuonamka and Olenyok Rivers in northern Siberia; north of Lake Baikal; and along the East Siberian Sea.

Deficits are forecast in western Kazakhstan and pockets of eastern Tajikistan. Intense surpluses are expected in northern Kazakhstan and from the Iran-Turkmen border into western Turkmenistan. Surpluses of varying intensity are forecast from central Uzbekistan into southern Kazakhstan and 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: April 2020 - March 2021



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that surpluses in Russia from the Northern European Plain through the Western Siberian Plain will shrink and downgrade but remain widespread. Exceptional anomalies will persist in the Vychegda Lowland and on the Severnaya Dvina River. Conditions will normalize on the Lower Volga River and surpluses will shrink and downgrade in the Volga Basin. Intense deficits will emerge on the central shores of the Gulf of Ob and in the Lower Yenisei River region with deficits of varying intensity increasing in much of the remaining Yenisei Basin.

In Kazakhstan, intense surpluses will persist in the north. Deficits will shrink in the west leaving some moderate anomalies in the Ural River Basin; deficits will also shrink west of Lake Balkhash while surpluses persist southeast of the lake. Some surpluses will persist in Turkmenistan but transitional conditions are also forecast. Surpluses will diminish in Uzbekistan and western Tajikistan, and some moderate deficits are expected in eastern Tajikistan. Surpluses will persist in pockets of Kyrgyzstan and will be intense in the east.

From October through December, surpluses will remain widespread in the vast Ob River Watershed in Russia but will shrink and downgrade overall in European Russia, though intense surpluses will persist in the Vychegda Lowland. Intense deficits will persist on the central shores of the Gulf of Ob but deficits in the Yenisei River Basin and north of Lake Baikal will downgrade, as will deficits along the East Siberian Sea. In Kazakhstan, deficits will nearly disappear, intense surpluses will persist in the north, and moderate surpluses will emerge along the Ile River in the southeast. Moderate surpluses will also emerge on the Amu Darya River in Uzbekistan. Exceptional surpluses will re-emerge in southwestern Turkmenistan and persist along the southern border. Surpluses will increase in northern Tajikistan and persist in several regions of Kyrgyzstan.

The forecast for the final months – January through March 2021 – indicates that surpluses will retreat from the Amu Darya River and shrink in the middle region of Russia's Ob River Basin. Deficits will increase somewhat in the Yenisei River Basin.

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

South Asia

The 12-month forecast through March 2021 indicates water surpluses in western India from Gujarat reaching through eastern Rajasthan and into pockets of Uttar Pradesh, and encompassing much of Madhya Pradesh, Maharashtra, and Goa. Surpluses but will be severe to extreme in most of Gujarat.

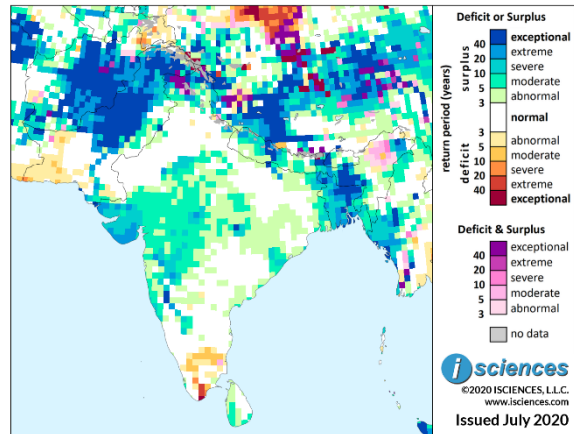
Surpluses will also reach south in a narrow path down the center of Karnataka and will be exceptional in a small pocket on the state's northern border. Surpluses are forecast for Odisha on the Bay of Bengal and for Indian regions bordering Bangladesh. Anomalies will be exceptional in western Assam and Meghalaya. In southern India, deficits are expected in Tamil Nadu. In Sri Lanka, some moderate surpluses are forecast.

Extreme to exceptional surpluses are expected in much of Pakistan's northern two-thirds with extreme anomalies reaching south along the Indus River. Mild deficits are forecast in the southwest. Surpluses will be extreme to exceptional in much of Afghanistan as well, encompassing Kandahar, Kabul, Mazar-e Sharif, and tracing the paths of the Helmand and Harirud Rivers.

Surpluses are forecast for Bangladesh, Nepal, and Bhutan, and will be especially widespread and intense in Bangladesh.

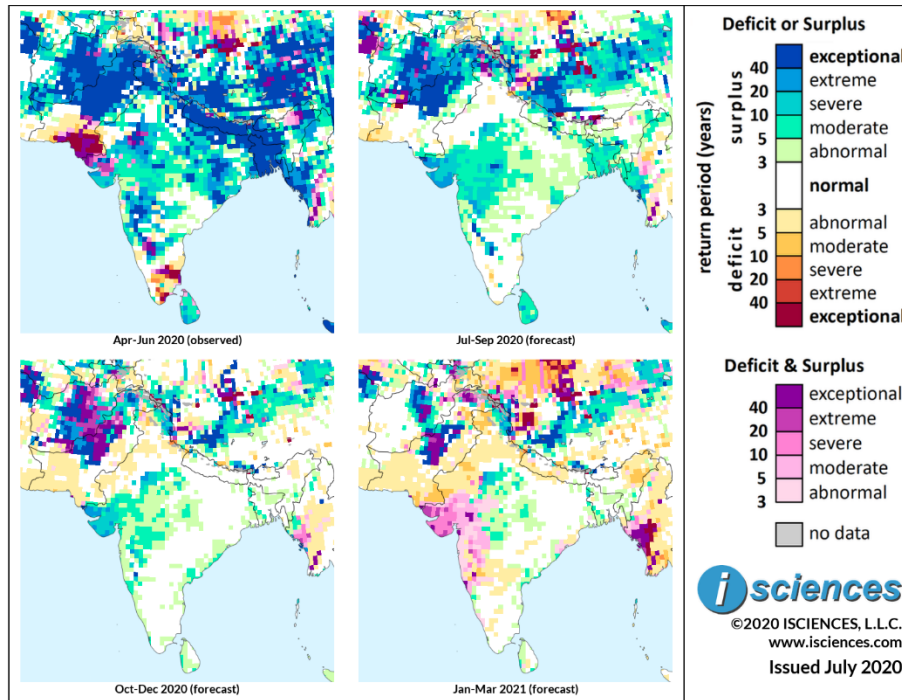
The 3-month composites (below) show the evolving conditions in greater detail.

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



Based on observed data through June 2020 and forecasts through March 2021

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



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that surpluses in the region will shrink but remain widespread. Nearly normal conditions are forecast in northwestern, southern, and parts of eastern India. Surpluses will persist in western and central India with severe to extreme anomalies re-emerging in northern Gujarat joining those in the south half of the state. Surpluses will persist in a path down the center of Karnataka and will moderate in southeastern Odisha, regions bordering Bangladesh, and a pocket of the Far Northeast. Surpluses will be moderate to severe in Bangladesh, of varying intensity in Nepal, and generally moderate in Sri Lanka. In Afghanistan and Pakistan, surpluses are expected to shrink and downgrade slightly but will remain widespread and intense. Deficits in southern Pakistan will nearly disappear.

From October through December, surpluses will shrink but persist in western and central India with severe and extreme anomalies in Gujarat. Nearly normal conditions are expected in Nepal, Bhutan, Bangladesh, and Sri Lanka, with moderate surpluses along a path down western Bangladesh. Widespread surpluses in Afghanistan and Pakistan will begin to transition but many areas of extreme to exceptional surplus will persist.

The forecast for the final months – January through March 2021 – indicates pockets of moderate to severe surplus in central India and transitional conditions in Gujarat. Surpluses in Pakistan and Afghanistan will shrink and transition. Mild to moderate deficits will emerge in Pakistan, northwestern India, and India's Far Northeast.

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

Southeast Asia and the Pacific

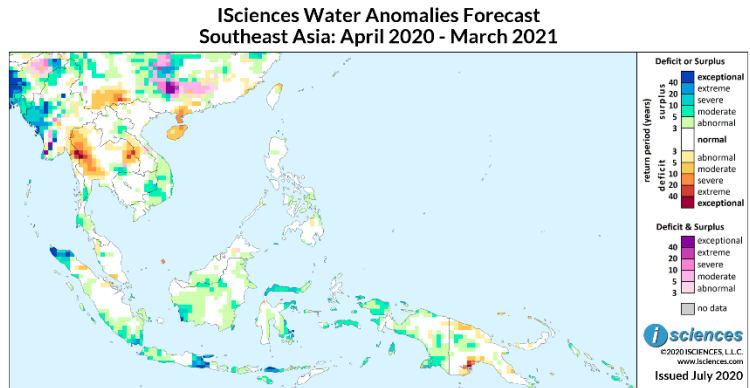
The 12-month forecast through March 2021 indicates moderate to extreme deficits in much of western Thailand reaching across the border into southern Myanmar. Deficits of similar intensity are forecast for eastern Thailand spanning the Mekong River into Laos.

Surpluses of varying intensity are forecast west of the Irrawaddy River in Myanmar. Moderate surpluses are expected in eastern Cambodia and pockets of Vietnam from Da Nang to Ho Chi Minh City; a pocket in southeastern Thailand and pockets in the peninsular regions of Thailand and Myanmar; and northeastern Laos.

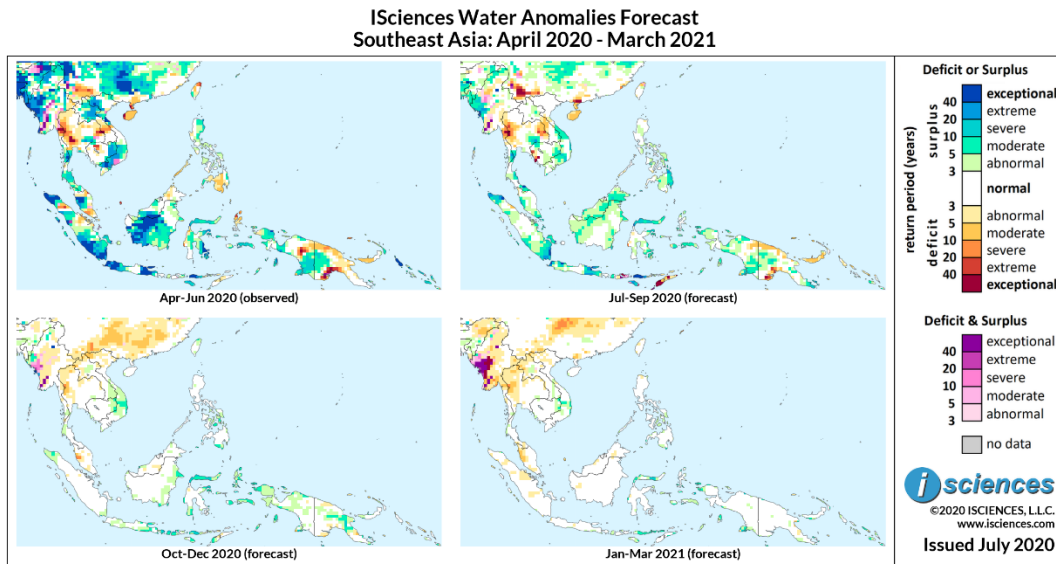
Surpluses are also forecast in many pockets of Indonesia. Anomalies will be intense in Aceh Province in northern Sumatra and in eastern Java and Flores Island. Other areas with a forecast of surplus include pockets of Borneo, southern Sumatra and western Java, northern and eastern Sulawesi, many small Indonesian islands, and the Bird's Head Peninsula (Doberai Peninsula) and other areas in Papua, Indonesia.

In Papua New Guinea, intense deficits are expected around the Gulf of Papua, moderate deficits along the northern coast, and moderate surpluses in the central Highlands. 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 June 2020 and forecasts through March 2021



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that surpluses will shrink and downgrade overall but persist in many areas. In Southeast Asia, surpluses are forecast for western and northern Myanmar; pockets in the Malay Peninsula; southeastern Thailand south of the Mun River; from eastern Cambodia into southeastern Vietnam; and central Vietnam. Deficits ranging from moderate to exceptional will persist in west-central Thailand reaching into Myanmar's Kayin State, and in northeastern Thailand. Nearby in central Laos, deficits will be moderate. A prior pocket of intense deficit in Cambodia north of Tonlé Sap will transition to surplus, but some pockets of exceptional deficit will emerge to the west near the coast.

Surpluses are forecast in many pockets of Malaysia and Indonesia. Anomalies will be intense at each end of Sumatra and Java and on Flores Island. Intense deficits will emerge on Timor Island. Deficits will shrink and downgrade on New Guinea but remain intense along the western shore of the Gulf of Papua in Papua New Guinea; surpluses are forecast for many other regions on the island. In the Philippines, surpluses will retreat from most of Luzon but increase in Mindanao with moderate anomalies in the east and mild surpluses emerging in the west in prior areas of deficit.

From October through December, water conditions in many parts of the region will normalize. Some generally mild deficits are expected in central Myanmar, western Thailand, and Vietnam's northwestern corner. Moderate surpluses are forecast for Vietnam's Central Highlands. Nearly normal conditions are expected in much of Malaysia, Indonesia, the Philippines, and Papua New Guinea, though pockets of surplus are forecast in the smaller islands of Indonesia and on New Guinea. Deficits will nearly disappear in Papua New Guinea.

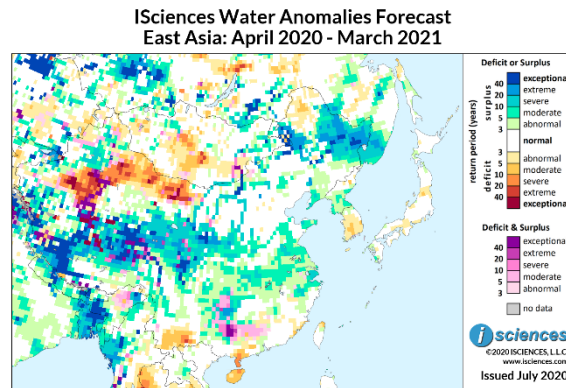
The forecast for the final months – January through March 2021 – indicates that deficits, generally mild to moderate, will increase somewhat, particularly in Southeast Asia. Some scattered, small pockets of surpluses are forecast, primarily in the smaller islands of Indonesia.

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

East Asia

The 12-month forecast for East Asia through March 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 to severe in the lower and middle watershed, but more intense in the upper reaches.



Based on observed data through June 2020 and forecasts through March 2021

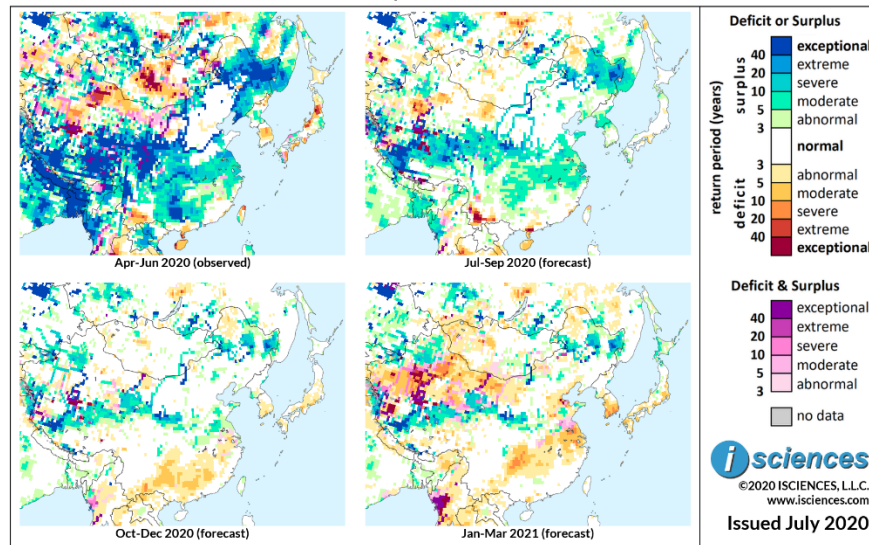
Surpluses are also expected in the Pearl River Basin (Zhujiang River) in southern China and will be extreme in Guizhou, though conditions of both surplus and deficit are expected in surrounding regions as transitions occur. Farther south in peninsular Guangdong, severe deficits are forecast and moderate deficits in nearby Hainan. Deficits are also expected in southern Yunnan. Surpluses are forecast for western Tibet (Xizang) and 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 west into Xinjiang through the center of the Taklimakan Desert. Some conditions of both deficit and surplus (pink/purple) are also expected in Xinjiang as transitions occur. Deficits of varying intensity are forecast for central Mongolia, and pockets of surplus in the west and far east. Northeast China can expect widespread surpluses of varying intensity.

On the Korean Peninsula, moderate surpluses are forecast in the north and moderate deficits in the south. Nearly normal conditions are expected in Japan.

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

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



Based on observed data through June 2020 and forecasts through March 2021

The forecast through September indicates that surpluses in China will shrink and downgrade overall but remain widespread. In the Yellow River Watershed, surpluses will moderate in the lower region, will downgrade but be severe along the Ordos Loop and in much of the upper region, and will be exceptional in southern Gansu. Surpluses will emerge on the Shandong Peninsula. In the lower and middle regions of the Yangtze River Watershed, surpluses are expected to moderate overall though severe anomalies will persist in Shanghai. Along the Upper Yangtze River (Tongtian River) and in much of Qinghai, surpluses will be intense. Surpluses will retreat from the Pearl River Basin and shrink and downgrade in Tibet and Northeast China though remain widespread.

Deficits will shrink in western Inner Mongolia, Mongolia, and Xinjiang, but in southern China deficits will intensify in southern Yunnan and southern Guangdong.

Conditions will normalize in South Korea, surpluses will increase in North Korea, and nearly normal water conditions are forecast for Taiwan and Japan.

From October through December, near-normal conditions are forecast for many regions in East Asia. Surpluses will shrink and downgrade in China, persisting from northern Anhui into Shandong in the east; in Shaanxi, southern Gansu, and Qinghai; central Tibet; and large pockets of Northeast China. Deficits will nearly disappear in Mongolia, western Inner Mongolia, and Xinjiang, but widespread moderate deficits will emerge in southern China. Nearly normal conditions are forecast for Taiwan, some surpluses in coastal North Korea and some mild deficits in the south and in Japan.

The forecast for the final three months – January through March 2021 – includes widespread deficits in northwestern China, the Lower and Middle Yangtze River Basin, and South Korea. Surpluses will persist in Northeast China and parts of the Yellow River Basin and Tibet.

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

Australia & New Zealand

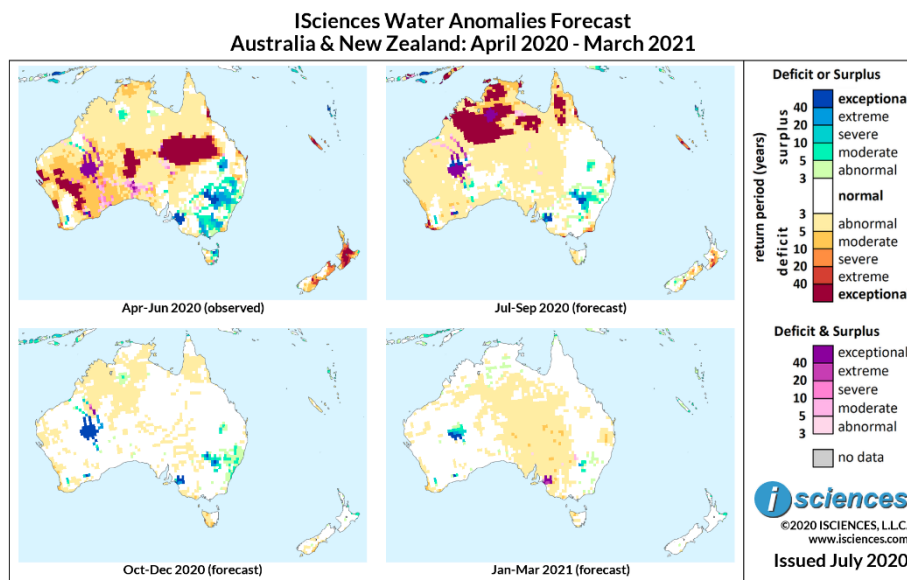
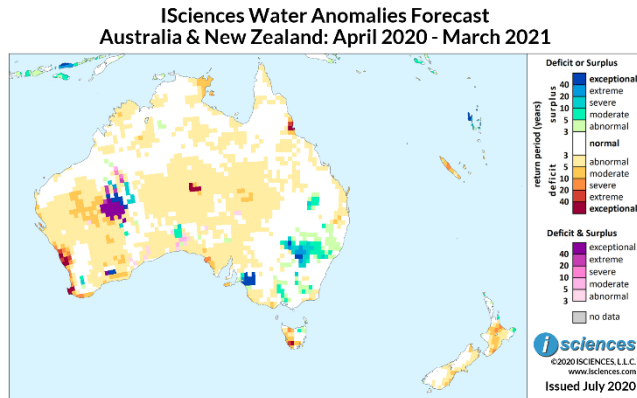
The 12-month forecast through March 2021 indicates surpluses in the central region of the Murray-Darling Basin in southeastern Australia and at the mouth of the Murray. Surpluses will be severe to exceptional in New South Wales between the Lachlan and Macquarie Rivers, and exceptional in South Australia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

Tasmania can expect some surpluses in the northeast, but deficits are forecast in the west and will be intense around Lakes Pedder and Gordon.

In Queensland, surpluses are forecast in the northwest corner of the Darling Downs and a small pocket of intense deficit is forecast on the northeast coast south of Cairns. Moderate deficits are forecast in Arnhem Land, Northern Territory; intense deficits south of Alice Springs in the center of the nation; and intense deficits along the southwest coast of Western Australia. Surpluses along with transitional conditions are expected in the Gibson Desert with moderate deficits to the west.

Moderate to severe deficits are expected in North Island, New Zealand, particularly north of Lake Taupo, and a few pockets of moderate deficit in South Island. Severe deficits are forecast for New Caledonia.

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



The forecast through September indicates the emergence of exceptional deficits in vast blocks of northern Australia from the Kimberley region and eastern Great Sandy Desert in the west into Northern

Territory (NT) and spanning its northern border with Queensland (QLD). Exceptional deficits will also emerge in QLD's Far North while prior exceptional deficits across the center of the state will disappear.

Widespread surpluses in southeastern Australia will shrink, persisting in the central Murray-Darling Basin in New South Wales (NSW). Surpluses will be extreme to exceptional between the Lachlan and Macquarie Rivers, and intense surpluses will persist between the mouth of the Murray in South Australia (SA) and the Victoria (VIC) border. Surpluses in the northwest Darling Downs of QLD will shrink and moderate. Deficits will intensify in VIC's eastern tip and along the coast west of Melbourne. Anomalies in Tasmania (TAS) will shrink.

In the western reaches of the nation, transitional conditions are forecast west of the Gibson Desert in Western Australia (WA) and along rivers leading north. Prior widespread deficits in WA will retreat but deficits along the state's southwest coastal tip will increase.

In New Zealand, deficits will shrink and downgrade overall but remain intense in North Island's southern regions and in South Island between Christchurch and Dunedin. A pocket of moderate surplus is forecast near Lake Wakatipu in the Southern Alps. The extent of exceptional deficits will shrink in New Caledonia, but anomalies will be intense.

From October through December, much of Australia will return to normal conditions with intense deficits retreating completely. In the Murray-Darling Basin surpluses will persist, shrinking slightly in the Riverina region but emerging in some moderate pockets near Sydney. Surpluses in Darling Downs, QLD will shrink. At the mouth of the Murray intense surpluses will persist, and in the west exceptional surpluses will re-emerge at the western edge of the Gibson Desert and, with lesser intensity, along several rivers leading north and a path to the south. A slight uptick in moderate deficits is forecast for TAS. Conditions in New Zealand and New Caledonia will become nearly normal.

The forecast for the final months – January through March 2021 – indicates that surpluses will shrink and mild deficits will emerge down the center of Australia. Nearly normal conditions are expected in TAS, New Zealand, and New Caledonia.

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