Government of **Western Australia**
Department of **Water and Environmental Regulation**

June 2021 Rainfall and Streamflow Summary

- The month of June was second coldest on record in Western Australia as a whole (BoM) and relatively wet across the South West Land Division (SWLD).
- Three locations along the south east coast (Pallinup River at Bull Crossing, Pallinup River at Ongerup and Salmon Gums) had their wettest June rainfall for 30 years. Denmark received 106 mm of rain in one day (21st of June) and extensive flooding was reported between Denmark and Albany.
- Most sites (26 of the 36 reference stations) recorded average (15 sites), above average (6 sites) or well above average (5 sites) rainfall. Ten reference locations were below average: seven stations reported below average rainfall, while three at Kelleberrin, Hotham River and Katanning were well below average.
- Kellebrrin was the only reference station to record below average rainfall for the first six months of the year. All other selected sites in the SWLD recorded average (10 sites), above average (9 sites) or well above average (16 sites) rainfall for the year to date.
- Only two sites (Gingin Brook and Harvey River) experienced below average streamflow conditions in June. The remaining 17 sites recorded average (10 sites), above average (2 sites) or well above average (5 sites) flows.
- Streamflow totals at Gingin Brook and Harvey River are tracking below average over the January to June period. The remaining seventeen reference sites had average (9 sites) or above average (5 sites) or well above average (3 sites) for the first six months of the year.
- The BoM and DPIRD forecasts differ slightly for the July to September period. The DPIRD forecast indicates average to below average conditions are more likely (less than 40% chance of exceeding median rainfall). While the BoM outlook indicates average conditions are more likely with a 45-75% chance of exceeding median rainfall.

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Monthly and year-to-date rainfall and streamflow

We track 36 rainfall sites and 19 streamflow sites across the South West Land Division (SWLD) as part of the seasonal response framework. Each site is chosen in relation to specific management priorities in the Department. The base period used for the rainfall and streamflow deciles is 1975 to 2020.

Rainfall

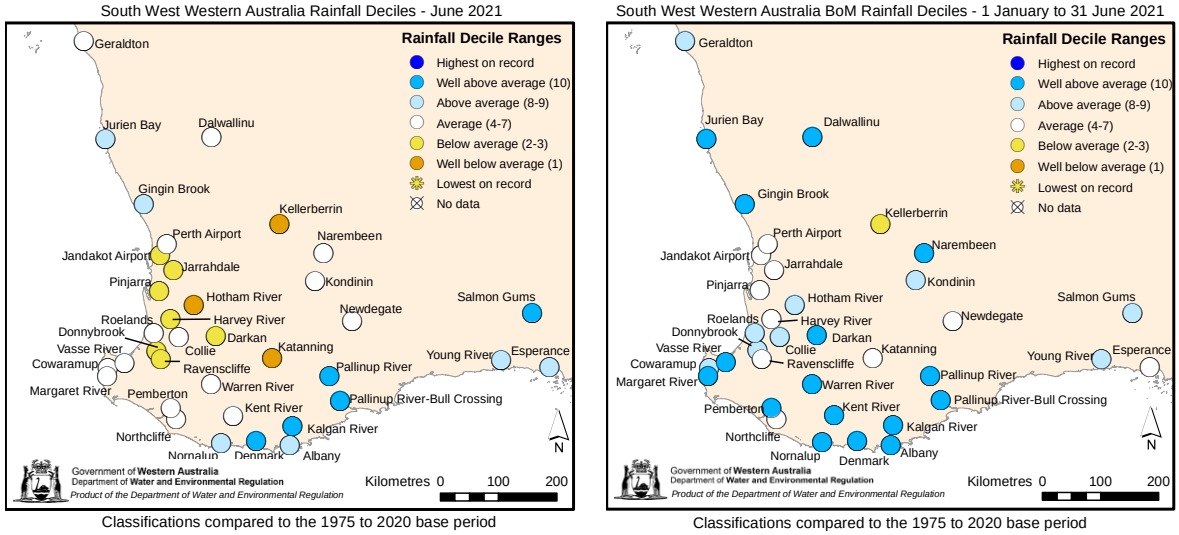

Figure 1 Rainfall deciles for June (left) and January to June (right) for South West Land Division of Western Australia

Figure 1 shows rainfall deciles across the 36 sites.

The first month of winter, June, was second coldest on record and rainfall was 32% below average in Western Australia as a whole (BoM). Across the SWLD, the rainfall received in June was average or above average at 26 of the 36 reference sites. This is also reflected in the year to date rainfall deciles:

- The majority of recording sites (26 sites) across the SWLD had average or above monthly rainfall totals for June. Five sites, located along the south coast (Denmark, Kalgan River, Pallinup River Bull Crossing, Pallinup River and Salmon Gums), were well above average, while six locations (Jurien Bay, Gingin Brook, Nornalup, Albany, Young River and Esperance) had above average rainfall. Close to half of the reference sites (15 sites) recorded average rainfall in June.
- Three locations along the south east coast (Pallinup River at Bull Crossing, Pallinup River at Ongerup and Salmon Gums) had their wettest June rainfall for 30 years. Denmark received 106 mm of rain in one day (21st of June) and extensive flooding was reported between Denmark and Albany.
- Seven stations (Jandakot Airport, Jarrahdale, Pinjarra, Harvey River, Darkan, Donnybrook and Ravenscliffe) had below average rainfall and only three sites (Kelleberrin, Hotham River and Katanning) experienced well below average rainfall for the month of June.
- For the year to date, 35 sites out of 36 in the south west region, had average or above rainfall. Well above average rainfall totals was recorded at 16 sites, above average at 9 sites and average rainfall was observed at 10 locations. Only one station (Kelleberrin) recorded below average rainfall in the first six months of the year.

Streamflow

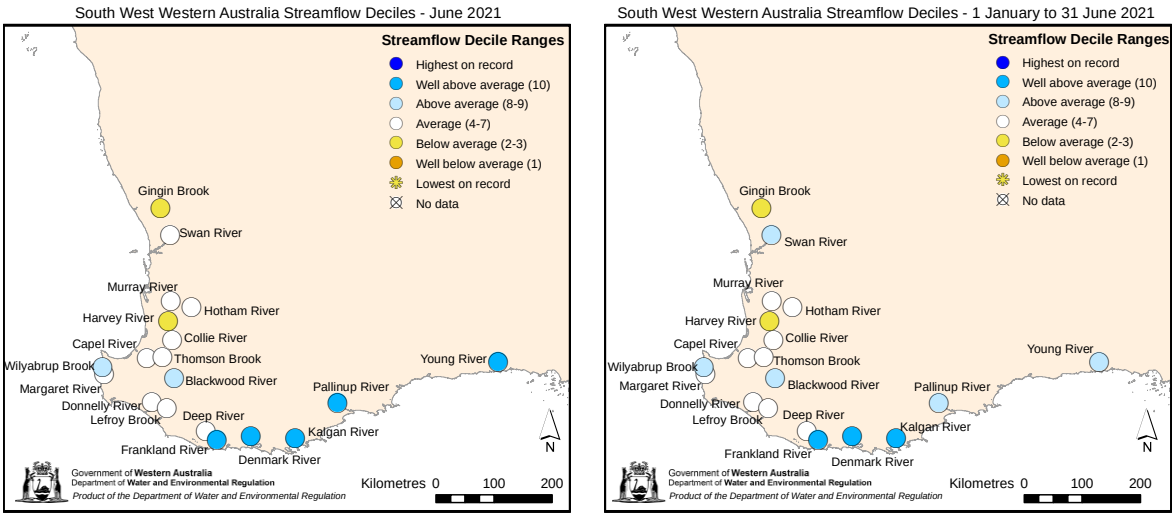

Figure 2 Streamflow deciles for June (left) and January to June (right) for South West Land Division of Western Australia

Figure 2 shows streamflow deciles across the 19 sites.

Above average rainfall experienced over much of the SWLD so far this year has resulted in average or above streamflow at most sites both for June and for the year to date:

- Five sites along the South Coast (Frankland River, Denmark River, Kalgan River, Pallinup River and Young River) had well above average flows over the month of June. Two sites (Wilyabrup Brook and Blackwood River) recorded above average conditions. There were ten sites with the average flows, and only two sites (Gingin Brook and Harvey River) with flows below average.
- Year to date streamflow is average or above average at 17 locations out of the 19 reference gauging stations. Three gauging stations (Frankland River, Denmark River and Kalgan River) have recorded well above average streamflow. Five sites (Swan River, Wilyabrup Brook, Blackwood River, Pallinup River and Young River) had above average flow totals, while 9 locations had average flow over the January to June period. Harvey River and Gingin Brook were the only two reference sites to record below average streamflow in the first half of the year.

Forecasts

We look at three month outlooks prepared by DPIRD and BoM for an indication of the likely conditions in the coming months. BoM uses a dynamical climate model for forecasting over the entire country. DPIRD uses a statistical forecasting system which is more specific to our region of interest.

We analyse data of the current year in relation to data from 1975 to 2020. DPIRD uses the same reference period, while BoM use a shorter period in its climate outlooks, 1990 to 2012.

The BoM outlook for July to September indicates that rainfall is likely to be average for the north and eastern portions of Western Australia. Winter rainfall for the south-east of the wheatbelt is likely to be above average (greater than 60% chance), while the south-west of the SWLD is likely to be

neutral or below average (less than 60% chance of exceeding median rainfall). Forecast skill for this period is 45 – 75% (Figure 3).

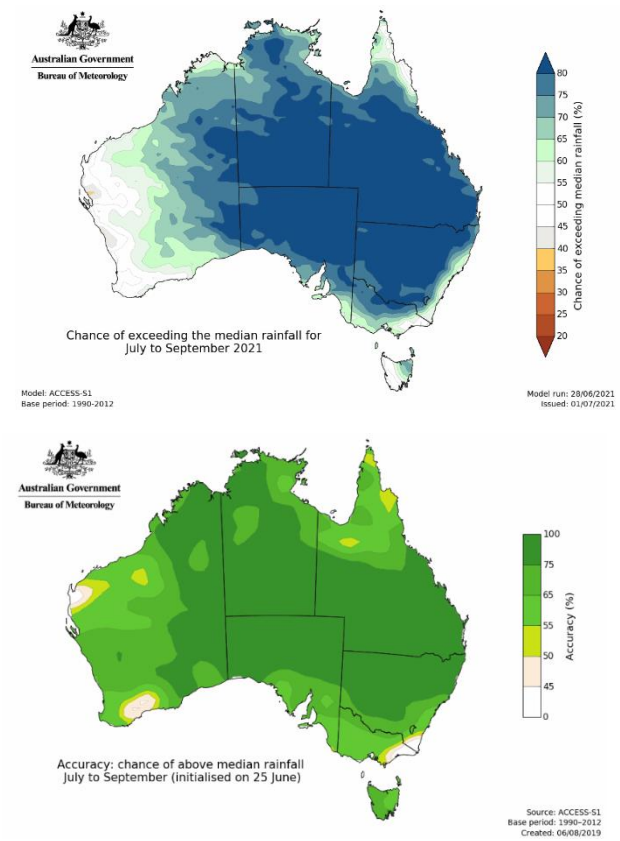

Figure 3 BoM July to September forecast (top) and skill (bottom)

The DPIRD outlook for the next 3 months suggests a much lower likelihood of exceeding the median rainfall, with less than 40% probability of exceeding average rainfall for most of the SWLD. The forecast skill for the DPIRD forecast is similar to that of the BoM outlook, with skill generally between 50 to 75% over the same area (Figure 4).

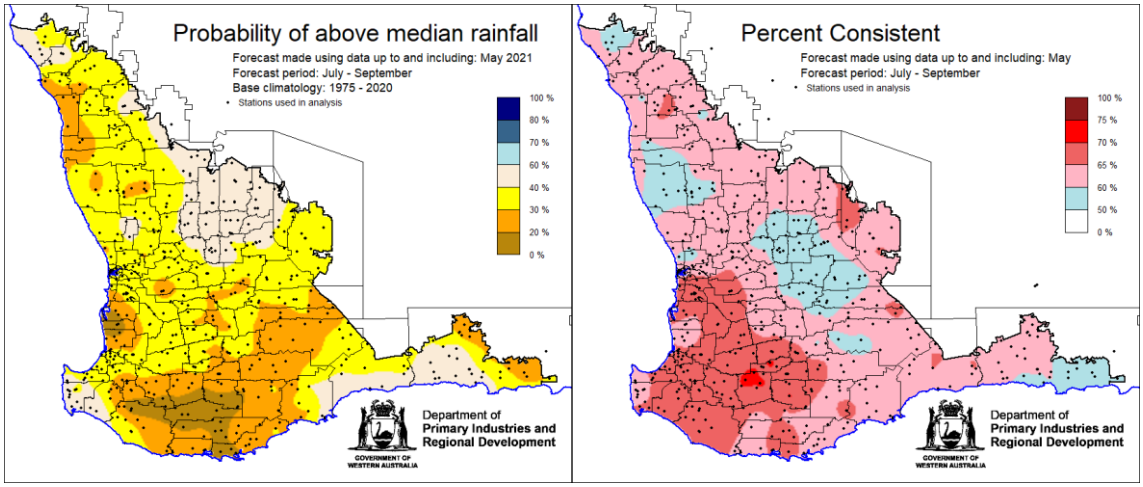

Figure 4 DPIRD July to September forecast (left) and skill (right)

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Rainfall and Streamflow Tracking

We produce tracking graphs[1] for each of our rainfall and streamflow sites. Graphs for the following four sites (Gingin Brook, Harvey River, Denmark and Pemberton) are saved to TRIM. Graphs for the other sites are available on request.

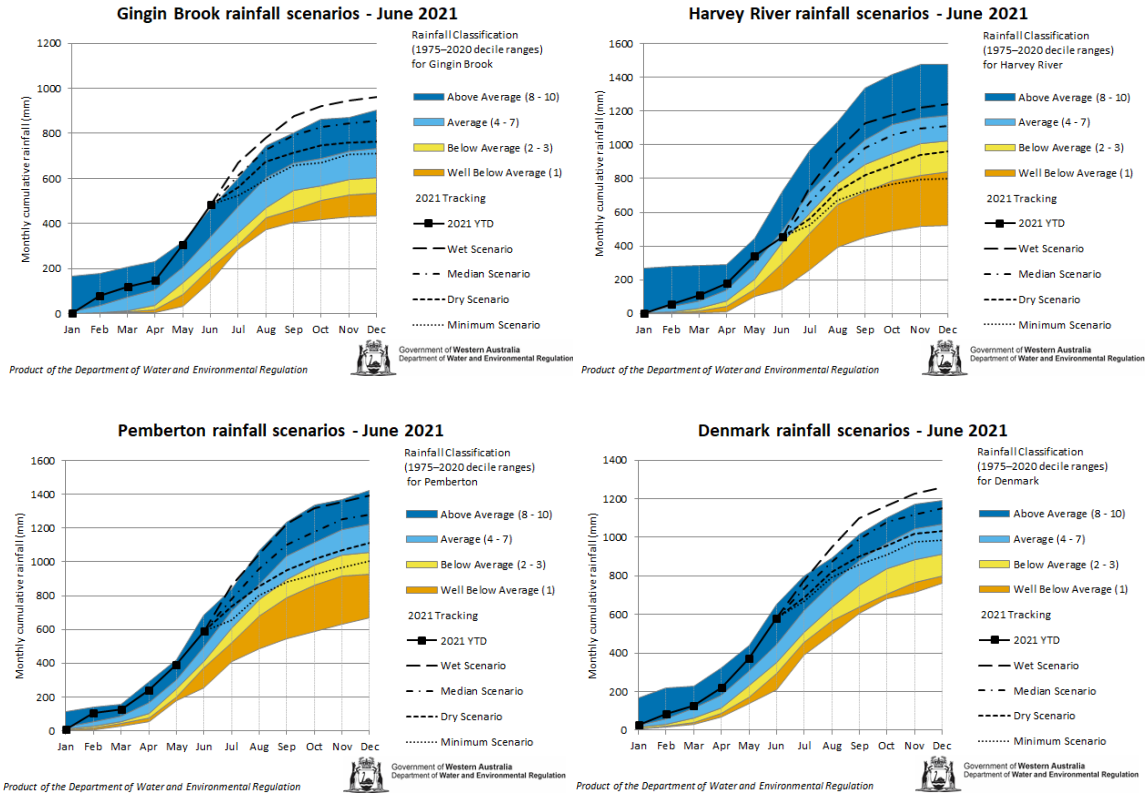

Figure 5 Rainfall tracking graphs for four representative sites

[1] The block colours show the range in cumulative monthly rainfall or streamflow based on 1975-2020 records.

- High (dark blue) refers to the highest on record to the 70th percentile.
- Average (light blue) refers to the 70th to 30th percentile)
- Low (yellow) refers to the 30th to 10th percentile
- Very low (orange) refers to the 10th percentile to the lowest on record.

The solid black line shows recorded rainfall or streamflow for the year to date.

The black dashed lines show scenarios, based on recorded values from 1975 to 2020, from what has happened so far this year.

- The wet scenario corresponds to the 90th percentile.
- The median scenario corresponds to the 50th percentile.
- The dry scenario corresponds to the 10th percentile.

A percentile is a measure used in statistics to rank one data point compared to the rest of the data. For example, the 70th percentile means that 70% of the data is lower and 30% of the data is higher.

Applying the DPIRD rainfall forecast (most probable decile range) for July to September the rainfall tracking plots give an indication of likely conditions in September (skill above 50%). Average (Dry Scenario) rainfall is most likely at Gingin, although this site received above average rainfall in June and has well above average total rainfall for the first six months of the year.

The streamflow tracking graphs for Gingin Brook, Harvey River, Lefroy Brook and Denmark River are shown below.

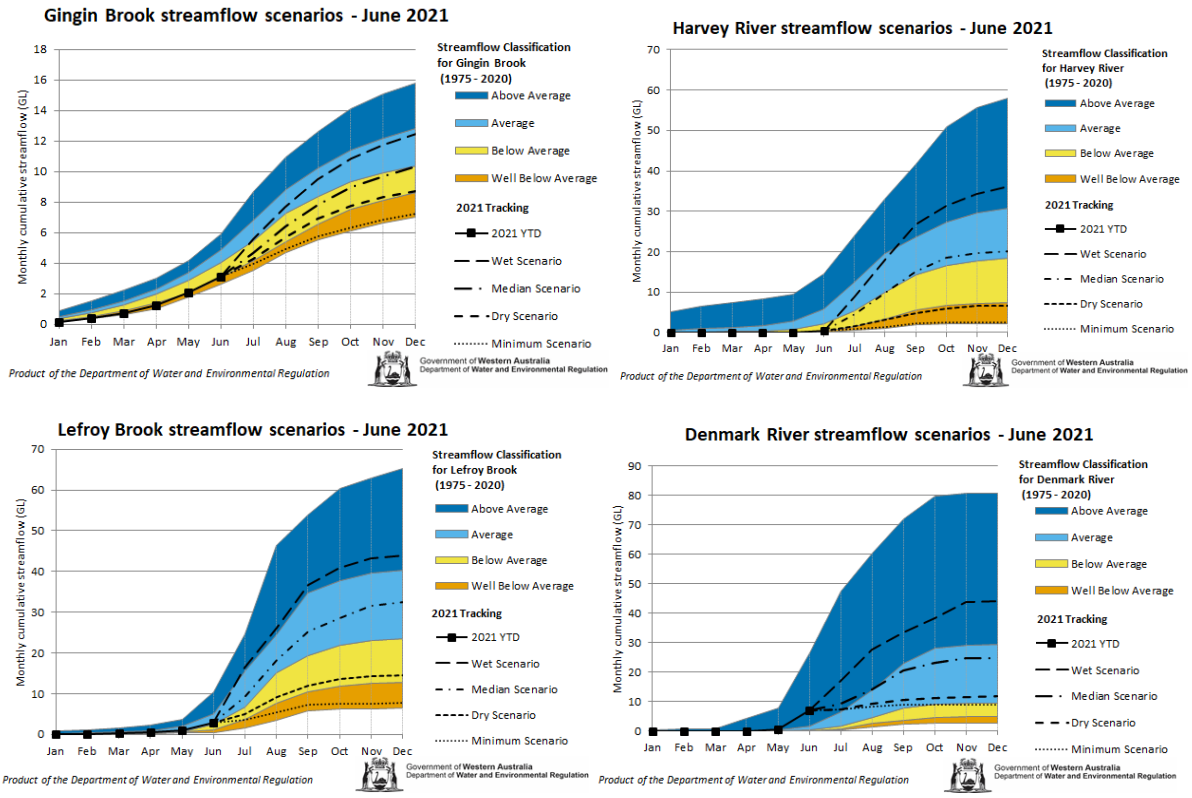

Figure 6 Streamflow tracking graphs for four selected sites

BoM streamflow forecasting suggests average to below average streamflow at Gingin Brook over the winter months with the 40% skill. The streamflow forecasts developed for Harvey River in June suggest average or below average flows with a moderate skill score (up to 20%). The forecast for Denmark River indicates above average flows are expected for 2021 (20% skill).

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Useful Links

BoM produce 1 week, 2 week, monthly and three month outlooks for Rainfall and Temperature (outlooks are issued mid-month and at the end of each month).

http://www.bom.gov.au/climate/outlooks/#/overview/summary

BoM also produce monthly water updates, including information about rainfall, streamflow (similar to our dotty maps), salinity and water storages.

http://www.bom.gov.au/water/monthly-water-update/current/south-west-coast-wa/

DPIRD produce a monthly seasonal climate outlook newsletter, which summarises data from their own forecast system as well as BoM's.

https://www.agric.wa.gov.au/newsletters/sco

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