

U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

June 2015 Highlights: **Seventy-six percent of groundwater and 33 percent of streamflow levels were normal at sites monitored by the U.S. Geological Survey across Maryland, Delaware, and the District of Columbia.**

Why is it important for the USGS to collect and analyze water-resources data?

USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during floods and droughts. These data can be used to assess how water resources respond to changes in climate. Scientists at the USGS have measured streamflow and groundwater levels to assess water resources for over 125 years.

In addition to providing the most extensive set of historical streamflow and groundwater data available to the public, the USGS continues to collect water data and quality-assures the data using standardized techniques across the country. The uniformity of the dataset enables multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water-resources conditions they might encounter in the future.

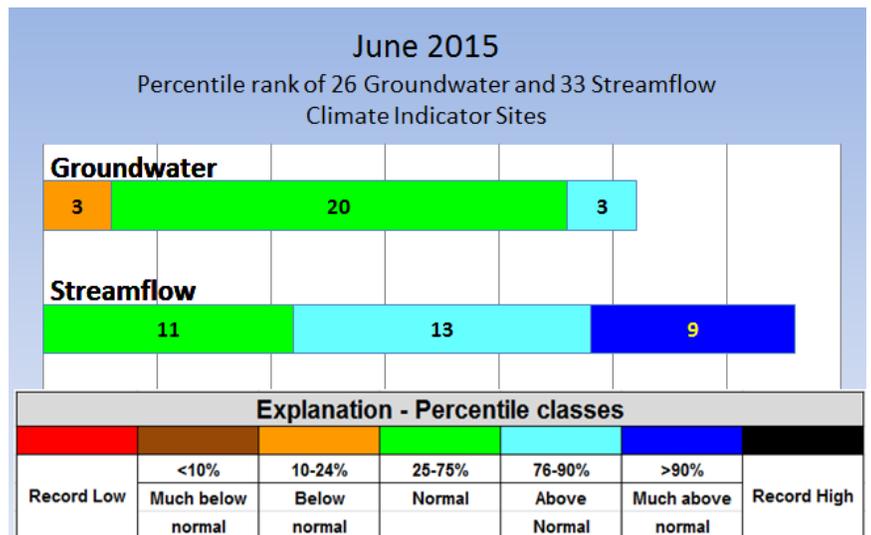
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized. Precipitation and reservoir data are also presented to give a more complete picture of the region's water resources.

USGS June 2015 Water Conditions Summary

Seventy-six percent of the groundwater levels and 33 percent of the monthly mean streamflow levels were normal (between the 25th and 75th percentiles) at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia.

Groundwater levels were normal in 20 of 26 USGS monitoring wells. In the remaining wells, the groundwater levels were above normal in three wells and below normal in three wells.

June monthly mean streamflows were normal at 11 of the 33 streamgages. Streamflow was above normal at the remaining 22 streamgages in Delaware and Maryland.



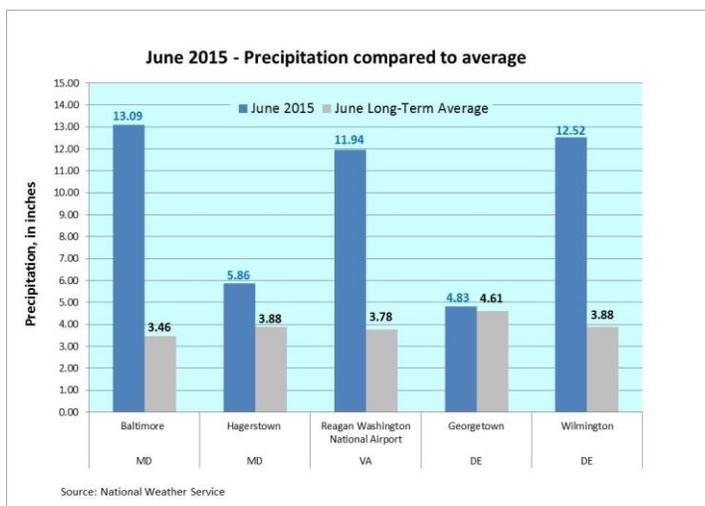
A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal. For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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June 2015 Precipitation and Weather

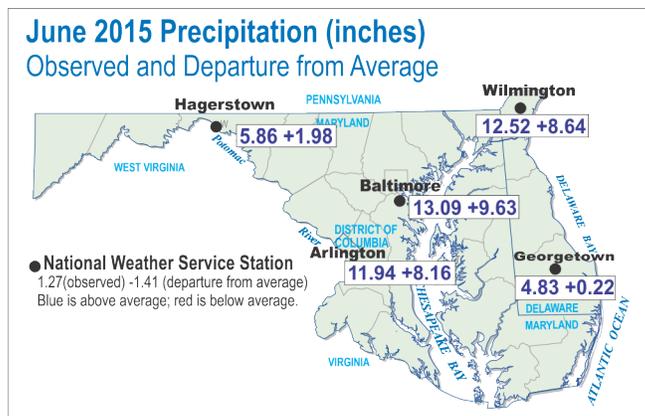
June precipitation was above the long-term average at the five National Weather Service (NWS) Mid-Atlantic weather stations. The highest amount of monthly precipitation was in Baltimore, Maryland with 13.09 inches or 9.63 inches above the long-term average for June. This set a new record, breaking the record of 9.95 inches set in 1972 when Hurricane Agnes engulfed the region. During Hurricane Agnes, over 6 inches of rain fell over 2 days, whereas in 2015, the rainfall was spread throughout the month.

The lowest amount of precipitation was in Georgetown, Delaware with 4.83 inches, which was only 0.22 inches higher than average.



National Weather Service Stations

- Baltimore** = Baltimore/Washington International Thurgood Marshall Airport (BWI)
- Georgetown** = Georgetown, Sussex County Airport
- Hagerstown** = Hagerstown Regional Airport
- Arlington** = Ronald Reagan Washington National Airport
- Wilmington** = New Castle Airport



The NWS Middle Atlantic River Forecast Center's (MARFC) 365-day precipitation data for Maryland, Delaware, and the District of Columbia showed about half the counties were in the normal range and the other half were above normal with the exception of Allegany County, Maryland, which was 7.2 inches below average.

For the third consecutive month, air temperatures were above the long-term average at all five NWS Mid-Atlantic weather stations. The lowest average June temperatures were in Wilmington, Delaware and Hagerstown, Maryland where the temperature averaged 73.1 degrees Fahrenheit. The warmest June temperature was 78.1 degrees Fahrenheit in Arlington, Virginia near the District of Columbia, which was 2.9 degrees Fahrenheit above average. This site also had the largest departure from average.

Sources: National Weather Service and Middle Atlantic River Forecast Center (MARFC)
 MD and DC: <http://www.weather.gov/climate/index.php?wfo=lwz>
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>
 MARFC <http://www.erh.noaa.gov/marfc/Precipitation/Departures/>

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Groundwater

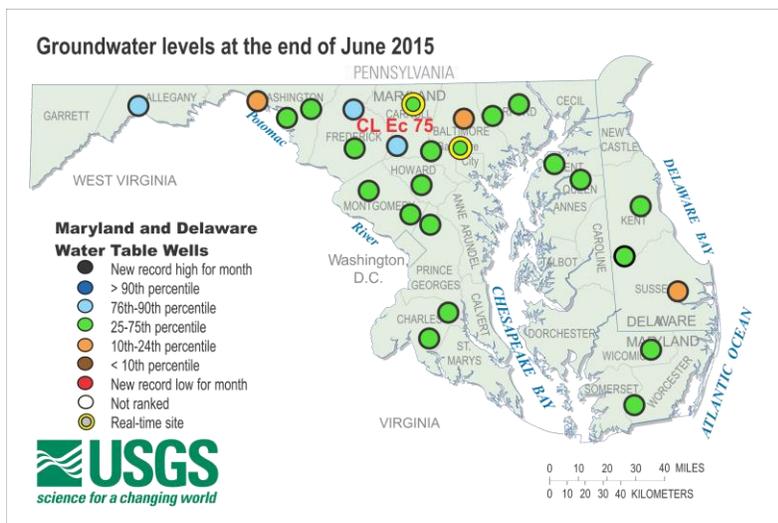
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- Located in an unconfined (water-table) aquifer;
- Open to a single, known hydrogeologic unit/aquifer;
- Groundwater hydrograph reflects changes in climatic conditions;
- No indicated nearby pumpage and likely to remain uninfluenced by pumpage, regulated streamflow, or changes related to human activities;
- Minimum period of record is 10 years of continuous/monthly records;
- Minimally affected by irrigation, canals, drains, pipelines, and other potential sources of artificial recharge;
- Well has a casing – dug wells are generally not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

June 2015 Groundwater Levels

June groundwater levels ranged from below normal to above normal in June, with 77 percent of the groundwater levels in the normal range (between the 25th and 75th percentiles) at USGS wells used to monitor climatic conditions in Maryland and Delaware. Twelve percent of June groundwater levels were below normal (less than the 25th percentile). Data are provisional and subject to revision.

Groundwater levels in the 20 USGS observation wells that were in the normal range were mostly in central Maryland and Delaware. There were three wells with below normal groundwater levels (10th – 24th percentiles) and three wells with above normal groundwater levels (76th – 90th percentiles).



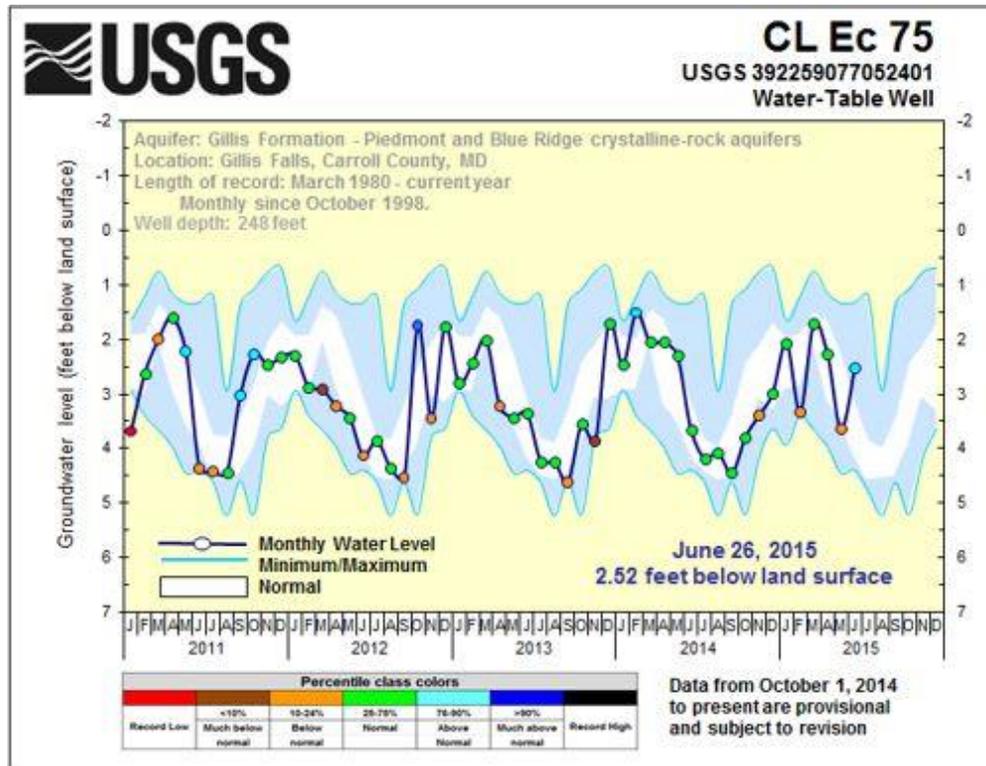
Two groundwater levels in Kent County, Delaware USGS observation wells were normal, whereas the groundwater level in the observation well in Sussex County was below normal.

To access the clickable groundwater map, go to:

http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

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The groundwater level in observation well CL Ec 75 in Carroll County, Maryland went from below normal in May to above normal in June. Groundwater levels typically decline in the summer, but the groundwater level rose in this well, likely because of the above normal precipitation. The groundwater levels rose in 16 of the 26 observation wells in June and fell in the remaining 10 wells.



Five-year groundwater hydrographs can be viewed at:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties

The 5-year hydrograph shows groundwater levels as a dark blue line, the minimum and maximum monthly values, and the normal range (between the 25th and 75th percentiles) as a white band based on the period of record. The maximum water level is at the top of the upper blue section and the minimum water level is at the bottom of the lower blue section in the graph. Each monthly measurement is colored according to the percentile rank in which it falls for the month.

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Streamflow

Streamflow data are used for many purposes. A few of the most common uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamgages in the region.

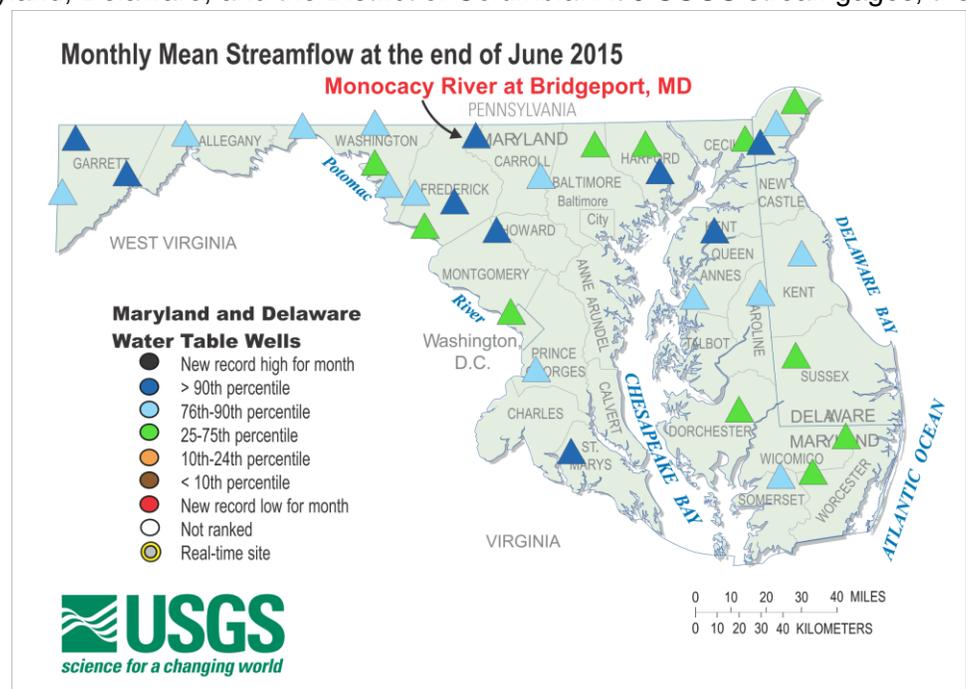
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- Minimum period of record is 10 years of continuous data;
- Watershed areas greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflect climatic conditions; and
- The surrounding area and watershed are not urban.

June 2015 Streamflow

Although rainfall set a record high in Baltimore, Maryland, and was above normal in other parts of Maryland and Delaware, because the rainfall fell over the entire month instead of during one big storm event, the monthly mean streamflows were not exceptionally high. The ground was able to soak up some of the rain and store it as groundwater.

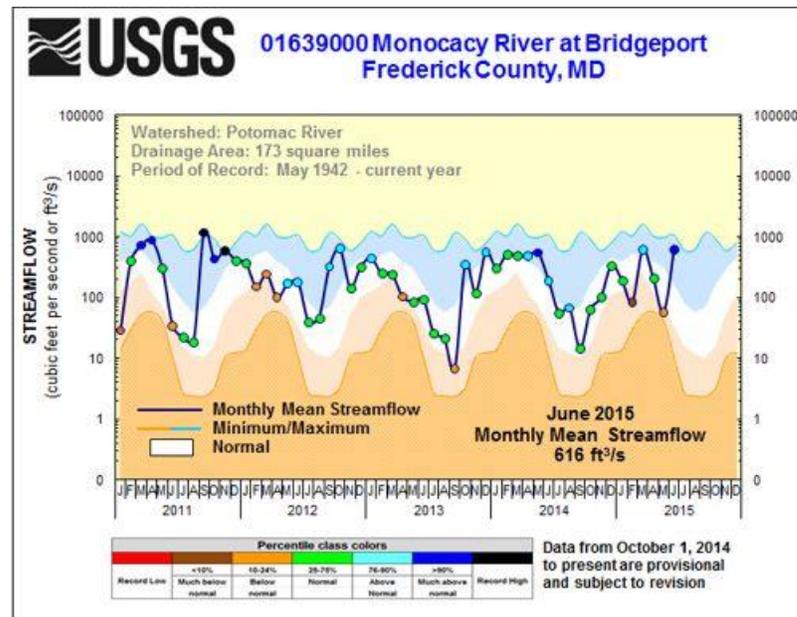
Monthly mean streamflow was above normal in 67 percent of the USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. At 9 USGS streamgages, the monthly mean streamflow was above the 90th percentile, and at 13 streamgages the monthly mean streamflow was between the 76th and 90th percentiles. Streamflow at the remaining 11 streamgages was in the normal range (25th – 75th percentiles).



To access the clickable streamflow map, go to:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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The monthly mean streamflow on the Monocacy River at Bridgeport in Frederick County, Maryland rose from below normal (10th – 24th percentiles) in May to greater than the 90th percentile in June 2015. The monthly mean streamflow typically falls at this time of year with the lowest levels occurring in September or October.



Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

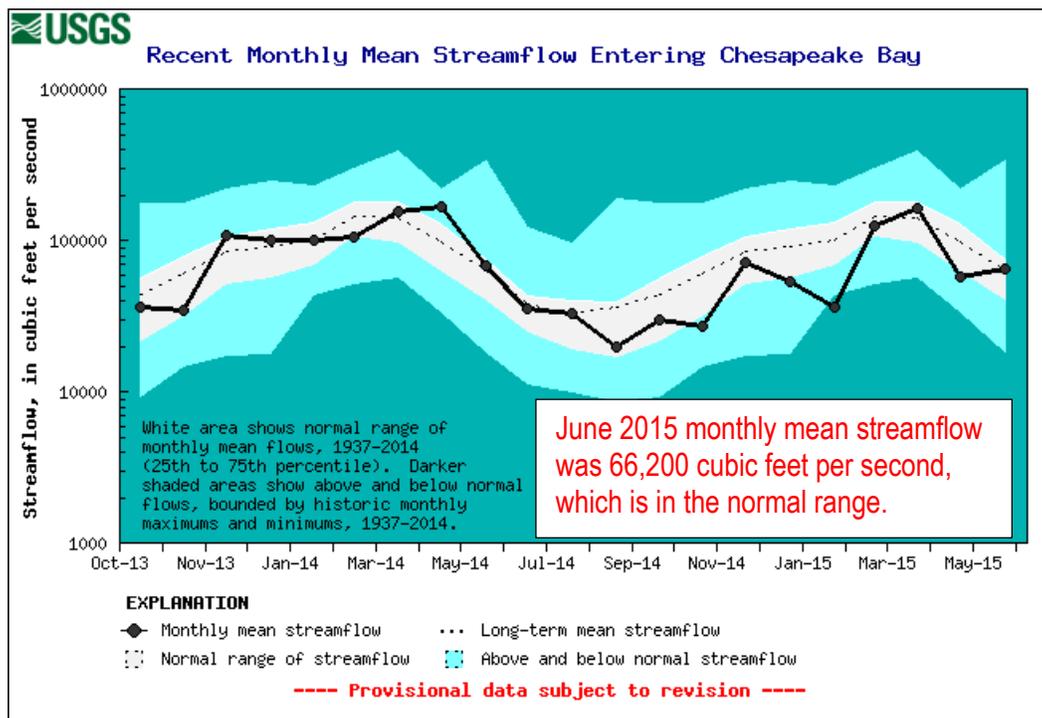
The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25th to 75th percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area. Each monthly mean measurement is colored according to the percentile rank in which it falls for the month.

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Estimated Streamflow to the Chesapeake Bay

The USGS estimates monthly mean freshwater streamflow to the Chesapeake Bay using streamflow measurements from the Susquehanna, Potomac, and James Rivers. In June 2015, the monthly mean freshwater flow to the Chesapeake Bay was 66,200 cubic feet per second (ft³/s; provisional, and subject to revision) which is close to the long-term June average (mean) of 64,600 ft³/s and within the normal range between 40,500 ft³/s and 75,800 ft³/s, the 25th and 75th percentiles of all June values. These provisional statistics are based on a 78-year period of record.

Runoff in the Chesapeake Bay watershed carries pollutants, such as nutrients and sediment, to rivers and streams that drain to the Bay. The amount of water flowing into the Chesapeake Bay from its tributaries has a direct impact on how much pollution is in the estuary and it also affects the salinity levels that are important for fish, crabs, and oysters. Generally, as river flow increases, it brings more nutrient and sediment pollution to the Bay.



More information on the freshwater flow to the Bay can be found here:
<http://md.water.usgs.gov/waterdata/chesinflow/>

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Reservoir Levels

Available reservoir storage at the end of June 2015 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was 100 percent of available storage capacity, or a total of 75.85 billion gallons of water. The Baltimore City Environmental Services Division manages the Baltimore reservoirs.

Total normal storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George’s Counties in suburban Maryland around the District of Columbia, was 104.68 percent of normal storage capacity at the end of June 2015, with 11.12 billion gallons of water. Not all of the water in the Patuxent Reservoirs is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage. The Washington Suburban Sanitary Commission (WSSC) manages the Patuxent reservoirs.

June 2015	Percent available/normal storage	Volume (billion gallons)
Baltimore Reservoirs		
Baltimore City – Environmental Services Division		
Liberty	100.00%	36.80
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
Total	100.00%	75.85
Patuxent Reservoirs		
Washington Suburban Sanitary Commission (WSSC)		
Triadelphia	106.59%	5.97
Duckett	102.77%	5.15
Total	104.68%	11.12