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MURRAY-DARLING
BASIN AUTHORITY

Infrastructure development

Use the resources:

- Student infrastructure history resource
- A video about all the infrastructure built in the Basin: <https://www.youtube.com/watch?v=Jbi3e4Ogx1c> (Note: You can stop at 3:25).
- You can also review the River Murray system poster.

Answer the following questions from what you discover:

1. Who were the three main people who drove irrigation development in the Murray-Darling Basin?
2. What did they hope to achieve?
3. What was the soldier settlement scheme and why was it introduced?
4. True or false: We have changed the highest flow in rivers from summer/autumn to winter/spring.
True False
5. Why were the barrages built?



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6. Which two rivers were connected to the Snowy Mountains Scheme?

7. Why was Dartmouth Dam built?

8. In the absence of rainfall, how long can Dartmouth dam sustain irrigation?

9. What amount of water remained in Hume dam by 1968?

10. Sydney harbour holds about 500 gigalitres of water. By 1979, how many Sydney harbours of water could the three largest dams in the Murray-Darling Basin store? (Show your working.)

11. Do you think this has 'drought-proofed' the Basin? (Explain why.)



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What the infrastructure does

Investigate:

- Goulburn-Murray Water's website (About us and Water Resources pages and GMW regional map <https://www.g-mwater.com.au/about/regionalmap>).
The lower map is interactive. Turn on and off options to learn more.
- River Murray system poster (download from mdba.gov.au/education/downloads).

What is the extent of the Goulburn-Murray irrigation district? (km area, percentage of Victoria's water storage, number of river basins)

From what storages is the water for the following irrigation areas released? *NB. You may need to both study the map and research using the search function on the website.*

- a) Central Goulburn
- b) Murray Valley
- c) Torrumbarry

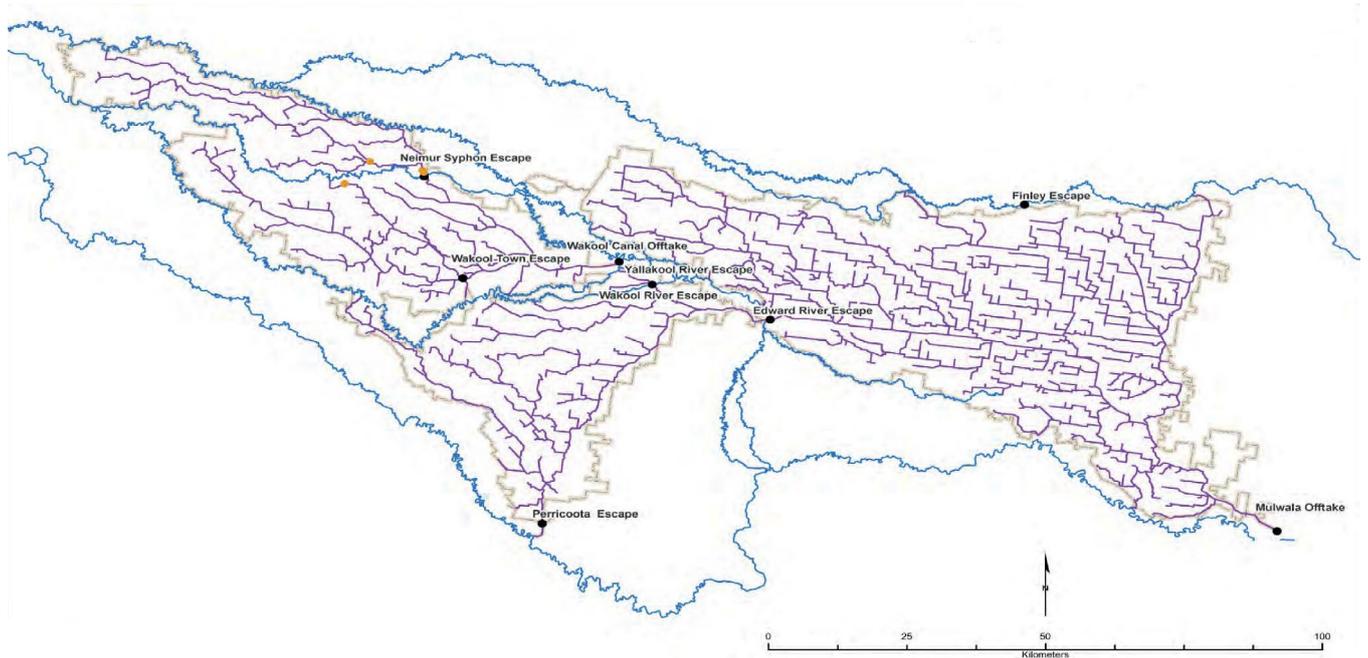
Which dams are involved in hydropower production?

View the snapshot (over the page) of the irrigation area between Lake Mulwala and Swan Hill in NSW (controlled by Murray Irrigation Ltd.). This covers 724,000 hectares; 3% of the Murray-Darling Basin. It includes 2,500 km of total river length.

Read more at: mdba.gov.au/discover-basin/catchments/central-murray



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Legend: Blue = river; purple = irrigation canal

First read how water is delivered in this area, here: <https://www.murrayirrigation.com.au/water/system/how-we-deliver/>. Then make some notes about key things you learned:

Go to the ABS website and search for “Water use on Australian Farms-2015-16”. Sort the region label column alphabetically and highlight ‘Murray’. Then:

- Find the ‘Water taken from irrigation channels or irrigation pipelines – total volume used (ML) and get the amount.
- Find the ‘Total volume of water from all sources’ figure; then calculate what percentage of farm water is from irrigation supply.
- Then find the total volume of water applied.



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d) What were the top four crops by water consumption?

- 1.
- 2.
- 3.
- 4.

e. What do you think is the primary land use in this area of NSW?

Draw or digitally create a simple explanation for your classmates about how the system works - from dam to farm - on both sides of the River Murray (NSW and Victoria). Include information about the extent of the channel network, how the water moves, how long it takes and the functions that water might perform as it moves along.



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How much water can be stored?

The Murray-Darling Basin's annual average inflow (water recharging the rivers and streams after rainfall) is 32,500 GL. But given that rainfall is highly variable, this can range from 7,000 GL (e.g. in 2006) to 118,000 GL (in 1956, but a very rare event).

Activity 1: view the MDBA's water in storages information (mdba.gov.au/managing-water/water-storage)

a) What is the total storage capacity of dams in the Basin?

Scroll down to the Southern Basin total and calculate the following:

b) How much of the total storage for the Basin is in the southern part of the system?

c) What is the capacity of each of the three largest storages and where are they? (Refer also to the River Murray system poster.)

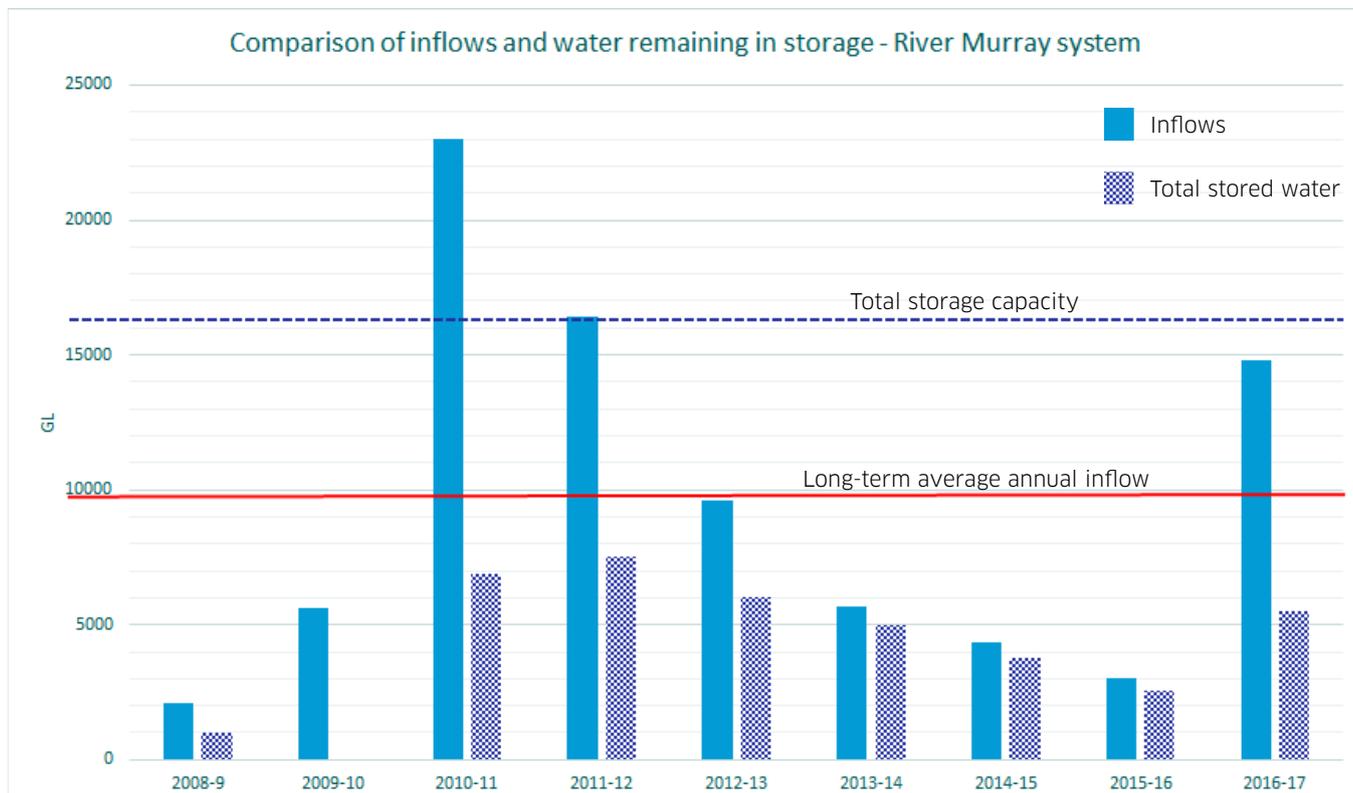
Go to the 'Archived Basin storage reports' link (left menu) and open the one for 22 April 2009.

d) What percentage of these three dams were full?

e) What was the total volume left in storage for the whole Basin at that date?



Activity 2: Analyse the following chart and answer the questions.



NB. Average annual inflows to the River Murray (southern) system are 9,800 GL.

f) How useful (and why) is the measure 'average annual inflows' to let us know how much water we are likely to store in a given year?

g) If this was a typical decade, how much of the 'usual' inflow each year can we store?

h) Consider that Sydney harbour holds approximately 500 GL (about 200,000 Olympic swimming pools). Draw an infographic, diagram or cartoon explanation to explain this to your classmates - and in comparison to the amount of water stored and used by agriculture in a year. (Think about all you learned above.)

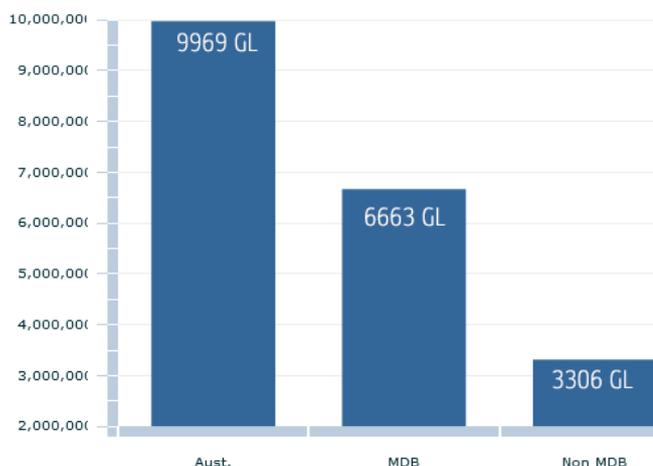
i) Do you think building another dam will help us expand agriculture in the southern Basin? Why?



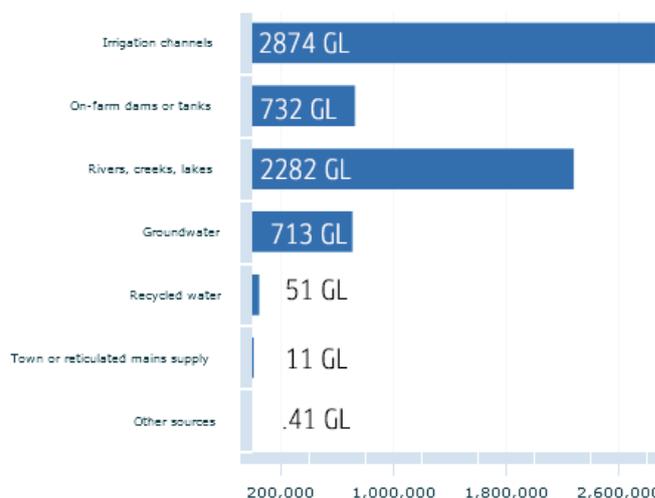
How much water is used each year?

1. Analyse these graphs and answer the questions:

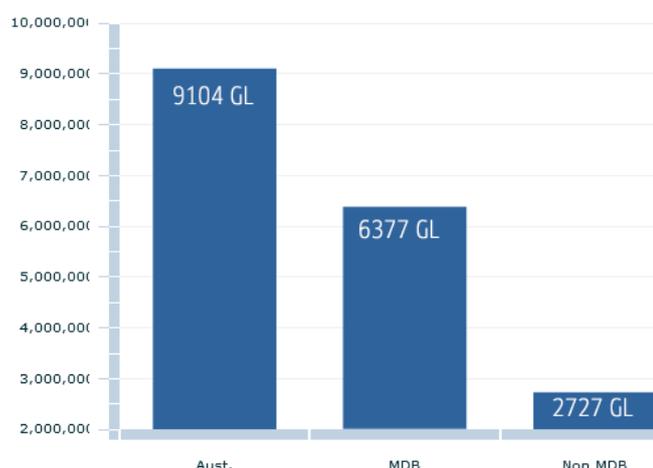
Total agricultural water use, 2016-17



Sources of agricultural water in the MDB, 2016-17



Irrigation water use, 2016-17



a) What percentage of total agricultural water use is in the Murray-Darling Basin (MDB)?

b) What percentage of Australia's irrigation water use is in the MDB?

c) What proportion of all MDB agricultural water comes from irrigation channels?



Now look at the ABS 2015-16 data online:

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4618.0Main+Features12015-16>

2. Find the total MDB agricultural water use:

Then read this information:

- a) 2015-16 River Murray system inflows were **3040 GL** (the median is 7880 GL).
- b) The capacity of the River Murray system’s major storages is **18,504 GL**.
- c) On 1 July 2015 the storages along the River Murray contained **3,781 GL***.
- d) Surface water diversions (water primarily used for farming) were **8,600 GL** during 2015-16.
- e) On 1 July 2016, the River Murray system total was **2,560 GL****.

(*River Murray System Annual Operating Report 2015-16; **River Murray System Annual Operating Report 2016-17, MDBA.)

3. Draw a diagram/infographic or write what you conclude from this.

4. Inflows in the past few years have varied wildly – from in the wettest 14% of records (2016-17) to the driest 13% of records (2017-18):

Water year	2012-13	2014-15	2015-16	2016-17
Inflows	9,600	4,350	3,040	14,800
Ag water use	8,574	6,174	5,209	6,663

Graph this data and describe what it tells you. (Think about the median inflows; and what the information about wettest/driest tells you about range as well.)