



# Summary of Events 2015–2022

A continuation and conclusion of **Summary of Events 2008-2014**

## Events in 2015

*More drying and spraying / Working group drives Management Plan / Poor rains keep lake low*

### Management Plan progresses slowly

In January 2015 the commission for preparing a Management Plan for the entire site was awarded to the civil engineering, mining and environmental consultants GHD Pty Ltd. In 2006 GHD (which stands for Gutteridge, Haskins and Davey) had prepared the commissioned report *Lake Jualbup Water Source Investigation* (41 pages for \$14,500), which concluded that feasible water sources for topping-up the lake were: (1) Treated waste water from the Subiaco Waste Water Treatment Plant. (2) Stormwater from the Herdsman main drain. In each case the capital costs approached \$1m. The option of topping-up with groundwater was not feasible because it was already fully allocated. Of course the restoration plan, if successful, eliminates any need for topping-up.

Several draft versions of the Management Plan were carefully reviewed by the working group, which uncovered various problems that were solved with Save Our Jewel's help, even though this did require more time. In the end the draft plan did confirm the working group's conclusion that any uncertainties about implementing it were manageable within the City's risk limits. Flood modelling by Water Corporation confirmed that flooding due to the planned restoration of the lake was not a significant risk. Subiaco Council accepted the finalised Management Plan in November. It was then sent to the relevant Government authorities for review.

### March 2015. More spraying but not entirely effective



**Above:** It is 25 March 2015. Even the highest flood in 30 years has quickly leaked away. The lake has dried up, noxious weeds have taken over the dryer parts, and spraying is once again necessary.

**Left:** Of course spraying has to avoid established reeds and sedges, but under this protection nearby noxious barnyard grass with its thick seed heads (arrowed) is surviving. Barnyard grass can reach more than waist height (p.17 of Pt 1), so spraying is the price to be paid for returning an urban lake to a "natural ephemeral wetland" (which by definition excludes permanent water as a natural deterrent).



### May 2015

**Left:** Autumn colours in the south west of the lake reserve.

**October 2015. Good news from Council elections**

There were 15 candidates for 6 seats. All 4 sitting councillors were re-elected with large margins, among them Save-Our-Jewel member Hugh Richardson, so 9 newbies were unsuccessful. Overall the election results suggest that the support for lake restoration should continue undiminished.



Despite the electioneering, life went on. At least at Lake Jualbup, even though in October the water level was 0.6m lower than in the previous year due to poor rains. October also saw an unusual ► buildup of algae in the lake, photographed here in polarised light. Its source was probably Kilgor Park Lake at QEII from which water is pumped to Lake Jualbup to prevent flooding. The algae did not seem to affect Lake Jualbup’s water birdlife or long-necked turtles.

**Events in 2016**

*Thank you Lynley Hewett / Contamination from Kilgor Park Lake / Soakwells reduce road runoff*



**Left:** In January the lake would normally be dry but has been kept wet by dewatering at QEII. This picture may look like deep water but most of the ducks are standing up. **Right:** To prevent algal blooms the lake is dosed with Soil-Zyme algicide (the man said this one jugful cost about \$500).



By mid-February the lake still contained water, but the level was too low for comfort, so these health warnings were displayed as a standard precaution.

Which (as shown on the right) regular park visitors and children immediately ignored as a standard reaction to instructions.

2016 was the year in which the City of Perth appropriated the southern part of Subiaco, causing a huge loss in revenue, which in turn led to many staff retrenchments and the loss of South Ward councillor Dr Lynley Hewett who in 2012 had moved the motion to restore Lake Jualbu. In April a thank-you meeting for Dr Hewett was held in the Shenton Park community hall



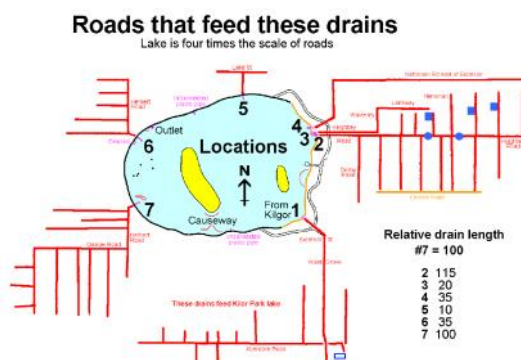
The meeting began with a recap of the lake's history given by Hugh Richardson.

Here an attentive audience shows that interest in the lake's restoration is still strong despite the apparent lack of progress on site.

Later in April an unusually heavy rainfall highlighted a problem that had so far been ignored (or at least postponed) during the restoration planning, namely contamination by pumpage from Kilgor Park Lake at QEII. The pictures below show how flooding at the QEII lake dislodged large amounts of weeds, some of which ended up in Lake Jualbu (top right). At other times material pumped from QEII ended up as a slick on Lake Jualbu (bottom right). Unfortunately the City has no control over Kilgor Park Lake, so such contamination has to be allowed for in the restoration.



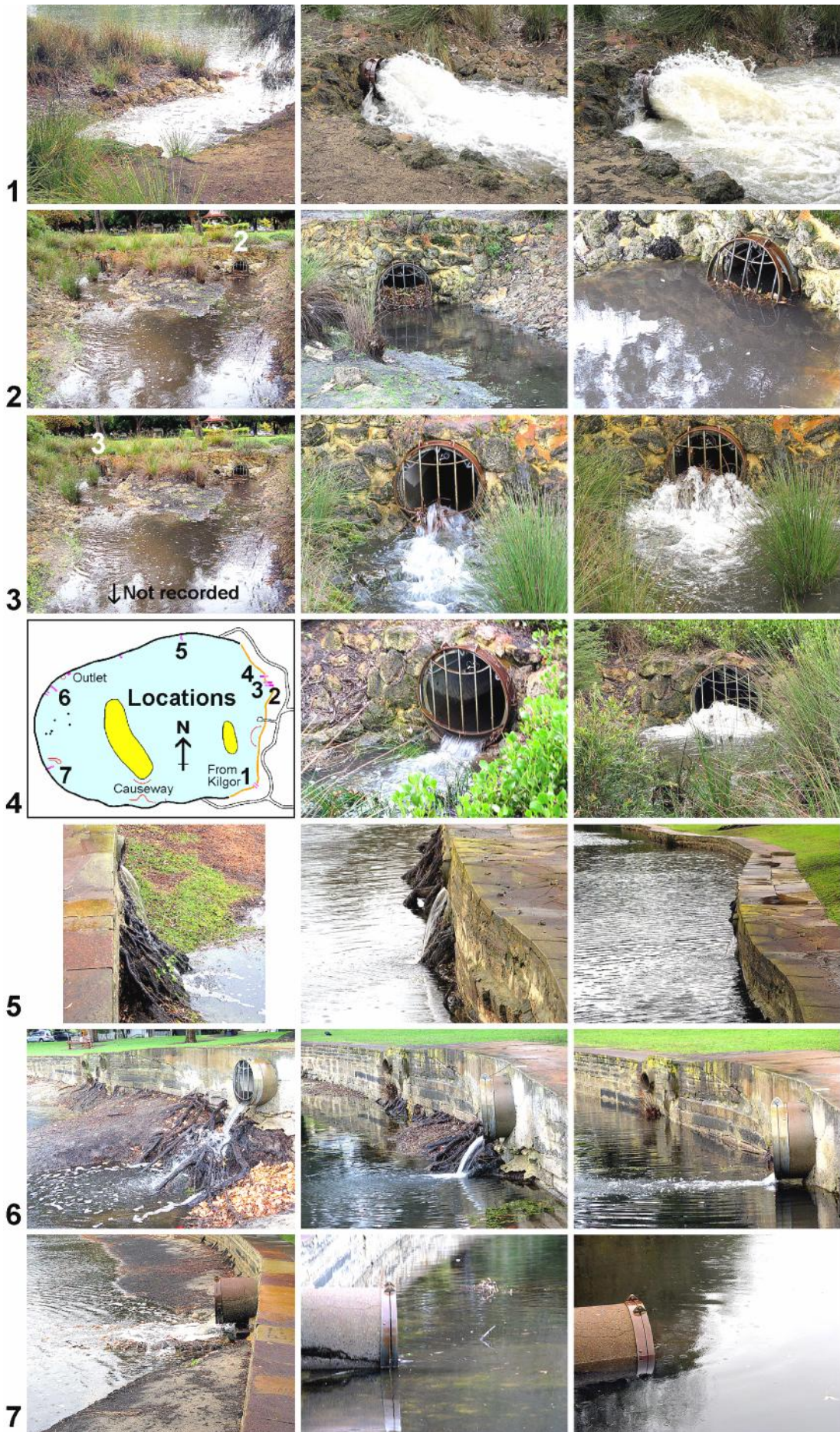
But much progress is being made by the City away from the lake, which nevertheless has an effect of the lake, namely the installation of soak wells in road drains to more efficiently return road runoff to the groundwater. This is part of a general move by all local councils to correct the alarming fall in groundwater levels everywhere on the coastal plain. The red lines in the left picture below show the roads whose drains flow into Lake Jualbu, with the confusion removed in the right picture.



Blue squares show the soak wells installed at April 2016. More are planned.

Their effect on runoff into the lake is shown on next page

Soakwells on the roads leading to outlet 2 have more or less eliminated the runoff into the lake.



16 May 2015 noon during steady light rain

19 Aug 2015 5pm after 8mm in 75 min

21 Aug 2015 noon after 15mm in 60 min

More pictures of Lake Jualbup during 2016. See how water makes all the difference.



February - Subi on Sunday concert. Weeds thrive while people jive.



May - Sunset clouds looking north



June - Screeching (or would be if mouths weren't full) cockatoos at ground level



June - Rosalie school nature study



July - Business as usual



September - This stunning vertical shot was taken by Bellcourt's drone and is reproduced courtesy of Kirk Bellerby. Brownish areas are floating debris from Kilgor Park Lake outlet at top right. Note dense vegetation on island. In bottom half, pale areas near the edge are sandy areas free of dark mud. Surroundings are an urban park, not native bush!

## Events in 2017

*Aboriginal Affairs and restoration funding approval / 120mm summer rainfall fills lake in two days*

For the Lake Jualbup restoration, the first few months of 2017 are the most momentous since the plan was approved in 2012. First, the long-awaited approval from the Department of Aboriginal Affairs is finally received with no dissent, leading to this headline on the front page of the POST:



Second, after statements to a receptive Subiaco Council made by Save-our-Jewel people, funding for the restoration plan is accepted on 28 March 2017, with only one vote against. This is from one councillor who feels that the plan could not work because the lake would dry up anyway, as if the generous amounts of road runoff it received each year counted for nothing. His comment is met by a conspicuous silence. The decision to approve funding is met by rapturous applause.



In February a record rainfall of 120 mm over two days filled the lake to overflowing, almost exactly matching the level reached in August 2014, and delighting all park visitors especially the younger ones.



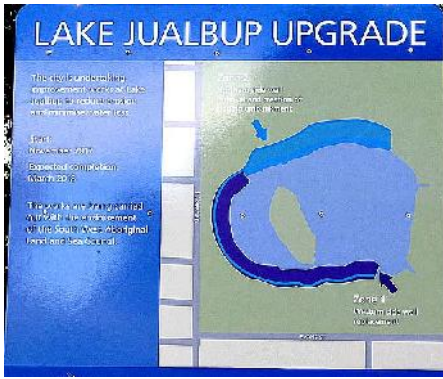


The same record rainfall leads to a flow reversal *into* the lake through what should have been the *outlet*, scouring away the sand below and leaving packed leaves and twigs *behind* the outlet grille..



Heavy rain in July leads to more delights for young people, and in August to a circuit of the island by a twin kayak repeats a visit made three years earlier (inset) to celebrate unusually high water.





Upgrade work begins November 2017. A fence keeps dust in and intruders out. The old wall and paved path are removed ready for the new. A row of sand bags and pumping stop water intruding.

### Events in 2018-2019

*Restoration of Lake Jualbup as urged by Save Our Jewel ten years ago is on the home straight. Pictures taken during official visits reveal work normally hidden from view by the safety fence.*



14 January 2018. Giant sandbags placed and moved by crane failed to keep water out because it seeped through the underlying sand confirming its permeability. But the lake is soon dry enough for laying the foundations of the new wall. 15-16 January a cyclone up north brings 124mm of rain (measured locally) all helped by floodwater pumped from Kilgor Park Lake (above right). It fills the lake to overflowing leaving only the tips of the biggest sandbags barely visible above water. The rise in water level from what were a few residual puddles to overflowing is 1.8 metres. It takes two weeks of pumping in business hours to return the lake to a state where work can continue. Shortly after, the contractor BCL goes into liquidation (no fault of Subiaco's) and is replaced by CivCon.





Each pump (red boxes) discharges 50kL a second down the outlet. The mounds in the background are natural clay mix ready for use. Their clay content is confirmed by cracking as it dries after rain.



The pumps remove water via pipes to which are attached long spikes driven into the groundwater.



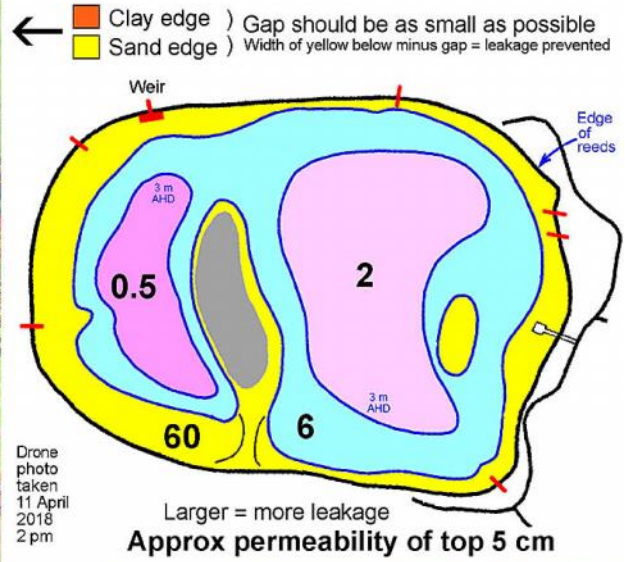
Noongar Land & Culture Protector Iva Hayward-Jackson (in red) inspects the diggings for possible human remains as required by law. None were found confirming that the area was not a burial site.



Subiaco staff give Save Our Jewel the opportunity to view progress and ask questions. In yellow facing camera is Gray Stead, Director of Technical Services. **Left** 6 February. **Right** 10 April, where across the lake the sloping banks are covered by cloth mesh to prevent erosion until established.



Looking W: New sloping banks on left, new wall and path on right. The compromise is well received.



Water    Original lake bed    Clay layer    Soil layer    New path    5 April 2018

**Above:** The clay layer covers all but the E end of the sandy perimeter (in yellow) through which most of the lake water was leaking. The reduced leakage would slow the loss of water in summer but not prevent it, so the seasonal variation in level would be retained to encourage bird and plant life. The soil is for the planting of reeds and sedges. **Below:** 584m of new wall uses 3700 limestone blocks. In total 14,000 sedges and another 7000 natives are planted, and 4600m<sup>2</sup> of turf are laid.





## Heroes of shrinking Jualbup

Two quiet local heroes have solved the riddle of the missing water: Lake Jualbup was drying up, but where was the water going?

Known as Shenton Park's jewel, the lake and its park are a stunning asset to birdlife, surrounding houses and visitors – but in summer the lake becomes a series of muddy puddles.

Many solutions were put forward, such as sprinkling a polymer in the water to seal the base, but scientist Dr Geoffrey Dean realised that the council would be throwing money away unless it really knew what was going on.

The Shenton Park resident took daily measurements over 10 years – sometimes twice daily to solve the mystery, all for free.

Another retired scientist and Jualbup-lover, Hugh Richardson, a Subiaco councillor, chipped in to help.

Their eureka moment came in Mr Richardson's garage almost two years ago – a discovery that led to this week's opening ceremony of the revamped lake (see page 20).

Before their results, the council had thought about hiring hydrologists, at enormous cost, to try to solve the mystery.

The citizen scientists collected 100 samples from the lake-bed, carefully mapping each site, then placed each sample in a long tube, poured



**Eureka ...** Dr Geoffrey Dean takes yet another depth measurement in Lake Jualbup, while Hugh Richardson shows the long tube used to time how fast lake water seeps through sand and mud. **Photo: Billie Faidough**

water in the top and timed how long it took the water to reach the bottom.

Water went through the sand at least 10 times faster than through the clay. They had their answer.

The lake was losing water not through evaporation or through its muddy bottom, but 80% through a porous 10m-wide fringe of sand.

The answer was to mix clay with soil – to provide a base for the thousands of reeds and sedges planted around the rim, and keep the water from seeping out.

It also keeps the lake at its historic level in relation to the water table, an important factor for the traditional owners who gave their approval for the work.

**Above:** A tented ceremony is held on-site at 10 am on Thursday 14 June 2018 by the City of Subiaco to mark the long-awaited end of the upgrade process. About 40 people attended including the mayor Penny Taylor and Subiaco staff, plus Noongar, community, and Save Our Jewel representatives.

Visible in the left picture is CEO Don Burnett (facing down) with Gray Stead in yellow just behind Allan Stoney with glasses. At the microphone Bella Bropho (with Iva Hayward-Jackson looking on) is saying how pleased they were to be invited, and how much pleasure the Lake was now giving to the descendants of the original Noongar.

Other speakers were equally effusive in praise.

**Left:** The POST for 16 June 2018 (page 5) gave this wonderfully concise account of the research findings that were decisive in leading to the present upgrade design.



Two plaques (bench and wall) organised by Mayor Taylor to commemorate the independent work.



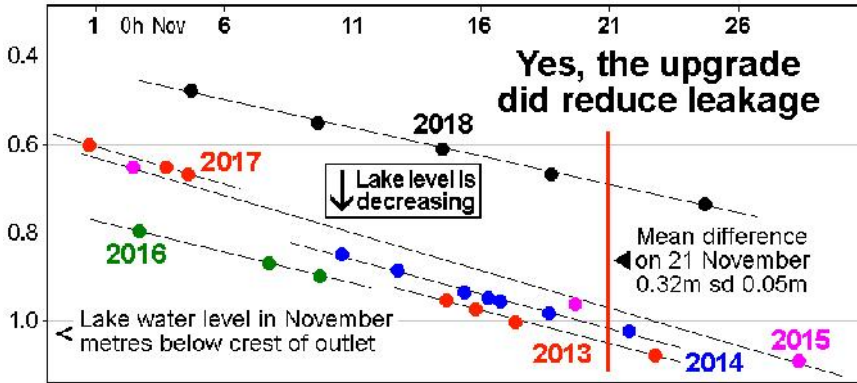
The upgrade has led to a marked increase in visitors enjoying the lake's attractions including its now-permanent water in summer. Thus the April 2019 picture below would previously have been dry and without bird life. In distance are bollard path lights (later vandalised) and planted reeds.





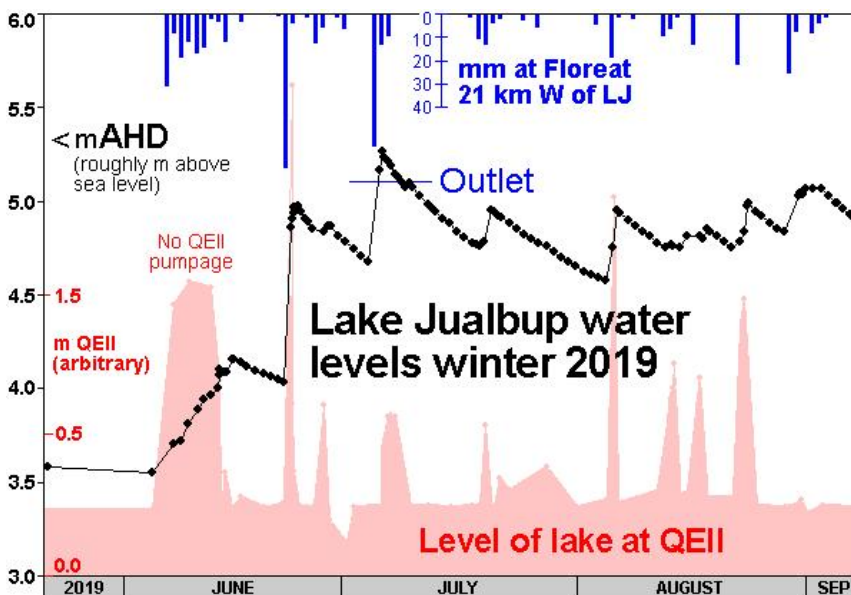
In November 2018 immediately after the upgrade the lake was nicely full and being enjoyed by the resident swan pair and their six brand new cygnets

But under this tranquil surface how was the lake performing? To what extent had the upgrade worked in reducing leakage? The next plot gives the answer.



Lake Jualbup water levels during the days of November BEFORE and AFTER the council upgrade.

Compared with the 5 previous years, the upgrade has reduced leakage and made the water more than 0.3m deeper. So the upgrade worked as planned and can be counted a success.



This next plot shows how the lake level increases as the rain falls (not just the rain falling on the lake but also the larger amount arriving via drains from the surrounding roads), and also with the level of the lake at QEII (the overflow is pumped to Lake Jualbup since the lake has no outlet of its own).

Which is less than a blessing when it contains algae as in the picture below. But to the QEII authorities it is not important because their only concern is to prevent local flooding.



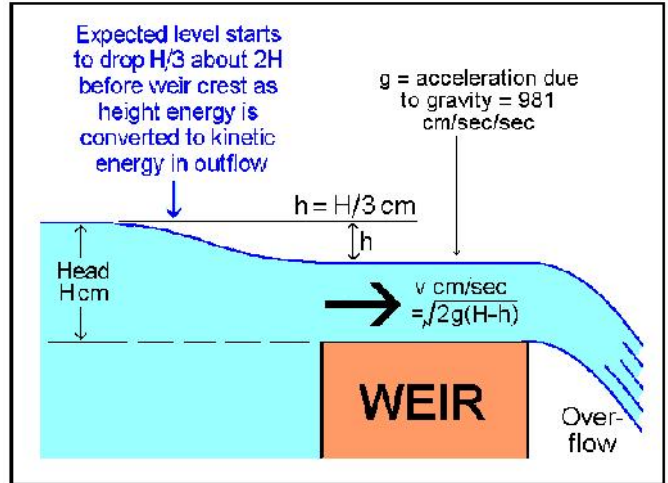
What looks like a lawn dividing the lake in two is in fact floating algae ready for delivery to Jualbup,



QEII algae is less pretty when exposed. And the lake is user unfriendly. But who wants to anyway?



Jualbup outlet weir after upgrade 2018



Back at Lake Jualbup, the outlet has been refurbished several times. In the bottom picture above (taken from a canoe) the water level is just below the edge of the masonry. Despite the refurbishing the outlet level is not affected. Nor are the outflow dynamics, which allow the rate of discharge to be estimated by measuring the head as shown (easily done by temporarily blocking the outflow).



One bonus from the upgrade has been a largely unexpected increase in the variety and numbers of the lake's birdlife.

Species that were seldom seen in large numbers (at least not since the lake started drying up) can now often be seen more prolifically when the times are right, as with these stately pelicans pictured in February 2019.

In previous years the lake in February would have been dry or close to dry and therefore of no interest to pelicans..



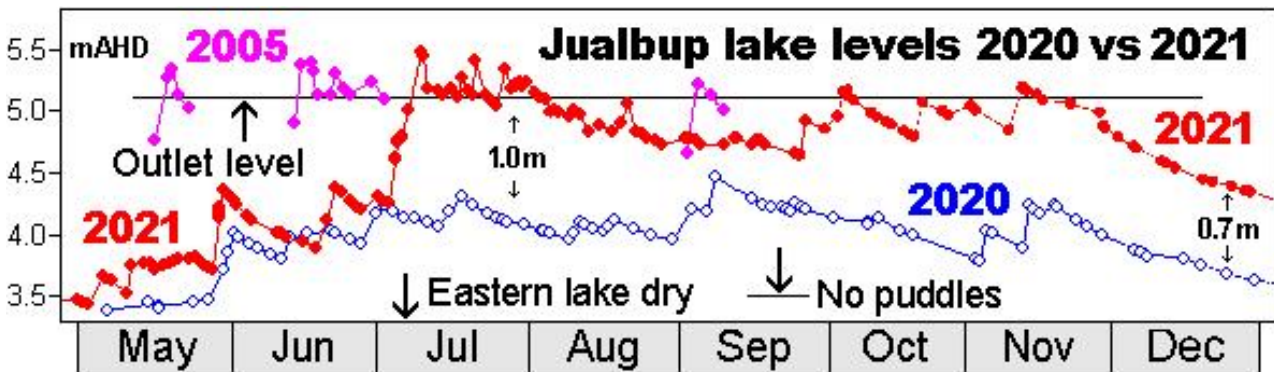
In 2019 nine fountains (not aerators, compare picture on page 14) were installed in the lake and were to be much admired by visitors, albeit less so by those seeking perfect reflections.

### Events of 2020-2022

*Poor rain in 2020 is a severe test of upgrade / North shore is now a springtime wonderland / Key importance of rainfall amount and timing./ Ample rain in 2021 creates memorable delights*

#### No rain means no lake

If rains are late or below average, any lake has a hard time catching up. One of the worst of these combinations occurred in 2020, when at the beginning of May the E end was only a tiny puddle.



Happily 2021 was quite the opposite. The above plot shows what happened. Heavy rainfalls in July and again in October and November caused the lake to overflow on 30 separate days, beating the high of 20 separate days in 2005.



Compared with 2020, the lake in 2021 was about 1.0 m deeper in winter and 0.7 m deeper in the following summer. Despite the setback of severely low rainfall, the upgrade was still working.

The difference was very apparent during the summertime concerts held on the Lake Jualbup reserve each year. In December 2016 before the upgrade the eastern lake bed was dry with a flourishing crop of weeds. In December 2021 after the upgrade the lake waters made a perfect backdrop for the festivities.

Equally attractive were the lush north shore plantings that were now established:



Lake Jualbup  
north shore

**What a  
difference  
a few short  
years make**

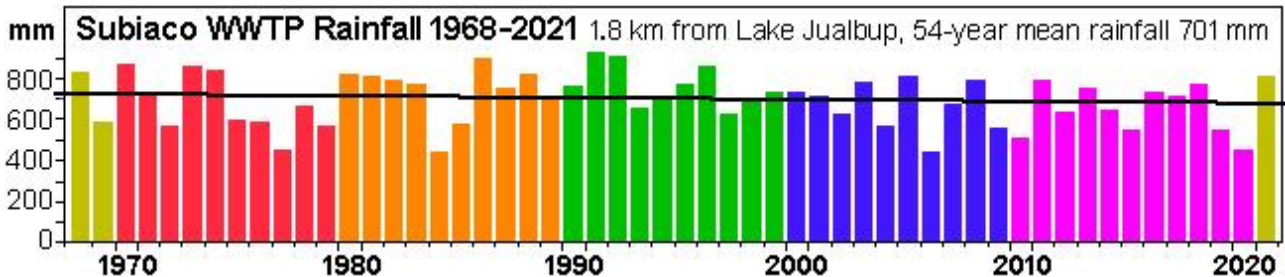
2018 } Council  
2019 } Upgrade  
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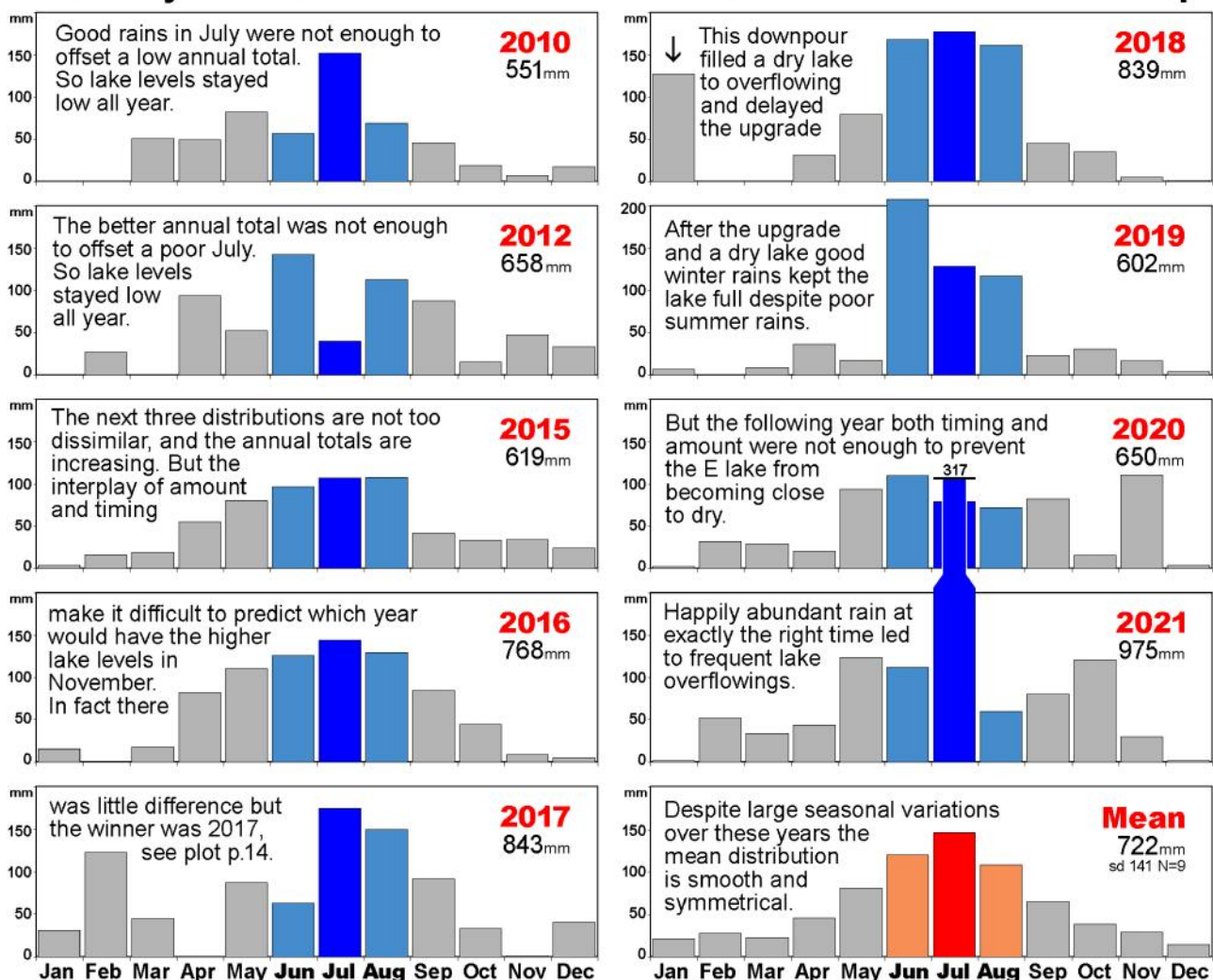


**Above:** This picture of storm clouds over Lake Jualbup is to remind us of the crucial importance of rainfall, in particular the importance of both amount and timing as shown by this graph of annual rainfall 1.8 km away at the Subiaco Waste Water Treatment Plant since records began in 1968:



The slow decline in total rainfall over 50 years (about 1 mm a year) is swamped by the much larger variation (typically 200 mm) from one year to the next. The upgrade had to deal not only with the variations in annual rainfall but also with the equally large (and equally unpredictable) variations in timing during a given year. The plots below step you through these variations over the past dozen years. Start top left and proceed in year order. Below each year is the total annual rainfall.

### Monthly rain at Floreat Weather Station 1.8 km N of Lake Jualbup



The picture is further complicated by soakwells inserted in various drains which largely prevent small rainfalls being passed to the lake (large rainfalls overwhelm them), and the variable pumpage from the lake at QEII. But so far the upgrade has performed well. Full marks to Subiaco Council.

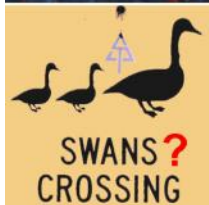


**Above:** The lake in flood is not good news for bottom-feeders like this solitary coot. **Below:** But for visitors and children it is a memorable delight as here in July 2021. If nothing else, their enjoyment alone is reward enough for the ten years of hard struggle put in by the Save-Our-Jewel group. The bottom picture also shows the new footpath safely high and dry while the old one is under water in the other two pictures, plus the sad remains of the bollard lights vandalised earlier in the year.





## Farewell from Save Our Jewel



And from all of us here at the lake, a big thank you for restoring our future!

**PS.** After ten years of activity, the Save Our Jewel action group had experienced many memorable events to mark its struggles, endless work, and eventual success in restoring the lake to its former glory as the jewel in Subiaco's crown. They and support from a few Subiaco councillors had made all the difference. The matching images (roughly in historical order) from the website look like this:

