

Paradise Dam

Fact Sheet: Palaeoflood study for the Burnett catchment at Paradise Dam - findings

May 2021

Sunwater has conducted a study to better understand Burnett River flood history and to gather information that will assist in planning the long-term remediation of Paradise Dam. This fact sheet shares information about the results of the study.

Sunwater acknowledges the traditional owner groups who provided cultural supervision during the site activities and the landholders who provided access to their properties for soil samples.

Purpose

The purpose of this study was to identify significant floods that have occurred before records of river height were kept for the Burnett River near Paradise Dam. This provides a more robust analysis of the frequency of extreme floods within the Burnett Basin, which will provide an input into the risk assessment and assist planning for future strengthening and stabilisation works at Paradise Dam (known as the Paradise Dam Improvement Project).

What is a palaeoflood study?

A palaeoflood study looks for evidence of flood events that occurred before written records were kept (pre-record) using information about deposited flood sediments. Sediment is typically transported during large flood events and deposited in areas where water velocities are lower – e.g. backwater locations up gullies and in sheltered areas. Over time, multiple flood sediment deposits are overlaid within the soil profile (see example in Figure 2).

These preserved sediments and their locations, both in relation to the river and vertically in the depth underground, provide useful information about the size of pre-record extreme floods and when they occurred.

Palaeoflood studies have been undertaken in many locations around Australia and internationally to aid in catchment management and infrastructure projects.

Where did we search for evidence of palaeofloods?

We sampled soil from six locations between Paradise Dam and Degilbo Creek. These sites are shown in Figure 1.

From each site, soil samples were taken from a range of layers that were indicative of previous flood deposits. A typical profile is shown in Figure 2.



Figure 1 - Palaeoflood excavation sites

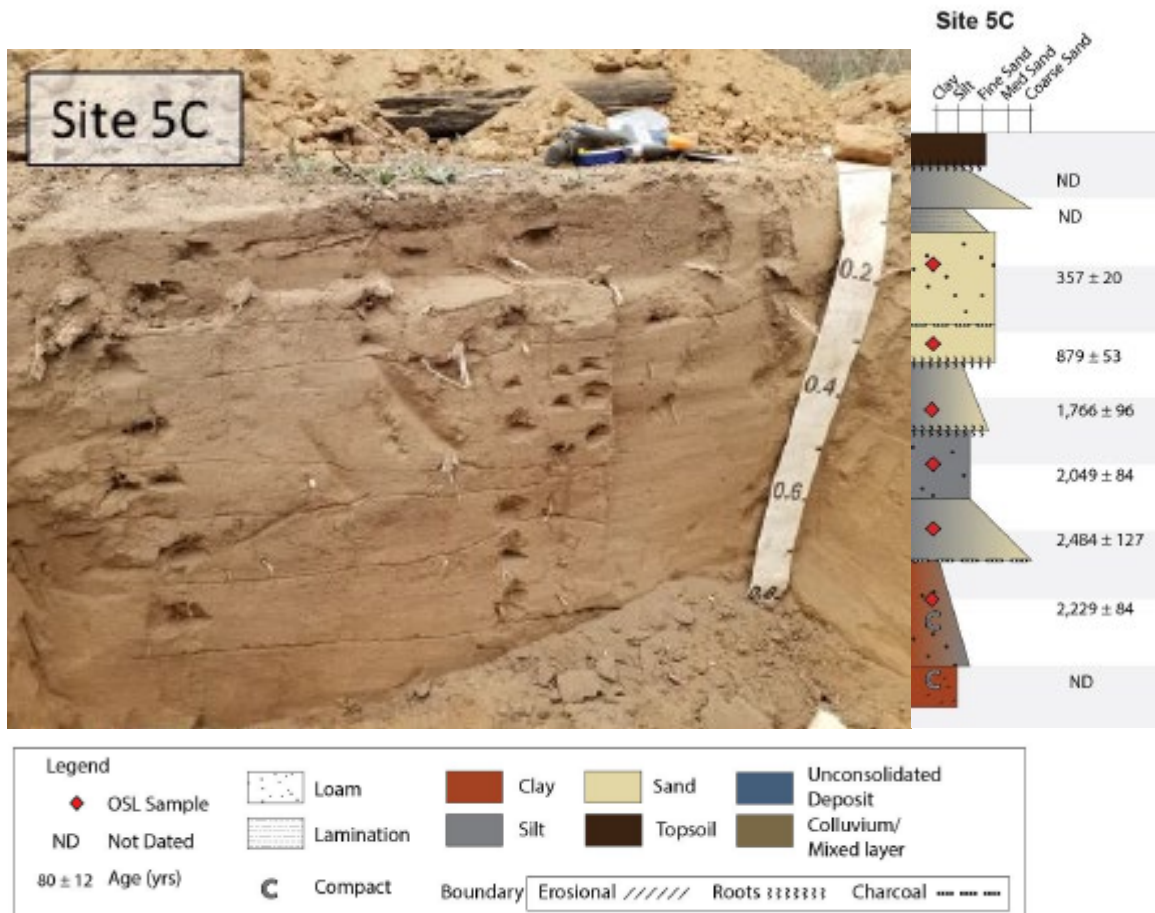


Figure 2 - Soil profile at site 5C (left: photo, right: soil classification for each layer and corresponding deposition date)

How are the soil samples dated?

The soil samples are dated using a technique called Optically-Stimulated Luminescence (OSL). This dating technique estimates the last time the deposited quartz sediment was exposed to sunlight. The OSL technique provides a date range for the age of the sediment deposit. That is why the dates for a historic event are shown as a range of years (Table 1).

What historic floods did the palaeoflood study find?

The palaeoflood study identified many Burnett River floods, including those within the historic records. The full range of floods sampled, their corresponding dates, the sites where the floods were identified, and the corresponding estimated minimum flood discharges associated with each flood are presented in Table 1.

Flood ID	Historical Event	Palaeoflood Site						Estimated minimum discharge	
		5A	5C	7	9	10	19	m ³ /s	ML/d
	2013							16,625	1,436,400
A	1942	X	•	•	X	•		21,292	1,839,629
B	1893			•	•			21,132	1,825,805
B1	1890	•	•	•	X	X	X	20,866	1,802,822
C	1864	X						15,931	1,376,438
D	1737-1769					X		13,980	1,207,872
E	1643-1683		X					17,180	1,484,352
F	1507-1575					X		13,664	1,180,570
G	1307-1377						X	18,660	1,612,224
H	1088-1145		X			X	X	18,261	1,577,750

Table 1: Summary of palaeoflood records

X - sampled flood unit; • - flood event interpreted from sample data

The inclusion of these palaeofloods in the stream record at Mount Lawless (situated upstream from Paradise Dam) is shown in Figure 3. The figure shows the annual maximum flows within each water year (assumed as 1 July to 30 June in this assessment), along with the corresponding estimated minimum flows for each of the identified palaeofloods.

What does this study mean for flooding at Paradise Dam?

This study has identified multiple palaeoflood floods that have occurred over the last 1,000 years.

Based on the palaeoflood findings, it has been determined that:

- 2013 was not the largest flood in the last 200 years and larger floods have occurred within the study area in 1890, 1893 and 1942, and
- the frequency of extreme flood events has not been consistent over the past 1,000 years, with five extreme flood events in the last 200 years, and at least another five extreme flood events in the 800 years prior to that.

Ultimately the palaeoflood study found that the 2013 event was not an outlier flood for the Burnett River, with multiple examples of extreme floods occurring within the last 1,000 years.

It is important to highlight that:

- the sample locations were selected specifically due to their proximity to the extent of the 2013 flood event
- the palaeoflood methodology can only estimate the discharge associated with that flood deposit, and
- the process does not estimate the maximum discharge associated with that flood, just the minimum magnitude of the flood required to inundate the palaeoflood site.

This means that although the flood water discharges are all of similar magnitude to the 2013 flood event, the peak flood water discharges may have been significantly greater than those specified in Table 1.

How will this palaeoflood study information be used?

The plans for further strengthening and stabilisation works at Paradise Dam will take into account the findings of this study. The study will improve our confidence in flood estimates for the dam, particularly around extreme flood events.

It is important to note that Paradise Dam is not a flood mitigation dam. The Paradise Dam Improvement Project will strengthen the dam to ensure that it can safely pass the expected range of floods, not stop floods from occurring downstream of the dam.

More information

- Palaeoflood Study for the Burnett catchment at Paradise Dam, [Fact Sheet](#), July 2020
- Visit sunwater.com.au/projects/paradise-dam-essential-works.

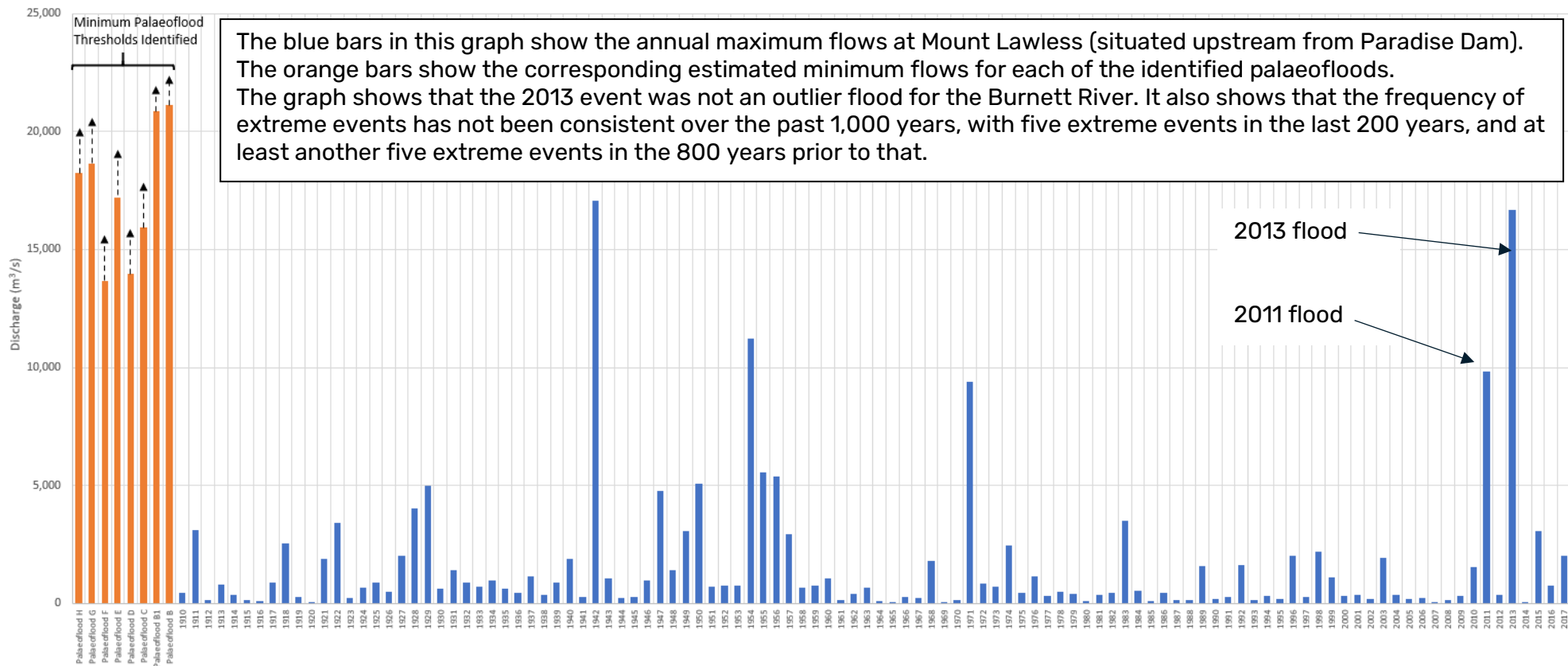


Figure 3 - Annual maximum flows (for each water year from 1910 to 2017) at Mount Lawless and estimated minimum flows for the identified palaeofloods