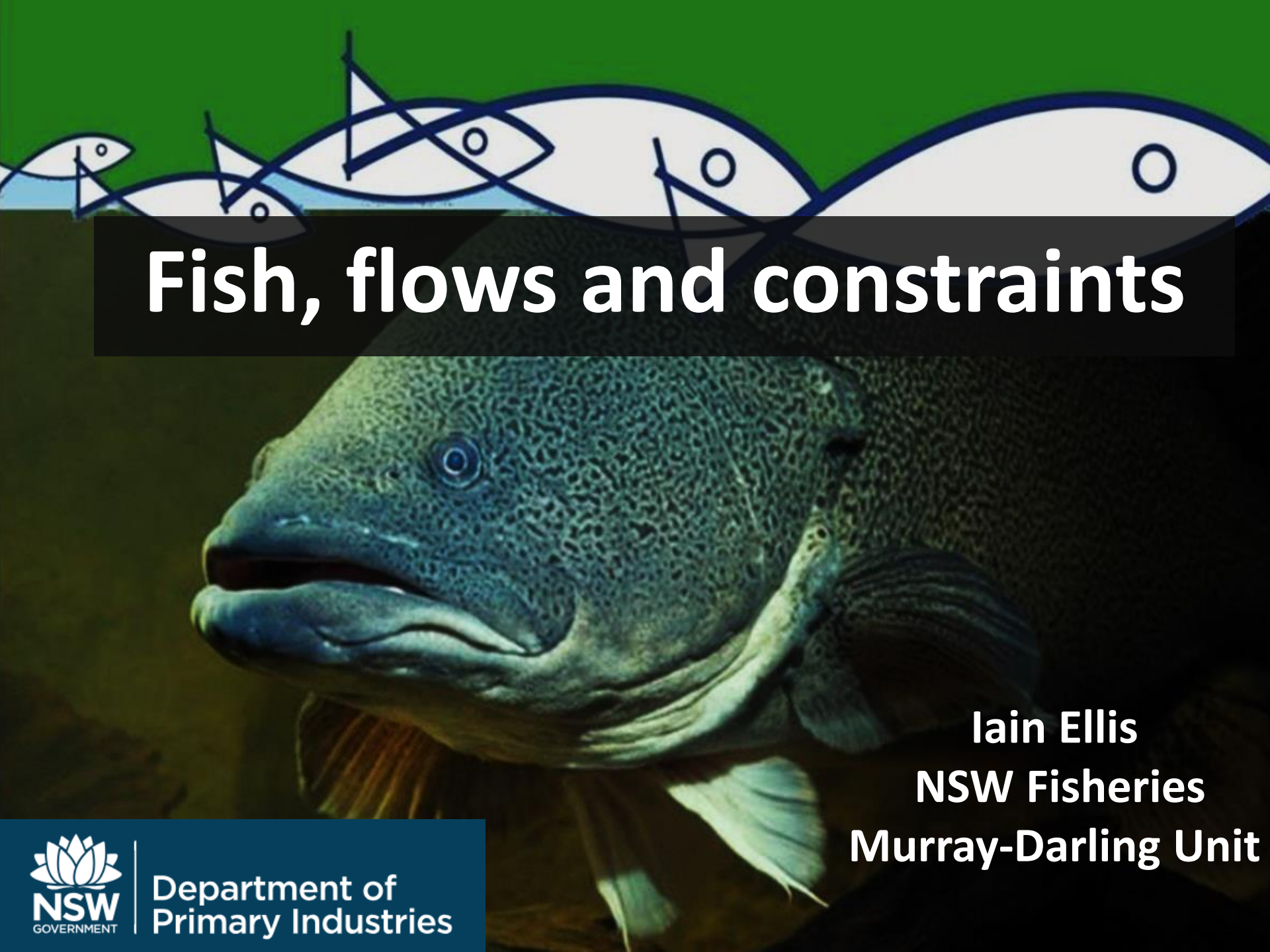
Fish, flows and constraints



Iain Ellis
NSW Fisheries
Murray-Darling Unit

NSW GOVERNMENT | Department of Primary Industries









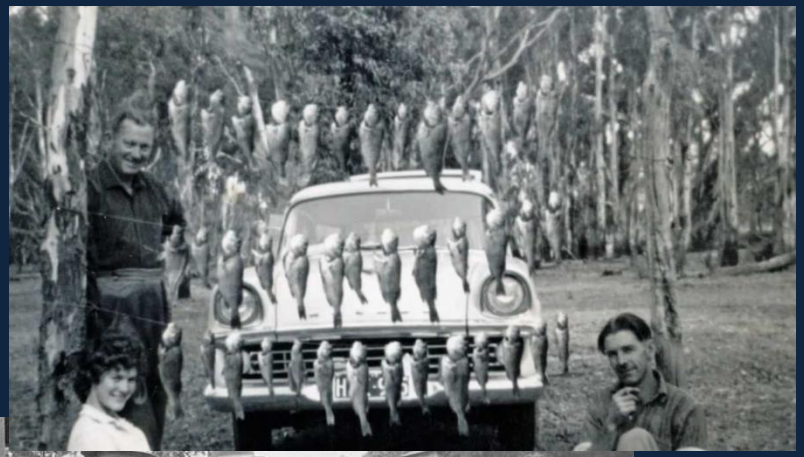








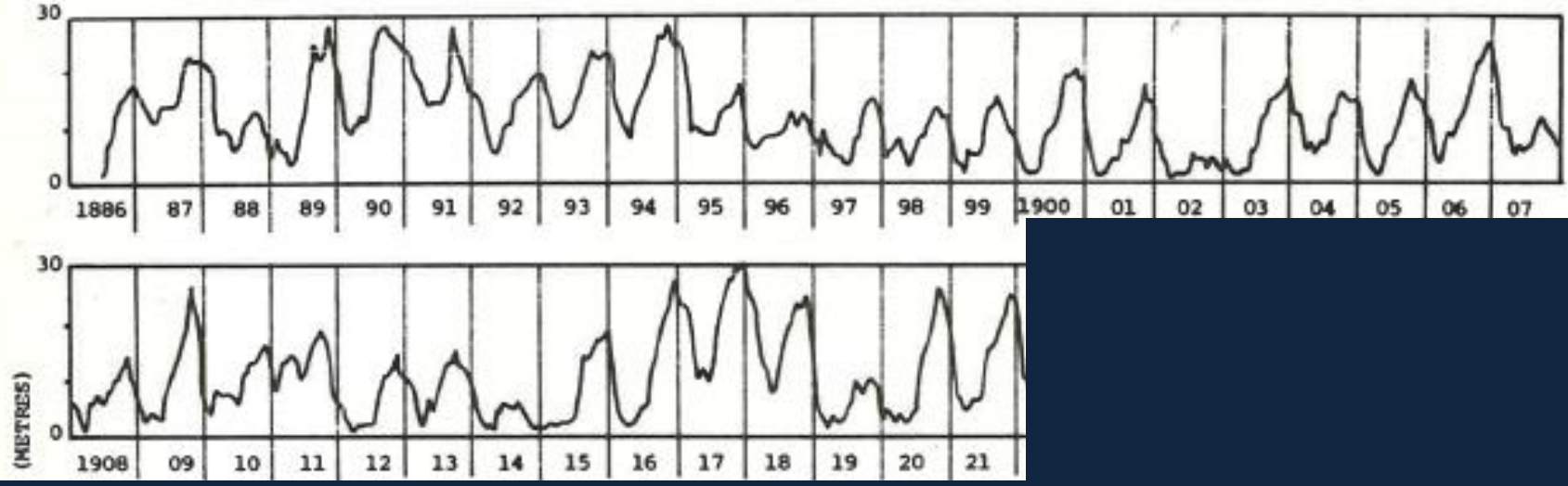
$1.3b in MDB

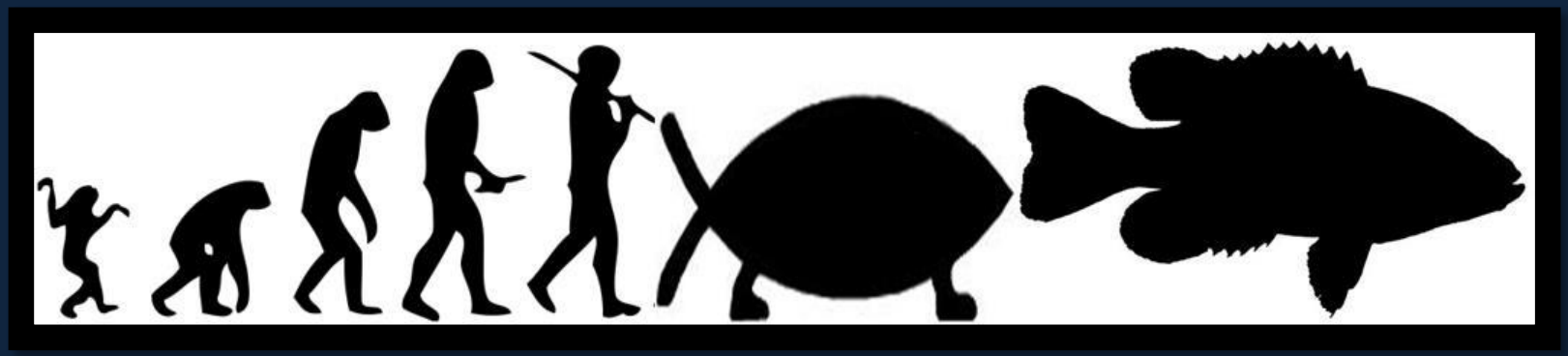


'Mayflower' with a good catch, c1914
State Library of SA: PRG1258/1/2600

Flow variability = River Heartbeat

Lock 1, Blanchetown (1886 – 1921)





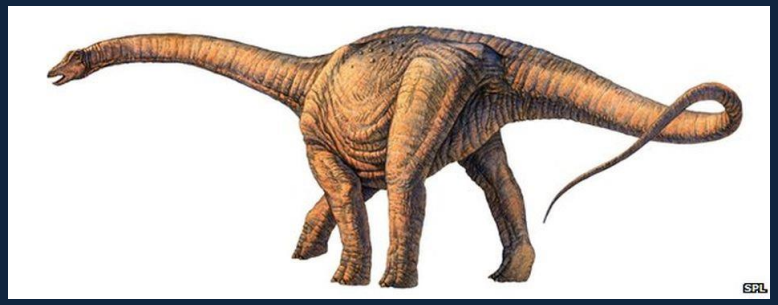
Tens of millions of years

For perspective…

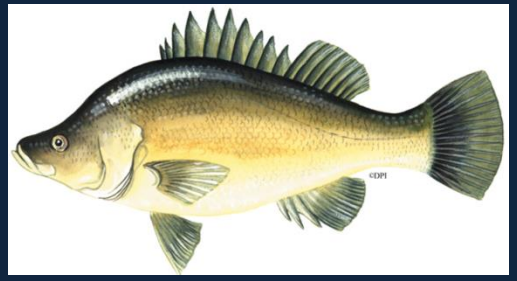
1 mm = 1 year

1 m = 1000 years

1 km = 1 Million years



65 Km



30 km

~ 50 meters

~ 5 meters

~ 2 meters

~ 23 cm

~ 10 cm

What do fish need?

- Food
- Habitat
- Breed
- Connectivity – movement

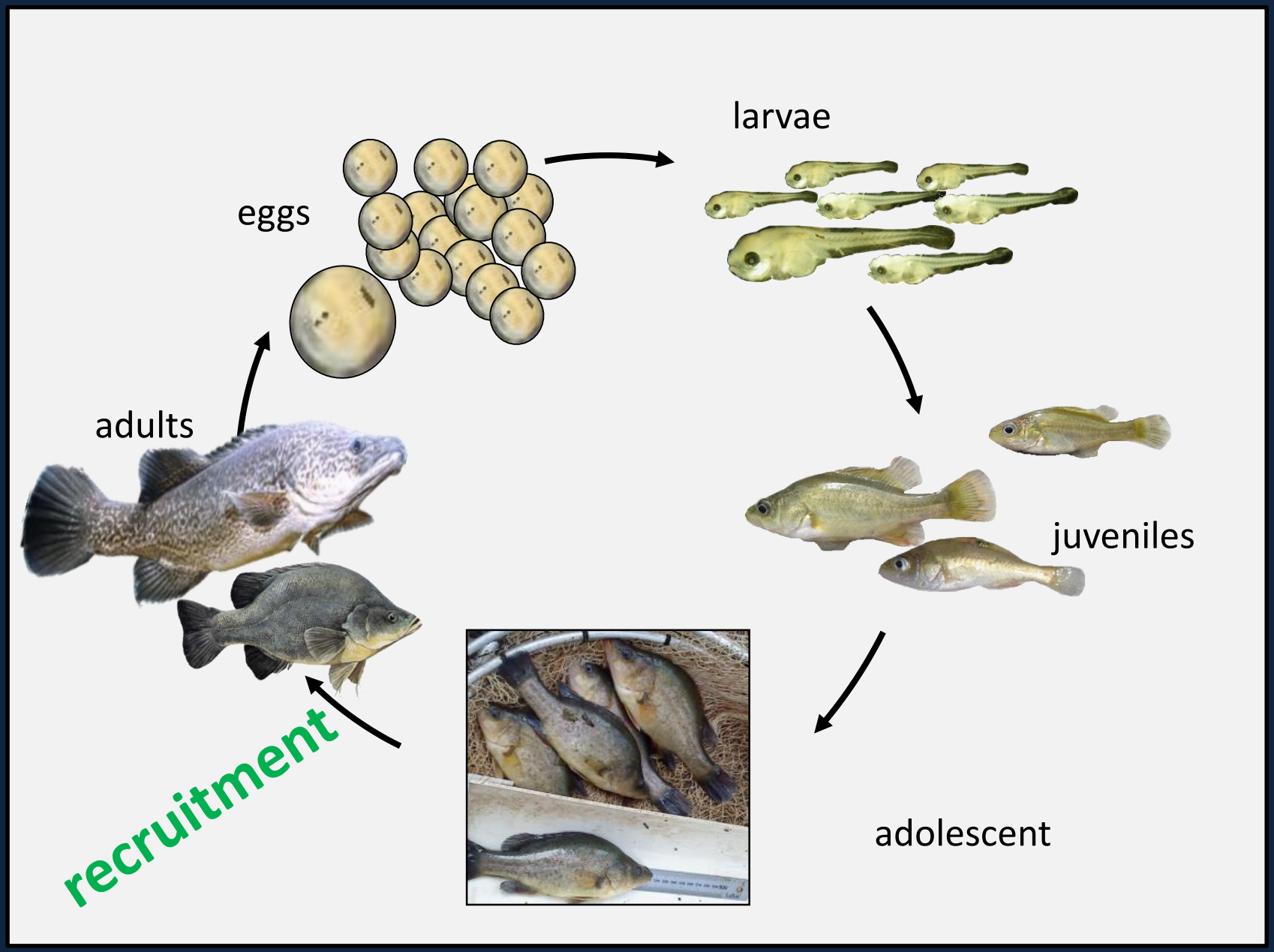
FLOW (variability)

Flow variability = Food

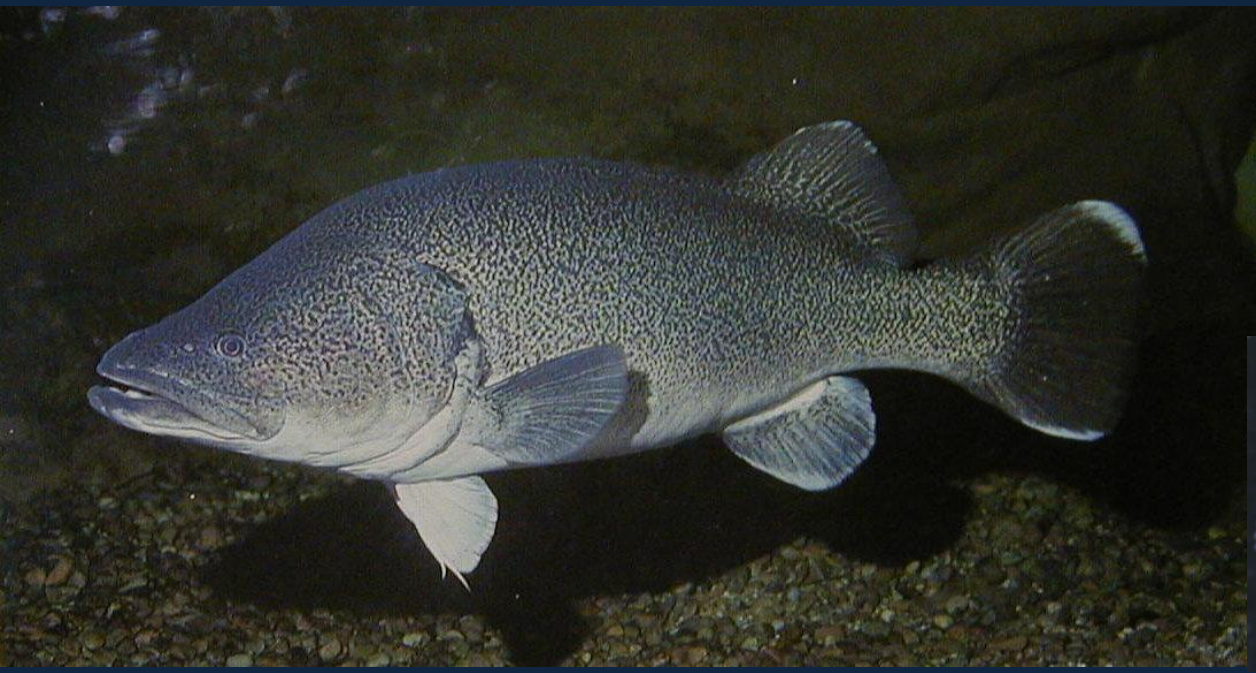
Flow variability = different habitats

Flow variability = Connectivity (movement)

Flow variability = breeding success

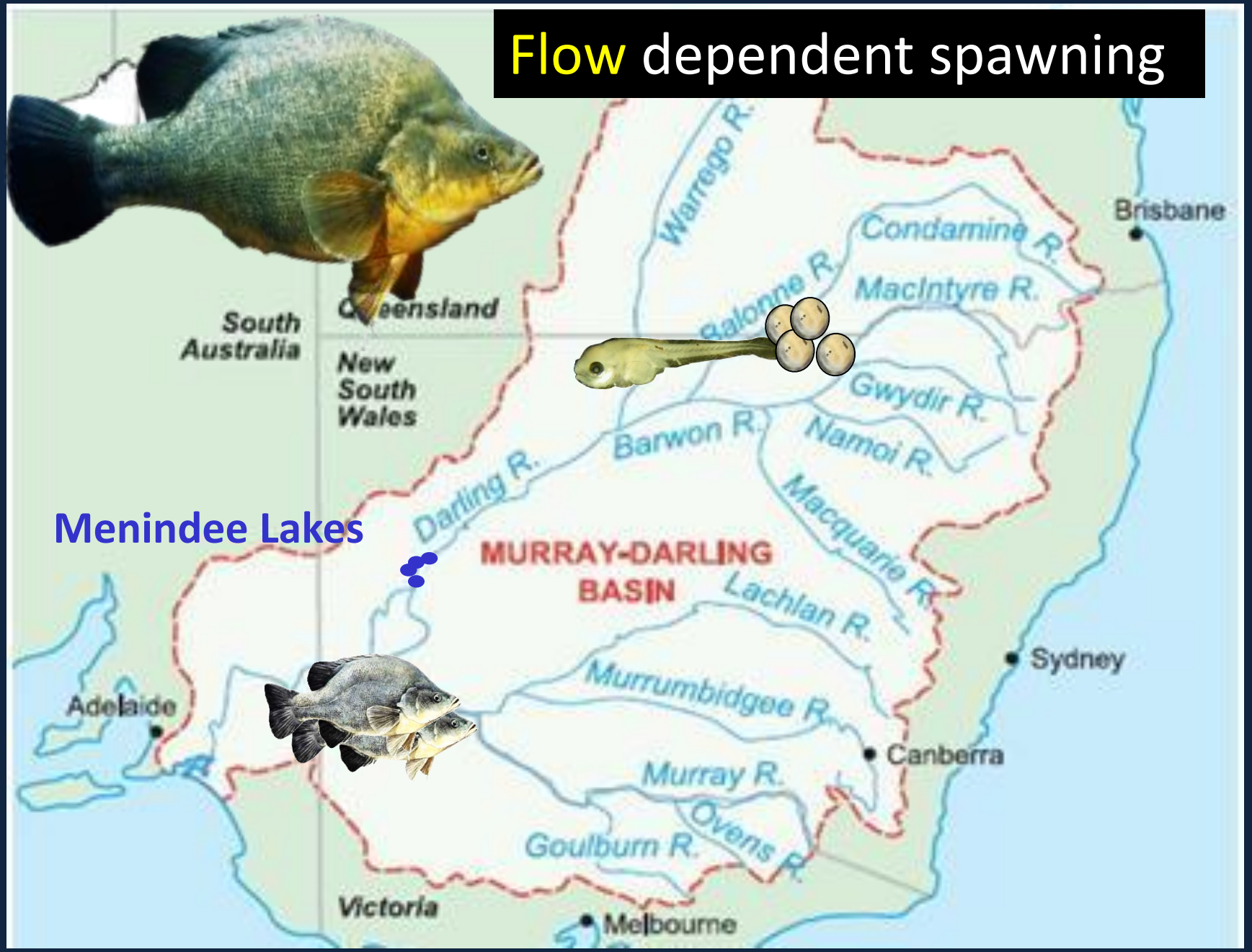


Murray Cod



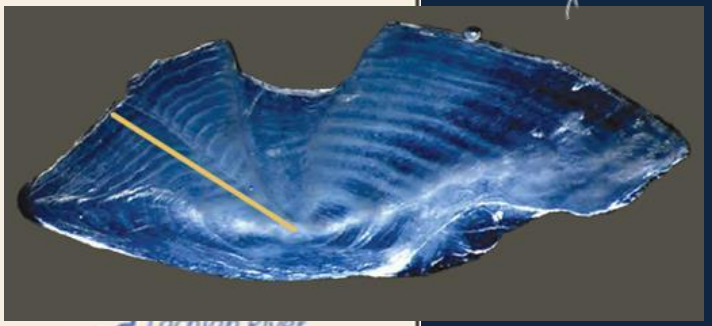
- Flowing habitat
- Dispersal of young
- Higher flow = higher recruitment

Golden perch (Callop)



Floodplain recruitment – fish nurseries!

Otoliths – when/where fish were 'born'



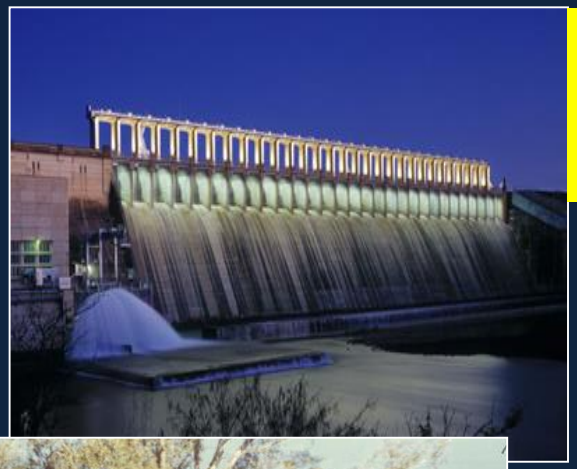
Darling bred cohorts dominate.

2010-12

Zampatti et al.

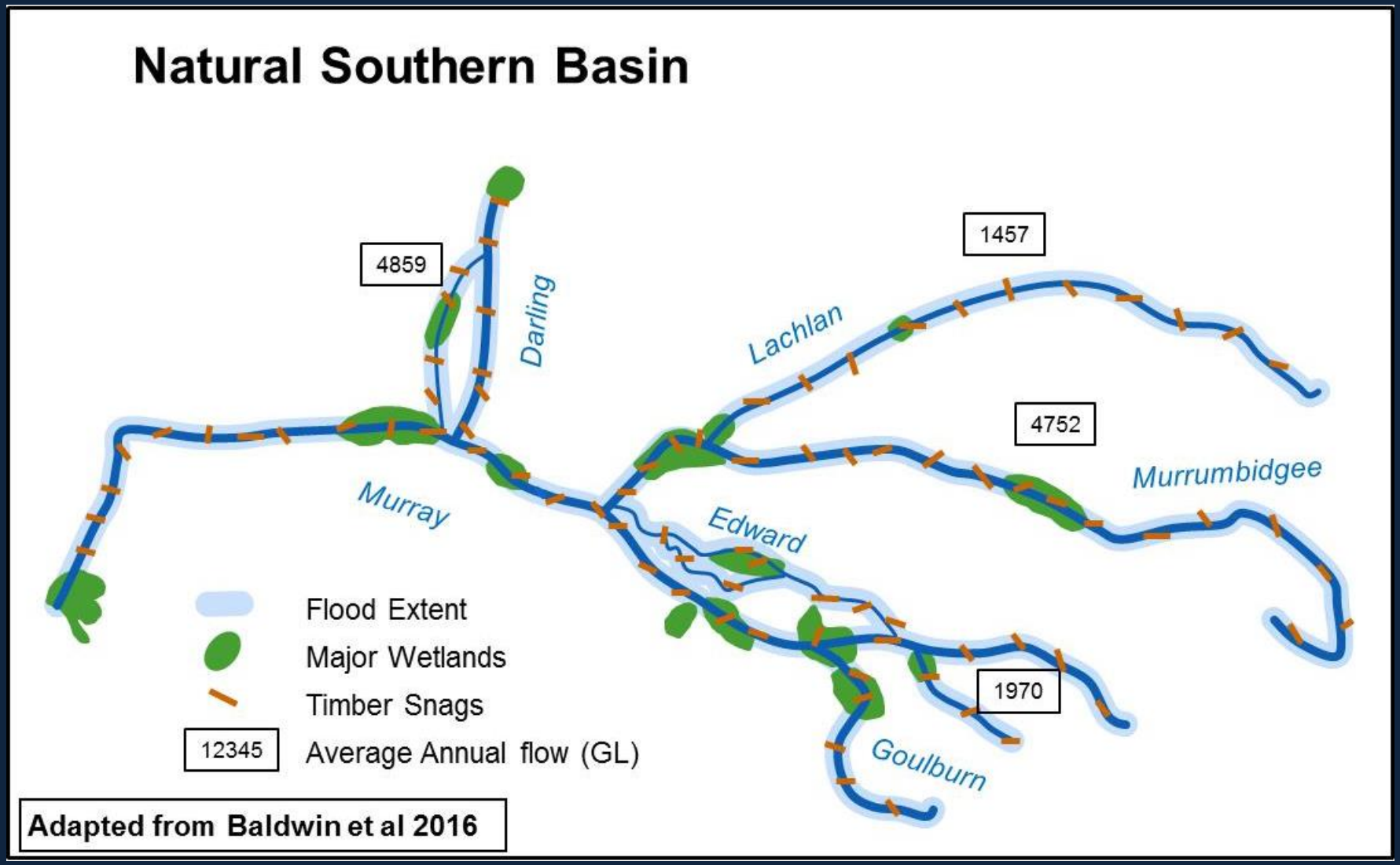
What's the problem?

F-issues

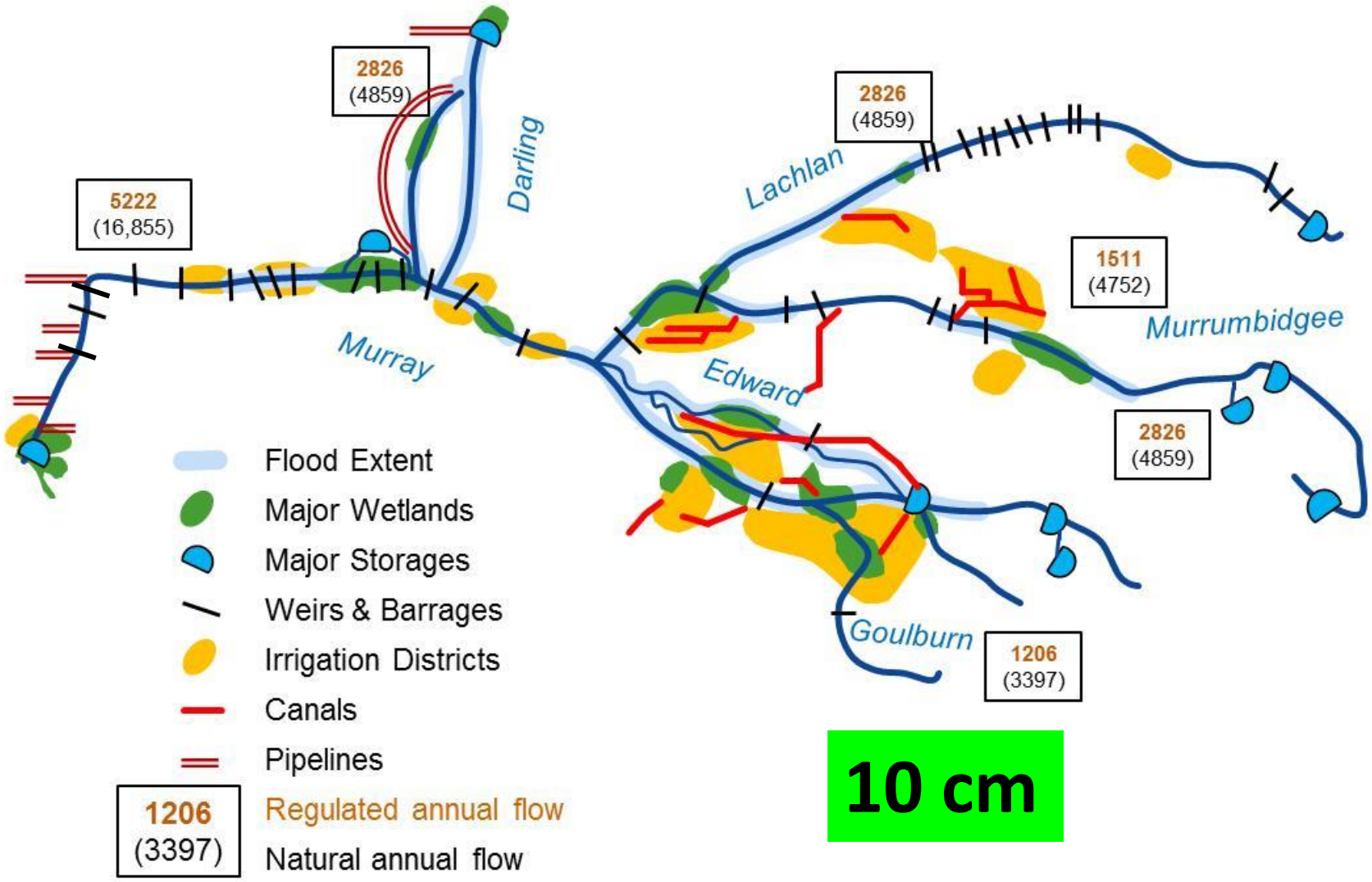


Cumulative Changes in the last 100 years **(10 cm)**

Regulation and water extraction

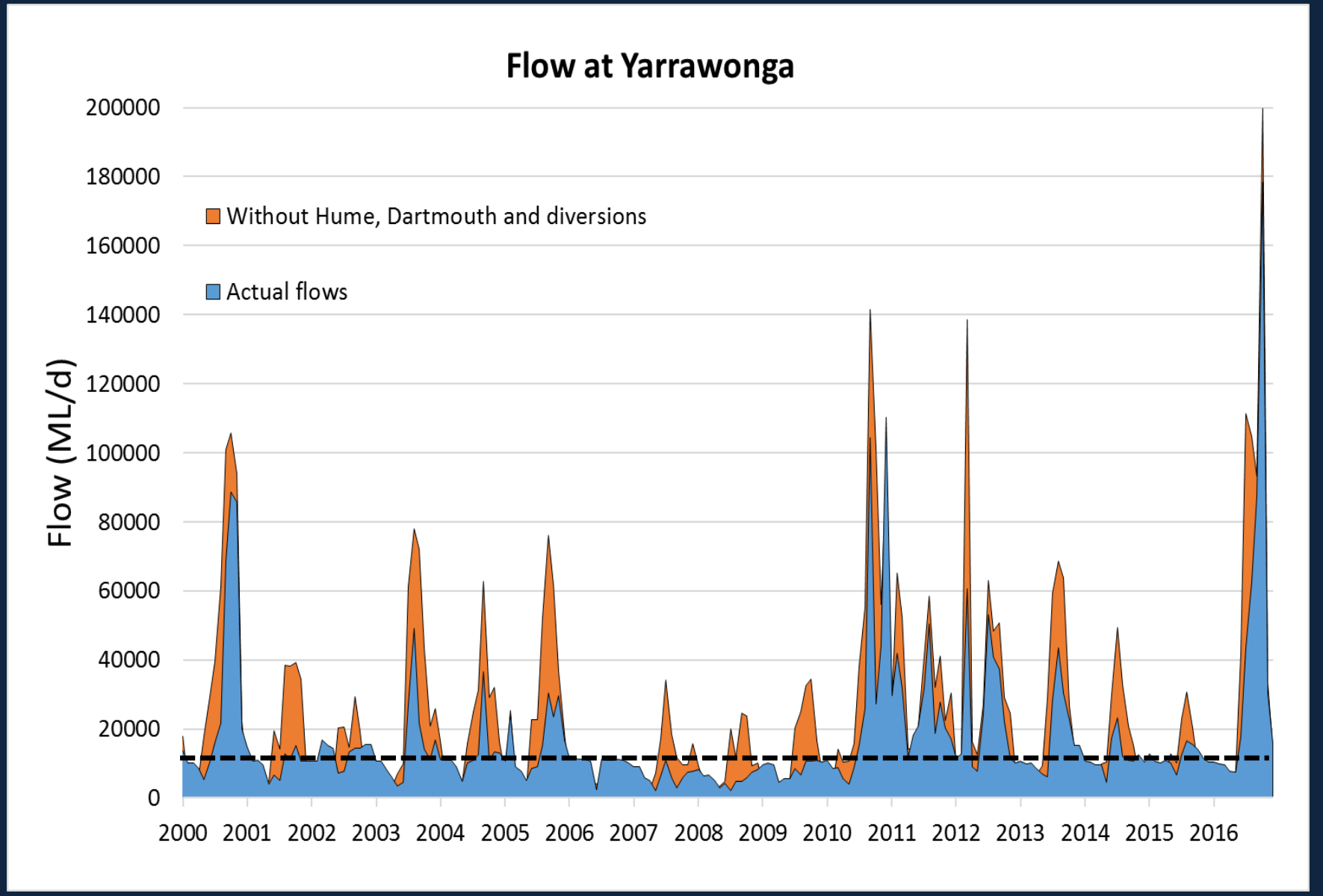


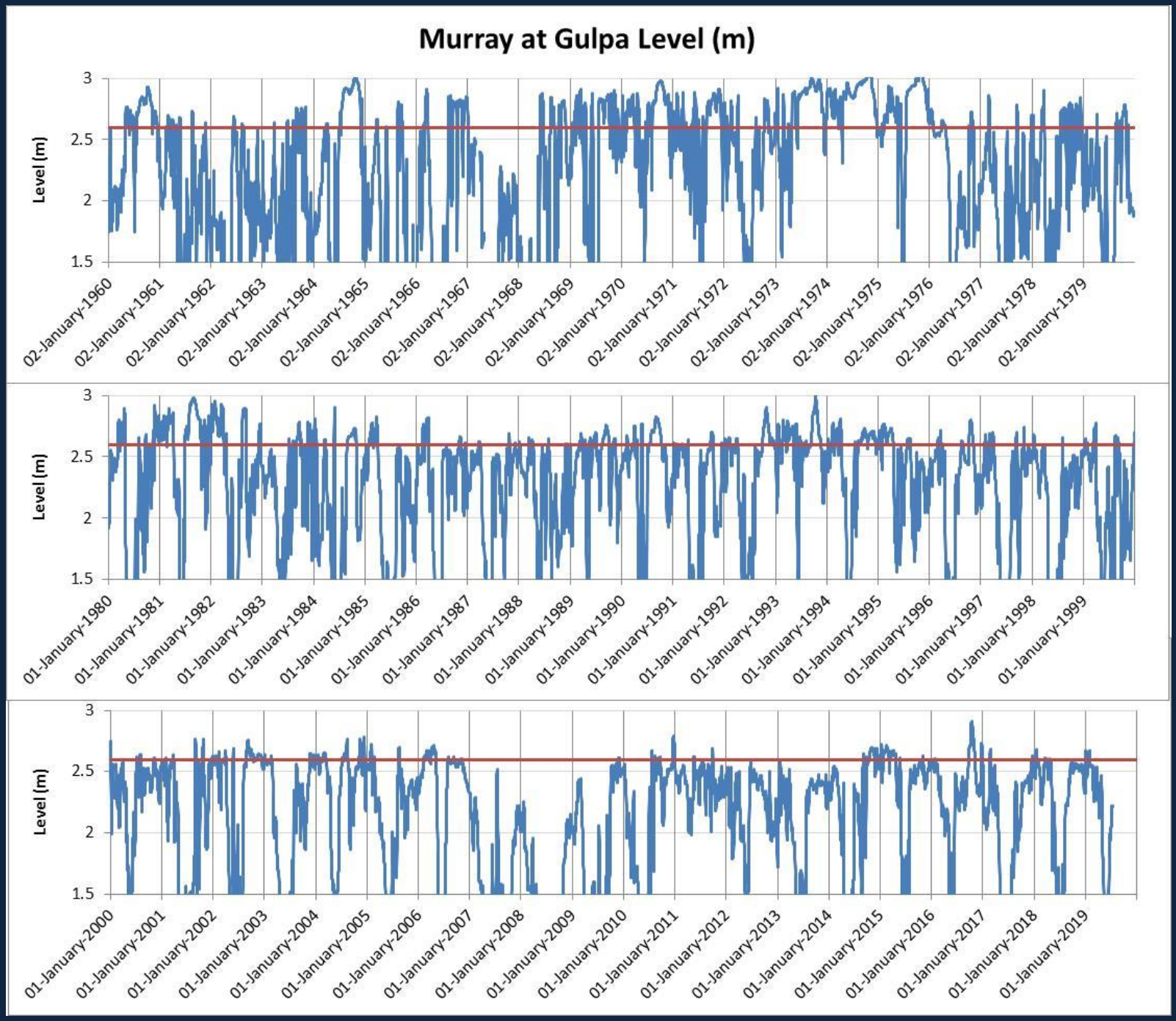
Altered Southern Basin - a “working river”



10 cm

Less flow, less over-banking




Murray at Gulpa Level (m)
Level (m)
3
2.5
2
1.5
02-January-1960
02-January-1961
02-January-1962
02-January-1963
02-January-1964
02-January-1965
02-January-1966
02-January-1967
02-January-1968
02-January-1969
02-January-1970
02-January-1971
02-January-1972
02-January-1973
02-January-1974
02-January-1975
02-January-1976
02-January-1977
02-January-1978
02-January-1979
Level (m)
3
2.5
2
1.5
01-January-1980
01-January-1981
01-January-1982
01-January-1983
01-January-1984
01-January-1985
01-January-1986
01-January-1987
01-January-1988
01-January-1989
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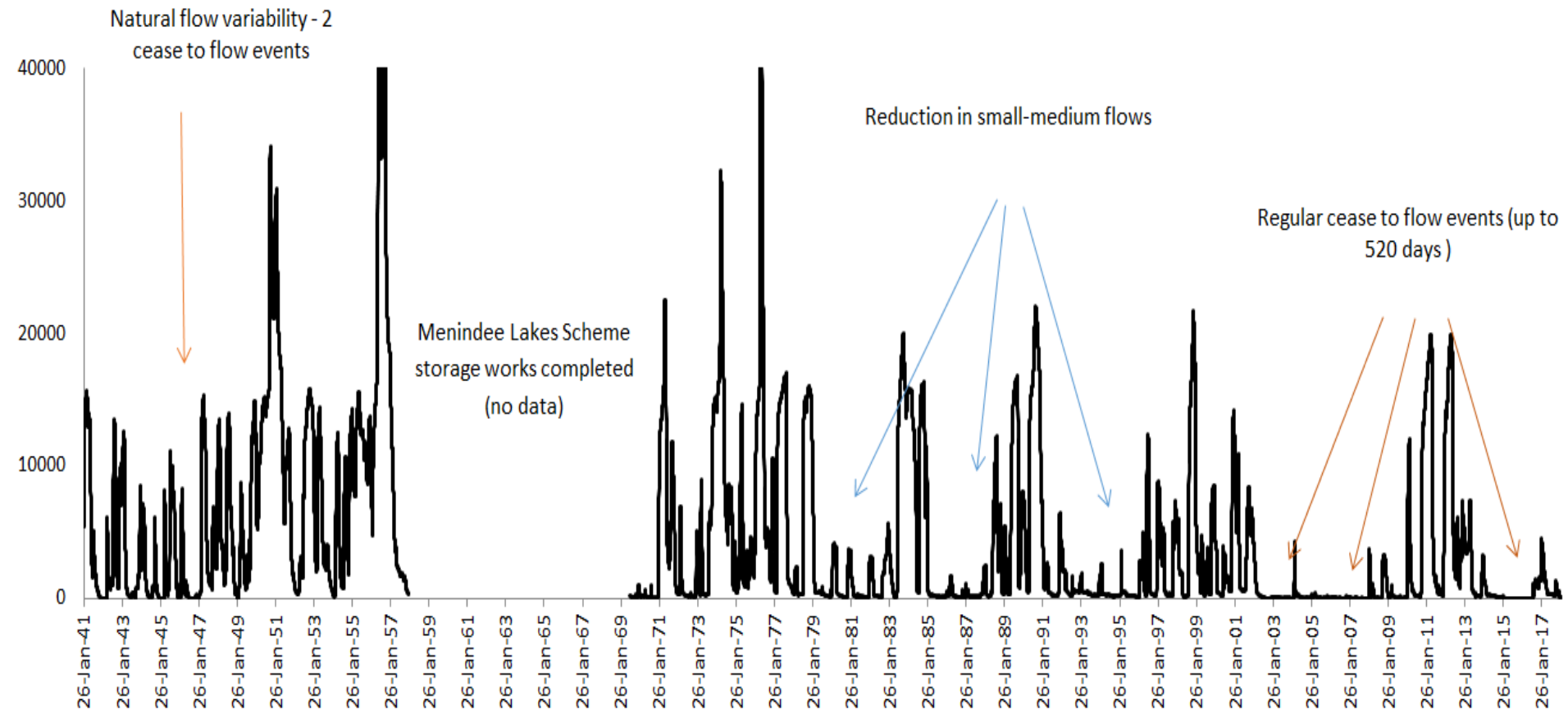
01-January-1992
01-January-1993
01-January-1994
01-January-1995
01-January-1996
01-January-1997
01-January-1998
01-January-1999
Level (m)
3
2.5
2
1.5
01-January-2000
01-January-2001
01-January-2002
01-January-2003
01-January-2004
01-January-2005
01-January-2006
01-January-2007
01-January-2008
01-January-2009
01-January-2010
01-January-2011
01-January-2012
01-January-2013
01-January-2014
01-January-2015
01-January-2016
01-January-2017
01-January-2018
01-January-2019

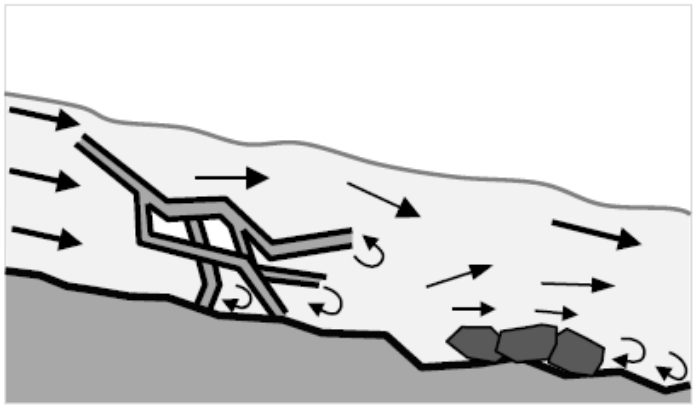
Lower Darling River - flows at Burtundy



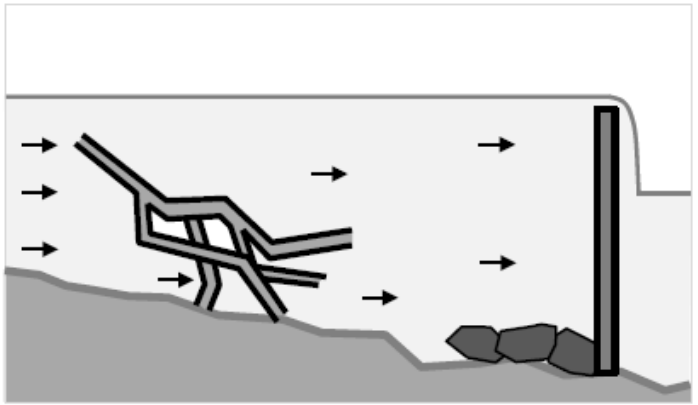
Impact of Weir and dams

A) Natural

Elevation

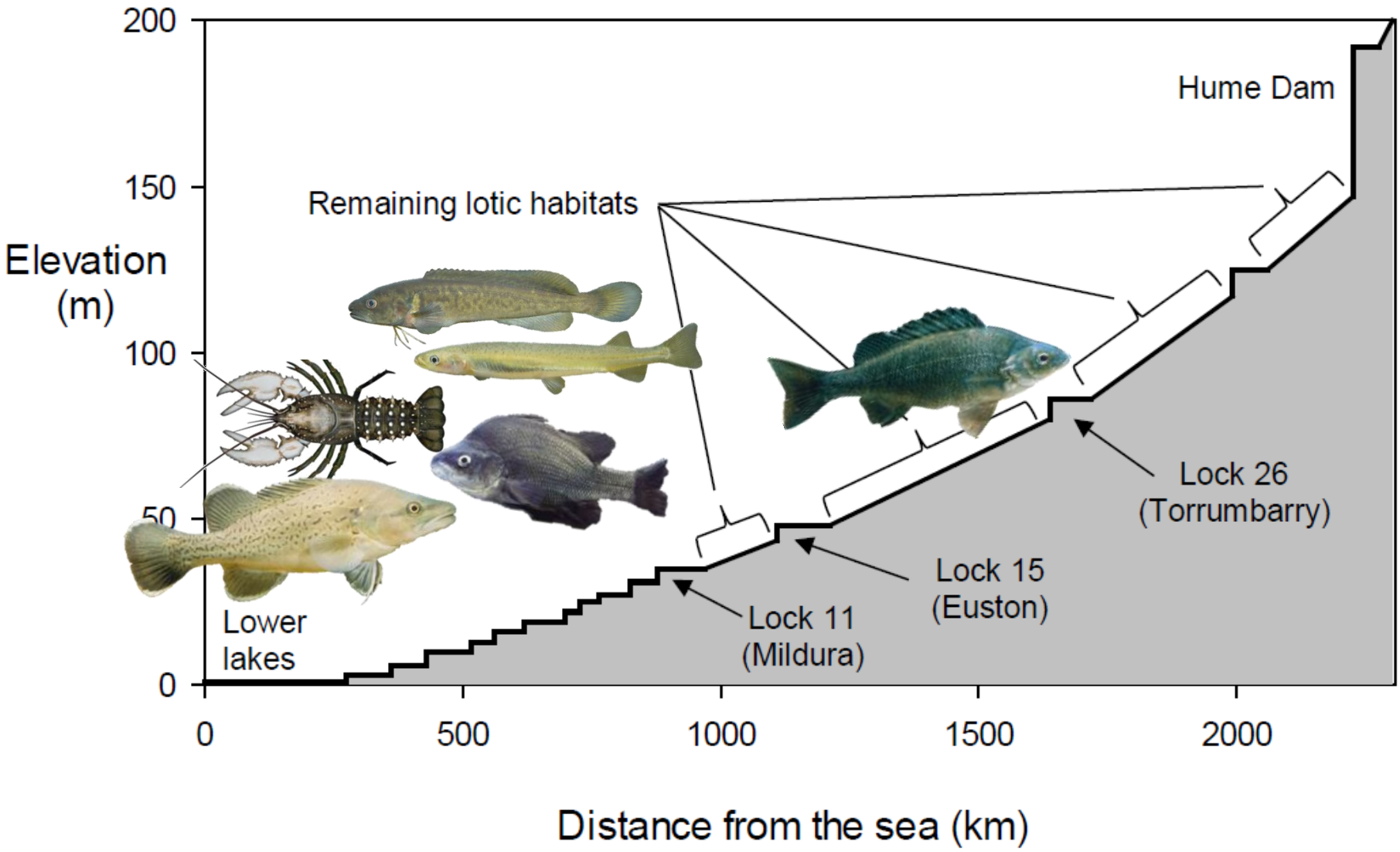


B) Regulated by Weir



Courtesy of Mallen-Cooper and Zampatti

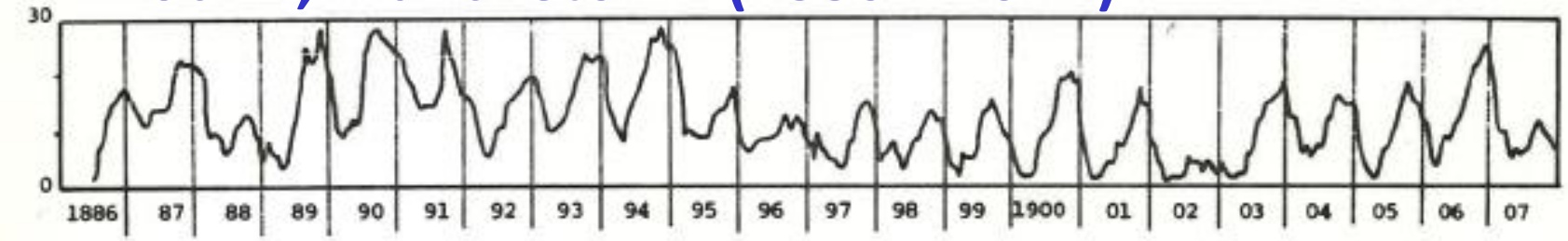
Weirs and dams

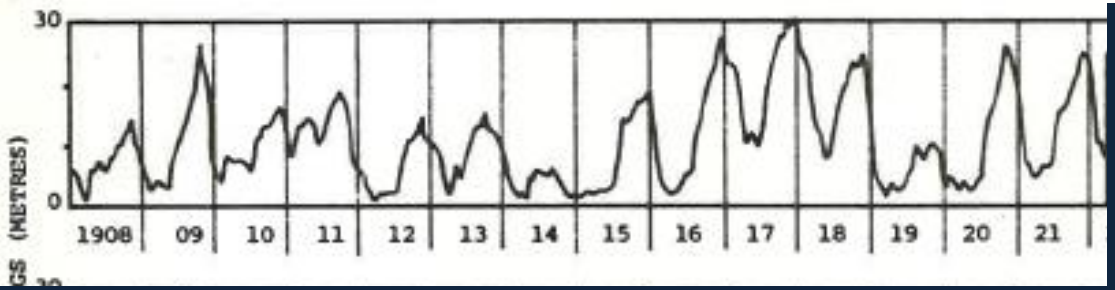


Courtesy of Mallen-Cooper and Zampatti

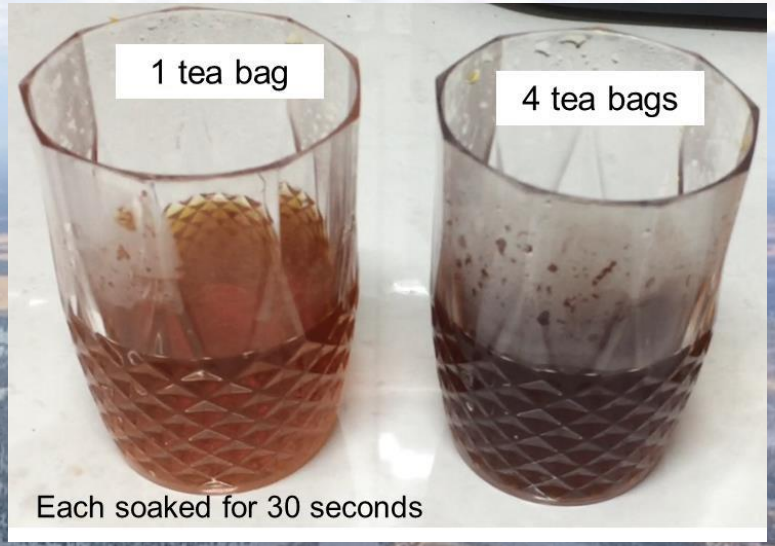
The River heartbeat…??

Lock 1, Blanchetown (1886 – 1921)

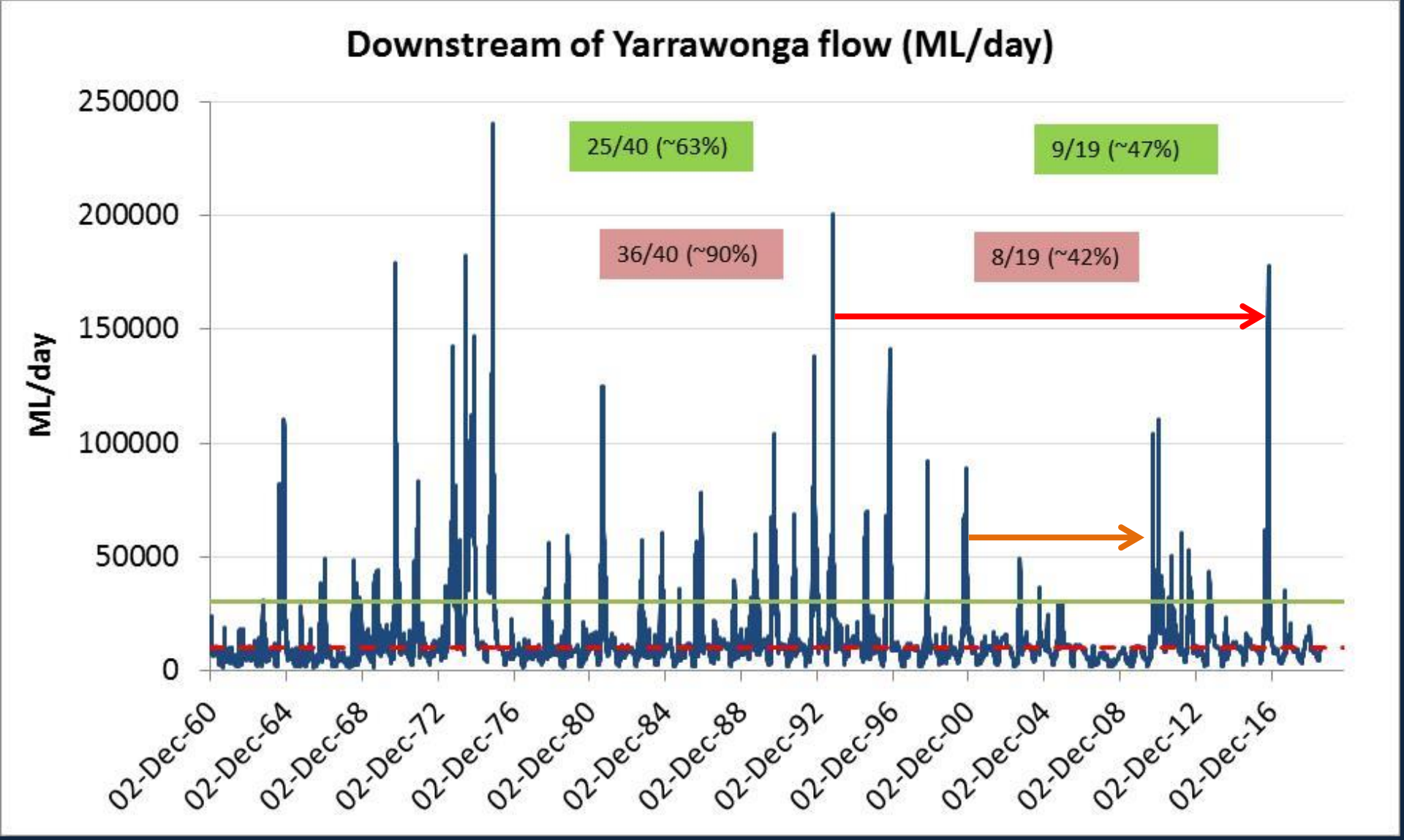




Less flooding
BLACKWATER

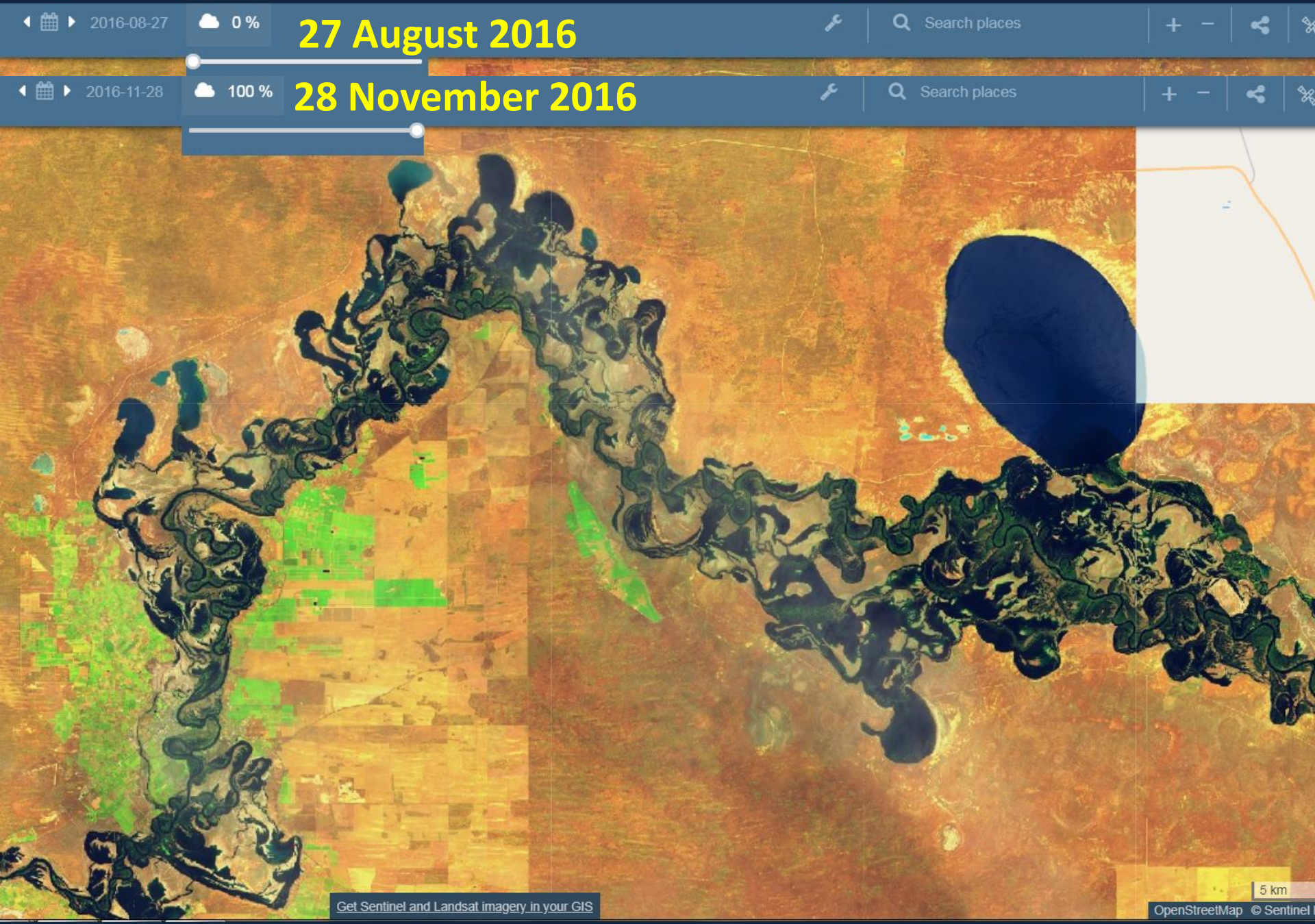


Bacteria ↑ Oxygen ↓
HYPOXIA



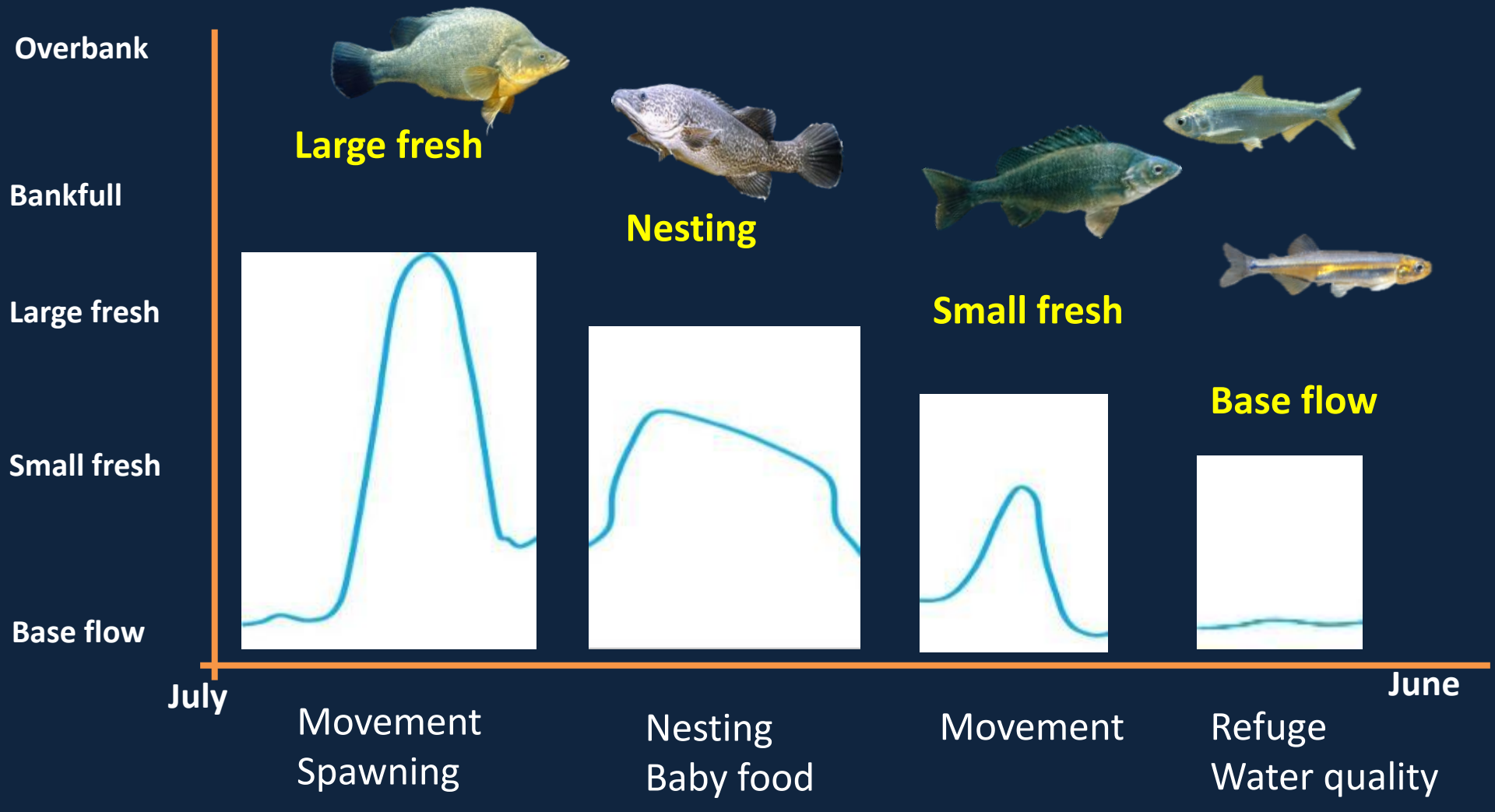
Less frequent flooding – carbon build up

Don’t blame environmental water

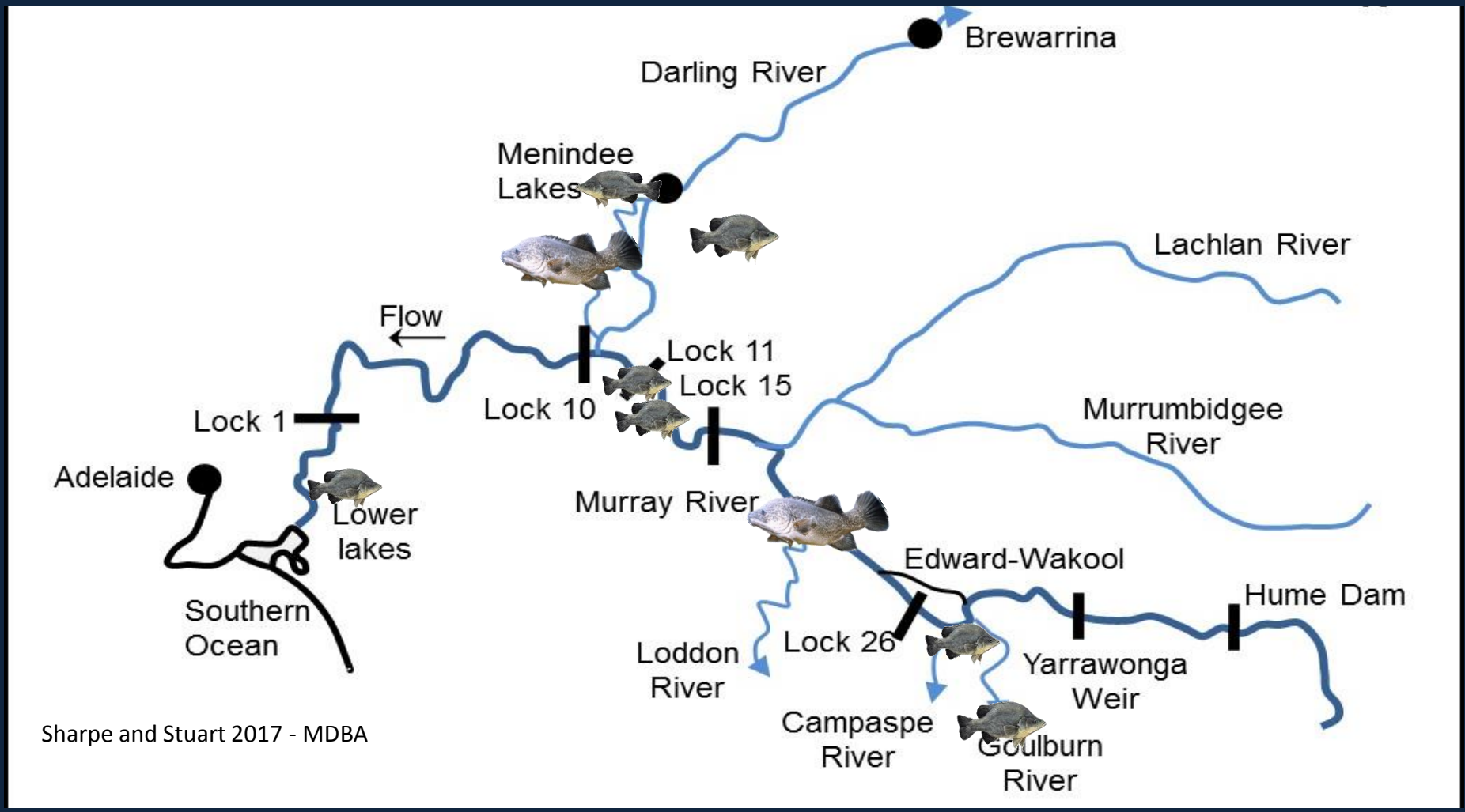

2016-08-27
0 %
27 August 2016
Search places
2016-11-28
100 %
28 November 2016
Search places
Get Sentinel and Landsat imagery in your GIS
5 km
OpenStreetMap © Sentinel

What can we do?

Restore flow components – Environmental water

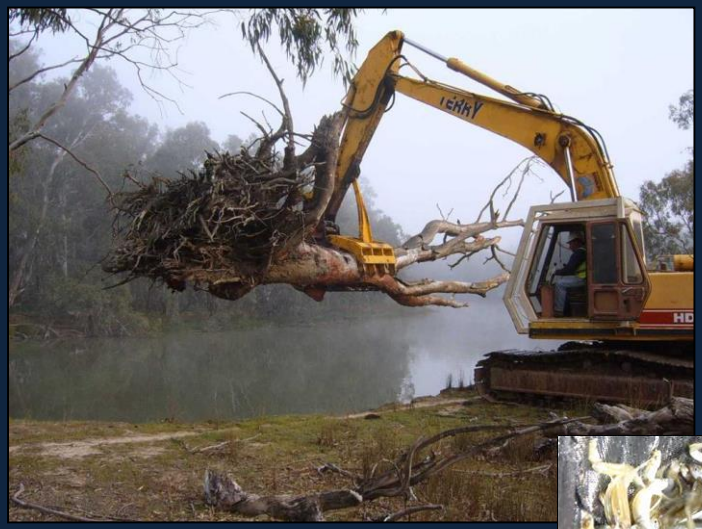


Connect Rivers



Sharpe and Stuart 2017 - MDBA

Complementary measures



Relax constraints

Because if we don't…

1. Less frequent floodplain inundation – floods WILL be hypoxic

2. Choke erosion (energy not dispersed)

3. Environment downstream will suffer (>1500km)

What can you do?

Think beyond your ‘patch’

Question – learn stuff

Accept human impact

No more regulation

Support E-water