Progress towards environmental targets in the Murray-Darling Basin Plan

Dr Anne Jensen
Healthy Rivers Ambassador

Healthy Rivers Ambassadors
Promoting a healthy, working Murray Darling Basin for the future

Aim of Basin Plan is *healthy working rivers*

healthy working rivers need:

- enough water to build resilience, to function and to support their ecosystems in order to support dependent human communities
- sufficient flow, seasonal variations in flow and level, occasional floods, water for life-cycles, flow to keep the mouth open, connections between floodplains and mainstreams

Healthy working rivers need floods
Floods in 1993 inundated floodplains and connected habitats with little threat to infrastructure

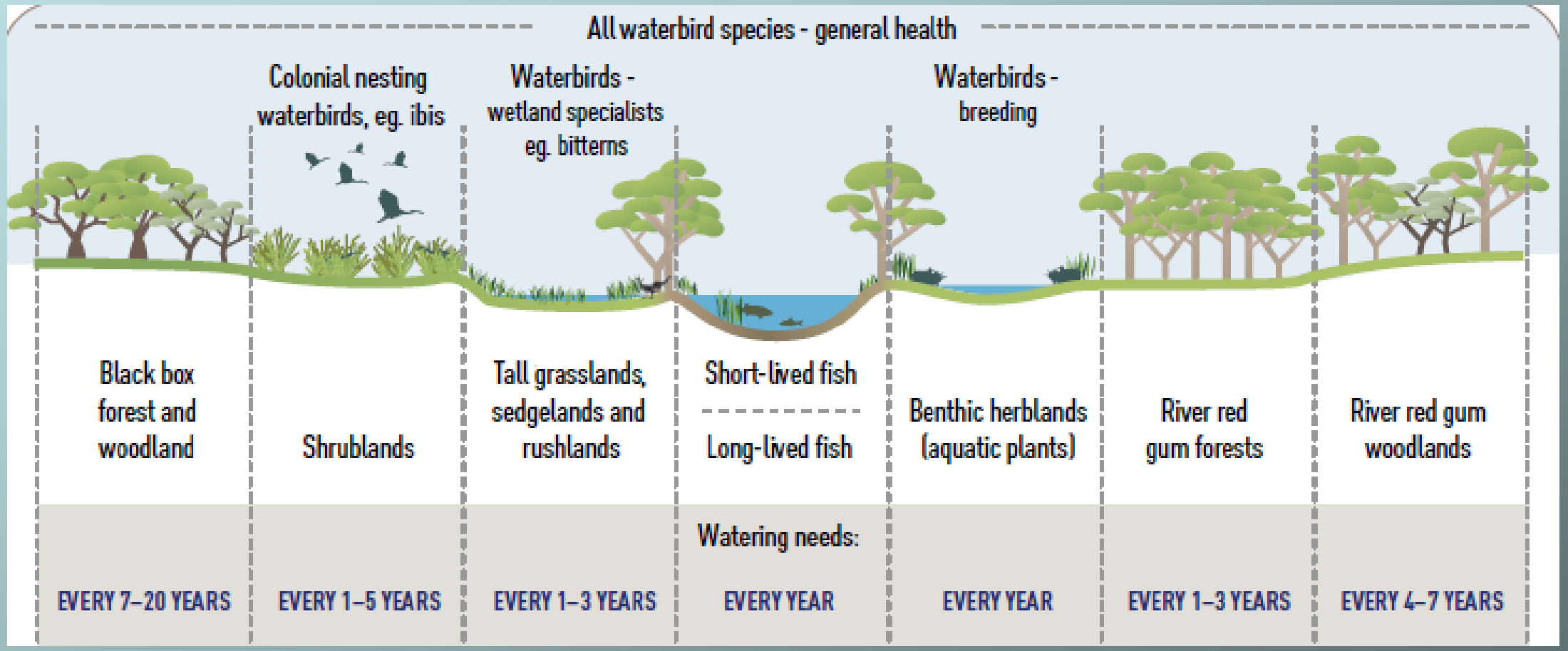
What does the Environment Need?
Flows which deliver the natural local water regime

Source: late Assoc Prof Keith Walker

- Water regime includes:
  - seasonality
  - quality
  - quantity
  - duration
  - rate of rise
  - rate of recession

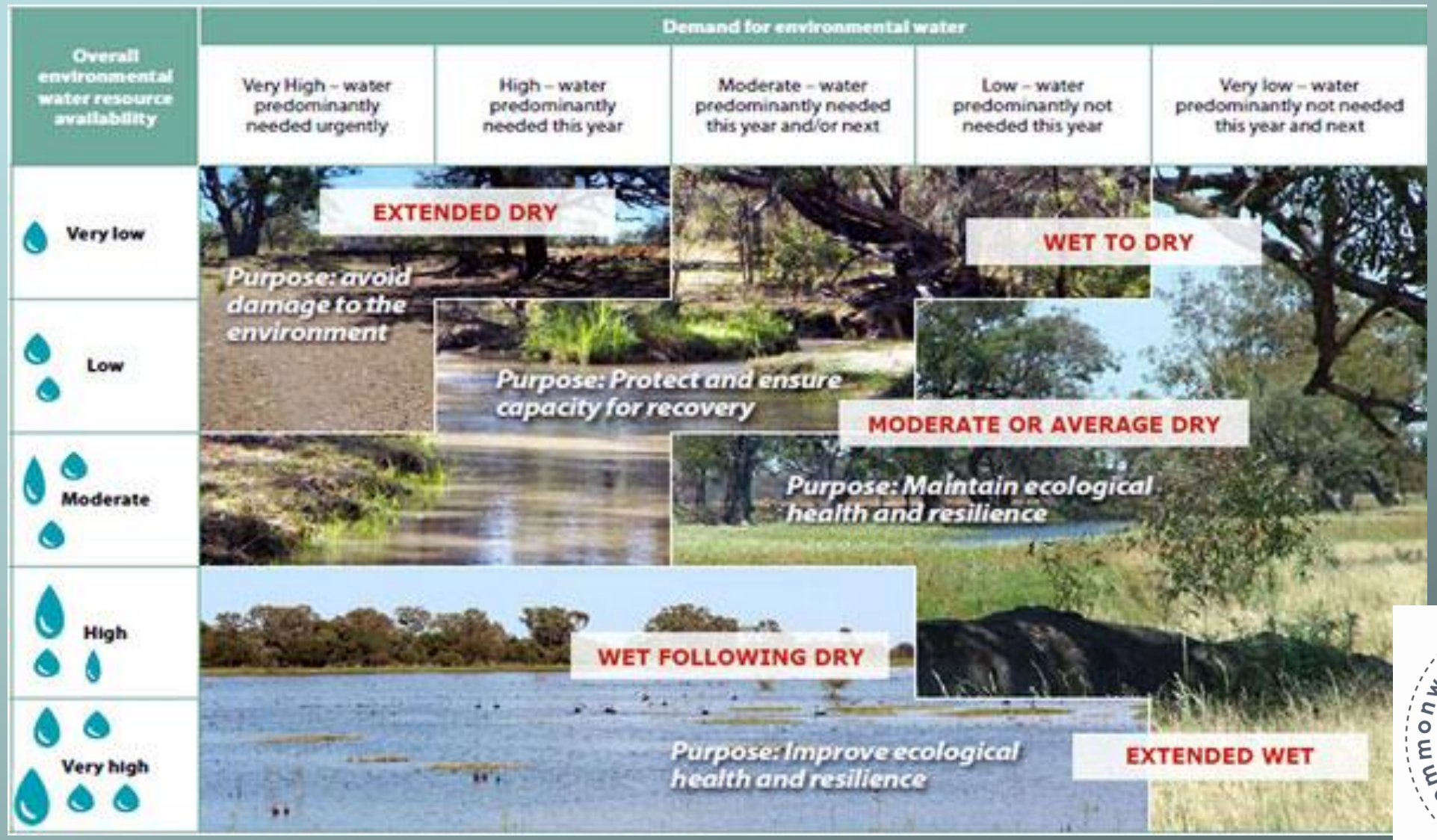
- need pulse flows, not steady flows, to deliver environmental outcomes,
- need magnitude, frequency, duration, timing to deliver appropriate flow regime

12 Basin Plan ecological elements to measure targets



Targets set to meet as much as possible natural frequency of watering

CEWO Framework for returning recovered water to rivers



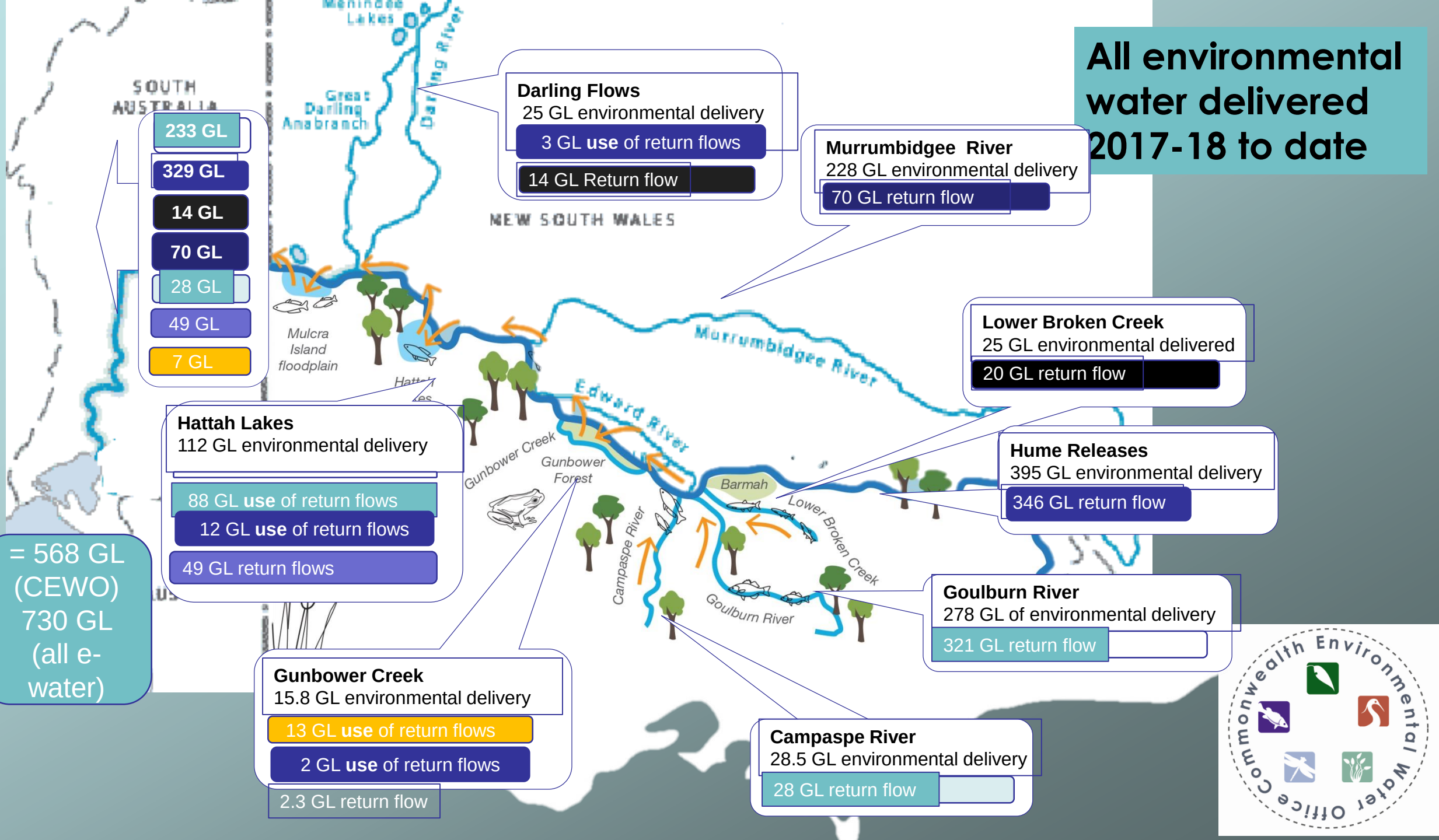
Commonwealth Environmental Water Office

CEWO: Entitlement vs Allocation vs Delivery

- Total water purchased 1227 GL (cap of 1500 GL), total water recovered for Basin Plan 2107 GL
- only 530 GL since Plan signed
- Total holdings in entitlements 2672 GL, with long term average annual yield of 1836 GL (to end Feb 2018)
- Delivery 2015-16: 1721 GL
- Delivery 2016-17: 1148 GL
- Delivery to end Feb 2018: 1012 GL
- No further purchases after 30 Jun 2017 if SDL adjustments accepted

Source (accessed 03/04/2018): http://www.environment.gov.au/water/cewo/about-commonwealth-environmental-water

All environmental water delivered 2017-18 to date



Darling Flows
25 GL environmental delivery
3 GL **use** of return flows
14 GL Return flow

Murrumbidgee River
228 GL environmental delivery
70 GL return flow

Lower Broken Creek
25 GL environmental delivered
20 GL return flow

Hume Releases
395 GL environmental delivery
346 GL return flow

Hattah Lakes
112 GL environmental delivery
88 GL **use** of return flows
12 GL **use** of return flows
49 GL return flows

= 568 GL (CEWO) 730 GL (all e-water)

Goulburn River
278 GL of environmental delivery
321 GL return flow

Gunbower Creek
15.8 GL environmental delivery
13 GL **use** of return flows
2 GL **use** of return flows
2.3 GL return flow

Campaspe River
28.5 GL environmental delivery
28 GL return flow

Commonwealth Environmental Water Office

Limitations of Delivering Environmental Flows

- can’t create a flood or overbank flows, can only piggy-back or coordinate releases
- need minimum natural flow of >45,000 ML/d for effective overbank flows to inundate large areas of Lower Murray floodplain
- no capacity to store & deliver large volumes, eg if 60,000 ML/d needed for 60 days to maintain ecosystem health = 3600 GL
- need to lift water 3 m out of river channel in Lower Murray Valley

Can Basin Plan Meet Environmental Targets?

***Review by Goyder Institute (Dec 2016)*:**

- 2750 GL/y environmental water meets 10 out of 18 targets (55.5%) in Basin Plan, only at low levels of certainty, and assuming all constraints have been met/removed/relaxed
- 3200 GL/y **with relaxed constraints** meets all targets except one at high flows (17 out of 18)
- 3200 GL/y **with** constraints meets 13 out of 18 targets
- 2800 GL/y **with** constraints meets 11 out of 18 targets
- additional 450 GL/y meets an additional 7 targets
- 3200 GL/y benefits the whole Basin, not just the downstream end

Can Basin Plan Meet Environmental Targets (2)?

***Review by Goyder Institute (Dec 2016)*:**

- assessments of EWRs based on healthy ecosystems, but MDB ecosystems still in stressed condition, recovering from Millenium Drought
- extra water needed to support continued recovery
- EWRs for red gum & black box not met at 2750 GL/y
- EWRs for Chowilla and Coorong icon sites only met at 4000 GL/y
- even 4000 GL/y not enough for black box communities on outer floodplains

Basin Plan has 16 Environmental Watering Targets

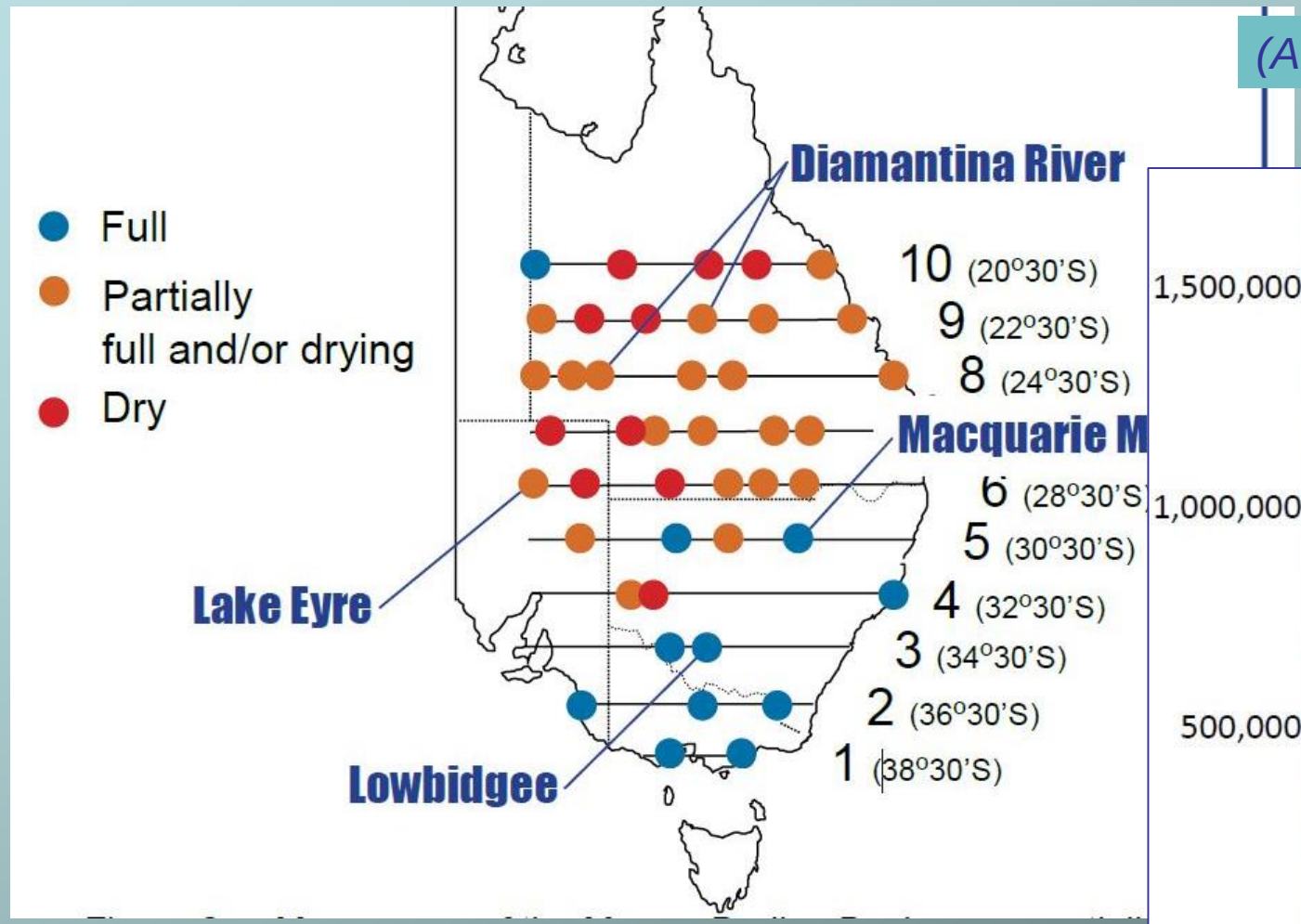
- 30% more base flows into the River Murray
- Murray Mouth open 90% of time
- improved connectivity with floodplains by 30-60% in Murray, Murrumbidgee, Goulburn, Condamine-Balonne
- maintain area & condition of river red gum, black box, coolabah
- improve condition of southern river red gum

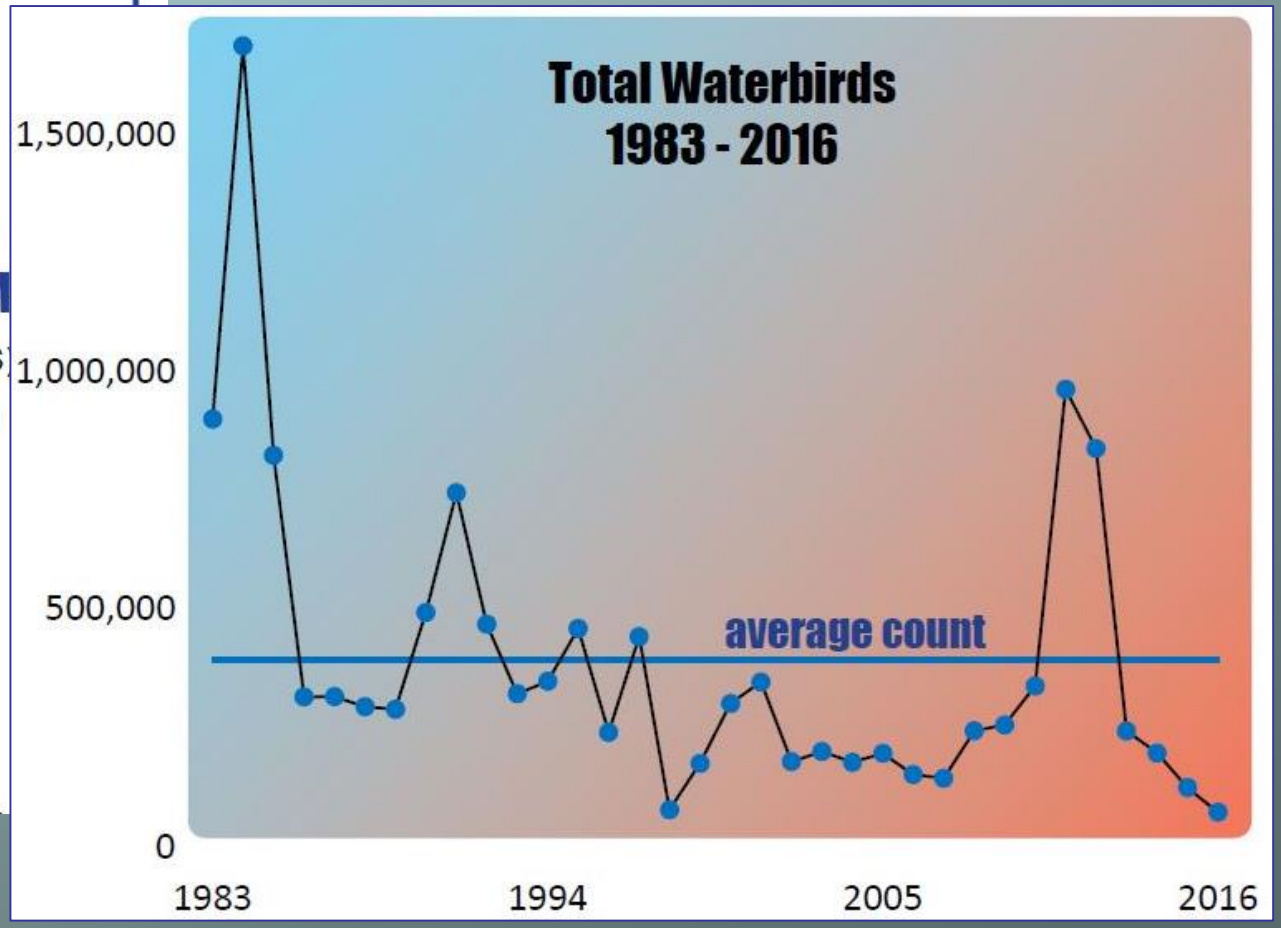
- maintain diversity of waterbirds
- increase abundance 20-25% by 2024
- improve breeding events for colonial nesting waterbirds by 50%
- improve distribution of native fish
- improve breeding success of mulloway in at least 5/10 years
- 10-15% more mature Murray cod and golden perch at key sites

Expressed as ‘expected outcomes’, not evaluated in 5-year BP review??

Waterbirds in Decline –
Eastern Australian Wetlands Survey Annual Report 2016

(Annual surveys by Prof Richard Kingsford & team)





Long term status of waterbird species since 1983

Why Environmental Watering is Essential!

- lack of flows 2014 -16 threatened loss of lower Darling River fish populations in key nursery area, especially callop
- environmental flows transferred from other river valleys to create low flows in spri… 2016, then increased to cre… sources and sit…
- bes… …ng event in 20 years!
- rain-fed river flows continued to allow fish to grow and migrate
- environmental flows saved key nursery area and Darling fish populations able to migrate to other Basin rivers

STOP PRESS: flows to Lower Darling under threat again in 2018!!

New information that Lower Darling is critical habitat for all native fish in Basin!

SDL Adjustments Process

SDLs are 'volume of extraction that will not have negative impacts on natural environments and functions of rivers, waterways, groundwater and wetlands of the Murray-Darling Basin'

- adjustments are being proposed through 37 engineered or operational projects to deliver '*equivalent environmental outcomes*' with less water
- MDBA states it is *'confident that environmental outcomes can be achieved with less water'*
- based on independent scientific review
- included 'ecological equivalence scoring'
- scored all projects as one package, not individually and scored at reach scale
- compared 2750 GL to 2100 GL
- recommended total reduction is 605 GL

Assessment of SDL Environmental Outcomes

- independent scientific review of SDL adjustments Southern Basin
- applied at river reach scale
- compared 2750 GL with 2100 GL for whole package of 37 projects
- found ‘equivalent environmental outcomes’ with lower volumes
- supported reduction in recovery target of 605 GL
- individual projects not assessed

- adjustments for Northern Basin(NB) compared flow scenarios of 390 GL with 320 GL
- found ‘equivalent environmental outcomes’ with 320 GL, so recommended 70 GL reduction
- neither scenario delivers more than half NB targets
- submissions suggested need to increase NB recovery target to 410 GL

Regulators fill gaps between floods

regulators don't deliver equivalent environmental outcomes compared to natural floods:

- good at increasing soil moisture storage
- most benefits to vegetation, less to aquatic animals
- capacity to mimic environmental cues and conditions is limited
- don't provide equivalent conditions for dispersal of seed and eggs
- barriers to fish passage
- don't provide flowing conditions
- natural rate of recession is <2 cm/d, hard to deliver with regulators
- if waterbirds start to breed and inundation stops, then may have done harm through wasting physiological resources, though on a limited scale

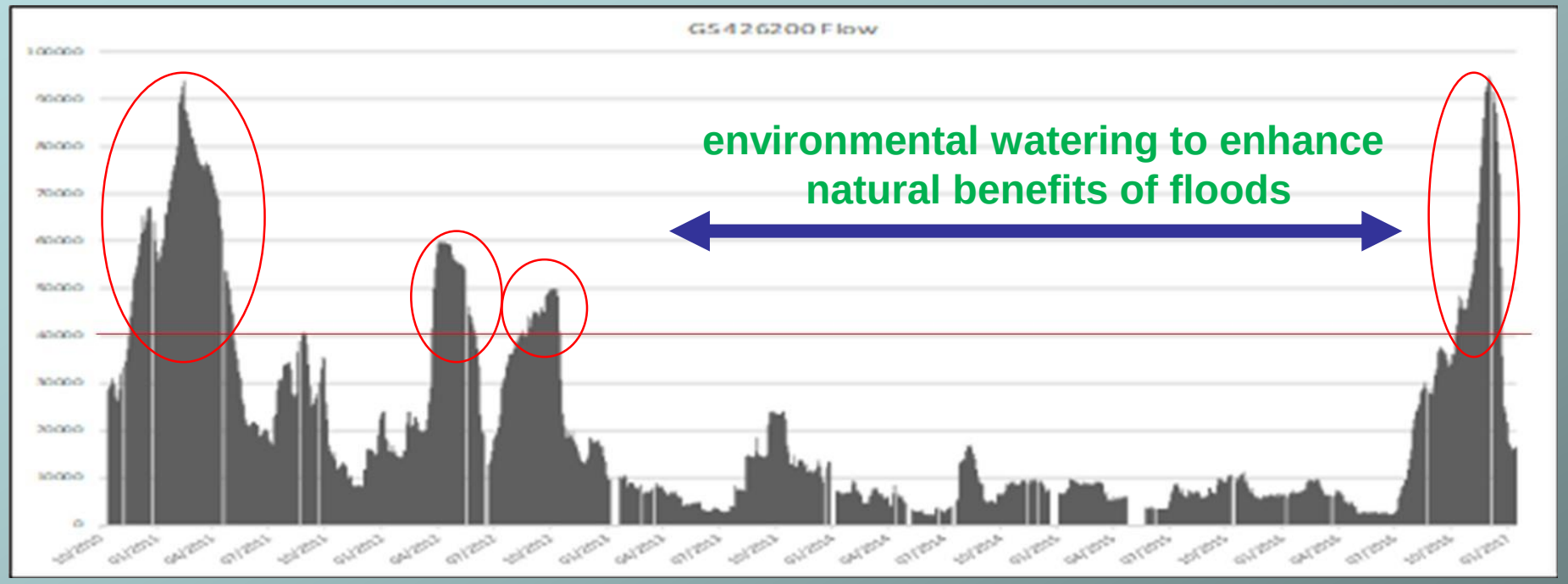
Floodplains & Ecosystems still Stressed

- rivers losing natural resilience to droughts because no small floods to build moisture reserves
- man-made drought of floodplains since 1970s
- natural floods in 2010-12 broke Millenium drought, major regeneration & breeding event
- short flood in 2016 after 4 dry years boosted soil moisture on floodplains
- river systems still recovering

2016 flood Photo: Natalie Stalenberg

No longer 'land of droughts and flooding rains', now extended droughts and shorter, fewer floods less resilience to droughts as small floods removed

Life-saving Flows delivered by Nature 2010-12, 2016



Flows at the South Australian border Oct 2010 to Feb 2017:

- overbank flows above 40,000 ML/d (*red line*)
- peak of 93,872 ML/d in Feb 2011 (170 d + 71 d 2012 overbank)
- dry period with no overbank flows Oct 2012 to Oct 2016
- peak of 94,865 ML/d in Dec 2016 (75 d overbank, rapid recession)

Black Box 2011 germination story

- Black Box is 2nd major eucalypt of Lower Murray floodplains, typically at higher elevations, lower flood frequencies, outer edge of floodplain, more salt- & drought-tolerant, compared to river red gum
- Black Box recruitment at $^1/_3$ rate required to replace existing communities (George *et al.* 2005)
- hardly any surviving trees from flood events in 1970s & 1990s, last extensive recruitment was from 1955-56 floods
- 2010-2012 flood sequence led to mass black box germination at medium elevations
- late flood peaks (Feb & Apr), extended duration into cooler months, soil moisture retained, very high rate of survival of seedlings

The 2011 black box seedlings, now saplings, are very special!!

Need effective MDB Plan to support functioning ecosystems for healthy working rivers

- Murray-Darling Basin Plan is only as good as its implementation
- need to return enough real water to support life cycles & processes
- need to ensure delivery of 450 GL, ensure real environmental outcomes if 605 GL reduction passed, protect delivery of environmental flows, ensure all-state compliance, control water theft
- ***need effective MDB Plan*** to deliver ***healthy working rivers*** to support all river communities

environmental flows essential for healthy rivers

PS Basin Plan still does not include climate change effects!