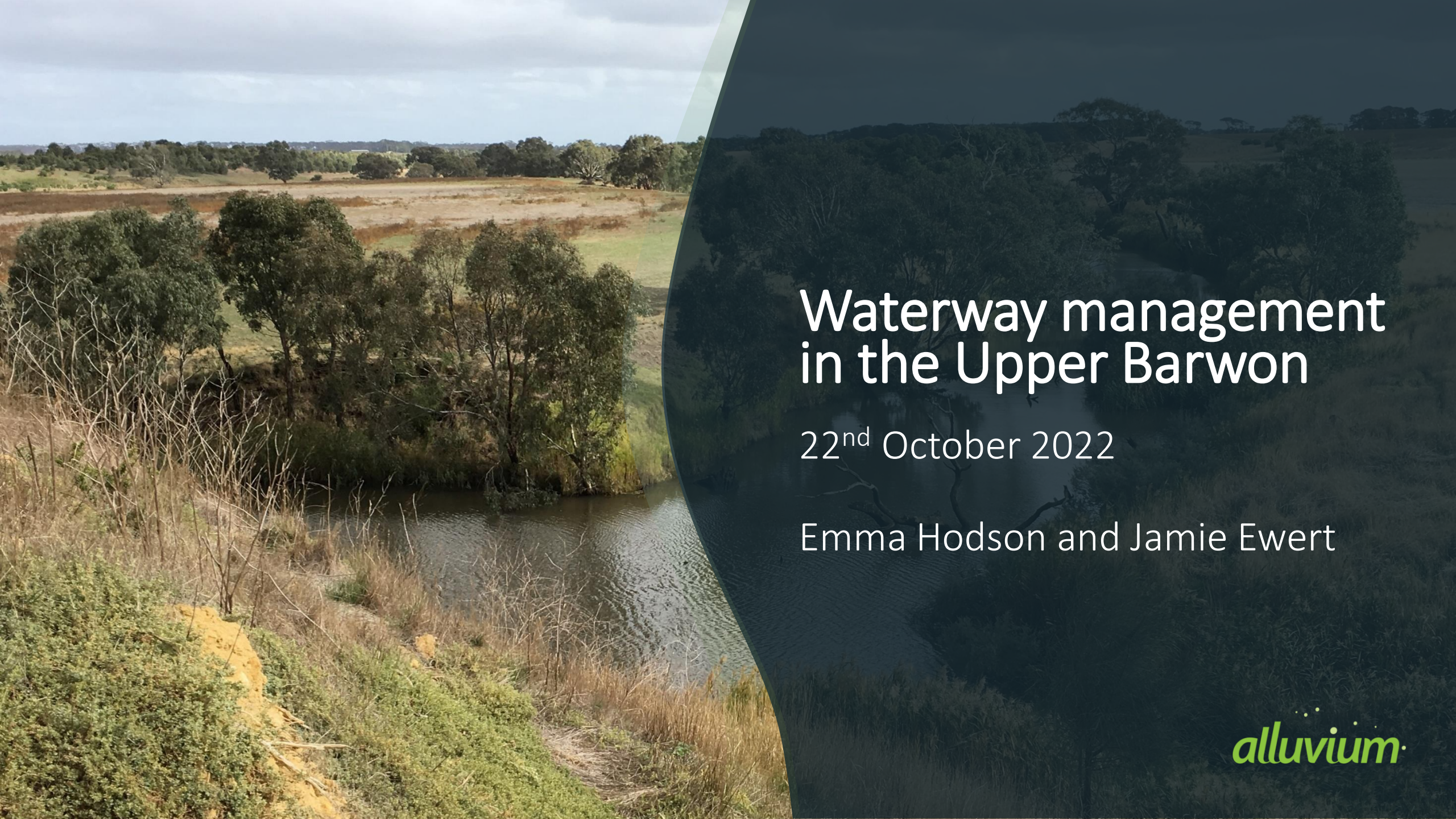


Waterway management in the Upper Barwon

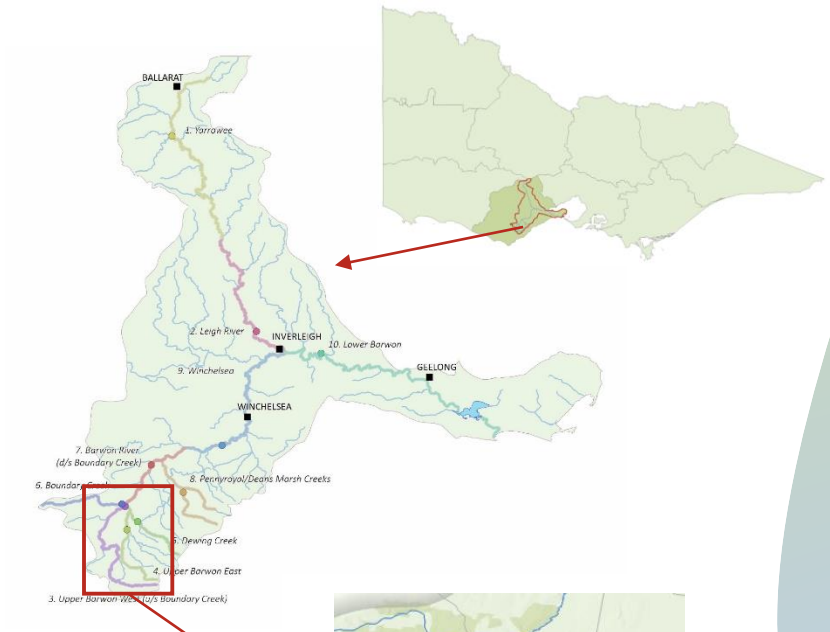
22nd October 2022

Emma Hodson and Jamie Ewert

alluvium

Overview

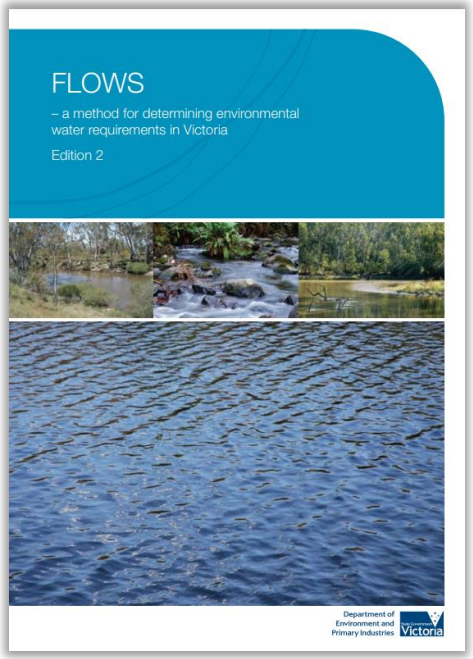
- Upper Barwon environmental flows study
- Upper Barwon restoration
- East Barwon water transfer and restoration project

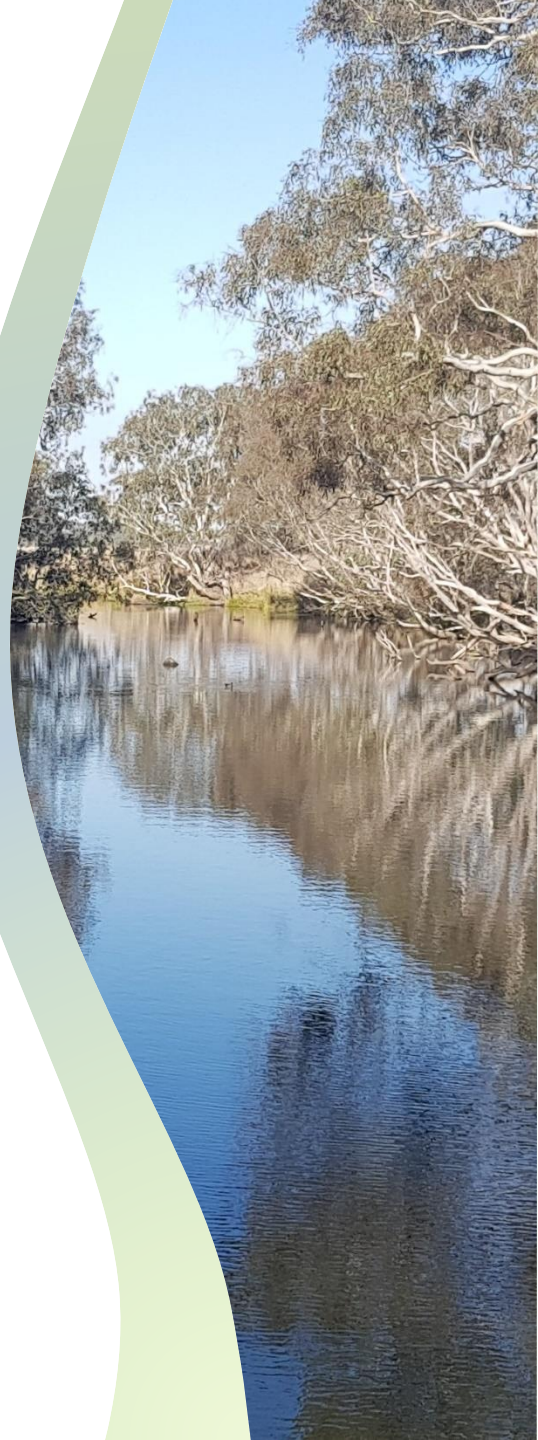


Upper Barwon, Yarrowee and Leigh Environmental Flows Study Update

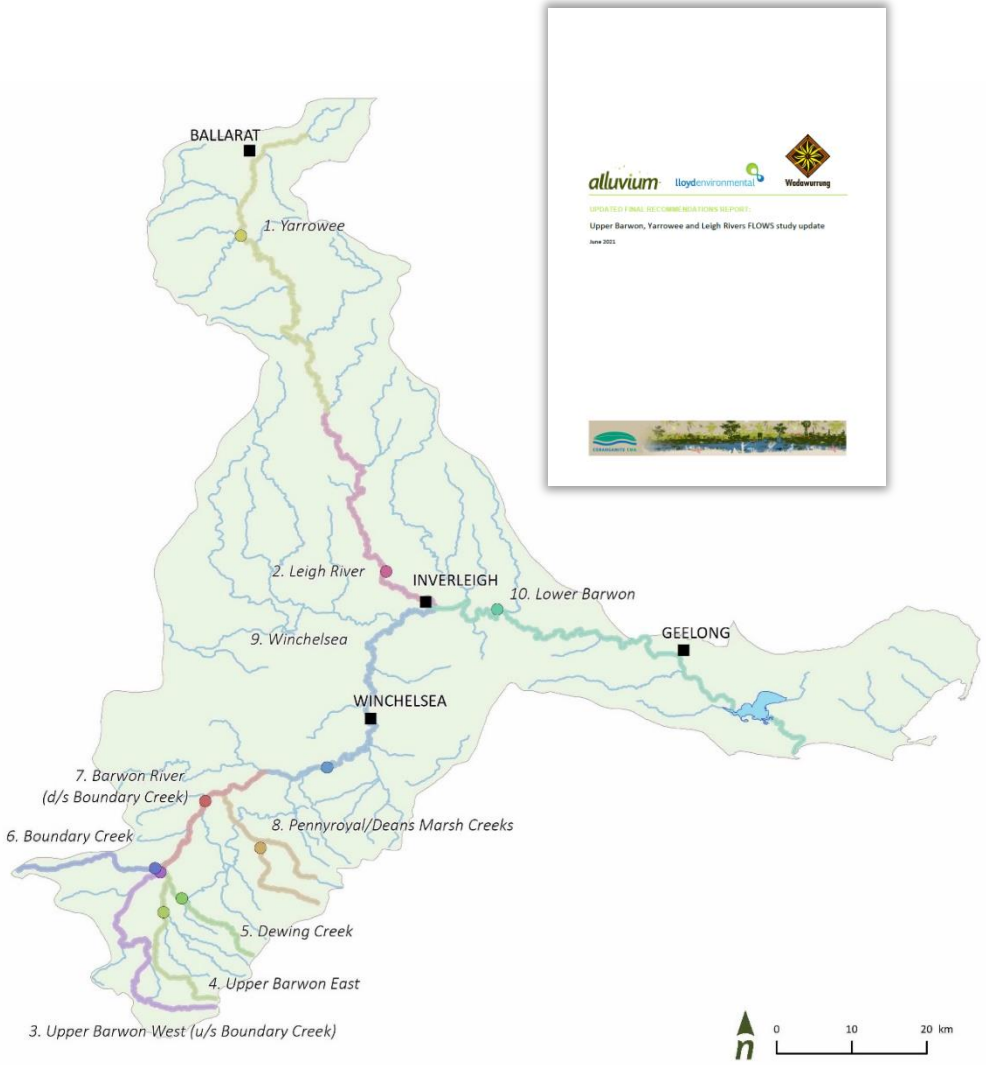
Environmental flow studies

- Technical assessments completed based on a standard method applied State-wide
- Process includes setting objectives and then determining the timing, duration and amount of water needed to support environmental values
- Recommendations feed into State-wide and catchment-based water management





The Upper Barwon environmental flows study



- Completed in 2018, reviewing 2005/06 recommendations
- Water recovery targets and recommendations
- For the Upper Barwon (including East and West Branches), Yarrowee and Leigh Rivers
- Recommendations for 10 reaches

Values

Vegetation
- Instream
- Emergent
- Riparian
- Floodplain

Fish
- Migratory
- Freshwater resident

Platypus

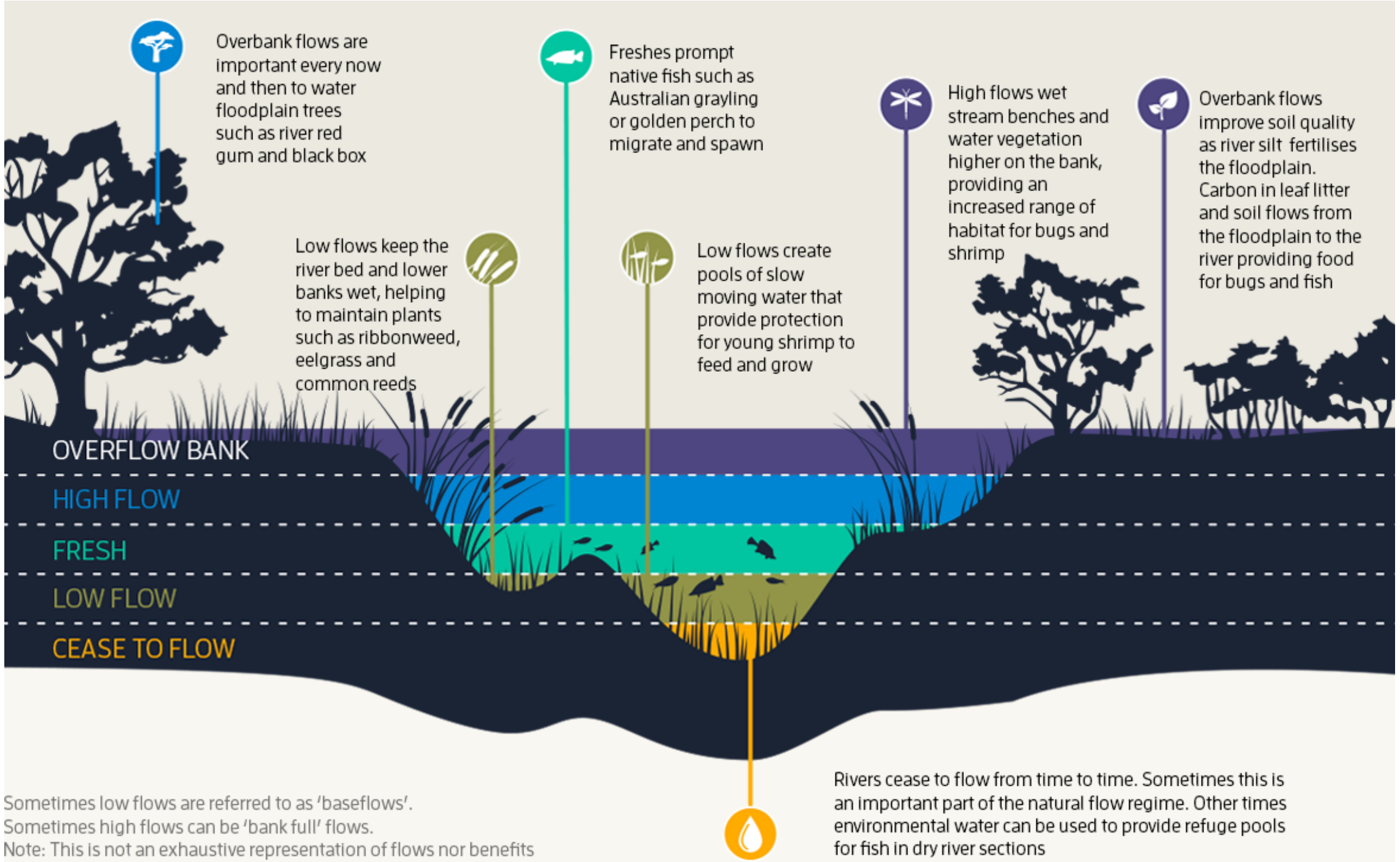
Frogs
Primarily Growling Grass Frog

Macroinvertebrates

Water quality
(supporting function)

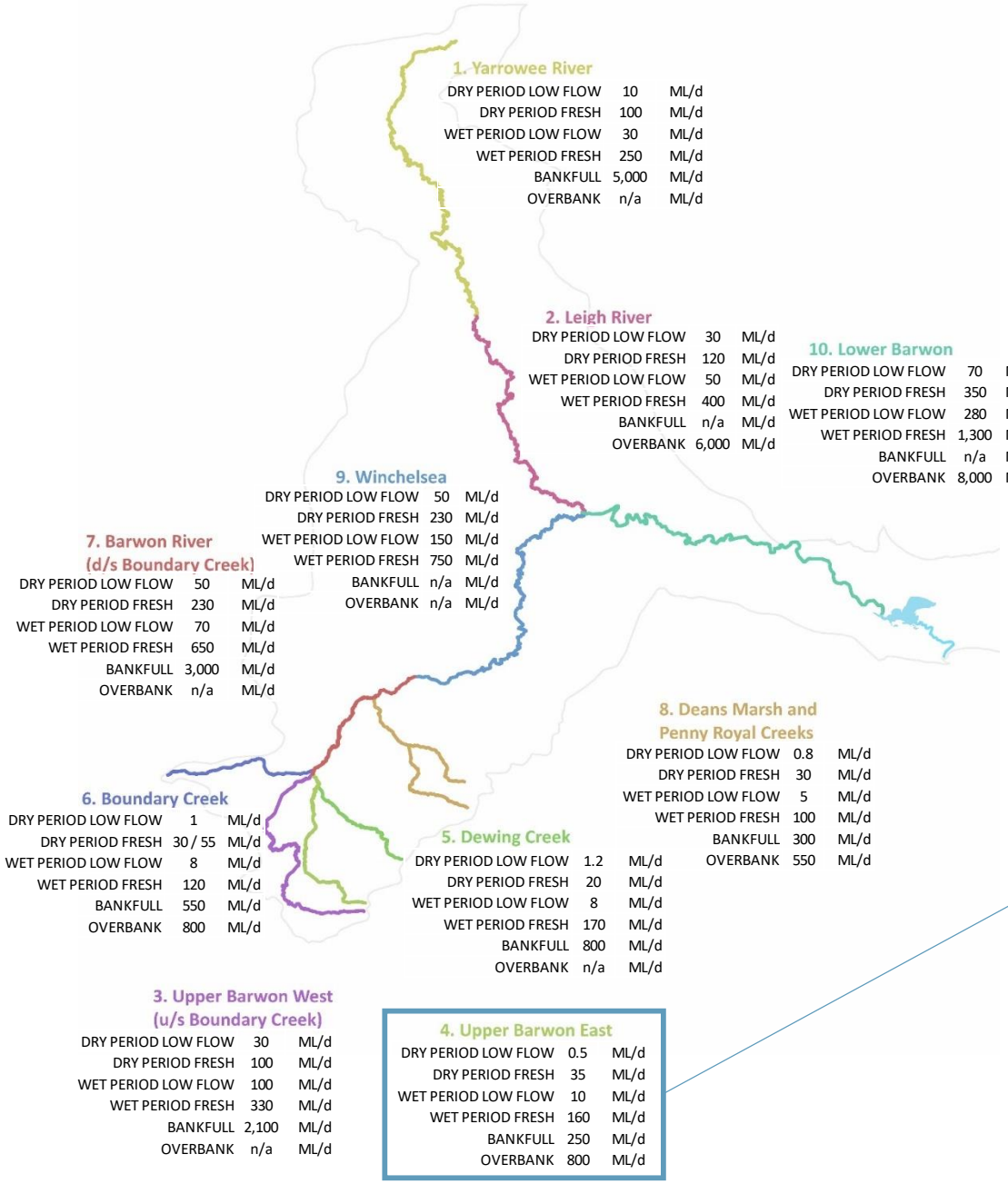
Geomorphology
(supporting function)

Aboriginal cultural values



Sometimes low flows are referred to as 'baseflows'.
Sometimes high flows can be 'bank full' flows.
Note: This is not an exhaustive representation of flows nor benefits

Environmental flow recommendations



1. Yarrowee River

DRY PERIOD LOW FLOW	10	ML/d
DRY PERIOD FRESH	100	ML/d
WET PERIOD LOW FLOW	30	ML/d
WET PERIOD FRESH	250	ML/d
BANKFULL	5,000	ML/d
OVERBANK	n/a	ML/d

2. Leigh River

DRY PERIOD LOW FLOW	30	ML/d
DRY PERIOD FRESH	120	ML/d
WET PERIOD LOW FLOW	50	ML/d
WET PERIOD FRESH	400	ML/d
BANKFULL	n/a	ML/d
OVERBANK	6,000	ML/d

10. Lower Barwon

DRY PERIOD LOW FLOW	70	ML/d
DRY PERIOD FRESH	350	ML/d
WET PERIOD LOW FLOW	280	ML/d
WET PERIOD FRESH	1,300	ML/d
BANKFULL	n/a	ML/d
OVERBANK	8,000	ML/d

9. Winchelsea

DRY PERIOD LOW FLOW	50	ML/d
DRY PERIOD FRESH	230	ML/d
WET PERIOD LOW FLOW	150	ML/d
WET PERIOD FRESH	750	ML/d
BANKFULL	n/a	ML/d
OVERBANK	n/a	ML/d

7. Barwon River (d/s Boundary Creek)

DRY PERIOD LOW FLOW	50	ML/d
DRY PERIOD FRESH	230	ML/d
WET PERIOD LOW FLOW	70	ML/d
WET PERIOD FRESH	650	ML/d
BANKFULL	3,000	ML/d
OVERBANK	n/a	ML/d

8. Deans Marsh and Penny Royal Creeks

DRY PERIOD LOW FLOW	0.8	ML/d
DRY PERIOD FRESH	30	ML/d
WET PERIOD LOW FLOW	5	ML/d
WET PERIOD FRESH	100	ML/d
BANKFULL	300	ML/d
OVERBANK	550	ML/d

6. Boundary Creek

DRY PERIOD LOW FLOW	1	ML/d
DRY PERIOD FRESH	30 / 55	ML/d
WET PERIOD LOW FLOW	8	ML/d
WET PERIOD FRESH	120	ML/d
BANKFULL	550	ML/d
OVERBANK	800	ML/d

5. Dewing Creek

DRY PERIOD LOW FLOW	1.2	ML/d
DRY PERIOD FRESH	20	ML/d
WET PERIOD LOW FLOW	8	ML/d
WET PERIOD FRESH	170	ML/d
BANKFULL	800	ML/d
OVERBANK	n/a	ML/d

3. Upper Barwon West (u/s Boundary Creek)

DRY PERIOD LOW FLOW	30	ML/d
DRY PERIOD FRESH	100	ML/d
WET PERIOD LOW FLOW	100	ML/d
WET PERIOD FRESH	330	ML/d
BANKFULL	2,100	ML/d
OVERBANK	n/a	ML/d

4. Upper Barwon East

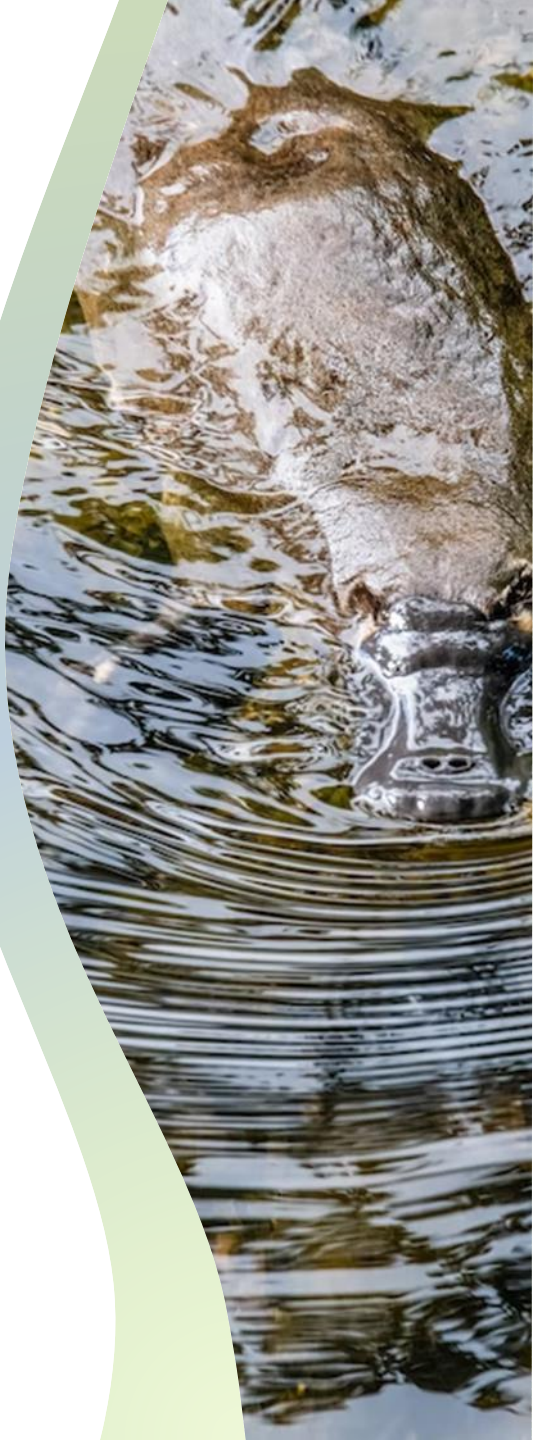
DRY PERIOD LOW FLOW	0.5	ML/d
DRY PERIOD FRESH	35	ML/d
WET PERIOD LOW FLOW	10	ML/d
WET PERIOD FRESH	160	ML/d
BANKFULL	250	ML/d
OVERBANK	800	ML/d

Flow component	Magnitude (ML/day)	Frequency (No/period)		Duration (days)		Hydraulic criteria met
Dry period low flow	0.5 or natural	DRY AVG WET	Cont	DRY AVG WET	Cont	RF1, PL1, IV1*, EV1*, FV2*
Dry period fresh	35	DRY AVG WET	2 2 3	DRY AVG WET	2 2 2	RF2, RF3, MA1, PL2, EV2, EV3, RV1, WQ2*, GE1, GE3
Wet period low flow	10 or natural	DRY AVG WET	Cont	DRY AVG WET	Cont	As dry period low flow, AG4, GE4
Wet period fresh	160	DRY AVG WET	0 2 2	DRY AVG WET	0 1 2	RF4*, MA2, MA3, EV4, RV2, GE2, GE5
Bankfull	250	DRY AVG WET	0 2 in 3 years	DRY AVG WET	0 As natural	RV3, GE6
Overbank	800	DRY AVG WET	0 1 in 5 years	DRY AVG WET	0 As natural	FV3, GE7

Upper Barwon Restoration

Delivering environmental water

- *Upper Barwon River Environmental Entitlement 2018*
- Upper Barwon channels have seen changing channel form and vegetation encroachment
- Reduced channel capacity means outcomes that can be achieved from environmental watering are limited
- Waterway management activities (sometimes referred to as complementary actions) are needed to realise full benefits of environmental watering



Project overview

- Identify constraints on delivery of environmental water to and through the East and West branches.

- Develop a potential program of work to address these constraints and progress riparian and channel restoration.

- High-level assessment using aerial photos, site inspection and broad-scale modelling

- Modelling identified multiple sites where there are potential constrictions to flow
- These include:
  - Infrastructure
  - Channel diversions and drainage
  - Willow and other vegetation (e.g. Glyceria) encroachment
- Around 50 constriction sites were identified

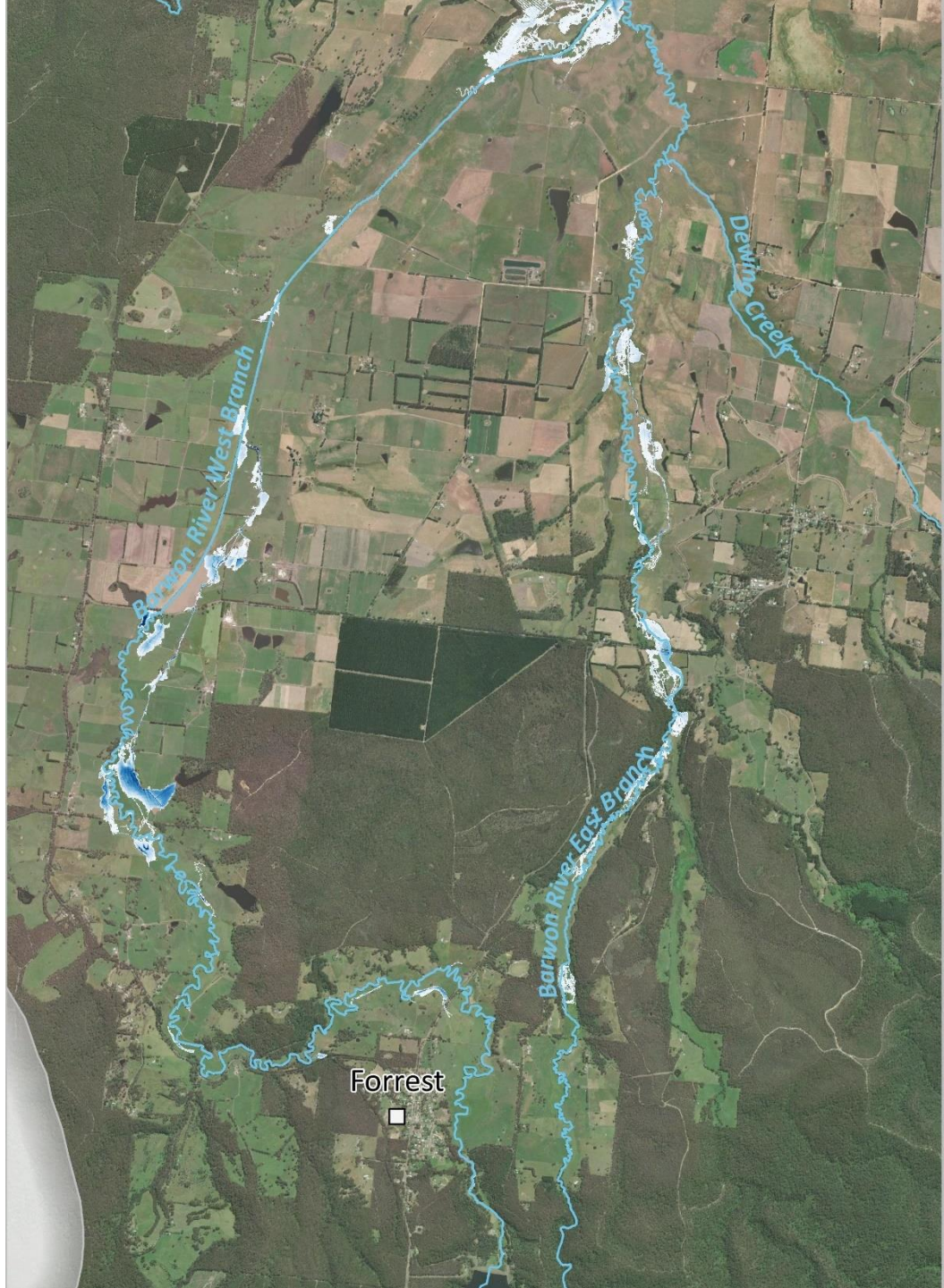


Image: Results of the current conditions modelling for the West Barwon at 100Ml/d and the East Barwon at 35Ml/d

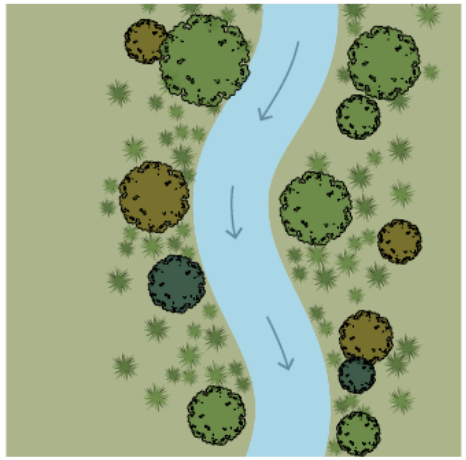
Management options

- Willow management (removal and replacement)
- Glyceria control
- Phragmites management
- Fencing and revegetation
- Physical stream interventions
- Offstream watering

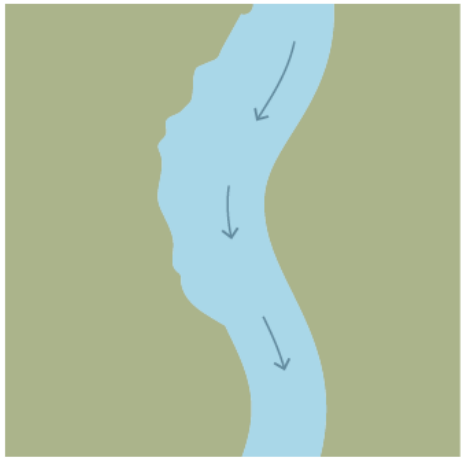
- Environmental flows also required to prevent channel vegetation encroachment

East Barwon water transfer and remediation project

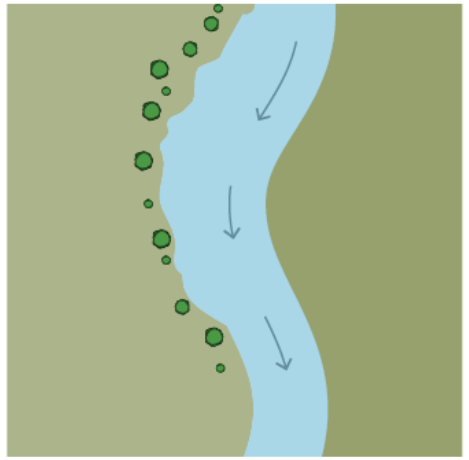
Why are willows a problem?



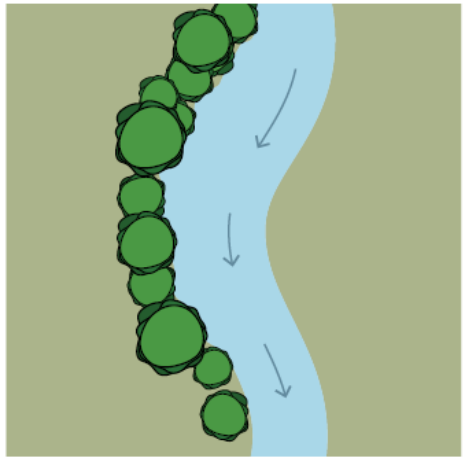
River banks with native vegetation.



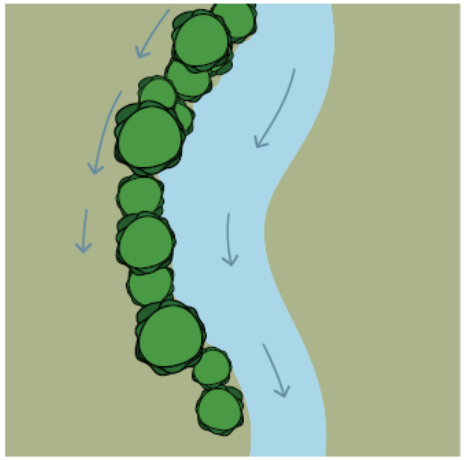
Vegetation cleared.
Bank erosion begins.



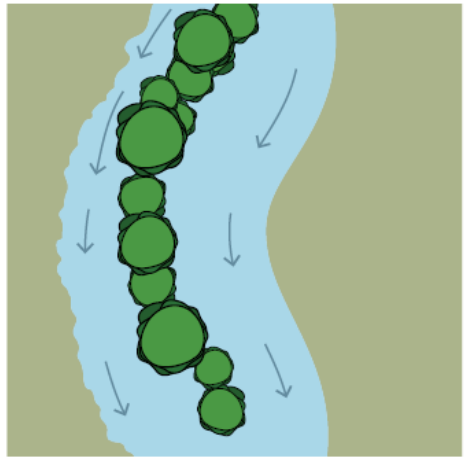
Willows planted to control erosion.



Growth of willows stabilises bank.



Willow growth out-competes native understory. In floods water diverts around and behind willows causing erosion.

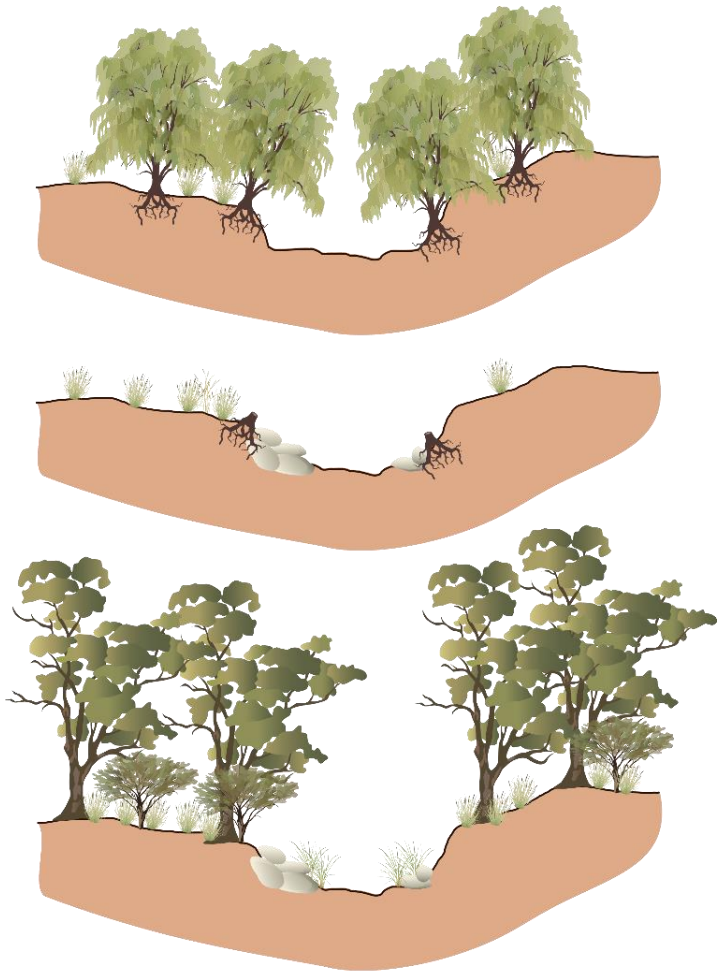


New wider river channel established around willows.

A rare opportunity to provide multiple benefits:

- Barwon Water’s water transfer requirements (water security)
- Willow removal in an ‘upstream area’
- Reduced erosion and water quality improvements
- Environmental and habitat restoration, with commitment to ongoing maintenance

Managing willows



Previous condition

Willows present along majority of riverbank and channel. Willows are poisoned prior to any physical works to limit the spread of live/viable material.

Willow removal and bank stabilisation

Willow removal undertaken in a downstream direction, retaining roots on banks to assist with protection of stream banks. Full stump removal for in-channel willows to achieve water delivery objectives. Additional bank protection provided in locations of high erosion risk. Native vegetation planted within 12 months of willow removal.

Native vegetation establishment

Native vegetation comprises ground cover, shrubs and reeds, and tree cover. Willow removal sites to be maintained in an effective willow free condition over a 20-year program.


Before willow removal


During willow removal


Planting


Upstream, after 12 years


Thank you