

# Characterising vegetation zones along the lower Fitzroy River, WA

Project update, September 2021

Fiona Freestone, Caroline Canham  
Samantha Setterfield, Michael Douglas and Robyn Loomes



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Western Australia's mighty Fitzroy River has high environmental, economic and cultural significance and there is increasing interest in developing its substantial water resources for irrigated agriculture. Important environmental values are likely to be impacted if the river's natural flows or groundwater levels are altered. To minimise risks to these natural values, we need to understand how they may respond to potential water resources development.

## What's new?

- We've been undertaking research along the Fitzroy River (Martuwarra), in the Kimberley region of WA, to identify the environmental water needs of the system to assist water managers maintain the important natural and cultural values of the River.
- We undertook surveys to characterise vegetation zones along the lower Fitzroy River, WA. Four broad vegetation zones were identified:
  1. riverbank
  2. top of bank
  3. floodplain
  4. off-channel wetlands and floodrunner channels.
- The distribution of riparian vegetation is strongly influenced by river flows. Characterising vegetation zones provides a foundation for water managers to assess the impact of changes in water flow on vegetation.

- Vegetation was surveyed at 58 sites along 300 kilometres of the lower Fitzroy River, between Willare and Fitzroy Crossing.
- Surveys were undertaken during the dry season between July and September 2018.

## Key points

- We have limited knowledge about riparian vegetation of the Fitzroy.
- We conducted surveys to characterise riparian vegetation, identifying four broad zones.
- Each vegetation community has unique water needs due to physiological and structural differences.
- Understanding water needs is important for maintaining the health and diversity of river habitats.



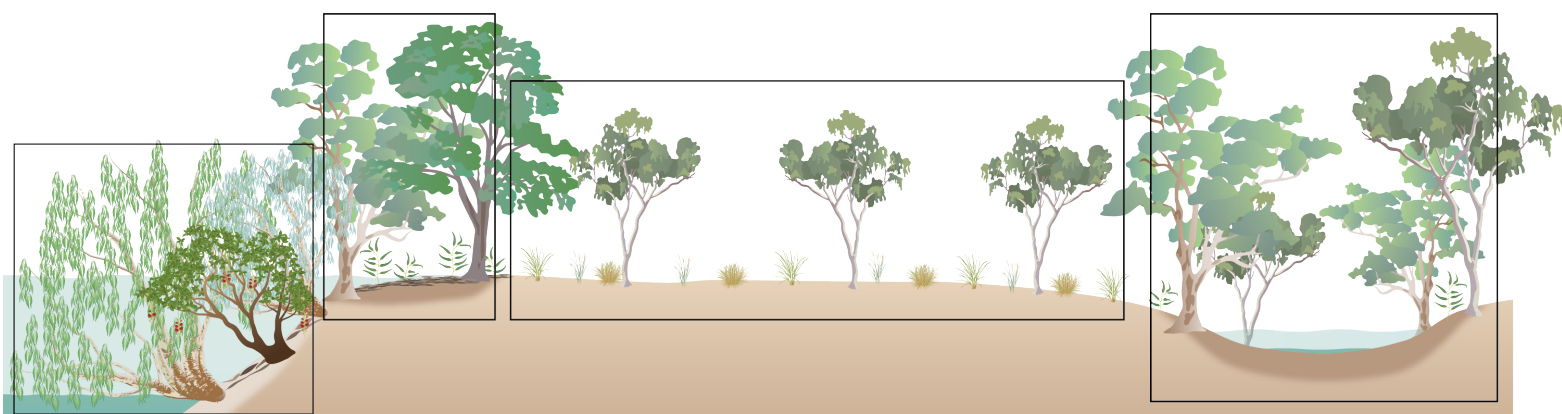
*The lower Fitzroy River, Western Australia.*

Riverbank

Top of bank

Floodplain

Off-channel wetlands



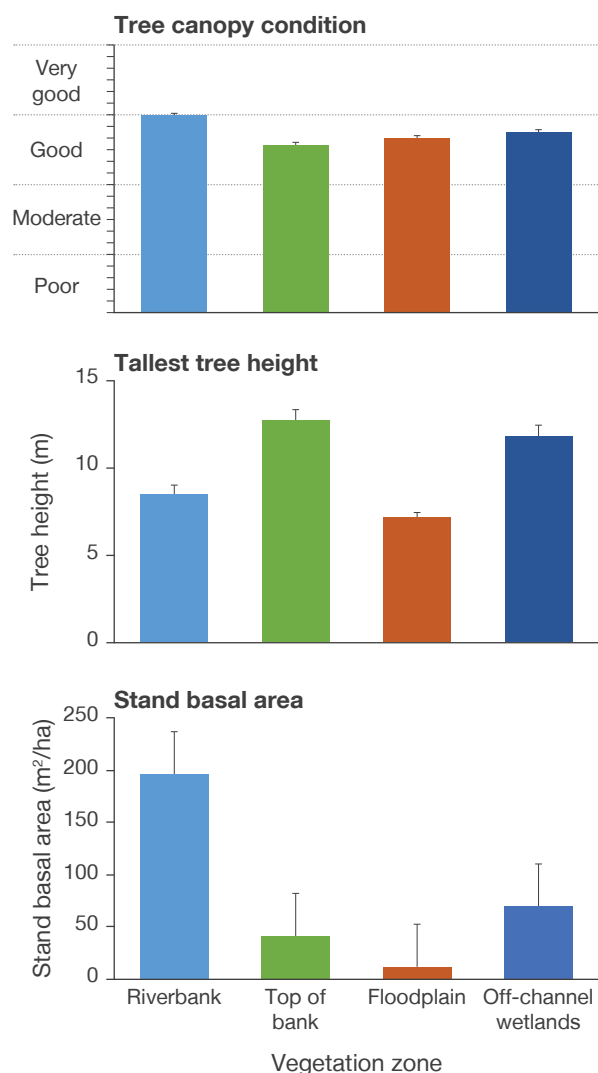
*Figure 1. Four broad vegetation zones were characterised, left to right: riverbank, top of bank, floodplains, and off-channel wetlands and floodrunner channels. For more information, see Freestone et al., 2020<sup>1</sup>.*





Left: Sumayah Surprise, Ngurrarra Rangers. Middle: Annie Milgin & Hilda Grey, Walalakoo Traditional Owners with The University of Western Australia researcher Caroline Canham. Right: Russell Smith & Luke Cherel, Gooniyandi Rangers. Photos: Fi Freestone.

- We worked in collaboration with Traditional Owners from Walalakoo, Yi-martuwarra and Gooniyandi Native Title groups, as well as pastoralists.
- We identified 32 tree species and determined the vegetation zone/s where they most commonly occurred.
- Only three tree species were found in all vegetation zones (*Eucalyptus camaldulensis*, *Eucalyptus microtheca* and *Terminalia platyphylla*).
- **Tree canopy condition** provides a measure of tree health by assessing the structure of the tree crown. Tree canopy was in good condition (healthy) in all zones.
- **Tallest tree height** was based on the tallest tree at each site, with an average taken for each zone. The tallest trees were found at top of bank and off-channel wetland zones, with mean maximum heights of 13 m and 11 m respectively.
- **Stand basal area** is a summary of the number and size of trees at a site (stand). This provides a measure of tree volume and density per hectare. Riverbank zones had the greatest stand basal area with a mean value of ~197 m<sup>2</sup>/ha, which was more than double the next greatest at off-channel sites (~70 m<sup>2</sup>/ha). Floodplains had the lowest stand basal area.
- We described four vegetation zones along the lower Fitzroy River, characterised by vegetation species composition and structure. Due to the physiological and structural differences in vegetation, it is likely that there are differences in the water requirements to support the vegetation communities in each zone.



Summary of tree assessment results for vegetation zones: riverbank (n=16), top of bank (n=16), floodplain (n=17), off-channel wetlands (n=9).



## Vegetation zones

► **RIVERBANKS** had large trees with thick trunks and a dense canopy cover. Terrain was sandy with steep banks that can be deeply inundated for an extended period of time. The dominant tree species were Paperbarks (*Melaleuca leucadendra* & *Melaleuca argentea*) and Freshwater Mangroves (*Barringtonia acutangula*), which tolerate periodic partial submergence.



► **FLOODPLAINS** had a lower diversity of tree species and were dominated by Coolibah trees (*Eucalyptus microtheca*). Trees were typically shorter and sparsely distributed with a less dense canopy cover compared with other vegetation zones.



◄ **OFF-CHANNEL WETLANDS** and floodrunner channels had soils with high clay content and dense canopy cover with tall trees and seedlings. Similar to top of bank zones, off-channel wetlands likely provide important recruitment habitat for woody species in an otherwise dry surrounding floodplain.

◄ **TOPS OF BANKS** were characterised by a high percentage of canopy cover, taller trees than other vegetation zones and high species richness. More seedlings were found at top of banks than riverbanks and floodplains.

## Summary

More detail about the information in this update can be found in the technical report<sup>1</sup>, which is a synthesis of plant survey information collected as part of the *Environmental water needs of the Fitzroy River* project.

For more information about the potential impacts of changes in water regime on woody riparian species, see Canham et al. (in press)<sup>2</sup>.

The *Environmental water needs of the Fitzroy River* project aims to further develop a framework for assessing the relative risk to riparian vegetation.





Vegetation study area between Willare and Fitzroy Crossing in the lower Fitzroy River, WA.

To learn more about plant water requirements, ongoing research aims to:

- investigate water sources used by dominant tree species
- assess plant functional traits in relation to water regimes.

A synthesis of this information, from a number of different studies, can help develop a framework of relative vulnerability of key species to changes in water regime.

This information will inform ongoing vegetation monitoring with a view to detecting change in response to threatening processes.

## Further information

Contact Professor Michael Douglas at [michael.douglas@uwa.edu.au](mailto:michael.douglas@uwa.edu.au), Caroline Canham at [caroline.canham@uwa.edu.au](mailto:caroline.canham@uwa.edu.au) or Fiona Freestone at [fi.freestone@uwa.edu.au](mailto:fi.freestone@uwa.edu.au)

The project page can be found at [nespnorthern.edu.au](http://nespnorthern.edu.au), along with the start-up factsheet.



## REFERENCES

1. Freestone, F.L., Canham, C.A., Setterfield, S.A., Douglas, M.M. and Loomes, R.C. 2021. Characterising vegetation zones along the lower Fitzroy River, Western Australia (report). The University of Western Australia, Perth.
2. Canham, C.A., Beesley, L., Gwinn, D.C., Douglas, M.M., Setterfield, S.A., Freestone, F.L., Pusey, B.J., & Loomes, R.C. (in press). Predicting the occurrence of riparian woody species to inform environmental water policies in an Australian tropical river. *Freshwater Biology*.



We gratefully acknowledge the Nyikina-Mangala people of the Walalakoo region, Yanunijarra and Gooniyandi people. Thanks to Indigenous rangers and pastoral managers.



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[nespnorthern.edu.au](http://nespnorthern.edu.au)

[nesp.northern@cdu.edu.au](mailto:nesp.northern@cdu.edu.au)



This project is supported through funding from the Australian Government's National Environmental Science Programme.

July 2021