



Fact sheet

May 2011

Water level ranges of Pilbara riparian vegetation

The water level range of a riparian plant species is the range of water levels that individuals of that species are found to be growing in. Some individuals may permanently draw on groundwater from the watertable while others may be flooded at times. The Environmental Water Section of the Department of Water has described water level ranges for riparian vegetation species that are important or common to river and wetland systems of the Pilbara.

Water level ranges are used to determine the likely sensitivity of riparian species to water level change. Comparing a species' range at a site of interest with the Pilbara regional mean range shows whether it is occurring at that site towards the wet or dry end of its known range for the region. This provides an indication of the risk to that species, at that particular site, due to changes in water availability.



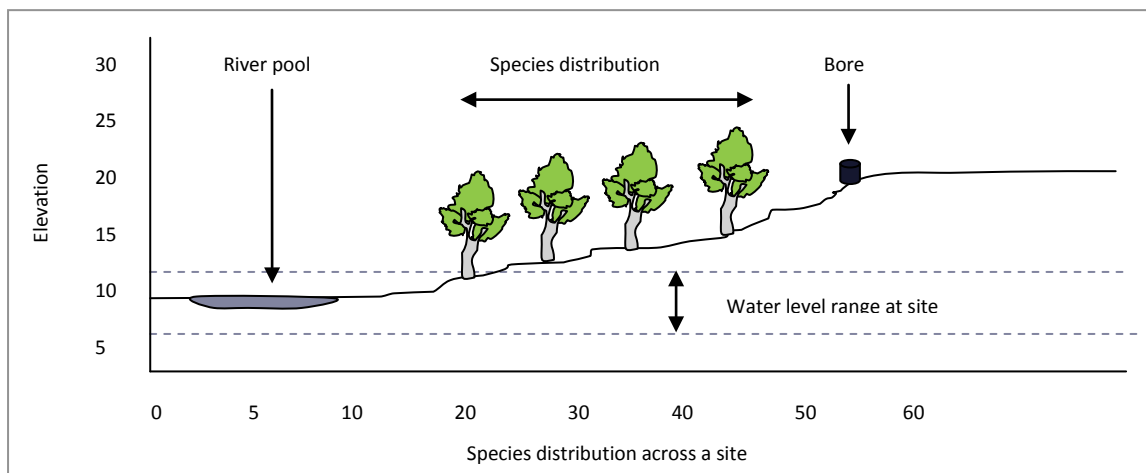
Water level ranges were determined for 16 species across 23 sites on four rivers: the Robe, Yule and De Grey rivers and the Fortescue River at Millstream. The most important species studied include:

- large, deep rooted trees such as *Eucalyptus camaldulensis* (River red gum) and *Melaleuca argentea* (Silver cadjeput)
- smaller trees and large shrubs such as *Sesbania formosa* (White dragon tree), *Melaleuca glomerata* and *Hakea subera* (Corkwood)
- emergent macrophytes (sedges), *Typha domingensis* (Bulrush), *Baumea juncea* and *Cyperus vaginatus*.

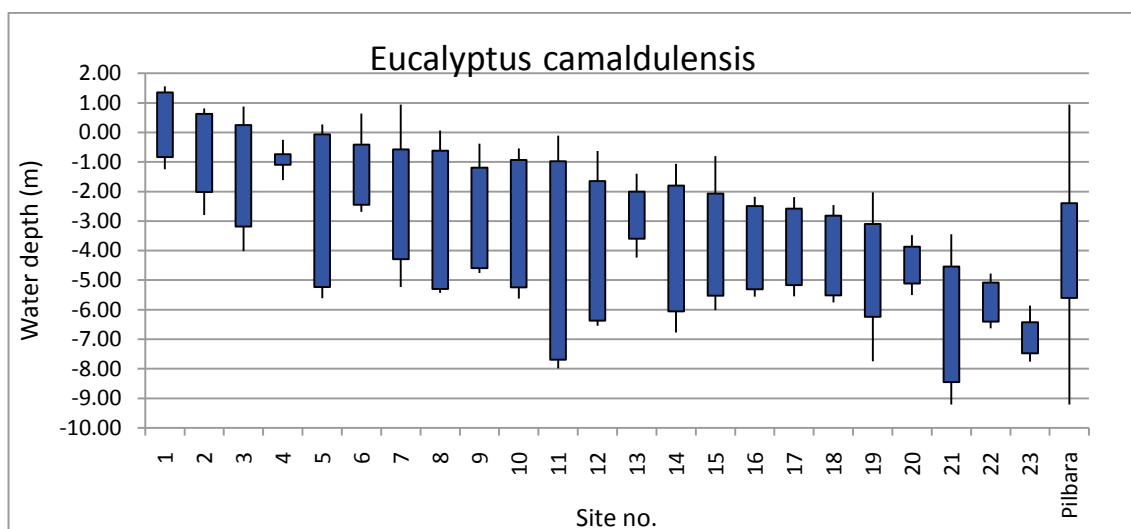
Describing water level ranges

Water level ranges were calculated using the distribution of species across vegetation transects and the depth to groundwater or depth of flooding across that range. Elevations along the transects were measured using LiDAR (light detection and ranging) or on-ground surveying equipment. Water level data from the nearest bore or pool were used.

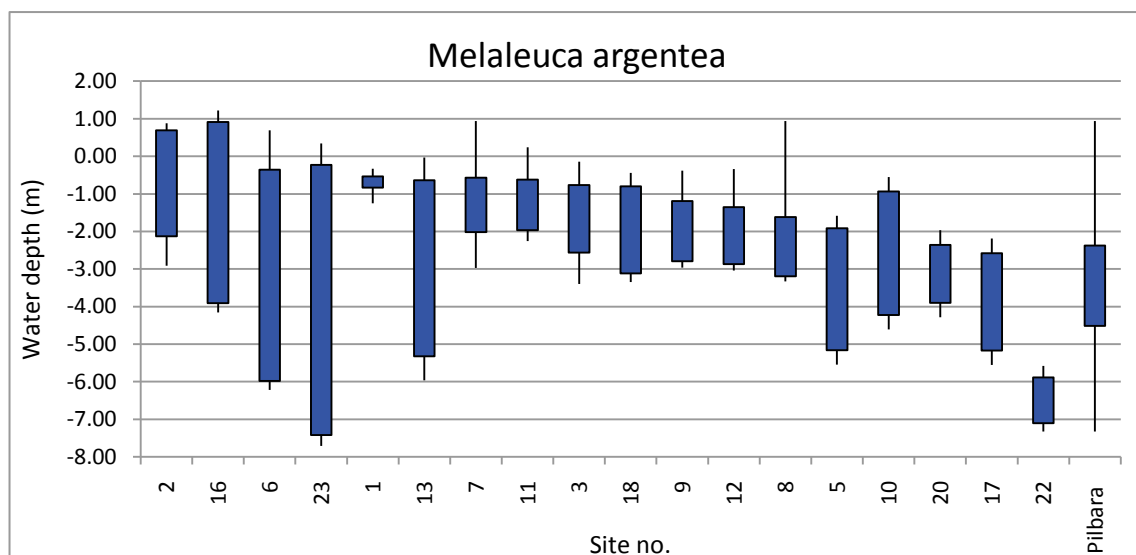
We determined highest, lowest and average annual water level ranges over various time periods relevant to different types of vegetation. For example 5, 10 and 20-year periods for long-lived tree species, or 2 and 5 years for shorter-lived sedges and rushes. These data were combined to derive a Pilbara regional range for each species.



The following 'box and whisker plots' show the water level ranges of *E. camaldulensis* and *M. argentea*, across all sites ranging from the wettest to driest. Negative values represent depth to groundwater, positive values depth of flooding. The tops and bottoms of the boxes represent the average maximum and minimum depths, and the whiskers show absolute maximums and minimums.



Not unexpectedly, the shallowest depths to groundwater were found at the permanent pools of Millstream, while the greatest depths were generally found at Yule River riparian fringe sites not associated with river pools. Of interest is the shallow depth ranges found at some semi-permanent and intermittent pools on the De Grey and Robe rivers. Site details are provided in the following table.



Site number	River	Site name or transect	Type of groundwater-dependent ecosystem
1	Millstream	Upstream Deep Reach	Permanent pool
2	Millstream	Delta near crossing	Permanent pool
3	Millstream	Palm Pool	Permanent pool
4	Millstream	Deep Reach	Permanent pool
5	Millstream	Delta near crossing_2	Permanent pool
6	De Grey	Coolenar Pool	Permanent pool
7	Robe	Grave Pool	Semi-permanent pool
8	De Grey	Downstream homestead	Intermittent pool
9	De Grey	Marloo Pool	Semi-permanent pool
10	Yule	Bore 17/04 (Yul04)	Riparian fringe
11	De Grey	Muccangarra Pool	Permanent pool
12	De Grey	Homestead Pool	Permanent pool
13	Yule	Unnamed pool (Yul05)	Permanent pool
14	Yule	Unnamed pool (Yul06)	Permanent pool
15	Robe	Maraminjii Pool	Semi-permanent pool
16	De Grey	Unnamed pool (bore 4/04)	Permanent pool
17	Yule	Bore 17/04 (Yul03)	Riparian fringe
18	De Grey	J/96 Pool	Permanent pool
19	Yule	Bore 9/04 (Yul01)	Riparian fringe
20	Yule	Bore 17/04 (Yul03a)	Riparian fringe
21	Yule	Bore 21	Riparian fringe
22	De Grey	Bore 2/04	Riparian fringe
23	De Grey	Bulgarene Pool	Intermittent pool

Other considerations

Water level range studies are useful tools for predicting susceptibility to water level changes. However, they are best regarded as 'rule of thumb' methods to use in the absence of a better understanding of the physiological tolerances of

riparian vegetation and/ or stronger guidelines. Detailed 'ecophysiological' investigations could improve our understanding of species and site-specific responses to altered water regimes.



There are a number of other factors affecting the susceptibility of vegetation to changes in water levels that were not able to be considered in the water level range studies we carried out. Some of these are:

- The local groundwater conditions under which vegetation establishes. This is a strong determinant of the tolerance to

water level change as individuals will grow in response to water availability (i.e. deeper watertables may promote deeper roots, shallow water tables shallower roots).

- Cumulative changes (past and predicted) in water regimes. If an area of vegetation has already experienced declines in water availability it may be more susceptible to further declines than other areas. Conversely, past water level rises may buffer future declines.
- Duration and frequency of altered water availability. Water level ranges described here are only based on the magnitude of change in water availability. The duration and frequency of change should also be considered, as the longer and/or more often vegetation is exposed to low water availability, the greater the risk.
- Vegetation condition. Healthy vegetation may tolerate a greater change in water regime before being affected.
- Other disturbances such as grazing and fire. These factors can also influence vegetation condition and resilience to change in water availability.



Reference

Loomes, R 2010, *Determining water level ranges of Pilbara riparian species*, Environmental water report series, report no. 17, Department of Water, Perth.

The full report can be found at www.water.wa.gov.au then select >Water regions> Pilbara >relevant links and click on 'to view entire listing please click here' for the report.

For further information please contact

Robyn Loomes

Water Allocation Planning Branch, Department of Water

Telephone 08 6364 7600