

MMCP Collaboration

How will declining water availability as a consequence of climate change affect habitat and species distributions in the Murray-Darling Basin?

This synthesis paper is a response to a question posed by the Murray-Darling Basin Officials Committee (BOC) in 2017, in relation to climate change. The objectives of this theme within the MMCP is to help the BOC address specific questions as they arise. These question will have relevance to the on-going management of Basin Assets.

- Rivers within the Murray-Darling Basin (MDB) and their associated flood-plains and wetlands are at risk from climate change.
- Drivers of habitat change will relate to alterations in flow regimes and physiological impacts.

Climate change will influence:

- Rainfall patterns:
 - ⇒ Reduce surface water run-off.
- Temperature:
 - ⇒ Modify thermal habitat for many biota.
- Increase atmospheric carbon dioxide concentrations:
 - ⇒ Give competitive advantage to some species over others (e.g. C4 over C3 plants).

For aquatic biota habitat change will be directly related to:

- Flow regimes.
- Increased ephemerality.
- Loss of connectivity.
- Changes in water quantity and quality.

Indirectly climate change will cause:

- Physiological impacts as a result of increased temperature.
- Changes in food web structure.
- Shifts in competition and predation.



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Refuges

Maintenance of refuges will be important for the preservation of habitats for biota and must be able to:

- Facilitate key life stages for many species including:
 - ⇒ Reproduction.
 - ⇒ Dispersal.
 - ⇒ Establishment.
- Provide buffering during periods of unfavourable conditions.
- Provide a recolonisation source to the surrounding area, following the return of favourable conditions.



Potential consequences associated with climate refuge management and their associated risk to the Murray–Darling Basin

Refuge management	Risk	Assessment
Flooding (natural or managed).	• Poor water quality (e.g. hypoxic blackwater events causing local extinctions).	Moderate
	• Introduction of invasive species (e.g. Introduced species outcompeting natives).	High
Maintenance of isolated refuges with no or limited connectivity.	• Isolation of populations (e.g. genetic bottlenecks causing inbreeding depression).	Moderate
Refuge sites are poorly prioritised for protection.	• Refuges fragment.	Moderate
Refuges become the only sources of permanent water in the landscape.	• Refuges used for human and agriculture requirements.	High
	• Refuges become threatened by feral species.	High

Note: the likely risk was estimated as a function of the likelihood of occurrence and the magnitude of the impact.

Further information

MMCP Collaboration (MMCP) is a project supported by the Joint State Governments and the Murray-Darling Basin Authority to generate and adopt freshwater ecological knowledge through collaboration, to maintain research capability and contribute supporting science to underpin the Basin-Wide Watering Strategy.

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