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Responses of aquatic invertebrate communities to changing hydrology and water quality in streams and significant wetlands of the south-west forests of Western Australia

Ecosystem Science

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Project Team	granted
Program Leader	granted
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Context

Aquatic habitats in the south-west of Western Australia are under increasing threat from changes in hydrology, water quality and fire as a result of the drying climate, historical and current land use and water resource development. The south west of Western Australia has had a significant reduction in rainfall since the 1970s and it is predicted that by 2050 there will be little stream inflow into water supply dams. At present, there is an inadequate understanding of the responses of aquatic communities to these threats to inform the management of many aquatic systems in the Forest Management Plan (FMP) area, including the Muir-Byenup Ramsar wetlands.

This project has two components: 1) Re-surveys of aquatic invertebrates in Muir-Byenup Ramsar wetlands sampled in 1994 and 2004 and suites of wetlands further south sampled in 1993, addressing KPI3 of the 2014-23 Forest management Plan (FMP) and, 2) Periodic monitoring of high condition streams, with a focus on effects of the drying climate and forest management, addressing KPI1 of the 2014-23 FMP.

Aims

- Address KPI1 of the 2014-2023 FMP by monitoring the condition of currently healthy streams in relation to reduced rainfall and forest management practices.
- Address KPI3 of the 2014-2023 FMP by determining responses of faunas of high value Warren Region wetlands to changes in hydrology, water chemistry and fire over the last 10 to 20 years.
- Provide baseline data for some internationally significant wetlands.
- Use the above information to report on the current conservation significance of key Parks and Wildlife managed wetlands and their response and vulnerability to threats.

Progress

- Samples of aquatic invertebrates from Tordit-Gurrup and Noobijup Swamp in 2016 were processed and specimens identified to determine response to acidification in these wetlands.
- Invertebrates collected from 20 forest streams in 2013 and 2016 were identified and AusRivAS condition ratings calculated. This information was included in a South West Catchment Council Regional Environmental Snapshot.
- Identification and taxonomic consolidation of historical macroinvertebrate data for Muir-Byenup invertebrates was completed.
- Collaborated with microinvertebrate taxonomists to reconcile taxonomic issues between 1996/97, 2003/4 and 2014/15 data for the Muir-Byenup wetlands.

Management implications

- Re-surveying the Muir-Byenup Ramsar and other high value wetlands in the Warren Region will provide the Department with knowledge of how these wetlands and their fauna have responded to threats (especially altered hydrology and water quality arising from land-use change and climate-change) over the last 20 years. Analyses are showing that aquatic invertebrates in some Muir-Byenup wetlands are being significantly affected by acidification. In conjunction with results from the peat wetlands project (SPP2014-24), this project will assist the Department with making decisions about protecting remaining high conservation value wetlands versus taking remedial action at those where condition is declining.
- Of the 21 stream sites sampled in 2013 and 2016 only one scored an AusRivAS condition band (band B - significantly impaired) lower than the 2005-2012 range for the same site. One site scored a higher band

rating (band A - reference condition) than had previously been recorded at the same site. This indicates minimal change in the condition of 'healthy' streams in south-west forests during the life of the 2014-23 FMP to date (addressing KPI1).

Future directions

- Publish a paper comparing macroinvertebrate communities in present in the Muir-Byenup wetlands in 1995/96, 2003/4 and 2014-16.
- Re-sample south-west forest streams in 2019 and publish report.
- Re-survey nationally important Warren region wetlands previously sampled by Horwtiz in 1997.