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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

Wetlands Conservation

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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

- To address KPI1 of the 2014-2023 FMP by monitoring the condition of currently healthy streams in relation to reduced rainfall and forest management practices.
- To 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, e.g. Lake Muir.
- 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

- Journal article published in *Freshwater Biology* that assessed compositional turnover in aquatic invertebrates in south-west forest streams and representation of aquatic invertebrates in the conservation estate
- Article published in *Wetlands Australia* on the Muir-Byenup Ramsar Wetlands.
- Conducted 2016 sampling of aquatic invertebrates in Tordit-Gurru and Noobijup Swamp to monitor response to pH changes in the Muir-Byenup Ramsar wetlands.
- Carried out field work for 2016 monitoring of aquatic invertebrates in 20 forest streams.
- Identification, vouchering and consolidation of historical data for Muir-Byenup invertebrates in progress.
- Collaborating with 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 will provide the Department with knowledge of how these wetlands and their fauna have responded to threats over the last 20 years. This, in conjunction with results from the peat wetlands project (SPP2014-24), will assist the Department with making decisions about protecting remaining high conservation value wetlands versus taking remedial action at those where condition is declining.
- Forest Management Plan commitments will be addressed with respect to measuring change in condition of 1) currently healthy (reference condition) stream ecosystems (KPI1) and 2) Ramsar and nationally listed wetlands (KPI3). Results addressing these commitments will inform future forest management practices.

- The generalised dissimilarity modelling suggested that stream invertebrate communities in the south-west forests (at least the insect component in middle order reaches) are well represented in the conservation estate, but areas of the eastern jarrah forest have not been well surveyed.

Future directions

- Voucher Muir-Byenup invertebrates collected in 2014/2015.
- Consolidate Muir-Byenup invertebrate data from 1996/97, 2003/04 and 2014/15 and produce a report.
- Publish report with summaries of long-term trends (2005 to 2016) for all stream monitoring sites.
- Publish further papers examining impacts of declining rainfall and forest management practices on macroinvertebrate diversity in forest streams.
- Re-survey nationally important Warren region wetlands previously sampled by Horwitz in 1997 (e.g. Owingup, Lake Jasper, Doggerup, Marringup, Mt.Soho Swamp) and listed in the Warren region Nature Conservation Plan.