Progress Report SP 2014-024

Understanding peat wetland resilience: evaluating the impact of climate and landuse change on the hydrodynamics and hydrogeochemistry of peat wetlands in the Warren (Muir-Byenup) District

Wetlands Conservation

Project Core Team

Supervising Scientist	Adrian Pinder
Data Custodian	Adrian Pinder
Site Custodian	Adrian Pinder

Project status as of July 17, 2018, 9:28 p.m.

Update requested

Document endorsements and approvals as of July 17, 2018, 9:28 p.m.

Project Team	granted
Program Leader	required
Directorate	required

Understanding peat wetland resilience: evaluating the impact of climate and landuse change on the hydrodynamics and hydrogeochemistry of peat wetlands in the Warren (Muir-Byenup) District

J Rutherford, L Bourke

Context

Peat wetlands are relatively rare in Western Australia but constitute an important habitat for biodiversity where they occur, especially in the far south-west of the State, providing refugia from seasonal and long-term drying for a range of restricted flora and fauna. Some peat wetlands in the Muir-Byenup Ramsar wetland suite are threatened by acidification and some have already acidified as a result of declining groundwater levels. Drying is also making these organic wetlands much more prone to catastrophic fires. The peat also stores a range of toxic metals and metalloids that are released to the environment as they dry. The major aim of this project is to undertake a risk assessment of fire susceptibility and release of acidity and other contaminants. The project will deliver a map of the distribution of at-risk peat wetlands, combined with recommendations for fire management and maintaining water balance.

Aims

- Determine current hydrogeological and hydrochemical conditions of four representative peat wetlands, particularly water and chemical conditions and gradients.
- Map and quantify peat wetland carbon and acid stores.
- Identify and assess the transient behaviour of major threats to the health of the peat wetlands particularly the role of drying climate in changing water retention in peat sediments and the source and mobility of acidity and salinity.

Progress

- Undertook scanning electron microscopy (SEM) work to resolve and quantify fine scale (nanometre scale) mineralogy to assess geochemical zonation and acid stores.
- Commenced development of a 3D conceptual model that integrates hydrogeophysical and hydrogeochemical data and interpretations.

Management implications

- The absence of bacteria that breakdown vegetation to form peat in disturbed peat wetlands confirms that these systems are under stress. The cause of the stress and likelihood of their recovery should be assessed so they can be actively managed.
- All peat wetlands have the potential to become acidic but they can be effectively managed if substrate geochemical gradients and discrete zones releasing acids are mapped and understood.
- Identifying the discrete zones within peat wetlands prone to acidification and drying allows management plans and actions to be developed and prioritised.

Future directions

- Complete work on the three dimensional understanding of the hydrogeology, water, salt and acid stores in order to understand spatial variability and identify wetlands where interventions are likely to be effective and the risk of peat fires reduced.

- Write a report, journal article and Science Information Sheet that details the approach and application for management.
- Map and characterise peat wetlands in the Warren region to better understand the likely distributions of threatened flora and fauna and risks of landscape threats (climate change, fire) to these systems.