Conservation Commission of Western Australia

CONSERVATION COMMISSION OF WESTERN AUSTRALIA

POSITION STATEMENT NO. 11

The protection of surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia.

December 2014

Context and Purpose

Management Activity 49 of the *Forest Management Plan 2014-2023* (FMP) provides that:

> *The Conservation Commission, in consultation with the Department (of Parks and Wildlife), will develop a position statement to provide guidance when proposals to take water from land to which the plan applies are considered.*

The Conservation Commission recognises that whilst Management Activity 49 specifically refers to land to which the FMP applies, the Conservation Commission has wider functions under the *Conservation and Land Management Act 1984* (CALM Act) and this position statement therefore addresses proposals[1] to take water from all lands vested in the Conservation Commission. This approach takes into account the concept of cumulative environmental impact to the vested estate.

Relevant legislation and policies

Conservation and Land Management Act 1984

As described in its long title, the CALM Act is to make better provision for the use, protection and management of certain public lands and waters and the flora and fauna thereof, to establish authorities to be responsible therefor, and for incidental or connected purposes.

Section 3 of the CALM Act defines ***land*** to include — (a) tidal land; (b) tidal waters in any inlet, estuary, lagoon, river, stream or creek; and (c) the waters of any inlet, estuary, lake, lagoon or swamp or of any river, stream or creek whether flowing continuously or intermittently.

This Position Statement has been prepared by the Conservation Commission as part of its policy functions under section 19 of the CALM Act, including to develop policies —

- for the preservation of the natural environment of the State and the provision of facilities for the enjoyment of the environment by the community; and
- for promoting the appreciation of flora and fauna and the natural environment.

The Conservation Commission respectfully acknowledges the mandate to protect the value of the land to the culture and heritage of Aboriginal people in accordance with the CALM Act, and particularly in the context of this Position Statement, the cultural value of rivers, streams and wetlands on lands vested in the Commission. Dreaming trails often encompass entire rivers and their tributaries, which also provide recreation and camping sites along their banks

[1] For the purpose of this Position Statement, the term proposal includes but is not limited to a significant proposal, strategic proposal, and a proposal under an assessed scheme as defined under the *Environmental Protection Act 1986* (WA).

(Conservation Commission, 2013). Any proposals to take water from Conservation Commission vested lands should therefore ensure the protection of cultural and heritage values associated with aquatic ecosystems in lands reserved under the CALM Act.

Rights in Water and Irrigation Act 1914

The *Rights in Water and Irrigation Act 1914* provides the legislative basis for the planning, regulation, management, protection and allocation of water resources in Western Australia, including the identification and management of water for ecosystems (National Water Commission, 2012).

Statewide Policy No. 5, Environmental Water Provisions Policy for Western Australia outlines the process for determining ecological water requirements and environmental water provisions for surface water and groundwater resources (Water and Rivers Commission, 2000, Department of Water). This Statewide Policy defines ecological water requirements as the water regimes needed to maintain ecological values of water dependent ecosystems at a low level of risk. Ecological water requirements are determined on the basis of the best scientific information.

Environmental Protection Act 1986

As proposals to take water from Conservation Commission vested lands may relate to Part IV (environmental impact assessment) and Part V (environmental regulation)[2] of the *Environmental Protection Act 1986* (EP Act), this Position Statement is also in line with the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing.

The protection of surface and groundwater biodiversity values of lands vested in the Conservation Commission

Management plans prepared by the Conservation Commission under the CALM Act identify key values and threats, management objectives and actions and key performance indicators (KPIs) for land vested in the Conservation Commission. Criterion 2 of Conservation Commission Position Statement No. 9 specifically requires KPIs in management plans to be driven by values and used to report management actions in relation to those values (Conservation Commission, 2014b). This criterion is particularly important in enabling the Conservation Commission to undertake its performance assessment function in relation to biodiversity values of lands vested under the CALM Act.

In considering proposals to take water from CALM Act reserves and/or from nearby areas, the Conservation Commission will refer to the management plan for the reserve (or group of reserves) in the first instance. Specifically, the Conservation Commission will look at how proposals will affect the values and delivery of management objectives prescribed in management plans prepared under the CALM Act. An example of this approach is the Conservation Commission's submission to the Environmental Protection Authority on the South West Yarragadee Water Supply Development which identified issues posed by the proposal in achieving management objectives in the *Forest Management Plan 2004-2013* (Conservation Commission, 2006).

In the absence of a management plan, the Conservation Commission will obtain guidance from environmental impact assessment processes, including expert advice from the Department of Parks and Wildlife.

[2] relevant to emissions and discharges from prescribed premises under the *Environmental Protection Act 1986* (WA). See also Schedule 1 — Prescribed premises, Category number 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore (*Environmental Protection Regulations 1987,* Schedule 1).

Aquatic habitats and the threat of secondary salinisation

Salinity is a measure of the content of salts in soil or water. Salts are highly soluble in surface and groundwater and can be transported with water movement. Large salts deposits are a natural feature of vast areas of the Australian landscape, stored deep in soils or as surface salt deposits and salt lakes. This natural distribution of salt in the landscape is referred to as *primary salinity.* In contrast, *secondary salinity* is the result of human land use and either produces more salt or causes primary salinity to rise to the surface of the land (Australian Government Department of Sustainability, Environment, Water Population and Communities, 2012).

The term *salinisation* has been described as the process of accumulation of salts in soils, waters or sediments (Conservation Commission, 2014a). There are two main types of *secondary salinisation*: dryland salinity and irrigation salinity. Dryland salinity occurs on non-irrigated land (also affecting wetlands) and usually results from broadscale clearing of native vegetation and its replacement with crops and pastures that use less water. Irrigation salinity occurs when irrigation water is applied to a landscape. In both cases, a change to the water balance leads to salinisation. In Western Australia, the predominant form is dryland salinisation which occurs mainly in the inland agricultural zone of the south-west (Conservation Commission 2014a and Department of Environment and Conservation (Department of Parks and Wildlife) 2012).

Pinder et al explain that the effects of secondary salinisation on aquatic habitats include increased water salinity and altered water chemistry, increased streamflow, more prolonged periods of wetland inundation, vegetation loss and changes, and formation of new wetlands where water tables intersect the land surface. In their study, Pinder et al also refer to evidence that secondary salinisation has detrimental effects on invertebrate communities of natural salt lakes. In addition, it has been recognised that secondary salinisation also has significant effects on the aquatic and fringing vegetation of natural salt lakes (Pinder et al., 2004).

In its recent performance assessment (Salinity management in south-west Western Australia), the Conservation Commission recognised that further information is required to understand the interactions between climate variability, saline groundwater levels, and the changing nature of the threat posed by salinity. In an agricultural context, groundwater disposal, in particular deep drainage, is a widely used engineering option by the agricultural sector for reclaiming salt-affected growing areas. Yet despite this wide application, the Conservation Commission has previously noted that there is limited understanding of the full range of impacts that agricultural drainage has on the biological communities living in wetlands of the Wheatbelt (Conservation Commission 2014a).

A study of aquatic invertebrate assemblages of wetlands and rivers in the Wheatbelt region of Western Australia revealed a wide variety of wetland types inhabited by a rich and diverse aquatic invertebrate fauna of largely southern Australian affinity (Pinder et al 2004). The study noted that a variety of freshwater wetlands including claypans, granite outcrop pools and rivers as well as lakes and swamps are required to provide adequate habitat for aquatic invertebrates in the region. At the time, Pinder et al also recognised the implications of the diffuse nature of the salinity threat, requiring catchment and landscape approaches to wetland and aquatic invertebrate conservation (Pinder et al, 2004).

A recent study provides some insight into the species richness in rivers in the Mediterranean region of south-western Australia. However, according to Davies and Stewart, whilst plant communities in this region have been widely studied, the biodiversity of freshwater communities has been less frequently reported (Davies and Stewart, 2013). Davies and Stewart explain that south-western Australian aquatic fauna is characterised by a high degree of endemicity including several species found only on Gondwanan continental fragments.

Groundwater-dependent ecosystems

Groundwater–dependent ecosystems are uniquely adapted features of the Western Australian landscape, especially on the Swan and Scott coastal plains (CSIRO, 2009). It has been noted that perhaps the most documented group of studies of the response of groundwater–dependent ecosystems in Australia are those relating to phreatophytic[3] vegetation and watertable decline as a result of groundwater pumping and rainfall regime change on the Gnangara (groundwater) Mound on the Swan Coastal Plain in Western Australia (Richardson et al, 2011). This aquifer supports several groundwater–dependent ecosystems within the Parks and reserves of Yanchep and Neerabup planning area including wetland and cave ecosystems, as well as terrestrial vegetation with varying degrees of groundwater dependency (Conservation Commission, 2012).

Eamus et al 2006 explain that when groundwater–dependent ecosystems are threatened by insufficient supply of groundwater, all the ecosystem services provided by that ecosystem may be threatened. Eamus et al describe examples of these ecosystem services as including soil formation, prevention of soil erosion, regulation of water flow (surface, subsurface and groundwater recharge), water purification, tourism value and carbon sequestration.

Groundwater-dependent ecosystems can be located in marine, coastal, riparian, in-stream, terrestrial and in cave and aquifer environments. The following three primary classes of groundwater-dependent ecosystems have been identified (Eamus et al 2006):

1. Aquifer and cave ecosystems, where stygofauna (groundwater–inhabiting organisms) reside within the groundwater resource.
2. All ecosystems dependent on the surface expression of groundwater including base-flow rivers and streams, wetlands, some floodplains and mound springs and estuarine seagrass beds.
3. All ecosystems dependent on subsurface presence of groundwater, often accessed via the capillary fringe (non-saturated zone above the saturated zone of the water table) when roots penetrate this zone. This class includes terrestrial ecosystems such as Banksia woodland on the Gnangara Mound in Western Australia. No surface expression of groundwater is required in this class of groundwater-dependent ecosystem.

From the above primary classes, the examples that follow will specifically address stygofauna and banksia woodland which pertain to 1 and 3 respectively.

- **Subterranean fauna: stygofauna**

Subterranean fauna are defined as fauna which live their entire lives (obligate) below the surface of the earth (EPA 2013). They are divided into two groups:

- stygofauna - aquatic and living in groundwater; and
- troglofauna - air-breathing and living in caves and voids

Western Australia's subterranean fauna is recognised as being globally significant because of its extraordinarily high species richness and high levels of endemism. It has been estimated that the total number of subterranean fauna species is about 4,000, most of which are unnamed or yet to be recorded (EPA, 2013). Subterranean fauna occur in most regions of the State, with particularly high diversity occurring at Cape Range, Barrow Island and the Yilgarn and Pilbara regions. The significance of subterranean fauna at Cape Range has been recognised globally. The best studied region for subterranean fauna in WA is the Pilbara, where it is estimated that about 500-550 stygofauna species are likely to be recorded. According to the EPA, research is increasingly showing that subterranean habitats

[3] Phreatophyte: plant that draws water from groundwater or the capillary zone to maintain vigour and function (see Richardson et al 2011).

contain more species than previously recognised and these are a significant portion of global diversity (EPA, 2013).

Examples of impact types include groundwater extraction/dewatering (single bore/borefield) and salinisation due to pit voids or intrusion. For instance, groundwater abstraction on stygofauna could range from a single bore impacting on a relatively large aquifer, to a series of bores impacting on a similar sized aquifer. In the former, if the duration was short and the spatial extent was low, the degree of impact would be low. In the latter, if the duration was long, the spatial extent was moderate or high and the level of water drawdown was several metres, the degree of impact would be high (EPA, 2013).

- **Banksia woodland**

Rivers are surrounded by, and interact with, the riparian vegetation adjacent to them. Groundwater therefore does not remain in isolation of surface waters (Eamus and Froend, 2006). Recharge and discharge of groundwater can occur from and to rivers and the ecology of many rivers is therefore groundwater-dependent for at least part of the year (Eamus and Froend, 2006).

In their study of the impact of groundwater abstraction on Banksia woodland in the Swan Coastal Plain, Groom et al 2000 explain that groundwater abstraction for public water supply results in lowering of the water tables, which may have a detrimental impact on ecosystems dependent on shallow groundwater. By way of example, the potential impact of groundwater drawdown on groundwater-dependent vegetation ranges from gradual changes in plant community structure, to sudden and extensive vegetation deaths.

Groom et al 2000 also recognise that reducing the impacts of drawdown on the native vegetation surrounding groundwater production bores and wellfields is an important task for managers of groundwater resources, the understanding of which is vital for the maintenance of groundwater levels necessary to support the water requirements of terrestrial vegetation.

The Conservation Commission's Position

Mitigation of environmental impacts is fundamental in the protection of surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia. In this regard, the Conservation Commission notes that the first principle of the WA Environmental Offsets policy states that environmental offsets will only be considered after avoidance and mitigation options have been pursued. In addition, environmental offsets will not be considered in the absence of proposed strategies to avoid and mitigate environmental impacts (see EPA, 2011).

Mitigation measures that lessen the significance of environmental impacts in general (such as avoidance and minimisation) recognise and value Government processes that result in the identification of lands for reservation under the CALM Act towards the goal of a comprehensive, adequate and representative reserve system in Western Australia.

Since research is increasingly showing that subterranean habitats contain more species than previously recognised and these are a significant portion of global diversity[4], proposals to take water in Conservation Commission vested lands should demonstrate consideration for the precautionary principle as articulated in both the CALM Act and the EP Act:

> *If there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

[4] EPA 2013

The Conservation Commission recognises that surface and groundwater management cuts across different tenures and agency responsibilities. Measures to protect surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia are also a shared responsibility between land managers and adjacent land users.

The Conservation Commission expects to be consulted by relevant government agencies including Parks and Wildlife and the Office of the Environmental Protection Authority in cases where potential direct or indirect environmental impacts on surface and groundwater biodiversity values of lands vested in the Conservation Commission of Western Australia are anticipated.

References

Department of Sustainability, Environment, Water Population and Communities (2012) *Salinity and water quality*. Australian Government. Available from www.environment.gov.au. Accessed October 2014.

Conservation Commission (2014a) *Salinity management in the south-west of Western Australia*, Conservation Commission of Western Australia, Kensington.

Conservation Commission (2014b) Criteria for developing Key Performance Indicators for management plans prepared under the *Conservation and Land Management Act 1984*. Conservation Commission of Western Australia, Kensington.

Conservation Commission (2013) *Forest management plan 2014-2023*, Conservation Commission of Western Australia, Kensington.

Conservation Commission (2012) *Parks and reserves of Yanchep and Neerabup management plan 2012*, Conservation Commission of Western Australia, Crawley.

Conservation Commission (2006) *Submission to the Environmental Protection Authority South West Yarragadee Water Supply Development:* Sustainability Evaluation Environmental Review and Management Programme. Conservation Commission of Western Australia, Crawley.

CSIRO (2008) *Salinity Fact Sheet: CSIRO Land and Water*. The Commonwealth Scientific and Industrial Research Organisation. Available from www.csiro.au. Accessed October 2014.

CSIRO (2009) *Water yields and demands in south-west Western Australia*. A report to the Australian Government from the CSIRO South-West Western Australia Sustainable Yields Project. CSIRO Water for a Healthy Country Flagship, Australia.

Davies., P.M., Stewart., B.A., (2013) *Aquatic biodiversity in the Mediterranean climate rivers of southwestern Australia*. Hydrobiologia 719, pp 215-235.

DEC (2012) *A guide to managing and restoring wetlands in Western Australia.* Department of Environment and Conservation, Perth.

DoW (2013) *Guidance note 7: managing the hydrology and hydrogeology of water dependent ecosystems in urban development*, Department of Water, Perth.

Eamus D., Froend R., (2006) *Groundwater-dependent ecosystems: the where, what and why of GDEs*. Australian Journal of Botany 54, 91-96.

Eamus D., Froend R., Loomes R., Hose G., Murray B., (2006) *A functional methodology for determining the groundwater regime needed to maintain the health of groundwater-dependent vegetation*. Australian Journal of Botany 54, pp 97-114.

EPA (2011) *WA Environmental Offsets Policy*. Environmental Protection Authority, Perth, Western Australia, September.

EPA (2013) *Environmental Assessment Guideline for consideration of Subterranean Fauna in Environmental Impact Assessment in WA*. Environmental Protection Authority, Perth, Western Australia, June.

EPA (2014) WA Environmental Offsets Guidelines. Environmental Protection Authority, Perth, Western Australia, August.

Government of Western Australia (2009) *Gnangara Sustainability Strategy Draft for public comment.* Department of Water, Gnangara Coordinating Committee, Perth.

Groom., P.K., Froend., R.H., Mattiske., E.M. (2000) Impact of groundwater abstraction on a Banksia woodland, Swan Coastal Plain, Western Australia. *Ecological Management & Restoration* 1, 117-124.

National Water Commission (2012) *Australian environmental water management: 2012 review*, NWC, Canberra.

Pinder., A.M., Halse., McRae., J.M., Shiel., R.J. (2004). *Aquatic invertebrate assemblages of wetlands and rivers in the Wheatbelt region of Western Australia*. Records of the Western Australian Museum Supplement No. 67, pp 7-37.

Richardson., S., Irvine E., Froend, R., Boon, P., Barber., S., Bonneville., B. (2011) *Australian groundwater-dependent ecosystems toolbox part 1*. Waterlines report, National Water Commission, Canberra.

Water and Rivers Commission (2000) *Statewide Policy No. 5: Environmental Water Provisions Policy for Western Australia*. Department of Water, Perth.