

Approved Conservation Advice for Clay Pans of the Swan Coastal Plain

(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

This Conservation Advice has been developed based on the best available information at the time this Conservation Advice was approved; this includes existing plans, records or management prescriptions for this ecological community.

Description

The Clay Pans of the Swan Coastal Plain ecological community occurs in Western Australia where clay soils form an impermeable layer close to the landscape surface, and wetlands form that rely solely on rainfall to fill and then dry to impervious pans in summer.

The ecological community generally occurs as a shrubland (less commonly as a low, open woodland) over a ground layer of geophytes, herbs and sedges which are characteristic of the wetter parts of the sites. There are no dominant species which characterise the entire ecological community. The ecological community, however, shows similar landform and vegetation structural features across its range.

A distinctive feature of these clay pan wetlands is the suite of geophytes and annual flora that germinates, grows and flowers sequentially as these areas dry over summer, producing a floral display for over three months. The clay pans have very high species richness, a number of local endemics and are the most floristically diverse of the Swan Coastal Plain wetlands.

The seasonally inundated clays that support this ecological community are relatively productive agricultural soils and many were cleared and drained soon after European settlement. Others were mined for clay for brick and tile manufacture. Those that remained intact were largely located on the Swan Coastal Plain in close proximity to metropolitan Perth. In more recent years large areas have disappeared under urban development and today the plant communities of the clay pan wetlands are amongst the most threatened in Western Australia.

A more comprehensive description of the ecological community is contained in the Listing Advice (TSSC, 2011) which is available on the Internet at:

<http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>

Conservation Status

The Clay Pans of the Swan Coastal Plain ecological community is listed as **critically endangered**. This ecological community is eligible for listing as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) as, in 2012, the Minister considered the Threatened Species Scientific Committee's (TSSC) advice and amended the list under section 184 to include Clay Pans of the Swan Coastal Plain. The TSSC determined that this community met criteria 1 and 2 of the eligibility criteria (TSSC, 2011). The Clay Pans of the Swan Coastal Plain ecological community corresponds with four separate ecological community types, determined as threatened by the Western Australian Threatened Ecological Communities Scientific Committee (WATECSC) on the 18th July 1996. These are:

- Herb rich saline shrublands in clay pans (SCP07) – Vulnerable
- Herb rich shrublands in clay pans (SCP08) – Vulnerable
- Dense shrublands on clay flats (SCP09) – Vulnerable
- Shrublands on dry clay flats. (SCP10a) – Endangered.

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The ecological community also includes the Western Australia community type 'Clay pans with shrubs over herbs' (Community 117). This type is listed as Priority 1 for consideration for listing as a Threatened Ecological Community by the WATECSC (DEC, 2010a).

Distribution and Habitat

The Clay Pans of the Swan Coastal Plain occur within the South West Botanical Province (SWBP) of Western Australia. The community is restricted to the Swan Coastal Plain IBRA bioregion, except for six small clay pans in the Jarrah Forest bioregion.

This ecological community occurs within the Natural Resource Management (NRM) Regions of Swan and the South West in Western Australia.

Components of the community are included in several **Wetlands of National Significance**, including Brixton Street Wetlands, the Ellen Brook Swamps Systems and the Forestdale Lake Nature Reserve, which is also a **Ramsar site** (Environment Australia, 2001).

The ecology of the ecological community is entirely dependent on the hydrological functioning of the clay pan. The clay pans fill during the winter rains and slowly dry over spring and early summer to a hard, almost impenetrable surface. The variation in depth and duration of inundation is a factor in determining the suite of plant species that occur in a particular clay pan, explaining some of the variation in clay pan flora across the extent of the national ecological community. Any change to the hydrological functioning of the community will significantly alter it, such that it is unlikely to remain part of the ecological community. This impact is evident in the loss of more than 90% of the ecological community through clearing and drainage of clay pans since European settlement.

The clay pans support a diverse array of fauna that depend on different aspects of the vegetation and surface water to provide shelter, food and suitable breeding conditions. Many of these animals are present seasonally, reflecting the seasonal changes in hydrology and the linked changes in flora. There are three threatened species (EPBC Act) known to be **dependent** on clay pans and the surrounding ecological communities for a portion of their life/breeding cycle (*Pseudemydura umbrina* (western swamp tortoise) (critically endangered) and two species of native bee *Leioproctus douglasiellus* (endangered) and *Neopasiphae simplicior* (critically endangered).

In 2010 the ecological community occupied 600 hectares (ha) but it is highly fragmented, with most remnants being under 10 ha in size.

Threats

The Clay Pans of the Swan Coastal Plain ecological community is affected by a suite of threats, many of which arise from the fact that the community occurs in the most densely populated region in Western Australia and on some of the most productive agricultural soils in that landscape.

The **main and ongoing threats** to the Clay Pans of the Swan Coastal Plain include:

- Hydrological changes and clearing for urban, industrial or rural development, weed invasion, inappropriate fire regimes and feral animals (predation and soil disturbance). Changes to the natural hydrology of the wetlands are the most significant threat to the ecological community, as the vegetation suite is dependant on the wetlands filling and drying at appropriate times of the year.
- Weed invasion is a significant threat to the clay pans, especially by bulbs of South African origin which naturally occur in similar habitats and climates (*Watsonia meriana* var. *bulbillifera*, *Sparaxis bulbifera* and *Tribolium uniolae*) as well as bridal creeper (*Asparagus asparagoides*), kikuyu (*Pennisetum clandestinum*; formerly

Cenchrus clandestinus) and annual and perennial grasses. *Watsonia* in particular is a major threat because it forms dense monocultures in clay pan communities. Some of the geophytes can spread very rapidly in sheet water flow across these wetlands (Brown et al., 2008; Brown and Brookes 2003; Brown and Clark 2009).

- Several tree species can be invasive within the drier patches in the community, including invasive eucalypts such as the river red gum (*Eucalyptus camaldulensis*) and eastern Australian wattles (e.g. *Acacia melanoxylon*, *Acacia baileyana*).
- Fire is a significant threat to integrity of the community, especially the impact of inappropriate fire regimes. Fire is not a part of the ecology of this wetland community and is the greatest threat to the survival of the fauna in the clay pan wetlands. Arson fires can and do occur frequently, depending on the proximity of an occurrence to urban areas. Frequent fire can facilitate weed invasion, but conversely can be a useful tool in weed control restoration of clay-based wetlands (Brown et al., 2008). Planned fire regimes are often dominated by the requirement to protect adjoining assets and land values (Mitchell et. al., 2002).
- Feral animals (foxes (*Vulpes vulpes*), rabbits (*Oryctolagus cuniculus*), cats (*Felis catus*) and increasingly in the south, pigs (*Sus scrofa*)) are not controlled in any but the largest reserves. The ecological community suffers effects of overgrazing by rabbits. Foxes, pigs and cats predate native animals, and rabbits and pigs disturb the vegetation by burrowing and rooting behaviours.
- Construction of tracks and new fence lines within remnant patches degrades the ecological community by direct damage, increasing fragmentation, and providing easier pathways for weeds and feral animals to access parts of the community. Fencing of blocks of natural bushland that contain clay pans generally ameliorates active threats such as rubbish dumping and off-road vehicle use.

The main **potential threats** to the Clay Pans of the Swan Coastal Plain include:

- Observed and predicted climate change may significantly impact the ecological community and individual species in each clay pan as winter rainfall declines over the Swan Coastal Plain. The winter-spring inundation that the clay pan community is dependent on is likely to be significantly reduced. The driest winter on record was recorded in 2010 and the majority of clay pans remained free of surface water. South-western Australia's significant drying trend is forecast to worsen under climate change with up to 80 per cent more droughts in south-western Australia by 2070 (Department of Climate Change, 2010).
- Inundation from rising saline groundwater may prove to be a serious threat to the community in the medium term. Due to the widespread clearance of native perennial vegetation and its replacement with annual crops and urbanisation, rising ground water in the surrounding region may flow overland into clay-based wetlands (Gibson et al., 2005). Salinity risk mapping indicates that almost all of the known clay pans occur on susceptible land systems (NLWRA, 2001); and
- The water mould *Phytophthora cinnamomi* occurs in parts of the Marri woodlands community¹ that surround some clay pans. Species in the plant families Proteaceae and Myrtaceae (as occur in community types SCP08 and SCP09) can be considered at risk (Gibson, 2010).

¹ EPBC listed Endangered Ecological Community *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain

Research Priorities

Research or monitoring priorities that could inform future conservation actions include:

- Support and enhance existing condition monitoring programs.
- Continue to support existing research and/or trials to control invasive weeds.
- Monitor the levels of salinity and nutrients to determine if salinisation (from rising saline water overland flow into clay pans), or altered water levels or quality generally pose a major threat to the community, or particular occurrences of it.
- Investigate techniques that may be used for management of feral species (foxes, pigs, rabbits and feral/domestic cats) in an urban/semi-urban context.
- Investigate methods to handle the requirements of the ecological community and competing management priorities for *Pseudemydura umbrina* (western swamp tortoise) in some clay pans (e.g. weed control methods, including herbicide use, without harming tortoises).
- Investigate the natural hydrological processes that maintain the ecological community, especially the water levels, quality and seasonal patterns of inundation. Use these data to help design buffers to protect hydrological processes.
- Quadrat and hydrological monitoring to assess if species composition is changing in response to any hydrological changes associated with changing climate.

Priority Actions

The following priority recovery and threat abatement actions can be done to support the recovery of the Clay Pans of the Swan Coastal Plain ecological community.

Habitat Loss, Disturbance and Modification

- Further loss to this critically endangered ecological community should be avoided.
- Protect and conserve all remnants of the ecological community.
- Apply appropriate buffer zones to protect the ecological community from edge effects.
- Ensure road widening, maintenance activities, fencing or other infrastructure or development activities involving soil or vegetation disturbance in areas where the Clay Pans of the Swan Coastal Plain ecological community occurs do not adversely impact on known sites.
- Avoid any changes to hydrology that may result in changes to the natural hydrological regime of the clay pans, groundwater water table levels and subsequent increase or decrease in run-off, salinity, or pollution.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure if possible. This is particularly important for areas that link remnants and create wildlife corridors.
- Develop and implement best practice standards and regimes for management of remnants on private and public lands, to maintain the biodiversity, including threatened species, of the ecological community.
- Monitor flora, fauna at the ecological community boundaries and identify key threats.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Invasive Species

- Manage sites to prevent introduction or further spread of invasive weeds which are a threat to the Clay Pans of the Swan Coastal Plain ecological community, using appropriate methods, and reverse the degraded condition of the habitat where applicable (rehabilitation).

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- Develop and implement a management plan for the control of *Watsonia meriana* var. *bulbillifera*, *Sparaxis bulbifera*, *Tribolium uniolae* and other major weeds identified as affecting the Clay Pans of the Swan Coastal Plain ecological community.
- Ensure chemicals or other mechanisms used to manage weeds do not have an adverse impact on the Clay Pans of the Swan Coastal Plain ecological community.
- Develop and implement a management plan for the control of pigs and rabbits in the Swan Coastal Plain region. Develop and implement a management plan for foxes and cats where they threaten fauna species in the ecological community.

Fire

- Develop and implement a suitable fire management strategy to manage fire regimes in the Clay Pans of the Swan Coastal Plain ecological community.
- Where appropriate provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigative measures in bush fire risk management plan(s), risk register and/or operation maps.
- Negotiate appropriate standing procedures with local fire brigades in relation to establishing fire control lines in native vegetation areas, to avoid unnecessary destruction of the ecological community.
- Develop fire response plans and maintain strategic fire breaks for occurrences on Department of Environment and Conservation (government) managed land.

Disease

- Develop and implement suitable hygiene protocols to protect sites where the threat of dieback caused by *Phytophthora cinnamomi* is known to exist.

Conservation Information

- Raise awareness of Clay Pans of the Swan Coastal Plain ecological community within the local community e.g. through active Conservation Management Networks, Landcare groups, local councils and other groups.
- Liaise with planning authorities to ensure that planning for growth zones in urban and peri-urban areas takes the protected remnants into account, with due regard to principles for long-term conservation.
- Liaise with local councils and State authorities to ensure new development, road widening, maintenance activities or other activities involving substrate or vegetation disturbance in areas where the Clay Pans of the Swan Coastal Plain ecological community occurs do not adversely impact on known remnants.
- Establish and maintain liaison with private landholders and managers of land on which remnants of the ecological community occur.
- Install interpretive signage at occurrences, especially in sites utilised heavily by members of the public.

The previous list does not necessarily encompass all actions that may be of benefit to Clay Pans of the Swan Coastal Plain ecological community, but highlights those that are considered to be of highest priority at the time of preparing the Conservation Advice.

Existing Plans/Management Prescriptions that are Relevant to the Ecological Community

Brown K and Brookes K (2002). Bushland Weeds: A Practical Guide to their Management. Greenwood, W.A., Environmental Weeds Action Network.

Brown K and Clark VT (2009). Monitoring Protocol: Weed control within Brixton Street Wetlands Herb Rich Shrublands in clay pans (FCT 8) Threatened Ecological Community. Department of Environment and Conservation, Western Australia.

Burbidge AA and Kuchling G (2004). Western Swamp Tortoise (*Pseudemydura umbrina*) Recovery Plan) 3rd Edition, January 2003 - December 2007. Department of Conservation and Land Management, Western Australia.

Department of Environment and Conservation (2010). Jandakot Regional Park Management Plan. Western Australia.

Government of Western Australia (2000). Bush Forever. Volume 1: Policies, Principles and Processes. Volume 2: Directory of Bush Forever Sites. Perth, W.A.

Ironbark Environmental (2007). Draft Management Plan for Bandicoot Brook bushland – North Waroona Reserve (including Reserve 31437; System 6 C53 – Coolup Reserves) 2007 - 2012. Shire of Waroona and Waroona Landcare Centre, Waroona, Western Australia.

Shire of Serpentine-Jarrahdale (2009). Brickwood Reserve & Briggs Park Management Plan.

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

Information Sources:

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- Mitchell DKW and Desmond A (2002). A Biodiversity Audit of Western Australia's 53 Biogeographical subregions in 2002. Department of Conservation and Land Management (CaLM), 606-623.
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- Threatened Species Scientific Committee (TSSC) (2011). Listing advice for the Clay Pans of the Swan Coastal Plain ecological community.
Available on the internet at:
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- Western Australia Climate Science Centre (2010). A very dry year so far in southwest Western Australia, Special Climate Statement 21. Bureau of Meteorology.