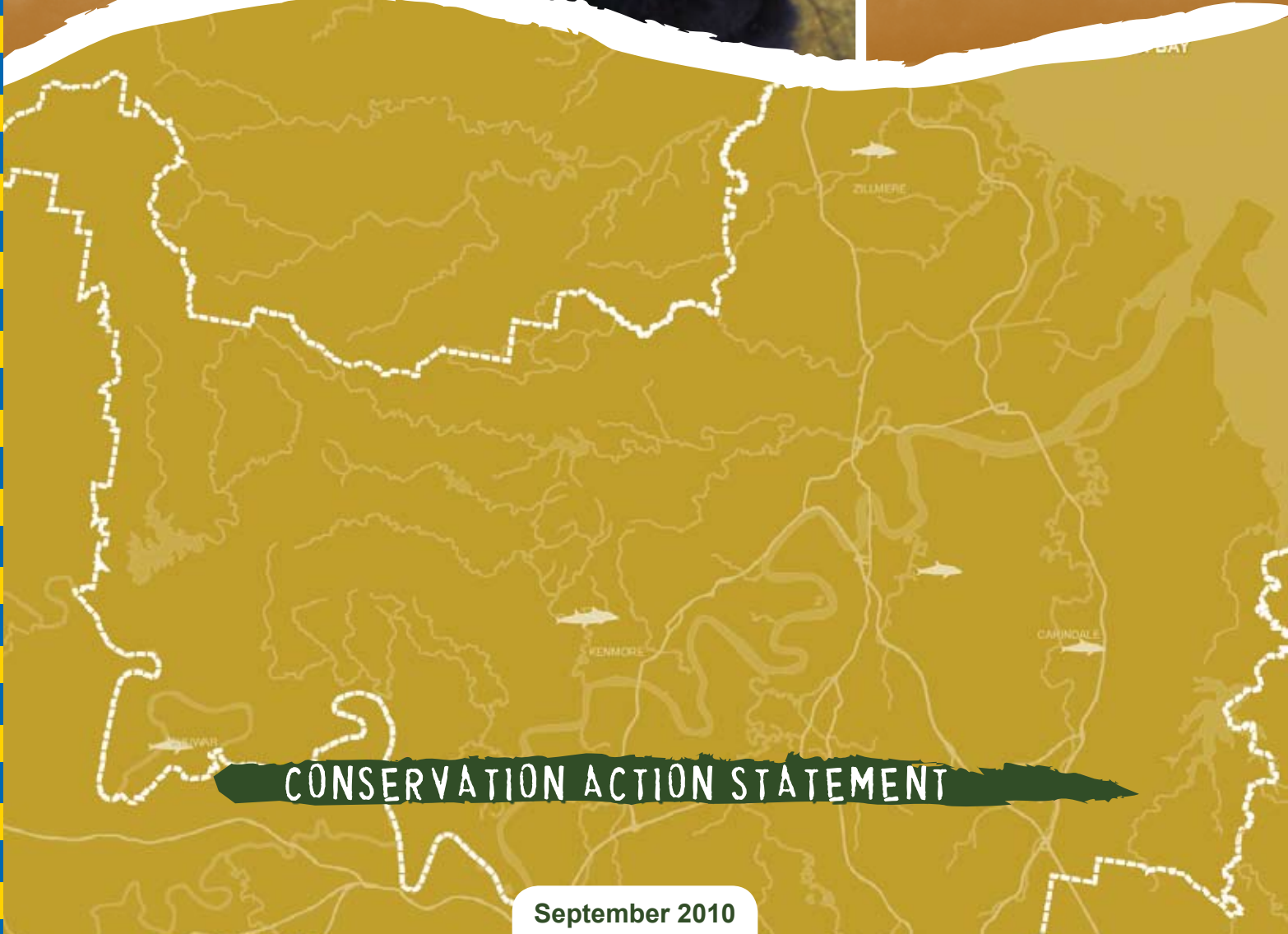


# SOFT-SPINED SUNFISH



## CONSERVATION ACTION STATEMENT

September 2010

**I ♥ BNE**

That's why I'm taking action  
to conserve our wildlife.



*Dedicated to a better Brisbane*

# SOFT-SPINED SUNFISH

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## Photography acknowledgment

Soft-spined sunfish, *Rhadinocentrus ornatus*, ©Queensland Museum, Gary Cranitch.

# SOFT-SPINED SUNFISH

## 1 Introduction<sup>1</sup>

This Conservation Action Statement addresses the soft-spined sunfish which is identified as a significant species within Brisbane, as per Council's Natural Assets Planning Scheme Policy (Brisbane City Council 2000).



Soft-spined sunfish (*Rhadinocentrus ornatus*)

This Conservation Action Statement will be updated as new information becomes available and to report progress on conservation actions. For more information about this or any other Conservation Action Statement, visit Council's website at [www.brisbane.qld.gov.au](http://www.brisbane.qld.gov.au) or phone Council on (07) 3403 8888.

### Aims

This Conservation Action Statement details Council's planning and management intent for the long-term protection and conservation of soft-spined sunfish within Brisbane through the following actions.

- Collating **existing information** on the distribution, ecology, physiology, behaviour and management requirements of this species within Brisbane and surrounds.
- Identifying **key threats** that significantly impact upon this species within Brisbane.
- Identifying **gaps in existing knowledge** of the habitat and management requirements of this species and research priorities.
- Detailing **practical and affordable strategies and actions** that support the long-term protection and conservation of this species within Brisbane.

## 2 Conservation status

The conservation status of a species will influence how it is managed. 'Threatened' species are typically accorded a more stringent management regime than 'common' species. Various conservation registers identify the status of fauna species at local, state and national levels. The current conservation status of the soft-spined sunfish is provided in Table 1.

**Table 1:** Official conservation status of Brisbane's soft-spined sunfish

Species	Brisbane City <sup>1</sup>	South East Queensland <sup>2</sup>	Queensland <sup>3</sup>	National <sup>4</sup>
Soft-spined sunfish	Significant	Regionally-significant priority taxa	Least concern	Not listed

<sup>1</sup> Brisbane City Council 2000, *Brisbane City Plan 2000*, Natural Assets Planning Scheme Policy, vol. 2 (2006 Amendments) <sup>2</sup> Significant for South East Queensland Bioregion under the Biodiversity Assessment and Mapping Methodology (Environmental Protection Agency 2002) <sup>3</sup> *Nature Conservation (Wildlife) Regulations 2006* under the *Nature Conservation Act 1992* <sup>4</sup> *Environment Protection and Biodiversity Conservation Act 1999*.

The soft-spined sunfish is listed as 'Significant' in Council's Natural Assets Planning Scheme Policy (Brisbane City Council 2000), signifying that this species is at risk of extinction within Brisbane City if future land use and management do not adequately accommodate its ecological needs. Local sunfish populations are geographically separated from broader distribution and considered to represent a significant amount of the genetic pool. The population is in decline and considered to be regionally-significant priority taxa.

## 3 Distribution<sup>2</sup>

### National/state


- Patchy distribution in wallum streams, swamps and rainforest creeks in a narrow coastal strip from Tin Can Bay, in the Great Sandy Region of central-eastern Queensland, to Coffs Harbour in north-eastern New South Wales.
- Includes Fraser, Moreton and North Stradbroke Islands, with a disjunct population occurring 350 kilometres away at Byfield in central Queensland (Page *et al.* 2004).

### Local

- Historically more widely spread in the Brisbane River system where it was common in the upper reaches of Oxley Creek and at Kholo Crossing (McKay and Johnson 1990).
- Currently, the species is known from Moreton Island and from the upper reaches of Spring Creek, Ithaca Creek and Carindale.
- For Moreton Island, distribution is shared with *Nannoperca oxleyana* and can be found at Lake Jabiru, Spitfire Creek, North and South Warrajamba Creek, Blue Lagoon and North Eagers Creek on the eastern coast, and in Ben Ewa Swamp and associated streams including Craven Creek and Tempest Creek on the western coast (Thompson *et al.* 2000).
- For mainland Brisbane, until recently the species was only known from the upper-most permanent section (approximately 300-400 metres in length) of Spring Creek, a tributary of Bulimba Creek. In 2006 a small population was discovered in Ithaca Creek.

Verified soft-spined sunfish records for Brisbane are shown on Map 1.

# Soft-spined sunfish

 Soft-spined sunfish



## DATA INFORMATION

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Publisher: Spatial Information Services  
Publication Date: 11 August 2009  
Reference: BMO76496  
File Path: BMO76496\_041\_Leaflet  
Project: Map Grid of Australia, Zone 56  
Horizontal Datum: Geocentric Datum of Australia, 1994

## Conservation Action Statement

### Records of soft-spined sunfish in Brisbane

*Dedicated to a better Brisbane*



# SOFT-SPINED SUNFISH

## 4 Ecology

### Habitat

- Occupies small, slowly-moving creeks, quiet backwaters of coastal streams and marsh swamps around melaleuca forest, usually over a sandy substrate (Arthington *et al.* 1994).
- Often locally abundant in unpolluted, tannin-stained, acidic (pH 5.0-6.8) creeks and lakes (Hansen 1992).
- Tends to congregate in small schools and may be found with other small-bodied native fishes (Page *et al.* 2004).
- Currently occurs in ephemeral headwaters of Spring Creek which is located in tall, open, mainly eucalypt forest (Taylor 2004).

### Diet

- Omnivorous surface-feeder (Merrick and Schmida 1984).
- Known to consume insects and their aquatic larvae as well as microcrustaceans and algae (Allen 1989).

### Reproduction

- Spawning occurs from October to December.
- Females lay several eggs each day for several days, probably with threads that adhere to plants (McDowall 1996).
- Larvae hatch in around 10 days (Allen 1989).

Table 2: Spawning seasons (brown shading indicates spawning months)

Species	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Soft-spined sunfish												

### Movement patterns

Movement and migration patterns for the sunfish are largely unknown. The two local populations of sunfish in Brisbane are extremely restricted and isolated, severely limiting the species ability to migrate.

## 5 Threats

### Habitat loss, fragmentation and simplification

- Since European settlement, an estimated 67,000 hectares, or two-thirds of the original woody vegetation in Brisbane City, has been cleared. This includes approximately 90% of lowland forests and more than 80% of all lowland vegetation (below 100 metres elevation). Habitat fragmentation is extensive – around 80% of the bushland remnants in the city are less than 20 hectares (Brisbane City Council 2001).
- Processes threatening the soft-spined sunfish include habitat clearing and disturbance.

### Habitat degradation and modification

- The effects of habitat disturbance and water quality degradation are well illustrated by the mainland population in Spring Creek. In the northern, well-vegetated reach of Spring Creek, which had a good flow of excellent quality water, the soft-spined sunfish was common in 2001 (BAAM 2005). Further downstream where the species was absent, water hardness rose, water acidity decreased and the riparian habitat was degraded. The decline of the soft-spined sunfish is most likely due to modification of its critical habitat, including vegetation removal and alteration of the preferred low pH and turbidity levels of waters, along with a reduction of preferred insect prey (Morris *et al.* 2001).



## 5 Threats continued...

### Habitat degradation and modification continued

- Threats to this species in general include development and infrastructure impacts, forestry (including pine plantations), water pollution (nutrient enrichment, increased suspended solids and toxic substances), mining operations and agriculture (Arthington and Marshall 1996).

### Predation, competition and invasive species

- The introduced mosquitofish (*Gambusia holbrooki*) may outcompete and displace the soft-spined sunfish over time (Arthington and Marshall 1999).
- The presence of mosquitofish in some dune lakes in north-eastern New South Wales has led to the soft-spined sunfish being competitively eliminated from these swamp-fringed habitats (Timms 1986).
- Mosquitofish are also highly aggressive, and have been recorded attacking native species including the soft-spined sunfish (Moore *et al.* Unpublished).
- Mosquitofish were present in Spring Creek (BAAM 2001) in more disturbed habitat where the soft-spined sunfish were absent. Mosquitofish were only recorded at one of the sites where the soft-spined sunfish were recorded and found predominantly in the downstream.
- It is unknown whether mosquitofish are present on Moreton Island, although they are present on North Stradbroke and Bribie Islands. It is likely that the mosquitofish has been introduced to Moreton Island.

### Recreational collection

- Currently the number of taken or possessed fish is legally limited to 20 under Fisheries Regulation (2008). However, this allowance of a take of 20 must be regarded as a threat to Brisbane's last remaining mainland populations.
- There is no estimate available of the populations in Spring and Ithaca Creeks, but the total number appears to be very small. The Spring Creek site is known to fish collectors and local residents have communicated their concern at the level of collecting.

## 6 Conservation

Several Council biodiversity initiatives are contributing to the protection and management of fish and their habitat across the city. The following are key initiatives.

- Bushland Acquisition program. Through this program more than 2700 hectares of the city's most significant lowland habitats have been purchased and protected to date.
- Wildlife Conservation Partnerships program. More than 600 private properties have established conservation partnerships with Council, covering some 2000 hectares of principally lowland habitat in significant fish habitat areas.
- Conservation Reserve Estate. More than 13,700 hectares of parkland including 7755 hectares of bushland and wetland reserves are managed and protected. This reserve network provides habitat for Brisbane's significant species.
- *Natural Assets Local Law (2003)*. Over 61,000 hectares of significant native vegetation is covered by the Natural Assets Local Law.
- *Brisbane City Plan (2000)*. The *City Plan* designates a green space system throughout the city to recognise and protect the contribution of open space areas to ecological functions. The plan's Biodiversity Code and supporting Ecological Assessment Guidelines provide performance criteria and acceptable solutions to protect significant biodiversity values on, or adjacent to, proposed development. *City Plan* also includes statutory schedules of flora and fauna species considered significant in Brisbane. These schedules recognise the conservation significance of species at a citywide and/or regional level.

## 6 Research

Page *et al.* (2004) collected specimens from the Spring Creek population as part of an investigation into the phylogenetic structure of the species throughout its known range. The study suggested that, on a genetic basis, the known population of this species may be divided into four major clades (i.e. Central East Queensland, Searys Creek (Tin Can Bay Region), South East Queensland and New South Wales) based on distribution and it was postulated that these clades could form possible units of conservation. Significant information gaps exist in the knowledge about sunfish ecology and conservation. Initially, conserving the soft-spined sunfish within Brisbane requires the identification of those waterways or sections of waterways maintaining viable populations of the species and the determination of inherent conditions within these waterways that allow the species to persist. Additionally, to contribute to an understanding of the habitat requirements of the species in the unique Spring Creek environment, it would be beneficial for Council to consult with Redland City Council with the intention of including the known habitats of Erapah and Tingalpa Creeks into any research program.

## 7 Management intent

### Strategies

Council intends to contribute to the long-term conservation of the city's significant soft-spined sunfish through the following.

- Adopting and encouraging innovative voluntary and statutory mechanisms that protect important habitats and movement corridors.
- Securing and long-term protection of important habitat for soft-spined sunfish.
- Ensuring appropriate ecological assessment, reporting and survey procedures are adopted in development, planning and management activities.
- Encouraging land management practices that avoid, or minimise, direct and indirect impacts on fish and their habitats on both public and private lands.
- Ensuring the timely availability of accurate, adequate and contemporary information for policy, planning and management decisions and actions.
- Facilitating research that targets priority information gaps and contributes positively to the conservation of Brisbane's fish and their habitats.
- Providing the Brisbane community with appropriate information and opportunities to contribute in a practical way to better understand and protect Brisbane's fish.



## 7 Management intent continued...

### Actions

Table 3 describes priority conservation actions that Council will pursue with its partners to address the stated strategies. These priority actions have been drawn from studies undertaken for Council by recognised fish experts and from consultation with a range of stakeholders. Actions will be undertaken as funds become available through Council's budgetary process. It should be recognised that Council must consider the timing of these actions against other priorities across the whole of the city.

**Table 3: Management actions**

Management aspect	Action	Timing	Lead agent & key stakeholders *
<b>Habitat protection</b>	Conserve and protect important soft-spined sunfish habitat on privately-owned land within Brisbane through Council acquisition of significant habitat (Bushland Acquisition program) and through conservation partnerships (Wildlife Conservation Partnerships program).	Ongoing	Council, private landowners
<b>Population protection</b>	Educate the community about the threat to the soft-spined sunfish population as a result of amateur and commercial fish collecting and introduction of invasive fish species into local creeks.	2010	Council, QPIF, community groups
	Investigate opportunities to enhance enforcement and policing under Council's local laws for the protection of aquatic fauna in council parks and reserves.	2010, ongoing	Council
	Work with QPIF to protect Brisbane's soft-spined sunfish population from amateur and commercial fish collecting by amending the species to a 'no take' species in the Fisheries Regulations (2008).	2010	Council, QPIF
	Investigate the potential for sponsoring a long-term captive breeding program for the Spring Creek and Ithaca Creek population to ensure the continued preservation of the fish specific to this area and to facilitate reintroduction in the event of habitat disturbance, disease or natural disaster eliminating the native population.	2012	Council, QPIF

\* Council: Brisbane City Council, QPIF: Queensland Primary Industries and Fisheries, DTMR: Department of Transport and Main Roads, RCC: Redland City Council.

# SOFT-SPINED SUNFISH

## 7 Management intent continued...

### Actions continued...

Table 3: Management actions continued...

Management aspect	Action	Timing	Lead agent & key stakeholders *
Habitat management	Expansion of potential habitat through restoration and habitat modification activities within Spring and Ithaca Creeks to allow new population establishment. Riparian enhancement at Spring Creek is particularly important in order to stabilise sedimentation due to nearby developments. Removal of excess leaf litter, supplementing in-stream woody material and revegetation of soft-spined sunfish habitat are medium priority habitat management actions.	Commence 2010	Council, Habitat Brisbane and catchment groups
	Develop comprehensive assessment criteria and habitat management guidelines for developments and other potentially harmful activities occurring adjacent to known soft-spined sunfish habitat. This may include but is not limited to species-specific guidelines for water quality, flow regimes, in-stream and riparian habitat protection.	Commence 2010	Council, universities
	Maintain habitat connectivity by ensuring linear infrastructure does not detrimentally impact on aquatic habitat connectivity in areas of soft-spined sunfish habitat through Council's Wildlife Movement Solutions program.	Ongoing	Council, DTMR
	Undertake water quality monitoring in known or likely soft-spined sunfish habitat areas. Aeration of sunfish habitat is a high priority. Restoring oxygen to the creek systems is vital and the improved conditions will be highly beneficial to all life forms within the creek.	Commencing 2010	Council, RCC, community groups
	Undertake regular monitoring of surrounding habitat quality. Early detection of disturbance may allow preventative activities to be undertaken.	Commencing 2010	Council, RCC, community groups
Invasive species management	Undertake comprehensive control/eradication of any identified harmful/potentially harmful invasive species of soft-spined sunfish habitat. Particular focus should be placed on mosquitofish, a known threat to sunfish. Barriers to the movement of mosquitofish should be assessed and the risk of the species spreading in Spring Creek an Ithaca Creek should be identified.	Ongoing	Council

## 7 Management intent continued...

### Actions continued...

Table 3: Management actions continued...

Management aspect	Action	Timing	Lead agent & key stakeholders *
Research	Seek collaborative partnerships to undertake surveys of the distribution and abundance of the soft-spined sunfish and develop associated baseline 'habitat requirement criteria' based on a detailed and specific analysis of water chemistry, flow regimes, in-stream and riparian habitat structure, abundance of prey, reproductive requirements and presence or absence of competitors/predators.	Commence 2010	Council
	Continue research into the genetic stability of soft-spined sunfish populations, particularly for the Ithaca Creek population.	Ongoing	Council
	Undertake research on potential threats to soft-spined sunfish populations on the mainland and Moreton Island, particularly the effects of invasive species.	Commence 2012	Council, universities
	Investigate opportunities to work with Redland City Council to contribute to a greater understanding of the habitat requirements of the soft-spined sunfish by including the known habitats of Eprapah and Tingalpa Creeks into research and monitoring programs.	Commence 2010	Council, RCC
Information management	Develop a central database for the collation of monitoring data.	Underway	Council
Community involvement	Trial community based water quality monitoring in Spring and Ithaca Creeks.	Commence 2010	Council, catchment groups

\* Council: Brisbane City Council, QPIF: Queensland Primary Industries and Fisheries, DTMR: Department of Transport and Main Roads, RCC: Redland City Council.

## 7 Management intent continued...

### Guidelines

The habitat protection and management guidelines detailed in Table 4 are provided to assist environmental planners, land owners, land managers, private industry and the broader community. These guidelines are preliminary and will be refined as more information about this species and its habitat requirements becomes available.

**Table 4:** Habitat protection and management guidelines

Issue	Guideline	Explanatory notes
Habitat disturbance	Protect and enhance known soft-spined sunfish habitats utilising the Biodiversity, Waterway, Wetland and Stormwater Management Codes, and the Ecological Assessment Guidelines and/or any species-specific assessment criteria.	The guidelines provided within the existing codes are generally acceptable for most species, but may require refinement to maintain viable populations of the soft-spined sunfish.
Habitat restoration or rehabilitation within the catchment or on the stream banks	Ensure stream banks are stabilised during any restoration activities. No large scale clearing of invasive weeds species along known soft-spined sunfish habitat if it will cause excess sedimentation runoff into the creek. Rehabilitate with appropriate native species.	It is possible that some invasive weed species are providing valuable stream bank stability, food source or habitat for the fish.
Water pollution	Protect and enhance known soft-spined sunfish habitats utilising the Biodiversity, Waterway, Wetland and Stormwater Management Codes, and the Ecological Assessment Guidelines in association with any species-specific assessment criteria.	The guidelines provided within the existing codes are generally acceptable for most species, but may require refinement to maintain viable populations of the soft-spined sunfish.
Alteration to natural flow regime	Protect and enhance known soft-spined sunfish habitats utilising the Biodiversity, Waterway, Wetland and Stormwater Management Codes, and the Ecological Assessment Guidelines in association with any species-specific assessment criteria.	The guidelines provided within the existing codes are generally acceptable for most species, but may require refinement to maintain viable populations of the soft-spined sunfish.
Displacement of local soft-spined sunfish populations due to localised invasions of invasive aquatic species.	Guidelines to be developed dependent on the results of the recommended research. This task should not be undertaken until the research provides guidance.	Certain exotic aquatic species may need to be locally eradicated to maintain soft-spined sunfish population viability at a given location. The need for any such action will be identified through research.

## 8 Further information

### Agencies

- Brisbane City Council, ([www.brisbane.qld.gov.au](http://www.brisbane.qld.gov.au))
- Bulimba Creek Catchment Coordinating Committee ([www.bulimbacreek.org.au](http://www.bulimbacreek.org.au))
- Queensland Primary Industries and Fisheries within the Department of Employment, Economic Development and Innovation ([www.dpi.qld.gov.au](http://www.dpi.qld.gov.au))
- Department of Environment, Water, Heritage and the Arts (Commonwealth) ([www.environment.gov.au](http://www.environment.gov.au))
- Queensland Department of Environment and Resource Management ([www.derm.qld.gov.au](http://www.derm.qld.gov.au))
- Queensland Museum ([www.qm.qld.gov.au](http://www.qm.qld.gov.au))

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