



**FLORA & FAUNA
GUARANTEE**

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing

(Potentially Threatening Process)

Date of receipt of the nomination: 27 March 2003
Date of preliminary recommendation: 2 September 2003
Date of final recommendation: 11 November 2003

File No.: FF/54/0264

Validity: The nomination is for a valid item

Prescribed Information: The prescribed information was provided.

Name of the Nominator is adequately provided.

Name and Description of the process;

In the opinion of the SAC the process is adequately defined and described.

The nominated item is defined as: the process by which natural aquatic habitats are drained, subject to altered water regimes, polluted, or reduced in size (leaving no wetland habitat, reduced/altered habitat or habitat remnants amidst an altered landscape) such that wetland habitats are reduced in extent and/or quality or entirely obliterated.

Degradation of wetlands can take the form of disturbing agents occurring at unnatural frequencies or levels. The modification of natural water regimes is a frequent degrading process in wetlands. Such modifications include drainage, the diversion of water away from wetlands and the stabilisation of natural fluctuations in water levels. Removal of, or damage to, aquatic, semi-aquatic and terrestrial fringing vegetation will result where the wetland is heavily grazed or pugged by stock or pest animals, where it is in close proximity to cultivated land or where fire occurs at unnaturally high frequencies. Deterioration in water quality can result from urban run-off, sewage or waste discharge, overgrazing, cropping, irrigation or deforestation within the catchment. Eutrophication results from increased nutrient inputs into the aquatic system and is a common degrading process in wetlands.

The most common threats to Victorian wetlands are:

- Dredging, draining and/or filling for conversion to agricultural, industrial or residential uses
- Population growth and urban development
- River regulation and water extraction for agriculture and industry
- Sand and gravel mining and mineral extraction activities
- Water pollution
- Nutrient enrichment
- Chemical treatments used for pest control (eg. mosquitoes)
- Over-grazing and unimpeded access for stock
- dammitg to raise water levels

These threats result in any number of the following:

- loss of wetland dependent flora and fauna
- loss and degradation of wetland habitat
- a reduction in size or period of inundation of remaining wetland habitat
- increased separation and isolation of remaining wetland habitat by intervening land use
- deterioration in water quality
- increased occurrence of algal blooms
- reduced supply of suitable water
- sedimentation
- reduced abundance and diversity of native plants and animals
- shifts in species dominance
- changed hydrologic regimes – eg. permanent inundation rather than a natural cycle of wet and dry periods
- an increased occurrence of pest animal and plant species
- disrupted waterbird breeding cycles eg. early cessation of breeding as a result of reduced flooding
- reduction in the frequency of breeding and migration cues for in-stream fauna
- increased salinity
- alteration of natural wetland temperature regimes
- alteration of natural water chemistry of wetlands eg. chemical poisoning

The wetland definition used in this nomination is based on that in CFL *et al.* (1988) viz.:

Wetlands are areas of marsh, fen, peatland or water whether natural, permanent, seasonal or cyclical, with water that is fresh, brackish or salt, including mudflats and saltflats.

Victorian wetlands have been classified into the following six main categories (Corrick & Norman 1980):

- Freshwater meadows (FM) - shallow freshwater wetlands holding water for less than four months of the year.
- Shallow freshwater marshes (SFM) - shallow freshwater wetlands that usually dry out in mid-summer and refill with the onset of winter rains.
- Deep freshwater marshes (DFM) - deep freshwater wetlands that remain flooded for most of the year but may dry out occasionally.
- Permanent open freshwater wetlands (POFW) - freshwater wetlands that hold water permanently.
- Semi-permanent saline wetlands (SPS) - saline wetlands flooded for less than eight months of the year, including salt pans and salt meadows.
- Permanent saline wetlands (PS) - saline wetlands that rarely dry out, including inland saline lakes.

Victoria's 16 525 wetlands occupy 629 366 hectares or two per cent of the State (1996 data) and are distributed unevenly across the landscape. Not surprisingly, the greatest concentrations of wetlands are in the lowland plains and in the Victorian Embayments marine bioregion. Wetlands are much less common in bioregions of higher relief, for example the Victorian Alps, and in the dunefields of the Victorian Mallee. The *Wetland Database* (DSE 2002) lists approximately 13 000 natural wetlands (over one hectare in size) for the state. In addition it lists approximately 3 600 human-made wetlands which form about 100 000 hectares of mainly permanent open freshwater wetlands, sewage ponds and salt works (see Table 1).

- The nominated process has an impact across all naturally occurring wetland types in Victoria.
- There is strong evidence that a number of flora and fauna species, and the communities they inhabit, are adversely affected by the nominated process.

The range of flora or fauna affected or potentially affected was adequately stated in the nomination.

Significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the Flora and Fauna Guarantee Act 1988, and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 2001.

Evidence that criteria are satisfied:

Criterion 5.1: *The potentially threatening process poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.*

Evidence:

Loss of wetland habitats through drainage and alteration of water regimes has occurred in all regions of Victoria, but to varying extents. Generally, the extent and severity of aquatic flora and fauna loss corresponds with the extent of overall wetland loss and degradation within an area. A large number of wetland species have been negatively affected by loss and degradation of wetlands across the state.

Sub-criterion 5.1.1 *The potentially threatening process poses or has the potential to pose a significant threat to the survival of two or more taxa.*

Evidence:

The survival of a range of wetland flora and fauna has been significantly compromised to the point where a number of taxa are facing possible extinction and many more are in decline, as a result of wetland habitat loss and degradation. At least 17 FFG-listed native aquatic plants and over 30 wetland-dependent animals are threatened by loss and degradation of wetland habitat in Victoria. In addition, these habitats are being further degraded by the invasion into wetlands of over 50 exotic weed species, and alteration of natural water, temperature and salinity regimes.

The following FFG-listed taxa are directly affected by the loss and degradation of wetland habitats:

Fauna

Waterbirds (eg. Brolga, Blue-billed Duck, egrets, bitterns)

Reptiles (Swamp Skink, Corangamite Water Skink, Alpine Bog Skink)

Amphibians (Growling Grass Frog, Giant Bull Frog)

Invertebrates (Western Swamp Cray, *Hemiphysalis damselfly*, *Hygrobia* water beetle, Western Bright-eyed Brown Butterfly)

Telicota eurychlora Southern Sedge-darter Butterfly

Flora

Orchids - *Corysanthes* sp. aff. *diemenica* Late Helmet-orchid, *Diuris palustris* Swamp Diuris, *Prasophyllum diversiflorum* Gorae Leek-orchid, *Prasophyllum niphopedium* Marsh Leek-orchid, *Prasophyllum* species (Nagambie) Swamp Leek-orchid.

Aquatics - *Brasenia schreberti* Water-shield, *Callitriche brachycarpa* Short Water-starwort, *Callitriche cyclocarpa* Western Water-starwort, *Lepilaena patentifolia* Spreading Water-mat, *Myriophyllum gracile* var. *lineare* Slender Water-milfoil, *Myriophyllum porcatum* Ridged Water-milfoil, *Myriophyllum striatum* Striped Water-milfoil, *Nymphoides spinulosperma* Marbled Marshwort

In addition, the following FFG-listed flora communities are likely to be affected by the nominated process: Herb-rich Plains Grassy Wetland (West Gippsland) Community, Red Gum Swamp Community No. 1 and Sedge-rich *Eucalyptus camphora* Swamp Community.

Additional Information

There has been a dramatic reduction in the number and area of natural wetlands since European settlement. Thirty-seven per cent of Victoria's wetland area has been lost, primarily as a result of drainage. The greatest losses of original wetland area have been in the freshwater meadow (90%), shallow freshwater marsh (56%) and deep freshwater marsh (70%) categories (Table 1). The majority of decline (90% of the wetland area) has been on private land. Of particular note is the original extent of the once immense Koo-wee-rup Swamp (to the north of Western Port), which has been almost totally drained and the high proportion of wetlands lost from south west Victoria and the Goulburn Valley.

	FM	SFM	DFM	Category POFW	SPS	PS	Total
Before settlement (a)							
Area (ha)	171 991	126 616	176 563	85 158	64 812	149 753	774 893
No.	7 031	5 482	2 351	534	1 173	171	16 742
Present day (b)							
Area (ha)	115 101	54 392	53 781	190 209	6 7876	148 007	629 366
No.	6 363	3 062	1 712	3 936	1 258	194	16 525
Change (a/b)							
Area (%)	67	43	30	23	105	99	81
No. (%)	90	56	73	737	107	113	99

Table 1: Changes in the number and area of all Victorian wetlands since European settlement.

(source: *Wetlands Database DSE 2002*)

Eighteen orchid species occurring in Victoria are totally reliant on wetland habitats (Backhouse *pers. comm.*). Four of these are already on the list of threatened taxa under the FFG Act as a result of wetland habitat alteration and loss (Table 2).

Taxon	Common name	Status	Comment
<i>Anzybas fordhamii</i>	Swamp Pelican-orchid	r	(previously called <i>Corybas fordhamii</i>)
<i>Burnettia cuneata</i>	Lizard Orchid	Rr	
<i>Corysanthes</i> sp. aff. <i>diemenica</i>	Late Helmet-orchid	e	Wilson's Promontory and Cape Schanck; previously called <i>Corybas</i> sp. aff. <i>dimenticus</i>
<i>Hydrorchis orbicularis</i>	Swamp Onion-orchid	v	previously called <i>Microtis orbicularis</i>
<i>Microtidium atratum</i>	Yellow Onion-orchid		was <i>Microtis atratus</i>
<i>Prasophyllum diversiflorum</i>	Gorae Leek-orchid	e	Has almost certainly declined due to wetland drainage/damage
<i>Prasophyllum</i> species (Nagambie)	Swamp Leek-orchid	e	
<i>Prasophyllum niphopedium</i>	Marsh Leek-orchid	e	
<i>Pterostylis falcata</i>	Large Sickle Greenhood		
<i>Pterostylis</i> sp. aff. <i>furcata</i>	Small Sickle Greenhood	k	
<i>Pterostylis oreophila</i>	Blue-tongue Greenhood	e	
<i>Pterostylis tenuissima</i>	Swamp Greenhood	Vv	Has declined due to wetland drainage and damage to/removal of Woolly Tea-tree stands
<i>Pterostylis uliginosa</i>	Marsh Greenhood	k	
<i>Spiranthes australis</i>	Austral ladies Tresses	-	Has almost certainly declined due to wetland drainage
<i>Thelymitra cyanea</i>	Veined Sun-orchid	-	
<i>Thelymitra erosa</i>	Swamp Sun-orchid	e	
<i>Thelymitra</i> sp. aff. <i>erosa</i>	Alpine Sun-orchid	v	montane/alpine sphagnum swamps
<i>Thelymitra</i> sp. aff. <i>holmesii</i>	Glistening Sun-orchid	k	

Table 2: Orchids relying solely on wetland habitats and their status

(source: *SAC Database, Backhouse pers. comm.*, codes as per DSE 2003b)

- Of the over 200 recognised aquatic flora species recorded from Victorian wetlands (DSE 2003b), 6.5% (13 species) are listed under the **Flora and Fauna Guarantee Act** and almost a third (29% or 58 taxa) have a conservation classification.
- More than 100 species of waterbirds use Victorian wetlands (DSE 2002). Wetlands are also important breeding areas for these species. Some colonially nesting species, such as terns, ibis, pelicans, spoonbills, egrets and cormorants, form breeding colonies when conditions are right. Seventeen waterbird/waderbird species are listed under the FFG Act (Table 3).

Colonially breeding waterbirds	IUCN/DSE 2003	Other threatened waterbirds	IUCN/DSE 2003
#Australian Pelican	-	<u>Blue-billed Duck</u>	e
#Darter	-	Musk Duck	v
#Pied Cormorant	lr	<u>Freckled Duck</u>	e
#@Cattle Egret	-	Australasian Shoveller	v
#@Great Egret	v	Cape Barren Goose	nt
#Little Egret	e	<u>Magpie Goose</u>	v
#Intermediate Egret	ce	Cape Gannet	e
#Nankeen Night Heron	nt	<u>Little Bittern</u>	e
#@Glossy Ibis	nt	<u>Australasian Bittern</u>	e
#Royal Spoonbill	v	<u>Black Bittern</u>	v
#Whiskered Tern	nt	<u>Lewin's Rail</u>	e
#Gull-billed Tern	e	<u>Baillon's Crake</u>	v
#@Caspian Tern	nt	@Latham's Snipe	nt
@Little Tern	v	<u>Painted Snipe</u>	ce
Fairy Tern	e	Banded Stilt	ce
#@Crested Tern	lr	<u>Brolga</u>	v
#Kelp Gull	ce	@White-bellied Sea-Eagle	v
#Pacific Gull	lr	<u>Hardhead</u>	v
		Azure Kingfisher	nt

Table 3: Some Victorian threatened wetland-dependent water and waderbird species

- restricted colonially breeding species

@ - Listed under international agreements (CAMBA, JAMBA)

Species underlined are listed under the **Flora and Fauna Guarantee Act 1988**.

IUCN/DSE 2003 - conservation status from DSE 2003a.

- There is a large literature related to the loss of wetland habitats and its affect on native biota (see references).

Advertisement for public comment

In accordance with the requirements of Section 14 of the **Flora and Fauna Guarantee Act 1988**, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:

'The Age' - on 1 October 2003

'The Weekly Times' - on 1 October 2003

The *Government Gazette* - on 2 October 2003

Submissions closed on 6 November 2003.

Further evidence provided:

Four submissions were received but no evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the potentially threatening process is eligible for listing.

Documentation

The published information provided to the SAC has been assessed. Based on the available evidence, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Final Recommendation of the Scientific Advisory Committee

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because primary criterion 5.1 has been satisfied. The SAC also concludes that sub-criterion 5.1.1 has been satisfied and that no evidence exists to suggest that primary criterion 5.1 cannot be satisfied as a consequence of sub-criterion 5.1.1 being satisfied.

The Scientific Advisory Committee recommends that the nominated item be supported for listing on Schedule 3 of the **Flora and Fauna Guarantee Act 1988**.

Selected references:

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- DCE & OE (1992) *An assessment of Victoria's wetlands*. Department of Conservation and Environment/Office of the Environment: Melbourne.
- DSE (2002) *Wetlands Database* (electronic wetland and waterbird database). Biodiversity and Natural Resources Section, Department of Sustainability and Environment: Melbourne.
- (2003a) *Advisory List of Threatened Vertebrate Fauna in Victoria - 2003*. Available from the Department of Sustainability and Environment web site: Melbourne. Check the 'Plants & animals' area at <http://www.dse.vic.gov.au>
- (2003b) *Flora Information System* (electronic flora database). Biodiversity and Natural Resources Section, Department of Sustainability and Environment: Melbourne.
- Environment Australia (2001) *A Directory of Important Wetlands in Australia*. 3rd edition. Chapt. 11: Victoria. Environment Australia: Canberra. (see <http://www.ca.gov.au/water/wetlands/database/index.html>)
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- SAC (1994) Final Recommendation on a nomination for listing: Great Egret *Ardea alba* (Nomination no. 314). Scientific Advisory Committee, Flora and Fauna Guarantee. Department of Conservation and Natural Resources: Melbourne.
- (1996) Final Recommendation on a nomination for listing: Intermediate Egret *Ardea intermedia* (Nomination no. 384). Scientific Advisory Committee, Flora and Fauna Guarantee. Department of Conservation and Natural Resources: Melbourne.
- SAC Database (2002) *Scientific Advisory Committee - Listing Database* (electronic database). Flora and Fauna Guarantee. Biodiversity and Natural Resources, Department of Sustainability and Environment: East Melbourne.

Other relevant wetland references

- Adam, P. (1992) Wetlands and wetland boundaries: Problems, expectations, perceptions and reality. *Wetlands* 11(2): 60-67.
- Aston, H. I. (1977) *Aquatic Plants of Australia*. A guide to the identification of the aquatic ferns and flowering plants of Australia, both native and naturalised. Melbourne University Press: Melbourne.
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- Brock, M. A., Smith, R.G.B. & Jarman, P.J. (1999) Drain it, dam it: alteration of water regime in shallow wetlands on the New England Tableland of NSW. *Wetlands Ecology and Management* 7: 37-46.
- Casanova, M.T. & Brock, M.A. (2000) How do depth, duration and frequency of flooding influence the establishment of wetland plant communities? *Plant Ecology* 147: 237 - 250.
- Crome, F. H. J. (1988) To drain or not to drain? Intermittent swamp drainage and water bird breeding. *Emu* 88: 243-248.
- Davis, J. A. & Froend, R. H. (1999) Loss and degradation of wetlands in southwestern Australia: underlying causes, consequences and solutions. *Wetlands. Ecology and Management* 7: 13-23.
- CFL (1988) *Wetlands Conservation Program for Victoria*. Department of Conservation Forests and Lands, Water Victoria and Ministry for Planning and Environment, Melbourne.
- Froend, R. H., Farrell, R. C. C., Wilkins, C. F., Wilson, C. C. & McComb, A. J. (1993) *Wetlands of the Swan Coastal Plain, Vol 4: The effect of altered water regimes on wetland plants*. Water Authority of Western Australia and the Environmental Protection Authority.
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- Kingsford, R. (2000) Ecological impacts of dams, water diversions and river management on floodplain wetlands in Australia. *Australian Journal of Ecology* 25: 109-127.
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- NRE (1996) *Manual of Wetlands Management. Wetlands Conservation Report Series, No. 4*. Wetlands Unit, Department of Conservation and Natural Resources: Melbourne.
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- Pressey, R. L. (1986a) Wetlands and catchment management. In: Total Catchment Management Special Edition (ed. K. Mullen). *Journal of Soil Conservation NSW*. 42(1): 36-41.
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- Riding, T. & Carter, R. (1992) *The importance of the riparian zone in water resource management. A literature review*. Department of Water Resources, Sydney.
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- (1994) *Waterplants in Australia*. 3rd edition. Sainty and Associates, Darlinghurst: New South Wales.
- Stone, A. (1991) Economic evaluation of wetlands: literature review and case study. *Wetlands Conservation Report Series No. 1*. Department of Conservation and Natural Resources: Melbourne.

Selected wetland websites: (current to Sept. 2003)

- Directory of Important Wetlands in Australia (site search)* - <http://www.ca.gov.au/cgi-bin/wetlands/search.pl>
- Endangered aquatic flora (Tasmania) - <http://www.dpiwe.tas.gov.au/inter.nsf/ThemeNodes/RPIO-4YCAE8?open>
- Environmental water requirements to maintain wetlands of national and international importance - <http://www.ea.gov.au/water/rivers/nrhp/wetlands/chapter1.html>
- Murray-Darling Basin Commission* - <http://www.mdbc.gov.au/>
- Ramsar Convention on Wetlands* - <http://www.ramsar.org/>
- State of the Environment Report 2001 (Inland Waters)* - <http://ea.gov.au/soe/2001/inland/conclusion-3.html>
- Wetland Care Australia* - <http://www.wetlandcare.com.au/wetlandLinks.asp>
- Wetland links (education etc, US) - <http://www.rice.edu/wetlands/links.html>
- Wetlands International (Wetland Inventory)* - <http://www.wetlands.org/inventory&/growi.html>
- Wetlands and lakes (links) - <http://www.nre.vic.gov.au/web/root/domino/gateway/envgate.nsf/viewforms/WetlandsLakes>

Selected waterbird conservation websites: (current to Sept. 2003)

- Action Plan for Australian Birds (2000)* - <http://www.ea.gov.au/biodiversity/threatened/action/birds2000/index.html>
- Asia-Pacific Migratory Waterbird Strategy - <http://www.wetlands.org/IWC/awc/waterbirdstrategy/>
- Australian Wader Studies Group* - <http://www.tasweb.com.au/awsg/index.htm>
- CAMBA (China-Australia Migratory Bird Agreement) - <http://www.austlii.edu.au/au/other/dfat/treaties/1988/22.html>
- Conserving migratory waterbirds (WA) - http://www.calm.wa.gov.au/national_parks/wetlands/cons_mig_waterbirds.html
- Convention on Migratory Species (CMS) - <http://www.wcmc.org.uk/cms/>
- JAMBA (Japan-Australia Migratory Bird Agreement) - <http://www.austlii.edu.au/au/other/dfat/treaties/1981/6.html>
- Migratory Waterbirds site (Environment Australia) - <http://www.ea.gov.au/water/wetlands/mwp/index.html>
- Non-government organisations involved in waterbird conservation (Aust.) - <http://ea.gov.au/water/wetlands/contacts/ngos2.html>
- Wetlands & migratory waterbirds site (*Environment Australia*) - <http://www.ea.gov.au/water/wetlands/>

Endorsement by the Convenor of the Scientific Advisory Committee

Date

11/11/03



Dr Michael Clarke
Convenor