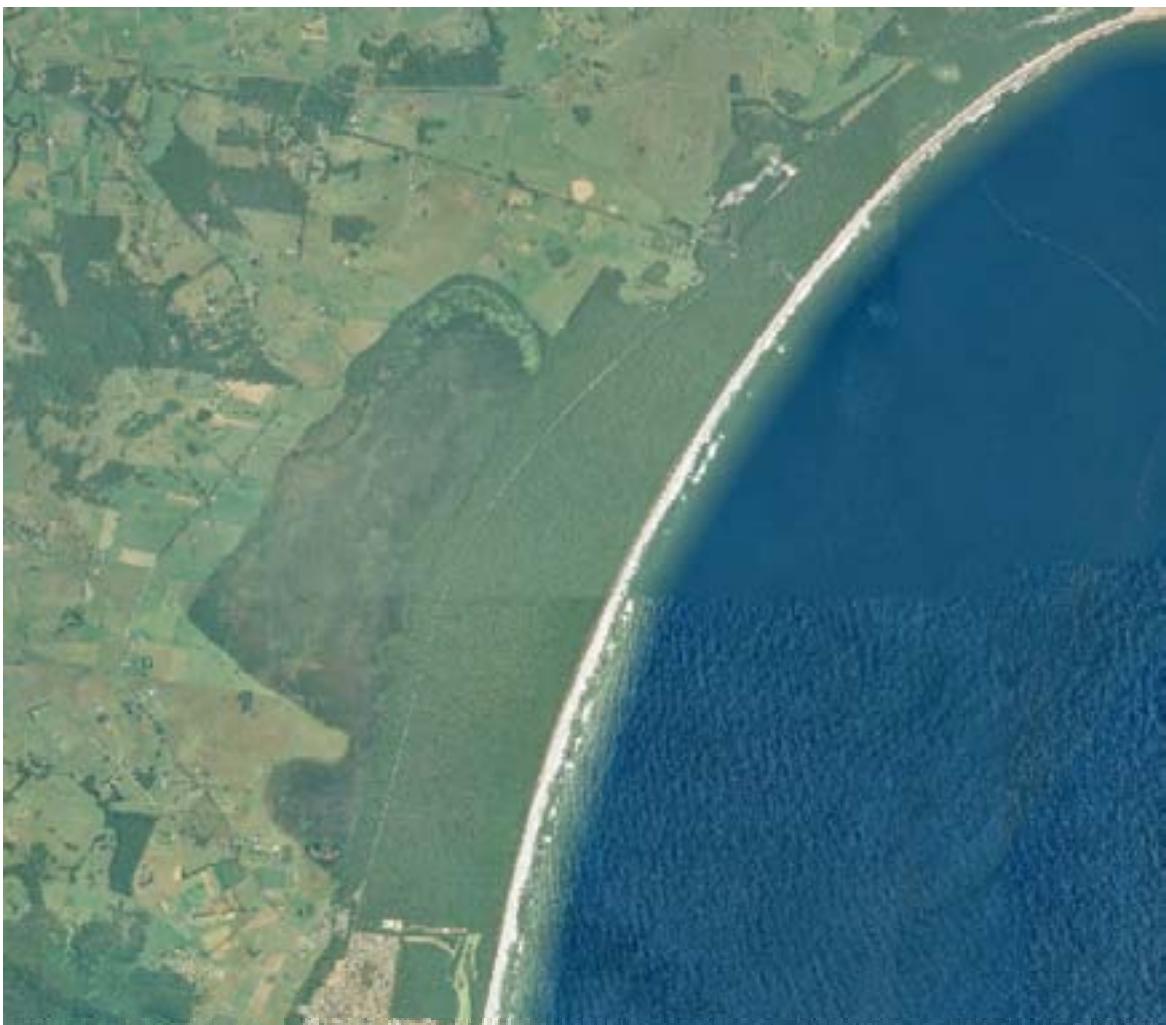


Management Plan

The Green and Golden Bell Frog Key Population at Coomonderry Swamp



May 2007

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1. BACKGROUND

1.1 Introduction

The Green and Golden Bell Frog (*Litoria aurea*) is a relatively large, muscular species. Adult sizes range from approximately 45 mm to 100 mm with most individuals being in the 60-80 mm class (Figure 1). The colouration of the back is quite variable, being a vivid pea green splotched with almost metallic brass brown or gold. The backs of some individuals may be almost entirely green whilst in others the golden brown markings may almost cover the whole dorsal surface (DEC 2005).

The Green and Golden Bell Frog was formerly distributed from the NSW north coast near Brunswick Heads southwards along the NSW coast to Victoria, where it extended into East Gippsland, and west to Bathurst, Tumut and the Australian Capital Territory (DEC 2005). In the 1960s, the species was considered widespread, abundant and commonly encountered (Mahony, 1996; Osborne *et al.*, 1996). Today, the species exists as a series of isolated populations within its former range (White and Pyke 2005).

The Green and Golden Bell Frog (GGBF) is listed as an endangered species under Schedule 1 of the NSW *Threatened Species Conservation Act 1995* (TSC Act). At the national level, the species is listed as Vulnerable under Schedule 1 Part 2 of the *Environment Protection and Biodiversity Conservation Act 1999*.

As a consequence of being listed under both state and national legislation a draft recovery plan has been prepared for the GGBF (Department of Environment and Conservation 2005). The present plan of management has been prepared to satisfy Action 11.3.4 of the draft GGBF Recovery Plan developed in accordance with the TSC Act. Action 11.3.4 calls for the NSW Department of Environment and Climate Change (DECC) to prepare and implement a GGBF Management Plan for each key population on its own land and liaise with other landowners as necessary (e.g. local councils, industry, residents) to prepare and implement site specific Management Plans across the extent of the species' distribution in NSW.

Where GGBF occur on public land, local councils are, under the Local Government Act, required to refer to the recovery plan for this species in any management plans. It is therefore envisaged that this Management Plan will satisfy this requirement of Shoalhaven City Council with respect to the Coomonderry Swamp population, which occurs on private and public land. The Shoalhaven local government area has been identified in the draft GGBF Recovery Plan (DEC 2005) as supporting eight of the 42 Key Populations. This Management Plan is also intended to provide guidance, direction and coordination for other stakeholders, land owner/managers within this area where the frog and/or its habitat occurs.

The Southern Rivers Catchment Management Authority (CMA) has developed a Catchment Action Plan (CAP) that identifies a number of targets for managing natural resources. Biodiversity Catchment Target number 2 within the CAP is supported by the actions undertaken and proposed within this Management Plan.



Figure 1: Female Green and Golden Bell Frog – Shoalhaven Heads © Garry Daly

1.2 Objectives of the Management Plan (MP)

The Coomonderry Swamp Management Plan covers GGBF occurring within the catchment of Coomonderry Swamp and associated drainage canal, Foy's Swamp, and adjacent freehold land (Fig 2.). This Management Plan has been prepared with the aim of ensuring that the population is managed and monitored such that the species continues to persist at the location and that measures of the population's viability are maintained or improved over time.

The objectives of this plan are to:

1. Identify and, where possible, ameliorate threats and other factors affecting, or likely to impact on, the conservation of the species within the Coomonderry Swamp study area.
2. Manage the species in accordance with the strategies outlined within the draft GGBF Recovery Plan (DEC 2005).
3. Conduct assessments of habitat at sites where the frog has been detected in recent times.
4. Facilitate community consultation, including workshops and information days.
5. Co-ordinate habitat protection, restoration and enhancement measures.
6. Collate recent records of the species within the area covered in this management plan.

Appendix A details five strategies that aim to achieve the above objectives, including detailed actions assigned to each strategy, potential funding sources, and the agencies responsible for implementing each action.

2. THE COOMONDERRY SWAMP POPULATION

2.1. Location and Land Ownership

Coomonderry Swamp ($34^{\circ}48' S$, $150^{\circ}44' E$) is a 670 ha wetland 15 km north east of Nowra on the New South Wales south coast. It is a wetland of national importance (ANCA 1996) being the largest semi-permanent freshwater swamp on the New South Wales coast (Figure 2) and represents 34 percent of this type of wetland in the State (Goodrick 1970). It is fed largely by ground water (Mitchell McCotter 1992). The swamp is a gazetted wetland (No. 370) under State Environmental Planning Policy (SEPP) No. 14 and 169 hectares of it (25 per cent) lie within Seven Mile Beach National Park (Mitchell McCotter 1992). This is one of the few national parks where GGBFs are known to occur. The Illawarra Regional Landscape and Environment Study (Department of Environment and Planning 1981) categorises the wetland as IIc-Priority Protection requiring protection against polluting land uses.

Previously, the GGBF was found on publicly owned land within this area, managed by either Shoalhaven City Council (SCC - including Shoalhaven Water) or the Department of Environment and Climate Change (DECC) (Murphy 1995). The frog was also found on privately owned land, including several farms adjoining the western portion of the wetland (Daly 1995). In addition, it was known to occur further north at Foy's Swamp in the 1990s (G. Leonard pers. comm.) and at a farm dam beside Beach Road in the 1980s (B. Virtue pers. comm.). However, no GGBF have been detected in these latter areas within the last decade.

The fact that part of Coomonderry Swamp is a National Park is significant. In New South Wales, GGBF are only known from twelve areas within the reservation system: Ben Boyd NR, Brundee Swamp NR (Gaia Research 2006), Murramarang NP, Koragang, Homebush, Kurnell, Yuraygir NP (Clancy 1995), Meroo NP (Daly in press), Nadgee Nature Reserve (Daly and Senior 2000), Hat Head NP, Myall Lakes NP, and Seven Mile Beach NP. GGBF were known from Booderee NP (including Bowen Island) during the mid 1990s, but no animals have been detected on the mainland within the last four years.

2.2 Habitat

Coomonderry Swamp is significant for GGBF because it is the most extensive wetland in which the frog has yet been discovered in New South Wales. During the 1990s the frog was known from both the eastern and western sides of the wetland. On the eastern edge the species occurred in Swamp Mahogany (*Eucalyptus robusta*) and Blackbutt-Bangalay (*E. pilularis-E. botryoides*) forest (Murphy 1994), on the western edge, in areas with Cumbungi-Spikerush (*Typha spp-Eleocharis spp*), and in farm dams containing Kikuyu (*Pennisetum clandestinum*) and Water Primrose (*Ludwigia peploides*).

GGBF are known to utilise a number of different habitats for:

- (a) Breeding: permanent water bodies or more ephemeral breeding habitat, often human constructions;
- (b) Foraging: usually areas of native or introduced grasses, tussock vegetation and emergent sedges and reeds bordering water features;
- (c) Shelter: either similar vegetation to that used for feeding or rock piles, ground timber, tussock forming vegetation or other features such as crevices or ground debris;
- (d) Movement: wet areas such as creek lines, drains, periodically damp areas; and
- (e) Over wintering: either similar to shelter habitat or overgrown or dense moist vegetation in residential gardens.

All components of habitat utilised by GGBF's need protection to cater for the species' overall requirements of dispersal and foraging. Most observations of GGBF are from breeding and shelter sites. The locations of these sites are presented in Figure 2.

2.3 Species status

Coomonderry Swamp has continued to maintain a population of GGBF during the 1990s (Daly 1995a; Murphy 1994, 1995; Ehmann 1997). During that time, a maximum of 21 adult frogs were observed at two ponds on the western side of the wetland. In addition, 16 frogs were detected on the eastern side of the wetland during 40 site visits between December 1993 and March 1995 (Murphy 1995). Surveys conducted in 1996 detected groups of males calling from on freehold land (Agars Lane) on the western side of the wetland (Daly unpub. data). However, the current status of the population is not known. Interviews conducted in February 2007 with four residents on the western side of the wetland indicated that no one has seen GGBF in the area during recent years. Surveys conducted on the eastern edge of the swamp by DECC staff in 2004 have also failed to detect any GGBF (P. Craven pers. comm.). Further surveys will be required to assess the current status of the Coomonderry Swamp GGBF population.

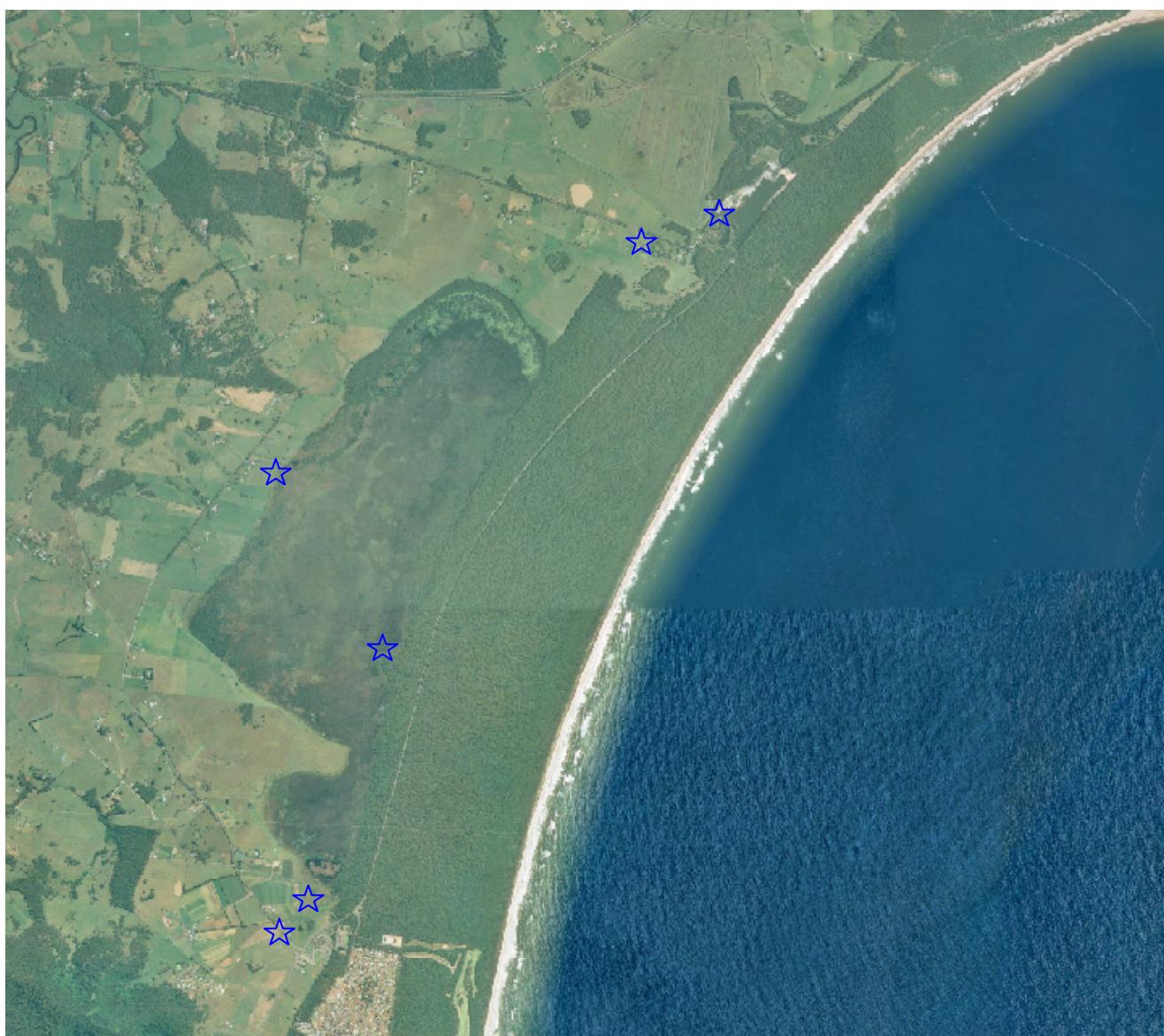


Figure 2. Sites covered within the Coomonderry Swamp plan of management. Stars represent sites where the GGBF has been detected since 1995, all covered in this plan.

3. THREAT ASSESSMENT

A publication from 1996 identified several issues and threats to GGBF in the Coomonderry area at that time (Daly 1996). These issues still pose threats to the population today and are as follows:

1. Loss of habitat. The GGBFs occupy and utilise a wide variety of habitat types within the areas identified above. There is continuing pressure to further develop and modify agricultural areas that provide much of these habitats and their connectivity. Loss of habitat can also be as a result of weed invasion, particularly Bitou Bush *Chrysanthemoides monilifera rotundata* (Listed as a Key Threatening Process under the TSC Act 1995).
2. Introduced predators that include Goldfish (*Carassius auratus*) and Plague Minnow – (*Gambusia holbrooki*) (Listed as a Key Threatening Process under the TSC Act 1995). Plague Minnow are present in Coomonderry Swamp and several of the dams and drainage lines within the western catchment. It is not known what impact this predator has had on eggs and small tadpoles of GGBF. Breeding behaviour and spawn have only been observed on the western side of Coomonderry Swamp, in two farm dams, which were fish free (Daly 1995). Frogs were not present in a nearby dam, which contained Plague Minnow. The fish-free water bodies around Coomonderry Swamp may be critical for the successful breeding of the frog in the area. There is no information on the status of Goldfish in the wetland.
3. Feral and Domestic Cats – (*Felis catus*) and Red Fox (*Vulpes vulpes*). The latter is listed as a Key Threatening Process under the TSC Act 1995.
4. Road mortality caused by collision with moving vehicles. A gravid female was found dead on Gerroa Road, near the drainage canal in 1994 (Daly 1995).
5. Sand mining has occurred to the north of Coomonderry Swamp, adjacent to Foy's Swamp. This process has required the removal of native forest. A large shallow dam exists where the sand was mined, but this waterbody contains Plague Minnow and is likely to be not suitable for GGBF (G. Leonard pers. comm.).

Since 1996 (see above), the following additional threats to the Coomonderry population have been identified:

6. Disease. Frog Chytrid *Batrachochytrium dendrobatidis* - is listed as a Key Threatening Process under the TSC Act and EPBC Act. This disease is possibly the single biggest threat to the species (as well as to many other species of frogs). When handling frogs or entering frog habitat, the hygiene protocol for the control of disease in frogs (Wellington and Haering 2001) has to be followed at all times.
7. Predation of GGBF from native predators is also considered a threat to the species because the population has declined to such an extent that it is not robust. Native predators include Eels *Anguilla* spp. Red-bellied Black Snake *Pseudechis porphyriacus*, Eastern Tiger Snake *Notechis scutatus* and White Ibis *Threskiornis molucca*, among other water bird species..
8. Water quality. Runoff including sediments and chemicals from urban and agricultural areas may pollute GGBF habitat such as wetlands and drainage areas. The application of chemicals (Glyphosate) for weed control may also impact on the species.
9. Anthropogenic climate change (Listed as a Key Threatening Process). Rises in sea level and changes in rainfall patterns may impact on breeding sites of the GGBF. All of the breeding sites of GGBF covered in this plan are less than two metres above sea level. During January 2007, one dam where GGBF had previously been detected breeding was dry. Drought inhibits breeding in ephemeral waterbodies. The long term reduction of rainfall may also reduce recruitment and lead to population decline or collapse at some sites. Saline inundation of wetlands caused by rises in sea level could threaten GGBF.
10. Other management actions that may negatively impact on GGBF and their habitat include

mowing or other vegetation management, the opening, closing or emptying of water bodies, and too frequent or high intensity fire (Listed as a Key Threatening Process under the TSC Act 1995).

4. MANAGEMENT ACTIONS

Appendix A lists several Management Actions, which aim to (a) maintain the existing GGBF population; (b) increase the population; and (c) improve habitat for GGBF in the Coomonderry Swamp area. These actions arise from discussions at a recent stakeholder meeting (see 4.1. below) and are also based on a publication from 1995, which lists several desirable conservation measures (Daly 1995). They can be assigned to the following categories:

1. Community consultation and education - to build awareness of the GGBF;
2. Habitat management;
3. Threat management; and
4. Monitoring and research.

The management actions proposed in Appendix A build upon a range of past and current actions to manage the species. Previous actions to manage the species are listed below.

4.1 Community consultations

A stakeholder workshop was facilitated by consultants Gaia Research Pty Ltd to identify the various issues threatening the population and the possible management actions as a basis for preparing this Management Plan. The workshop was held on 5 March 2007 with representation from local residents, Shoalhaven City Council, Shoalhaven Water, State Forests and DEC. A draft of this plan was distributed to these stakeholders for comment. Further comments are welcome and should be submitted to DECC, Metro (details on inside cover).

In 2007, five landowners on the western edge of Coomonderry Swamp were contacted during a survey of suitable habitat. Two were locations where the frogs had been detected during 1994 (Daly 1995). No GGBF were detected during the 2007 diurnal inspections, and none of the residents could recall having seen the frogs in the area. Future surveys will need to intensify the search for GGBF on private land.

A radio interview on the local ABC radio with G. Daly focused on the plight of the GGBF and was broadcasted from Wollongong south to the New South Wales/Victorian border and west to Bombala, on 14 March 2007. This resulted in several listeners reporting information about GGBF in their area. Although the follow up of reported sightings in the Coomonderry Swamp area did not reveal any new records it shows that the media can be used to further increase the awareness of GGBF in the area and to detect previously undetected sites where the species occurs.

4.2 Construction of additional breeding habitat

A number of dams have been constructed on the western edge of Coomonderry Swamp within the last fifteen years. Two dams were found to be utilised by GGBF for breeding in February 1994 (referred to by Daly (1995) as dam C and D). Dam D is located approximately one kilometre from Coomonderry Swamp, and Dam C approximately 200 metres from the wetland. In February 2007, Dam C was dry and no frogs were present. Dam D had been deepened during 2002 and was no longer ephemeral. Future inspections will reveal whether GGBF still use this area. At least three additional dams have been constructed on farms since 1994, and at least two of these new dams did not contain Plague Minnow in February 2007. Future surveys will need to confirm whether GGBF use this newly created habitat.

Shoalhaven Water manages sewerage facility to the south-east of Coomonderry Swamp. There is a possibility of providing additional breeding habitat within this facility. Also, the treated water could contain antifungal chemicals that reduce or treat Chytrid infection.

4.3 Habitat restoration

A number of bush regeneration programs have been undertaken in order to restore the native vegetation adjacent to Coomonderry Swamp. Shoalhaven City Council has spent a total of five days spraying weed (both lantana and blackberry) on freehold land on the western side of the wetland. In addition, \$10,000 is currently being spent on revegetation and weed control around the Shoalhaven Heads sewerage treatment works (G. Thompson - SCC, pers. comm.). The National Parks and Wildlife Service in conjunction with Conservation Volunteers Australia has undertaken works to control lantana and other weeds in the buffer zone habitats of the wetland. A weed control program has been written for Seven Mile Beach NP (BES 2002) and is currently being implemented (V. Corrigan, pers. comm.).

4.4 Habitat acquisition and conservation

Much of Coomonderry Swamp is privately owned freehold land. A number of mechanisms are available that could be used to secure the conservation management of the swamp. These include:

- Voluntary Conservation Agreements
- Property Management Plans
- CMA incentive programs
- Biobanking

Opportunities to apply these mechanisms should be actively pursued. Once an agreement is in place the landholder can apply to have the portion of land covered by the agreement exempt from rates.

The continuous protection of land used by GGBF could be achieved if land owners entered into a Voluntary Conservation Agreement or a Property Vegetation Plan for areas of wetland or bushland that can not be developed or used for agricultural activities. The incentive for land owners would be a reduction in rates on land that can not be used for agriculture. DECC could be proactive in this area through education and community consultation.

Shoalhaven City Council could also acquire portions of the wetland as a condition of consent for subdivisions within the catchment. This could be a component of bio-certification offset within local structure plans.

Note: A VCA is an agreement between landowners and the NSW Minister for the Environment. The agreement is voluntary, in perpetuity, legally binding and registered on the land title. It protects significant natural and cultural values identified in a specific conservation area and can include land privately owned or leased from the Crown. It includes strategies for the on-going management of the identified conservation values as well as a monitoring protocol. Once a landholder has a VCA registered, he or she can apply to have the affected portion of the land exempt from rates.

PVP – A Property Vegetation Plan is a voluntary but legally binding agreement between a landholder and the local Catchment Management Authority. It is often used when seeking to utilise offsets associated with clearing, when approval under the Native Vegetation Act 2003 is required.

4.5 Fox baiting

Fox baiting is conducted by Shoalhaven City Council on freehold land around the wetland and by the National Parks and Wildlife Service. The program was initiated in 2004 at one site on the northern edge of the swamp. Since then the program has expanded. The number of fox baits taken has decreased from 14 in March 2006 to none since September 2006, indicating that the number of foxes has likely decreased. Currently, fox baiting occurs four times a year at eight stations (for 1 month each time). Shoalhaven City Council also supports shooters which further decrease fox numbers. On-going fox control will be necessary to control fox numbers. There is scope for the gut content of such shot foxes to be examined to ascertain if they contain GGBF remains.

4.6. Monitoring and research

There have been no systematic surveys for GGBF conducted at Coomonderry Swamp. The wetland is of sufficient size to place a number of standard 30 minute/250 m transects around the perimeter (Daly and Craven in press). The use of standard systematic sampling is recommended so that comparisons of population size can be made between key populations (Gaia Research 2007) and at sites over time. Targeted searches can also be conducted around specific dams that are historic breeding sites. Searches must be conducted when weather conditions are appropriate during the activity or breeding season, and after rainfall events, to enhance detection. This action should be given highest priority given that no GGBF have been detected at this site for about a decade.

Chytrid fungus *Batrachochytrium dendrobatidis* is a key threatening process to amphibians within many countries, including Australia (Berger *et al.* 1998, Hyatt *et al.* 2007). The disease has been implicated in amphibian deaths, species or population declines and extinction in some species of Australian frog. The disease is widespread in many different environments and is implicated in the decline and local extinction of the GGBF. There is a need to sample GGBF (and /or other species of frog) at Coomonderry Swamp for the presence of chytrid.

5. DURATION

The duration of this plan will be three years, i.e. start June 2007 and to end May 2010.

REVIEW

A meeting of stakeholders will be organised to occur following the activity period each season where results and trends will be discussed and recommendations for adding to and modifying management actions in the plan made.

A review of the plan is required after 2.5 years as a basis for its next iteration after three years, should further funding be available. Informal review of the plan is also encouraged both within organisations and through networks and partnerships. All recommendations to improve the plan should be directed to the DECC contact below.

FROG HYGIENE PROTOCOL

Individuals studying or surveying frogs often travel and collect samples of frogs from multiple sites and, when not implementing the hygiene protocol, may be a cause for the spread of the chytrid disease. Green and Golden Bell Frogs can be particularly sensitive to the introduction of infectious pathogens, such as the frog chytrid fungus. Therefore, it is important that frog workers recognise the boundaries between sites and undertake measures that reduce the likelihood of spreading infection. The detailed procedures and measures are provided in the Hygiene protocol for the control of disease in frogs (Wellington and Haering 2001), that can be obtained from the Department of Environment and Climate Change, or downloaded from: <http://www.nationalparks.nsw.gov.au/pdfs/hyprfrog.pdf>

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Kelly Rowley – Forests New South Wales;

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Appendix A. Implementation plan

Strategy 1: Education and communications to build awareness of the GGBFs and encourage further on-ground actions

Action	Recovery plan links	Responsibility	Cost	Funding source	Timeframe
1.1 Liaise with Shoalhaven Water to provide breeding habitat for GGBF within Shoalhaven Heads STP	Actions 10.3.1, 14.3.2	DECC, Consultants, Shoalhaven Water	In-kind to industries	Shoalhaven Water DECC	2007-08
1.2 Prepare, distribute and report on a community survey seeking GGBF observations - redistribute "Have you seen any bell frogs brochure"	Actions 12.3.1, 14.3.2	Consultants, Shoalhaven City Council Environment groups	\$2,000 (advertising, printing). Environment groups distribute/collect and collate	DECC/ Shoalhaven City Council	2007-08
1.3 Liaise with Illawarra Department of Education & Training (DET) to develop and implement GGBF education programs in local schools	Action 14.3.2	DECC Illawarra DET	In-kind DET; educational consultants \$1,500	Environmental Trust	2007-08
1.4 Develop web based information about local GGBF populations and frog-friendly activities and promote community participation in this management plan	Action 14.3.1	DECC, Consultants, Other stakeholders	as required		2008-10
1.5 Liaise with local media (print, radio, TV) to encourage them to report on GGBFs and the implementation of management actions in this plan	Action 14.3.1	DECC Other stakeholders	In-kind by DECC (e.g. media releases)		2007-10
1.6 Use or stage local community events to highlight GGBFs and encourage frog-friendly actions	Action 14.3.2	Shoalhaven City Council DECC	\$3,000 (production of static display for events)	SCC and Local sponsors	2007-2010
1.7 Develop and maintain a network of stakeholders and partners including through a stakeholder list. Consider the formation of a local GGBF group.	Action 14.3.1	DECC, Gaia Research, other consultants	In-kind by DECC and Gaia Research		2007 -2010
1.8 Raise community awareness through field demonstration days, information brochures and other community education programs	Action 14.3.2	Shoalhaven City Council DECC, Consultants	\$1,000	DECC/ Shoalhaven City Council	2008

IMPLEMENTATION PLAN (continued)

Strategy 2: Further development of GGBF breeding habitat on public and private lands

ACTION	RECOVERY PLAN LINKS	RESPONSIBILITY	COST	FUNDING SOURCES	TIMEFRAME
2.1 Create breeding habitat at filtration ponds at Shoalhaven Heads STP	Action 11.3.3	Shoalhaven City Council, Consultants	> \$20,000	NHT/NSW Environmental Trust Grants/ Council/ Threatened Species Network Community Grants	2007-10
2.2 Install plastic breeding troughs at appropriate locations with approvals	Action 11.3.3	DECC, Consultants	\$2,000	NHT/NSW Environmental Trust Grants/CMA devolved grants	2007-08
2.3 Liaise with industries (Turfco and vineyards) to retain and improve breeding habitat on site (link with Action 1.1)	Actions 10.3.1, 11.3.3	DECC	As required	Environmental Trust Grants/ Council/	2007-10

IMPLEMENTATION PLAN (continued)

Strategy 3: Improvement and protection of habitat

ACTION	RECOVERY PLAN LINKS	RESPONSIBILITY	COST	FUNDING SOURCES	TIMEFRAME
3.1 Investigate opportunities for improving habitat connectivity between Foy's Swamp and Coomonderry Swamp and along the drainage canal. (link with Action 5.1)	Actions 10.3.1, 11.3.3	DECC SCC	\$20,000 (same budget as for Action 5.1)	CMA devolved funding/NSW Environmental Trusts/local sponsors	2007-2010
3.2 Improve habitat connectivity (e.g. create swales, wet areas, appropriate landscape plantings) based on findings from Action 5.1	Action 11.3.3	DECC Landowners and State Government	>\$50,000	NHT/NSW Environmental Trust Grants/CMA devolved grants/ Threatened Species Network Community Grants	2008-2010
3.3 Secure the conservation management of the freehold portion of Coomonderry Swamp through existing legislative and planning mechanisms (i.e. VCA, PMP, Biobanking, CMA incentives)	Action 10.3.1	DECC	As required		2007-2010
3.4 Investigate the rezoning of portions of land within the immediate catchment of Coomonderry Swamp for environmental protection		DECC in consultation with SCC			2008-2009
3.5 Investigate methods to manage water levels in the wetland (e.g. review of probability inflows, drainage arrangements under different inflow events)		DECC	In-kind	DECC	2008

IMPLEMENTATION PLAN (continued)

Strategy 4: Reduction of external threats to GGBFs

ACTION	RECOVERY PLAN LINK	RESPONSIBILITY	COST	FUNDING SOURCES	TIMEFRAME
4.1 Promote responsible cat ownership in relation to GGBFs through education (link with Actions 1.4, 1.5, 1.6)	Actions 11.3.2, 14.3.2	DECC, Consultants, Shoalhaven City Council	As required	In-kind, council and industry work budgets in liaison with DECC	2007-10
4.2 Control feral predators (i.e. continue fox baiting) at Coomonderry Swamp/Seven Mile Beach NP. Initiate and coordinate further fox baiting programs	Actions 11.3.2, 11.3.6	Shoalhaven City Council DECC	As required	Council and industry works budgets in liaison with DECC	2007-10
4.3 Minimise stormwater impacts on GGBFs and their habitats through stormwater plans and actions	Action 11.3.1	Shoalhaven City Council DECC	As required	Stormwater plan budgets	2007-10
4.4 Investigate opportunities to remove Gambusia at Coomonderry Swamp & dams in catchment of wetland, in consultation with DPI Fisheries and SSC. Link with Gambusia TAP.	Actions 11.3.2, 11.3.6	DPI DECC	As required		2007-2010
4.5 Investigate mechanism to reduce road toll on GGBF on surrounding roads	Actions 11.3.2,	Shoalhaven City Council	As required		2007-10
4.6 Liaise with landowners (Council, industries, residents) to encourage best practices (e.g. mowing, landscaping, maintaining wet areas) related to GGBF habitat (link with Actions 1.1, 1.4, 1.6, 1.7)	Actions 11.3.1, 14.3.2	DECC	See Actions 1.1., 1.4., 1.6 and 1.7		2007-10

IMPLEMENTATION PLAN (continued)

Strategy 5: Monitoring and research to better understand the extent and dynamics of the Coomonderry Swamp GGBF population

ACTION	RECOVERY PLAN LINKS	RESPONSIBILITY	COST	FUNDING SOURCES	TIMEFRAME
5.1 Map and identify existing and historic habitat for the population and identify tenure of affected lands (link with Action 3.1)	Action 11.3.4, 12.3.2	DECC and/or consultants	\$5,000 (same budget as Action 3.1)	CMA devolved funding/NSW Environmental Trusts	2007-09
5.2 Conduct annual coordinated and systematic surveys to determine baseline population numbers around the perimeter of the wetland and other locations.	Action 12.3.1	DECC and/ or consultants	\$10,000	CMA devolved funding/NSW Environmental Trusts/local sponsors	2007-2010
5.3 Monitor effectiveness of management actions against baseline data from Action 5.2. Report findings to stakeholders and community (link with Action 1.5)	Action 12.3.1	DECC	\$10,000	CMA devolved funding/NSW Environmental Trusts/local sponsors	2008-10
5.4 Continue research and monitoring projects	Action 12.3.2	DECC, Consultants, , landowners, public	As required		2007-10
5.5 Undertake sampling of frogs at different locations to see if frog chytrid is present.	Actions 11.3.5, 12.3.2	DECC, Consultants	\$5,000	CMA devolved funding/NSW Environmental Trusts/local sponsors/TAP funds, DECC,	2007-09
5.6 Take water samples from various GGBF locations as part of the national Threat Abatement Plan (TAP) for chytrid. (link with Action 5.5)	Actions 11.3.6, 12.3.2	DECC, Consultants	\$5,000	CMA devolved funding/NSW Environmental Trusts/local sponsors/TAP funds, James Cook University	2007-09