

Information Sheet on Ramsar Wetlands (RIS)

— 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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for:

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

November 2012

3. Country:

AUSTRALIA

4. Name of the Ramsar site:

Little Llangothlin Nature Reserve

5. Designation of new Ramsar site or update of existing site:

This RIS is for:

- b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
ii) the boundary has been extended ; or
iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
ii) the area has been extended ; or
iii) the area has been reduced**

**** Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

The site was designated in March 1996 and the previous RIS was completed in January 1998. Since that time no significant changes to the ecological character have occurred, however some ongoing improvements to the ecology that resulted from changes to landuse and drainage which occurred prior to 1996 continue to unfold.

Cessation of agricultural livestock grazing occurred at the site in 1989, and areas of cleared woodland are still regenerating despite the ongoing effects of eucalypt dieback which also continues. The constructed outlet drain to Little Llangothlin Lagoon was decommissioned in 1989 and this raised the maximum water depth by around 1.0 metre and increased the maximum extent of the lake, and also resulted in the redistribution of vegetation communities which depend on a specific water depth range. While these changes have probably now stabilised, the response of waterbirds to reduced drying of the lake, especially in extreme drought which may occur only once or twice each century, may still unfold. Ongoing weed and feral animal control programs continue to reduce the impact of invasive species.

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a hard copy (required for inclusion of site in the Ramsar List): ;
ii) an electronic format (e.g. a JPEG or ArcView image) ;
iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary of the site is the boundary of Little Llangothlin Nature Reserve as gazetted on 14 December 1979, an area of 257.6 hectares. The projection of the GIS data is GDA 1994 MGA Zone 56.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

30°05'11"S 151°46'55"E

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Approximately 418 kilometres north-north-west of Sydney and 18 kilometres north-east of the town of Guyra, in Guyra Shire local government area in the north-east of New South Wales, Australia

10. Elevation: (in metres: average and/or maximum & minimum)

Minimum elevation is 1,355 metres and maximum elevation is about 1,380 metres above sea level.

11. Area: (in hectares)

257.6 hectares (as gazetted on 14 December 1979).

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Little Llangothlin Nature Reserve (LLNR) contains the 105 hectare, permanent, Little Llangothlin Lagoon and 7.7 hectare of the 17 hectare, intermittent, Billy Bung Lagoon. Both of these are examples of the nationally threatened ecological community 'upland wetlands of the Monaro Plateau and New England Tablelands', with Little Llangothlin Lagoon being particularly significant for its large area, permanency, function as a drought refuge for fauna, and near-natural condition. The site also contains a total of 16 hectares of fen, a non-forested peat wetland, (Hunter 2011) including a large 7.9 hectare *Carex* fen in the main inlet watercourse at Little Llangothlin Lagoon (Hunter and Bell 2009), and additional very small groundwater-fed seepage wetlands (freshwater springs), all of which add to the overall wetland values of the site.

In addition, the site supports terrestrial habitat including about 44 hectare of eucalypt woodland with grass understorey (including patches of the nationally threatened ecological community 'New England peppermint (*Eucalyptus nova-anglica*) grassy woodlands') and cleared areas that are predominantly grasslands containing kangaroo grass (*Themeda australis*) and exotic pasture species (Benson and Ashby 2000). The grasslands support the nationally endangered Austral toadflax (*Thesium australe*), a small plant which parasitises the roots of kangaroo grass. The nationally endangered yellow-spotted bell frog (*Litoria castanea*) was previously recorded from the site, however it has not been recorded from the site or from the area since the 1970s.

About 226 hectare of the 568 hectare local catchment is located within the boundary of the Nature Reserve and the non-reserved portion of the catchment includes a public road and private agricultural land subject to grazing by livestock and some cropping. The site has important Aboriginal sites, is of scientific interest for the geology and ecology, and serves as an educational and low-key recreational area for bushwalkers and bird watchers. Minimal infrastructure is provided in the form of toilets, a parking area, interpretive signage, boundary fencing, and walking trail. Pest and weed control activities are routinely implemented by the site manager, the New South Wales National Parks and Wildlife Service.

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Little Llangothlin Lagoon and Billy Bung Lagoon are part of the larger New England Lagoons system which includes 57 lakes and swamp depressions extending along 100 kilometres of the Great Dividing Range. Only 39 of these lakes and swamp depressions occur within the South-East Coast Drainage Division (Haworth 1998). At 105 hectares, Little Llangothlin Lagoon is one of the largest examples of these high altitude lakes in the drainage division. It is also rare due to its near-natural condition, as the majority of the lakes have been severely degraded through hydrological modification, grazing and cropping. Little Llangothlin Nature Reserve Ramsar site is one of only two reserves in the New England Tablelands which contain examples of these lakes, and which are protected under the *National Parks and Wildlife Act 1974*.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Species

Common name	Scientific name	IUCN	CITES	CMS	National Status
Plants					
Austral toadflax	<i>Thesium australe</i>	-	-	-	Vulnerable (EPBC Act 1999)
Birds					
Australasian bittern	<i>Botaurus poiciloptilus</i>	EN	-	-	Endangered (EPBC Act 1999)

Threatened ecological communities

Name	IUCN	National Status
Woodlands		
New England peppermint (<i>Eucalyptus nova-anglica</i>) grassy woodlands	-	Critically endangered (EPBC Act 1999)
Sedgelands		
Upland wetlands of the New England Tablelands and the Monaro Plateau	-	Endangered (EPBC Act 1999)

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Little Llangothlin Nature Reserve Ramsar site provides a habitat refuge for numerous species of waterbird which increase significantly in number at Little Llangothlin Lagoon during times of drought (White 1987). Particularly significant differences in numbers have been recorded for Pacific black duck (*Anas superciliosa*) (at least 600 individuals), grey teal (*Anas gracilis*) (approximately 1800 individuals), Australasian shoveler (*Anas rhyncotis*) (184 individuals), Eurasian coot (*Fulica atra*) (722 individuals) and blue-billed duck (*Oxyura australis*) (180 individuals). Protection of the site as a nature reserve increases its drought refuge significance as alternative habitat at relatively nearby coastal wetlands continues to be pressured by ongoing coastal development. The site also supports eight internationally listed migratory waterbird species: white-necked heron (*Ardea pacifica*), glossy ibis

(*Plegadis falcinellus*), marsh sandpiper (*Tringa stagnatilis*), cattle egret (*Bubulcus ibis*), Latham's snipe (*Gallinago hardwickii*), red-necked stint (*Calidris ruficollis*), sharp-tailed sandpiper (*Calidris acuminata*) and common greenshank (*Tringa nebularia*).

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

South-East Coast Drainage Division.

The South-East Coast Drainage Division includes the long narrow strip of coastal south-east Australia between the Great Dividing Range and the sea. With the northern boundary at the New South Wales - Queensland border, it extends south and includes all of coastal New South Wales, all of coastal Victoria and a small part of south-eastern South Australia.

b) biogeographic regionalisation scheme (include reference citation):

Australian Drainage Divisions (Commonwealth of Australia, Bureau of Meteorology 2011). Australian Hydrological Geospatial Fabric

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Little Llangothlin Nature Reserve covers 257.6 hectares of the 568 hectare local sub-catchment which functions effectively as a closed basin, situated as it is in the upper catchment, on a high elevation plateau on the eastern fall of the Great Dividing Range. The site is situated about 30 kilometres west of the escarpment and 18 kilometres east of the topographic divide in undulating montane country formed from metasediments, granite intrusions and basalt flows, the most recent of which originated from Ben Lomond about 14 kilometres north-west. It lies at the western margin of the surface basalt so most of the site has relatively fertile but shallow basalt soils. The basalt flows vary in thickness from around 1 metre to over 20 metres, and some are fractured or porous and act as aquifers. Granite underlies the site in the east.

The site consists of the 105 hectare Little Llangothlin Lagoon, 7.7 hectares of the 17 hectare Billy Bung Lagoon, several inflow watercourses that also contain wetland soils and vegetation, small alluvial flats adjoining the lakes and watercourses, and drier undulating country containing basalt outcrops and rocks that extend about 30 metres higher than the lakes (Haworth 1994). The lakes are thought to have formed where erosion-resistant ferricrete or silcrete blocked ancient drainage lines as the basalt weathered away, and in extended dry periods deflationary processes deposited aeolian sediment against the barriers which formed lunettes (Walker 1977).

The lunette at the south-east of Little Llangothlin Lagoon is about 1 kilometre long, and is in the form of a small sandy rise 5-10 metres high, comprised mostly of coarse granite-derived particles (Walker 1977). The permanent Little Llangothlin Lagoon has a maximum depth of around 2 metres, rarely overflows into the Oban River (an upper tributary of the Clarence River), and may dry out in extreme droughts (Haworth 1994).

The intermittent Billy Bung Lagoon has a maximum depth of about 0.8 metre, lacks a lunette, and overflows to the north into the main inlet watercourse to Little Llangothlin Lagoon (Bell et al. 2008). Both lakes are fed by rainfall in the local catchment which is summer-dominated and around 880 mm per year, and possibly also by groundwater seepage including from basalt aquifers at a number of groundwater-fed soaks. Pan evaporation is around 1 342 mm per year (BoM 2010), so surface runoff from local storms is also important in maintaining a positive water balance in the lakes.

The lake beds, comprised of basalt, granite and probably ferricrete overlain by sediment, are probably reasonably impervious. Long term background sedimentation rates are low at around 0.084 millimetre/year, however after European settlement and the introduction of clearing and livestock, a massive sedimentation event occurred, resulting in the deposition of sediment at Little Llangothlin Lagoon 0.4-1.0 metre deep (Haworth 1994). More recently, sedimentation was measured at 9.7 millimetre/year from 1960 to 1989 or more than 100 times the background rate (Haworth 1994).

The site lies near the boundary between the high rainfall eastern seaboard and the dry inland and is affected by large scale weather patterns that dominate each and so droughts that occur in inland Australia are likely to be moderated

by coastal rainfall patterns. Large scale rainfall patterns in the New England Tablelands are dominated by the tropical easterly winds of summer, and the temperate westerly winds of late autumn, winter and early spring (Sumner, 1983). Rainfall at the site may also benefit to some degree from orographic uplift although it is located about 30 kilometres from the escarpment. The average annual rainfall at nearby Guyra is 881 mm with the highest monthly average rainfall occurring in summer months with lower averages in autumn and winter; mean monthly rainfall is highest in January (113 mm) and lowest in April (48 mm) (BoM, 2010).

At nearby Guyra, the maximum mean monthly temperature ranges from 24.5 °C (January) to 10.2 °C (July) while the minimum mean monthly temperature is also lowest in July dropping to -0.6 °C and is highest in February (10.9 °C) (BoM 2010). The lower areas of the site (alluvial flats and lakes), especially when dry, are likely to experience regular winter frosts as a result of the high elevation (the adiabatic lapse rate is about 1-1.5°C /100 metre elevation) and cold air drainage. Guyra, at elevation 1,332 metres and about 18 kilometres south-south-west of the site, experiences an average of around five snowfalls per year, including light falls (Burr 2010).

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

Little Llangothlin Nature Reserve Ramsar site is situated in the Clarence basin of the South-east Drainage Division, about 12 kilometres east of the topographic divide, within the Tubbamurra sub-catchment near the headwaters of the Oban River, a tributary in the south west corner of the 22 300 km² Clarence River catchment.

The local catchment of the two lakes in Little Llangothlin Nature Reserve Ramsar site is essentially a 568 hectare closed basin located on the tableland, as no flows arrive from upstream and discharge into the Oban River occurs only periodically when Little Llangothlin Lagoon overflows.

The lake basin of Billy Bung Lagoon covers about 17 hectares and has a catchment of about 74 hectares. Little Llangothlin Lagoon covers about 105 hectares with a catchment of about 568 hectares (catchment areas include the lakes themselves). About 226 hectares (40%) of the local catchment falls within the Little Llangothlin Nature Reserve Ramsar site.

During periods of high rainfall, Billy Bung Lagoon spills into Little Llangothlin Lagoon. When Little Llangothlin Lagoon overflows, it drains from the outflow in the south-eastern corner into the headwaters of the Oban River, which eventually discharges into the Pacific Ocean via the Clarence River.

Billy Bung Lagoon and most of the local catchment of the two lakes occur on basalt which produces shallow but fertile soils, however the eastern portion of the site (and probably the eastern part of Little Llangothlin Lagoon) occurs on granite which produces infertile soils and probably contributed the sand which comprises most of the lunette material to the south of Little Llangothlin Lagoon.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The relatively high plateau of the New England tableland has generally small local catchments with little or no inflows from upstream, mostly intermittent streams, evaporation in excess of rainfall, and geology based on basalt, granite and metasediments, and as a result, the area has few natural areas of open water.

Consequently, the main hydrological value of the site is the occurrence of a natural, permanent water body in the form of Little Llangothlin Lagoon, which is also well above average size for montane lakes in northern New South Wales. It is the third largest lake on the New England plateau at 105 hectares and it has a maximum depth of about 2 metres.

The 0.8 metre deep (maximum depth) Billy Bung Lagoon is intermittent yet still retains water during most years of average rainfall (it is thought to dry out about every 20 years), and 7.7 hectare of this 17 hectare lake is within the site boundary.

The small local catchment generally operates as a closed basin, as outflow into the Clarence River (via the Oban River) occurs only when Little Llangothlin Lagoon overflows. Groundwater soak areas are evident on the slopes above the lakes and basalt aquifers also occur in the near region but their significance in supplying the lakes and other wetlands is unknown.

The site has been protected as a Nature Reserve since 1979 and agriculture ceased in 1989, and since that time the hydrological values remain the same – the open water supports scientific, educational and passive recreation activities that would not otherwise be possible.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar “Classification System for Wetland Type” present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

The area of the Little Llangothlin Nature Reserve is 257.6 hectare, and the following wetlands occur at the site:

1. **O - Permanent freshwater lakes** (over 8 hectare) - Little Llangothlin Lagoon, 105 hectares.
2. **P - Seasonal/ intermittent freshwater lakes** (over 8 hectare) – 7.7 hectares of the 17 hectare Billy Bung lagoon lies within the Ramsar boundary.
3. **U - Non-forested peatlands** – 7.9 hectare *Carex fen* in the drainage line of the inlet watercourse on the western side of Little Llangothlin Lagoon and other patches at the margins of the lakes, for a total of approximately 16 hectare.
4. **Y – Freshwater springs** – small freshwater spring wetlands occur especially on the toe and slopes adjoining the lakes and watercourses; total area is estimated at <0.1 hectare (Haworth 1994; Bell et al. 2004).

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The site completely contains the 105 hectare Little Llangothlin Lagoon which is the third largest of the upland lakes of the New England Tablelands. It also contains approximately 7.7 hectare of the 17 hectare, intermittent, Billy Bung Lagoon. The Little Llangothlin Nature Reserve Ramsar site is situated on the New England Tableland at an altitude of 1,355-1,380 metres and the lakes are upland wetlands which are a listed, nationally threatened ecological community, under the Environment Protection and Biodiversity Conservation Act, 1999.

The lakes collect water from the small surrounding catchment which acts essentially as a closed basin as no flows originate from upstream. Water from the small shallow Billy Bung Lagoon overflows to the north, into the north-west corner of Little Llangothlin Lagoon. The rare outflow from Little Llangothlin Lagoon is at the south eastern end and forms the headwaters of the easterly flowing Oban River. Little Llangothlin Lagoon is a permanent lake with a maximum depth of about 2 metres which dries out only in extreme droughts. The intermittent Billy Bung Lagoon has a maximum depth of about 0.8 metre and it dries out about every 20 years. The edges of Little Llangothlin Lagoon are relatively steep at the southern end, however the northern section is relatively flat, forming a large area of seasonally inundated waterlogged soils.

The site supports extensive native wetland vegetation which grows within and around the two lakes in the reserve. Vegetation within Little Llangothlin Lagoon occurs in zones from submerged aquatic vegetation at the deepest part of and throughout the lake, through reed swamp to wet meadow, wet grass and wet sedge swamps as water becomes shallower toward the edge of the lake. Dry grass swamp and grass meadow encircle the lake just above the area of inundation. Vegetation zones are related to water depth and reflect the topography of the bottom of the lake and the phase of the hydrological period (Briggs 1976).

The small inlet watercourses also support wetlands, notably a fen on the main western inlet watercourse of Little Llangothlin Lagoon which has been identified as one of the few remaining large and high quality fens in the New England Tablelands (Hunter and Bell 2009). Small groundwater-fed seepage areas also support very small wetlands. Much of the area surrounding the lakes has been previously cleared but supports patches of open forest and woodland dominated by eucalypt species including *Eucalyptus nova-anglica* (New England peppermint). The eucalypts have suffered from dieback and although regrowth is evident, the age-structure of the woodlands may have changed over time.

Due to the presence of permanent and intermittent lakes and the surrounding native vegetation, the Little Llangothlin Nature Reserve provides habitat for many species of waterbirds, some of which, in particular the Black swan (*Cygnus atratus*), Blue-billed duck (*Oxyura australis*), White-bellied sea eagle (*Haliaeetus leucogaster*) and possibly Australasian bittern (*Botaurus poiciloptilus*), nest in the reserve. The site is known to serve as a habitat refuge for waterbirds during widespread drought conditions.

The site also provides habitat for frogs and significant aquatic invertebrates, including some at the limit of their range. Wetland fauna species that have previously provided food for human inhabitants and visitors in pre-historical times and into the historical era probably include eels, freshwater crayfish, and turtles, as well as waterbirds.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Little Llangothlin Nature Reserve supports two near-natural examples of the nationally endangered ecological community ‘upland wetlands of the New England Tablelands and the Monaro Plateau’ in Little Llangothlin Lagoon and part of Billy Bung Lagoon.

The nationally threatened herb Austral toadflax (*Thesium australe*) parasitizes the roots of kangaroo grass (*Themeda australis*) in the understorey of Eucalypt woodlands on the slopes to the east of Billy Bung Lagoon.

Patches of the nationally threatened (critically endangered) ecological community ‘New England peppermint (*Eucalyptus nova-anglica*) grassy woodlands’ occur at the site, including on the slopes to the north of Little Llangothlin Lagoon and on the lunette to the south.

Asperula charophyton (Rubiaceae) is not listed as threatened under the Environment Protection and Biodiversity Conservation (EPBC) Act, 1999, however is on the Rare or Threatened Australian Plants (RoTAP) list which is managed by the Centre for Plant Biodiversity Research. The RoTAP code of 3RCa signifies that the species has a range of greater than 100 kilometres but that it is found only in small populations (3), rare but with no identifiable threat (R), is known to occur within a proclaimed reserve (C) and is considered to be adequately reserved with 1 000 or more plants occurring within a proclaimed reserve (a) (Australian Native Plants Society, 2010; Australian National Botanic Gardens, 2010). *Asperula charophyton* was found in a fen on the margins of Little Llangothlin Lagoon (Hunter and Bell 2009) and is considered noteworthy.

Fifty nine introduced plant species have been recorded from the site. Introduced pasture grasses such as cocksfoot (*Dactylis glomerata*), perennial ryegrass (*Lolium perenne*), phalaris (*Phalaris aquatica*) and clover (*Trifolium* spp.) compete with the native kangaroo grass (*Themeda australis*) which supports the threatened Austral toadflax (*Thesium australe*). Other introduced plants which are a threat to the site’s wetlands and fauna include jointed rush (*Juncus articulatus*), blackberry (*Rubus ulmifolius*), nodding thistle (*Carduus nutans*) and *Ranunculus sceleratus*.

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The nationally threatened species Australasian bittern (*Botaurus poiciloptilus*) has been observed at the site on two occasions (a juvenile bird in 2002 and an adult in 2009) and heard more frequently, and based on these it is possible that a small breeding population of this highly cryptic species persists at the site (J. Clifton-Everest, Pers. Comm. 2011).

The nationally endangered yellow-spotted bell frog (*Litoria castanea*) is also listed as critically endangered on the IUCN Red List of Threatened Species. The species was found in some numbers at the site in the 1970s, however surveys in the 1990s and in 2011 failed to find any specimens either at the site or in other target wetlands in the New England Tablelands and the species is presumed to be locally extinct.

Available data shows that at least 21 species of waterbird are known to breed at Little Llangothlin Nature Reserve, while at least 48 species occur at the site of which eight are listed on migratory bird agreements with Japan, China or South Korea (JAMBA, CAMBA and ROKAMBA): White egret (*Ardea modesta*), Marsh sandpiper (*Tringa stagnatilis*), Glossy ibis (*Plegadis falcinellus*), Cattle egret (*Bubulcus ibis*), Latham's snipe (*Gallinago hardwickii*), Red-necked stint (*Calidris ruficollis*), Sharp-tailed sandpiper (*Calidris acuminata*), and Common greenshank (*Tringa nebularia*). The White-bellied sea eagle (*Haliaeetus leucogaster*) is known to breed successfully within the site however is now considered to be erroneously listed as a CAMBA species on the Australian Government migratory species list.

Grey teal (*Anas gracilis*), Chestnut teal (*Anas castanea*), Eurasian coot (*Fulica atra*) and Pacific black duck (*Anas superciliosa*) are the most abundant waterbirds recorded at the site with recorded maximum counts of 600 or above, for a density of at least 5 individuals of each of these species per hectare of wetland. Black swan (*Cygnus atratus*) and purple swamphen (*Porphyrio porphyrio*) have also occurred at the site with maximum recorded numbers above 400 for each species.

The Blue-billed duck (*Oxyura australis*), uncommon over its relatively restricted range in south-eastern Australia and listed as threatened in NSW, now usually occurs in numbers of greater than 100 birds present and also breeds at the site. (J. Clifton-Everest, Pers. Comm. 2011).

Additionally, the Freckled duck (*Stictonetta naevosa*), while not nationally listed as threatened, is widely considered to be Australia's rarest species of duck. It is nomadic in habit and often found on ephemeral wetlands and appears quite regularly at the site, though in small numbers (J. Clifton-Everest, Pers. Comm. 2011).

An undescribed species of the order *Rhabdocoel* has been found at Little Llangothlin Lagoon, its only known location (Bayly 1995 Unpub). This little known order includes flatworms that exhibit behaviour similar to a plankton, in that they have a floating, free swimming life. The calanoid copepod *Boekella montana*, which is common in highland areas of southern Australia, occurs at Little Llangothlin Lagoon at the most northern limit of its presently known range and *Boekella major*, previously only known from isolated localities in Tasmania, Victoria and the southern Highlands of NSW, was also found at Little Llangothlin Lagoon (Timms 1970).

The major pest animals recorded from the Ramsar site are European red fox (*Vulpes vulpes*), feral cat (*Felis catus*) and rabbit (*Oryctolagus cuniculus*), which have been identified as one of the key threats to the 'Upland wetlands of the New England Tablelands and the Monaro Plateau' threatened ecological community (DEWHA 2008b). Foxes and cats pose a threat through predation of waterbirds and other native species including those using the reserve as a drought refuge. The introduced mosquito fish (*Gambusia holbrooki*) also poses a threat as it is an aggressive predator which has documented impacts on native fish and frog species (Rowe et al. 2008). It is thought to be a contributor to the decline of the yellow-spotted bell frog and its presence may be a reason why the threatened species is no longer found in the Ramsar site (J. Kreis, NSW NPWS, Pers. Comm. 2011).

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The Little Llangothlin Nature Reserve Ramsar site is located within the boundary of the Anaiwan tribe which lies approximately between the towns of Glen Innes, Uralla, and Tingha, and there is evidence of relatively intensive Aboriginal occupation in the New England Tablelands dating back to at least 5,000 years before present in the mid-Holocene period (Bowdler 1981).

Davison (1982, 51) found evidence of two archaeological open (or living) sites in 1978 at Little Llangothlin Nature Reserve, demonstrating moderate density in an area where important resources of food and water were available, and where later agricultural and other activities allowed them to be discovered.

Five separate archaeological find spots were identified in the vicinity of the Llangothlin lagoons, and although the absolute quantity of flaked artefacts was not great, an additional find of six edge-ground hatchets and four grinders by a landowner west of Little Llangothlin Lagoon, indicates that past Aboriginal activity in the area was more than an isolated incident (Davidson 1982, 52). Some of the flaked artefacts from the sites included a flaked piece of glass found near Llangothlin Lagoon within 1 kilometre north-east of the site which shows that such activity continued into the historic era (Davidson 1982, 52).

According to Hunt (2010), Banbai people (an Anaiwan sub-group centred around Guyra) emphasise that they had a complex society, which lived well on the natural resources available; they had good nutrition, they ground flour and baked bread, they knew the plant medicines and were doctors and meteorologists, and had developed the technology of the boomerang.

In addition to the stone artefacts, scarred trees have been identified at the site with at least one scar indicating use of bark for a container or coolamon (J. Kreis, NSW NPWS, Pers. Comm. 2010).

Aboriginal food resources on the tablelands included animals caught in standing kurrajong bark nets, crayfish from swamps, panic grass seeds, grass tree blossoms, and yams, possibly the daisy yam *Microseis scapigera* (Bowdler 1981, 106). Godwin (1983, 45) reports tableland food from three zones, the open woodlands (macropods often caught in communal nets, figs and other fruit including the native grape *Vitis hypoglauca*), swamps and marshes (crayfish, two types of yam, waterfowl, eels, roots and stems of reeds), and grassy clearings (attractive to eastern grey kangaroo and red-necked wallaby). Many other plants and animals are also likely to have been used for food, including reptiles such as snakes, lizards and tortoises, non-wetland birds, and the seeds and flowers of a large number of plants.

Europeans settled the area in the early 1800s, burning and clearing the land for livestock grazing (Haworth, 1994). Agricultural activities at the site also included some cropping on the most fertile basalt flats, introduction of improved pastures and use of fertiliser, and dairying. The remains of an old dairy are still located on the hill to the west of Little Llangothlin Lagoon, and there is evidence of fencing, water troughs and windmill, signs of the farming which occurred until 1989 when the last grazing ceased.

The site is managed as a nature reserve and continues to have social significance for tourists and locals for bushwalking, nature appreciation, and bird watching in particular. Scientists and students, including interested members of the general public, also use the site and make use of the interpretive signage that has been provided.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

a) within the Ramsar site:

The Ramsar site is located on Crown land reserved as Little Llangothlin Nature Reserve, which is managed by the NSW National Parks and Wildlife Service (part of the NSW Office of Environment and Heritage) for the purposes of conservation of biodiversity and cultural heritage.

b) in the surrounding area:

Most land adjacent to the Little Llangothlin Nature Reserve is freehold farming land with some small parcels of Crown land road reserve and local public roads (also Crown land).

25. Current land (including water) use:

a) within the Ramsar site:

Little Llangothlin Nature Reserve was gazetted as a nature reserve in 1979 under the *NSW National Parks and Wildlife Act 1974* and is managed primarily to protect the site's natural and cultural values, with a limited amount of recreational use and scientific research. No water extraction occurs at the site. The site has some minimal infrastructure such as toilets, parking bay, signage, and walking trail (and access tracks for authorised vehicles) which pose no threat to the ecological character if usage rates remain near current levels and impacts are managed.

b) in the surroundings/catchment:

Land in the surrounding local catchment has been cleared and is primarily used for grazing cattle and sheep on improved pasture with some cropping (NSW NPWS 1998). Agricultural practices result in inflows to the site of nutrients and some sediment, and seeds of weed species including exotic pasture grasses. In addition, cattle directly access the privately owned western portion of Billy Bung Lagoon, resulting in disturbance of bottom sediment and reduced water quality, and reduction in the diversity and abundance of native plants, and a likely increase in weed species, and these impacts are likely to transfer to some degree onto the upstream portion of this lake within the Nature Reserve. No known groundwater extraction has been identified in the small local catchment, however some relatively minor farm dams and small channels divert or trap surface flows in the local catchment outside of the Little Llangothlin Nature Reserve Ramsar site boundary.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

Past significant factors that adversely affected the ecological character of the site include land clearing, agriculture, and draining which reduced the biodiversity and habitat value, added a massive sediment load to the lake beds and reduced the maximum available water depth in the lakes. The site became a Nature Reserve in 1979, the last agricultural practice (grazing) ended in 1989, and the discharge drain at Little Llangothlin Lagoon was filled in by 1.0 metre in 1989 to restore the natural water level, so the direct effects of these factors ended although the ecosystem is probably still undergoing transition.

Present factors affecting the site include:

- The presence of introduced fauna, especially:
 - rabbit which: eat plants including kangaroo grass (*Themeda australis*) and potentially its root parasite Austral toadflax (*Thesium australe*) which is also directly sensitive to grazing, can cause erosion by building burrows which also have the potential to disturb the scientific and archaeological value of the lunette; rabbit numbers are reduced by regular control programmes
 - European red fox and feral cat which prey on animals including waterbirds, frogs and other animals, and may also disturb waterbird breeding.
- The presence of introduced flora such as:

- introduced pasture grasses which compete with kangaroo grass (*Themeda australis*) (host to the nationally endangered Austral toadflax (*Thesium australe*)), other groundcover plants, and woodland recruits.
- the weed *Ranunculus sceleratus* which grows on bare mud, is dispersed by waterbirds, and competes with native wetland plants especially in areas that cycle through wet and dry phases such as the margins of Little Llangothlin Lagoon and all of Billy Bung Lagoon (Bell et al 2008, 487).
- and the wetland plant jointed rush (*Juncus articulatus*) which comprised about 21% of the vegetation in Little Llangothlin Lagoon in the 1970s (Briggs 1980, 730) and competes with native plants; it appears to have declined in numbers since the 1970s however still occurs at the site including in the seedbank.
- Climate change which may result in higher temperatures (virtually certain), drier soil in spring and winter (likely), and more rainfall in all seasons except winter (likely) and which are likely to contribute to changes in the structure and functioning of the ecosystem (DECCW 2010a, 78-82).

b) in the surrounding area:

Past significant factors in the surrounding area that adversely affected the ecological character of the site are similar to those that affected the site itself - land clearing, agriculture, and the introduction of exotic flora and fauna. All of these factors continue to the present time.

Potential factors which could affect the site in the future include:

- Surface water interference, for example through construction in the local catchment of infrastructure such as roads for public access or any future developments in the area
- Groundwater interference, for example through mining exploration or extraction (existing mineral exploration licences adjoin the site and geothermal exploration licences occur in the larger area), and groundwater extraction

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

Little Llangothlin Nature Reserve was gazetted in 1979, and under section 30J of the *NSW National Parks and Wildlife Act 1974* the primary purpose of reserving land as a nature reserve is:

...to identify, protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

Under the NPW Act a nature reserve is to be managed in accordance with the following principles:

- a. the conservation of biodiversity, the maintenance of ecosystem function, the protection of geological and geomorphological features and natural phenomena,
- b. the conservation of places, objects, features and landscapes of cultural value,
- c. the promotion of public appreciation, enjoyment and understanding of the nature reserve's natural and cultural values, and
- d. provision for appropriate research and monitoring.

The site was designated a Wetland of International Importance, in March 1996, and afforded additional protection under the *Environment Protection and Biodiversity Conservation Act, 1999*, which also protects the nationally threatened species and ecological communities at the site.

Additional protection is afforded the site, or aspects of it, through various legislation in the state of New South Wales, such as the *National Parks and Wildlife Act 1974* (which protects, for example, Aboriginal objects and places), and the *Threatened Species Conservation Act 1995*.

The values at Little Llangothlin Nature Reserve have also been recognised through the June 1997 listing, with Portion 18 Parish of Bagot, on the Register of the National Estate.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

The IUCN (1994) protected areas categories which apply to the site:

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

The *Little Llangothlin Nature Reserve Plan of Management* was developed for the site in 1998 (NSW National Parks and Wildlife Service 1998).

The plan of management specifies that the following strategies will be implemented in managing the nature reserve:

- Management will be designed to encourage the return of the reserve to as natural a condition as possible following the cessation of farming and grazing by promoting regeneration, undertaking revegetation programmes, controlling and eliminating weeds and feral animals and establishing an appropriate fire regime.
- High priority will be given to research and monitoring in fields such as archaeology, botany, geomorphology, palynology, herpetology, ornithology and aquatic fauna and flora investigations to establish the most appropriate management policies and programmes. Priority will also be placed on the management and interpretation of Aboriginal and European sites within the Little Llangothlin Nature Reserve.
- Limited public use of the reserve will be encouraged for environmental education. Priority will be placed on the interpretation of wetlands of the Tablelands, including Aboriginal interaction with the natural environment. Only interpretative displays and basic visitor infrastructure will be provided.
- Close co-operation will be encouraged and maintained between the Service, neighbouring landholders and the local community.

It is expected that the plan of management will be reviewed in 2013.

In addition, a Fire Management Strategy was developed for the site in 2006 and updated in 2008, by the NSW National Parks and Wildlife Service (NSW National Parks and Wildlife Service 2006).

d) Describe any other current management practices:

DECCW's *Northern Tablelands Region Pest Management Strategy 2008-2011* addresses the measures for controlling feral animals, noxious weeds and introduced plants in the Ramsar site (DECC 2007).

In addition, the required and planned conservation measures are supported by targets and mechanisms listed in the regional Northern Rivers Catchment Action Plan (Northern Rivers Catchment Management Authority, 2007) such as biodiversity management targets for threatened species (B4) and biodiversity threat mitigation (B3).

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

Ongoing efforts to control priority exotic flora and fauna are implemented annually by the site manager, and these will continue, including investigating and trialling new control methods. This is particularly important for the control of exotic pasture species which have not been eliminated since agricultural grazing ceased at the site in 1989, and new trials are currently in the investigation and planning phase (Kreis J. DECCW, Pers. Comm. 2010).

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

No facilities as such are provided at the site, however the NSW National Parks and Wildlife Service assesses, and supports and authorises where relevant, scientific research at the site, consistent with the Plan of Management (NPWS 1998).

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Governments lead the delivery of CEPA activities at local, state (NSW Government), national and international scales (Australian Government). Various non-government organisations such as universities, Southern New England Landcare, WetlandCare Australia and Birds Australia partner the delivery of local CEPA activities at Little Llangothlin Nature Reserve by contributing to monitoring and research activities, and community field days.

The 1998 Management Plan for the Little Llangothlin Nature Reserve identifies CEPA-related use of the nature reserve including the promotion of natural and cultural heritage conservation, environmental and cultural education, and scientific research (NSW NPWS 1998).

Key CEPA messages that arise from the specific ecological character of and threats to Little Llangothlin Nature Reserve, and which should be promoted include:

- Promotion of the values underpinning the Ramsar criteria for the site; that Little Llangothlin Nature Reserve Ramsar site has significant biodiversity, contains threatened ecological communities, and threatened plants and animals.
- The importance of Little Llangothlin Nature Reserve Ramsar site as a result of the near-natural representative wetlands, permanent water, and waterbird habitat.
- That past land use in the region has caused massive sedimentation which threatened the water regime of the lakes and continues to pose a threat.
- That weeds and feral animals require controlling to avoid threats to the ecology of the site.
- That negative ecological impacts resulting from visitors and recreational use of Little Llangothlin Nature Reserve Ramsar site can be minimised by wise use of the lake.

The NSW Government has implemented a number of CEPA activities at the state level including printing and distributing a Little Llangothlin Nature Reserve visitor guide, and providing easy web access to information on the Little Llangothlin Nature Reserve including the Little Llangothlin Nature Reserve Plan of Management 1998, and information on the Ramsar Convention and NSW Ramsar wetlands.

The Australian government also provides CEPA-related information, including providing easy web access to Ramsar-related information, the Little Llangothlin Nature Reserve Ramsar Information Sheet, and the Little Llangothlin Nature Reserve Plan of Management 1998.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Little Llangothlin Nature Reserve Ramsar site is advertised regionally as a tourist attraction and nationally as a nature reserve including for the high altitude wetland threatened ecological community and as a wetland of international importance. The nature reserve provides limited infrastructure in the form of toilet and picnic facilities, interpretive information, and mostly unformed walking trail, but no other facilities, while activities such as camping, canoeing and boating are not permitted (DECCW 2010c). As a result, Little Llangothlin Nature Reserve Ramsar site attracts day visitors interested in nature appreciation, bushwalking and bird watching including from regional clubs and organisations.

The NSW NPWS has recorded vehicles visiting the site since around 2002 and records show that annual visitor numbers, using a conversion of 2.5 visitors/car, increased from around 400 in 2005 to over 1 000 in 2010 (J. Kreis, DECCW, Pers. Comm. 2011).

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Territorial jurisdiction resides in the government of New South Wales via the Office of Environment and Heritage, 59-61 Goulburn Street, Sydney, NSW (PO Box A290, Sydney South NSW 1232).

Functional jurisdiction is shared by the:

- New South Wales government's Office of Environment and Heritage, 59-61 Goulburn Street, Sydney, NSW (PO Box A290, Sydney South NSW 1232), through the *National Parks and Wildlife Act 1974*, and the
- Australian government's Department of Sustainability, Environment, Water, Population and Communities GPO Box 787, Canberra ACT 2601, Australia, through the *Environment Protection and Biodiversity Conservation Act, 1999*.

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The management authority for the Little Llangothlin Nature Reserve is:

National Parks and Wildlife Service

Office of Environment and Heritage

Street address: 68 Church Street, Glen Innes NSW

Postal address: PO Box 281, Glen Innes NSW 2370

Phone: +61 2 6739 0700

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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