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Project Sub-title: Acid Frog Suitability
Client Name: Byron Shire Council
UPR No.: 3544-1011
Project Manager: Michelle Erwin

Acid Frog Suitability – Preliminary Investigation

BSC Lot 12 Bayshore Drive

Date	Author	Notes
4/3/2021	GKQ	Set-up and content
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10 March 2021
Ref No: 3544-1011

Andrew FitzGibbon
Byron Shire Council
Via email: afitzgibbon@byron.nsw.gov.au

Dear Andrew

Preliminary Investigation - Acid Frog Habitat at Lot 12 DP1189646 Bayshore Drive

The purpose of this letter is to summarise the results of a preliminary investigation into the suitability of Lot 12, Bayshore drive ('the site') as habitat for acid frogs. For the purposes of this letter, 'acid frog' refers to two frog species, Wallum Froglet (*Crinia tinnula*) and Wallum Sedge Frog (*Litoria olongburensis*) associated with acid swamp environments and listed as Vulnerable under the NSW *Biodiversity Conservation Act 2016*.

Introduction

It is understood that Byron Shire Council (BSC) propose to develop part the site for the purposes of an educational establishment such as a TAFE and other non-residential development such as retail shops.

The western portion of the site comprises forest dominated by Broad-leaved Paperbark and the eastern portion of the site is comprised of previously cleared/ disturbed land. Within the eastern portion there is a constructed dam/ pond near the southern boundary and a small pocket of forest in the north-eastern corner of the site, which is dominated by Broad-leaved Paperbark. It is understood that the area proposed to be developed is within the western portion of the site.

The objective of the investigation was to determine areas of the site that may be suitable as acid frog habitat. This was achieved by:

- Identifying areas of standing water/poor drainage where ponding occurs
- Assessing the vegetation at these areas in terms of vegetation preferences of acid frogs
- Monitoring the water quality for key parameters relevant to acid frogs.

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Methodology

Monitoring was undertaken from 11 February to 4 March 2020 at four locations within areas where standing water is present. Monitoring at these locations included:

- A vegetation assessment
- Four rounds of weekly surface water quality monitoring with an in-situ water monitoring probe for the following parameters:
 - pH
 - Electrical conductivity (EC)
 - Dissolved oxygen (DO)
 - Turbidity
 - Temperature
- Four rounds of weekly acid frog aural-visual and call-playback surveys. Surveys comprised of five minutes of listening, two minutes of Wallum Froglet call playback, followed by 5 minutes of listening. A search of each waterbody and surrounding area was also conducted.

Results

Figure 1 shows the location of monitoring sites and **Table 1** provides a description of each monitoring site.



Figure 1 Monitoring locations

Table 1 Description and location of monitoring sites

<i>Site</i>	<i>Comments</i>	<i>Easting</i>	<i>Northing</i>
SW1	A small pocket of paperbark forest with standing water in the north-eastern corner	556735	6832571
SW2	A shallow, constructed pond/dam near the southern boundary	556736	6832571
SW3	A constructed open drain that runs along the south western boundary	556621	6832561
SW4	A mature paperbark forest with standing water in the western portion	556716	6832691

The weather conditions during each monitoring event and the total rainfall recorded in the days leading up to each monitoring event are presented in **Table 2**. Temperature and rainfall data are from the Bureau of Meteorology Cape Byron Station (058216).

Table 2 Weather conditions during and rainfall leading up to each monitoring event

<i>Date</i>	<i>Observed Conditions</i>	<i>Temperature (°C)</i>		<i>Rainfall Totals Prior to Monitoring (mm)</i>	
		<i>9am</i>	<i>3pm</i>	<i>2 day</i>	<i>5 day</i>
11/02/2021	Recent light rain	19.1	25.5	11	29
18/02/2021	Drizzle	24.6	26.0	29	87
25/02/2021	Fine weather	25.7	27.2	8	14
4/03/2021	Overcast	19.4	23.8	7.8	8

Vegetation Assessment

Plate 1 to Plate 4 provide photographs and vegetation descriptions.



Plate 1 SW1, view north, 18 February 2021

A small pocket of disturbed Paperbark forest occurs at this site with standing water. Ground vegetation is dominated by Creeping Knotweed (*Persicaria strigosa*), Singapore Daisy* (*Sphagneticola trilobata*), Swamp Water Fern (*Telmatoblechnum indicum*) and exotic grasses (e.g. *Urochloa mutica**, *Setaria sphacelate**). This vegetation comprises poor acid frog habitat.



Plate 2 SW2, view west, 18 February 2021

A shallow constructed pond/dam occurs at this disturbed site. Dominant ground vegetation consists of Cuphea* (*Cuphea carthagenensis*), Slender Knotweed (*Persicaria decipiens*), Frogsmouth (*Philydrum lanuginosum*), Budda Pea (*Aeschynomene indica*) and maintained exotic grasses (e.g. *Setaria sphacelate**, *Sorghum halepense**, *Chloris gayana**). This vegetation comprises poor/unsuitable acid frog habitat.



Plate 3, view south-east, 11 February 2021

SW3: This is a disturbed site with a sparse canopy dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Pink-flowered Doughwood (*Melicope elleryana*). The dominant vegetation in the drainage line consists of grasses (*Leersia hexandra*, *Setaria sphacelate**), with Swamp Water Fern, Pouched Coral Fern (*Gleichenia dicarpa*) dominant on the banks. This vegetation comprises potential Wallum Froglet habitat.



Plate 4, view west, 11 February 2021

A mature patch of Paperbark forest occurs with standing water dominated by Grey Rush (*Lepironia articulata*) and flanking beds dominated by Plume Rush (*Baloskion tetraphyllum* subsp. *meiostachyum*) and Swamp Water Fern. This area comprises high quality habitat for both acid frog species, with Wallum Froglets recorded previously (Blackwood Ecological 2013).

*Introduced species

Water Quality

Both acid frog species are typically associated with oligotrophic (nutrient poor) and acidic (pH between 3.5 and 6.0) water which is typically clear, still and tannin stained (DoE 2016).

Figure 2 presents the pH results for each monitoring round and the pH upper limit (pH 6) for acid frog habitat. Full water quality monitoring results are provided at **Appendix A**. SW2 could not be monitored on 11 February 2021 due to insufficient water.

The pH at SW1 was within a range suitable for acid frogs during the first two monitoring events and higher than the acid frog upper limit during the second two monitoring events. The pH range for SW2 was above the acid frog upper limit during all monitoring events (where the water could be sampled). The pH at SW3 and SW4 were within a suitable range for acid frogs during all monitoring rounds.

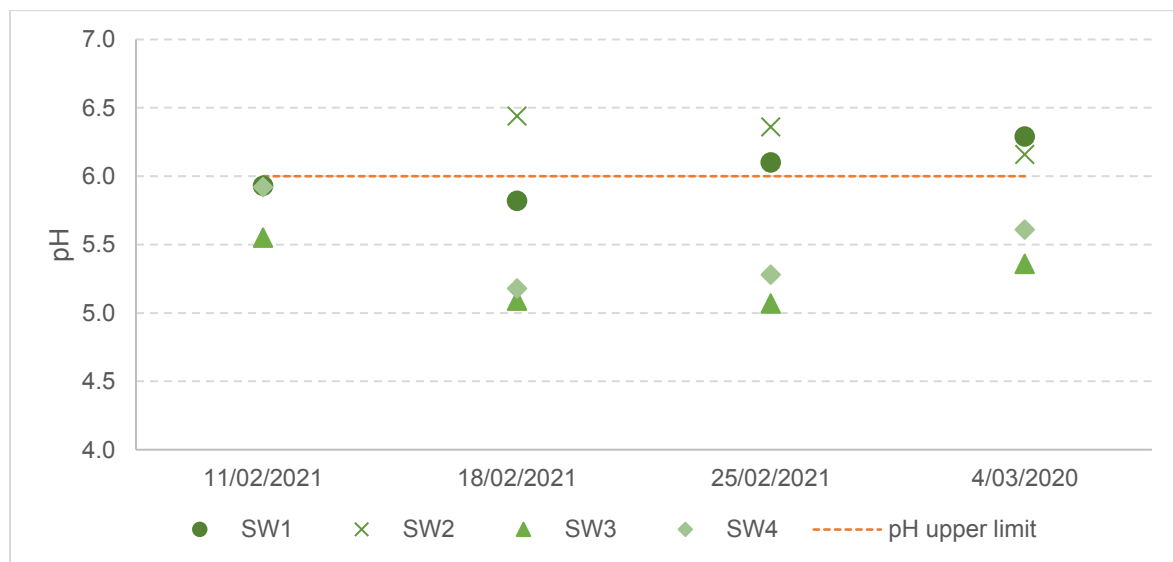


Figure 2 pH of standing water at each site for all monitoring rounds and pH upper limit for acid frog habitat

Frog Monitoring

The frog monitoring results are presented in **Table 3**. The Wallum Froglet (*C. tinnula*) was recorded at SW4 during three monitoring events with numbers ranging from approximately 3 to 20 individuals (est.). Wallum Froglets were also heard calling in areas adjacent to SW3 and SW4 on the 11 February, 25 February and 4 March 2021. The species was not recorded within the drainage line at site SW3. The Wallum Sedge Frog (*L. olongurensis*) was not recorded at any site.

Other frog species recorded during surveys included Common Eastern Froglet (*Crinia signifera*), Eastern Dwarf Tree Frog (*Litoria fallax*) and Striped Marsh Frog (*Limnodynastes peronii*). Striped Marsh Frog egg masses were also recorded at two sites on two occasions.

Table 3 Frog monitoring results

Date	<i>C. tinnula</i>	<i>C. signifera</i>	<i>L. fallax</i>	<i>L. peronii</i>	Comments
SW1					
11/02/2021	-	-	-	Y	10 <i>L. peronii</i> egg masses.
18/02/2021	-	-	Y	-	-
25/02/2021	-	-	Y	-	-
04/03/2021	-	-	-	-	-
SW2					
11/02/2021	-	-	-	-	Nil frogs.
18/02/2021	-	Y	-	Y	One <i>L. peronii</i> egg mass.
25/02/2021	-	-	-	-	-
04/03/2021	-	-	-	-	-
SW3					
11/02/2021	-	-	-	-	<i>C. tinnula</i> heard in adjacent wetland approx. 40m NE.
18/02/2021	-	-	Y	Y	-
25/02/2021	-	-	-	-	-
04/03/2021	-	-	Y	-	<i>C. tinnula</i> heard in adjacent wetland approx. 40m NE.
SW4					
11/02/2021	Y (approx. 3)	-	Y	-	<i>C. tinnula</i> also calling approx. 30m NE.
18/02/2021	Y (approx. 12)	Y	Y	Y	-
25/02/2021	-	-	-	Y	<i>C. tinnula</i> calling approx. 30m NE.
4/03/2021	Y (approx. 20)	-	-	-	-

Discussion

Monitoring indicates that the suitability of the habitat for acid frogs varies across the site.

The vegetation characteristics and the pH results at SW4 indicate that the undisturbed forested areas in the western portion of Lot 12 provide high quality habitat for acid frogs. The Wallum Froglet was recorded on multiple occasions in this area during monitoring. The Wallum Sedge Frog was not recorded at this site during monitoring, however diurnal surveys for this species are not recommended, hence there is potential the species may be detected if nocturnal survey is undertaken.

In contrast, the vegetation characteristics, frog monitoring results and pH levels at SW1 indicate that this area is unsuitable as acid frog habitat. At SW2 the frog monitoring results, the fragmented nature of the vegetation and (during the second two monitoring events), the pH levels indicate that this site also constitutes poor/unsuitable habitat for acid frogs.

At SW3 the vegetation is considered poor, however pH levels were within an acceptable range for acid frogs during all monitoring events. As this site is relatively disturbed it is considered unsuitable for the Wallum Sedge Frog. However, the Wallum Froglet is known to occur in disturbed areas. Given that this species was recorded approximately 30 m north-east of the drainage line in adjacent vegetation this site is considered as potential Wallum Frog habitat.

Any consideration of development of the site should take into account the known presence of Wallum Froglets in the western portion of the site and the possibility that they may occur in the drainage system along the south-western boundary.

Yours sincerely
GeoLINK



Gemma Quick
Environmental Scientist

Attachments:

Appendix A: Water Monitoring Results

References:

Blackwood Ecology (2013). *Ecological Assessment Lot 2 DP 1004514 Bayshore Drive Byron Bay, NSW*. A Report to BMack Project Management Services.

Department of the Environment [DoE] (2016). *Litoria olongburensis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from:
<http://www.environment.gov.au/sprat> Accessed Wed, 24 Aug 2016.

Certification

	Name	Signature	Date
Prepared by	GKQ		4/3/2021
Reviewed by	ILC		10/3/2010

UPR	Description	Date issued	Issued By
3544-1011	First issue	10/03/2021	DH



Appendix A

Water Monitoring Results

Date	Field Notes	Time	pH	EC (mS/cm)	DO (mg/L)	Turbidity (NTU)	Temperature (°C)
SW1							
11/02/2021	Small isolated pool with low water level and no flow. Tannins. Recent light showers.	10:44	5.93	0.26	1.58	8	20.8
18/02/2021	High water level, no visible flow. Tannins. Drizzle.	11:27	5.82	0.15	2.39	12	22.8
25/02/2021	Medium water level, no visible flow. Tannins. Weather fine.	11:05	6.10	0.27	0.98	3	24.4
4/03/2020	Medium water level, no visible flow. Tannins. Overcast.	11:33	6.29	0.19	1.58	7	22.0
SW2							
11/02/2021	Insufficient water to monitor. Fine weather.						
18/02/2021	High water level, no visible flow. Overcast.	11:10	6.44	0.12	3.91	4	25.7
25/02/2021	Medium water level, no visible flow. Fine weather.	10:56	6.36	0.14	0.77	11	26.2
4/03/2020	Medium water level, no visible flow. Overcast.	11:23	6.16	0.14	3.33	5	23.4
SW3							
11/02/2021	Very low water level, no flow. Sampled in heavily vegetated drain. Fine weather	11:49	5.55	0.41	1.37	7	21.8
18/02/2021	Medium water level, very low flow. Overcast.	11:38	5.09	0.24	2.26	1	22.9
25/02/2021	Medium water level, no flow. Fine weather.	9:55	5.07	0.18	0.49	4	22.7
4/03/2020	Low water level, no flow. Overcast.	12:27	5.36	0.24	1.00	1	21.8
SW4							
11/02/2021	Low water level, no visible flow. Tannins. Fine weather.	12:08	5.92	0.27	1.90	8	22.0
18/02/2021	Medium water level, no visible flow. Tannins. Drizzle.	12:25	5.18	0.17	2.93	3	23.5
25/02/2021	High water level, no visible flow. Tannins. Fine weather.	10:23	5.28	0.14	1.98	10	24.4
4/03/2020	Medium water level, no visible flow. Tannins. Overcast.	12:07	5.61	0.11	1.96	3	22.6

* Sampled at alternate monitoring approx. 70m NE due to access issues caused by inundation of drainage system.