



Institute for Land,  
Water and Society  
Charles Sturt University

# Wetland monitoring in the Yanco, Billabong & Colombo creeks

Amelia Walcott, Skye Wassens, Andrew Hall, Ben Wilson & Ben Wolfenden

*research for a sustainable future*

# Overview

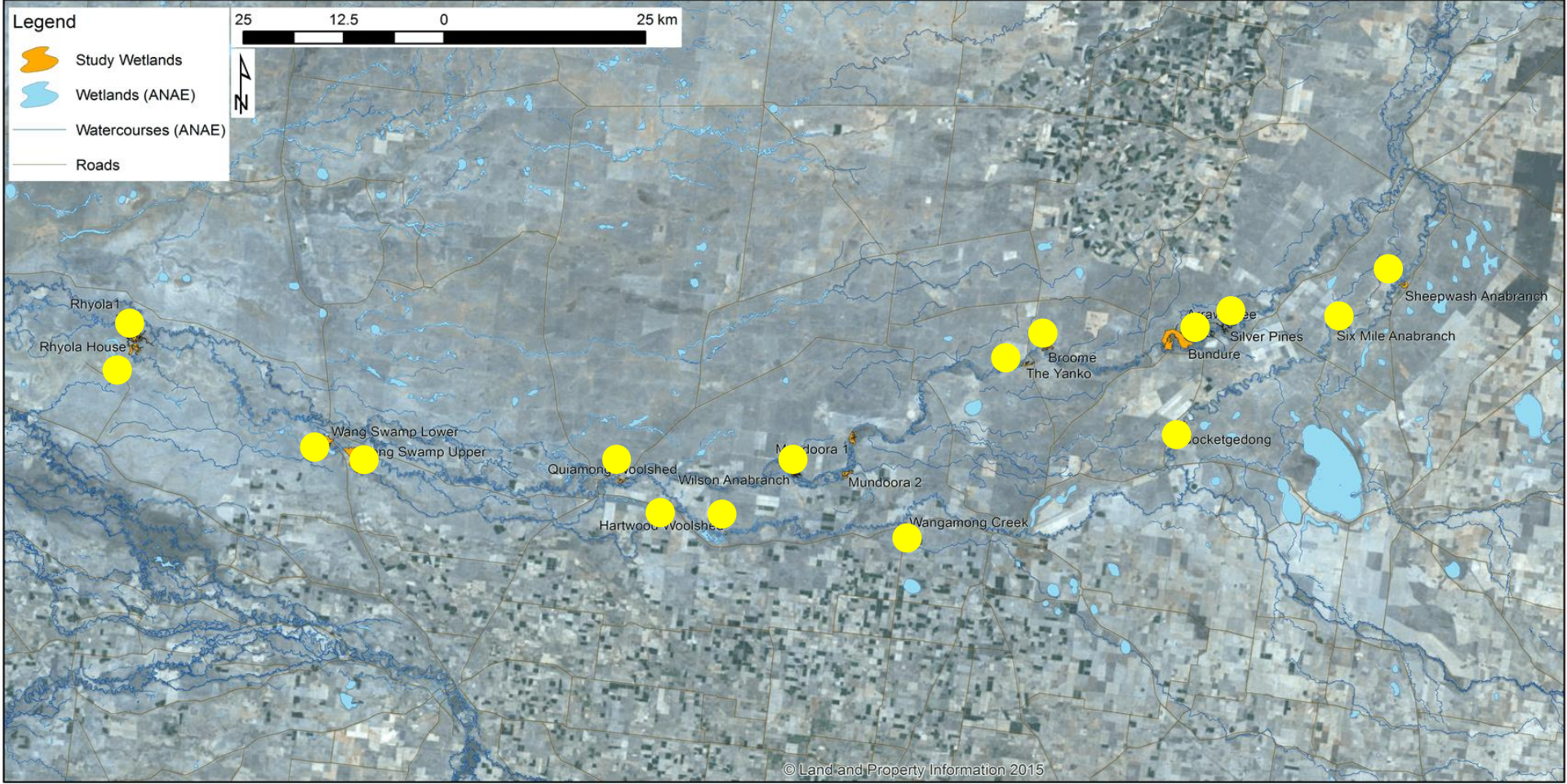
15 wetlands, at each surveyed:

- Wetland soil carbon stocks (May & June, 2017)
- Stable isotopes (May & June, 2017)
- Frog surveys (Oct & Dec 2017)
- Audio monitoring (Oct 2017 – Feb 2018)
- Bird surveys, OEH (Dec 2017)



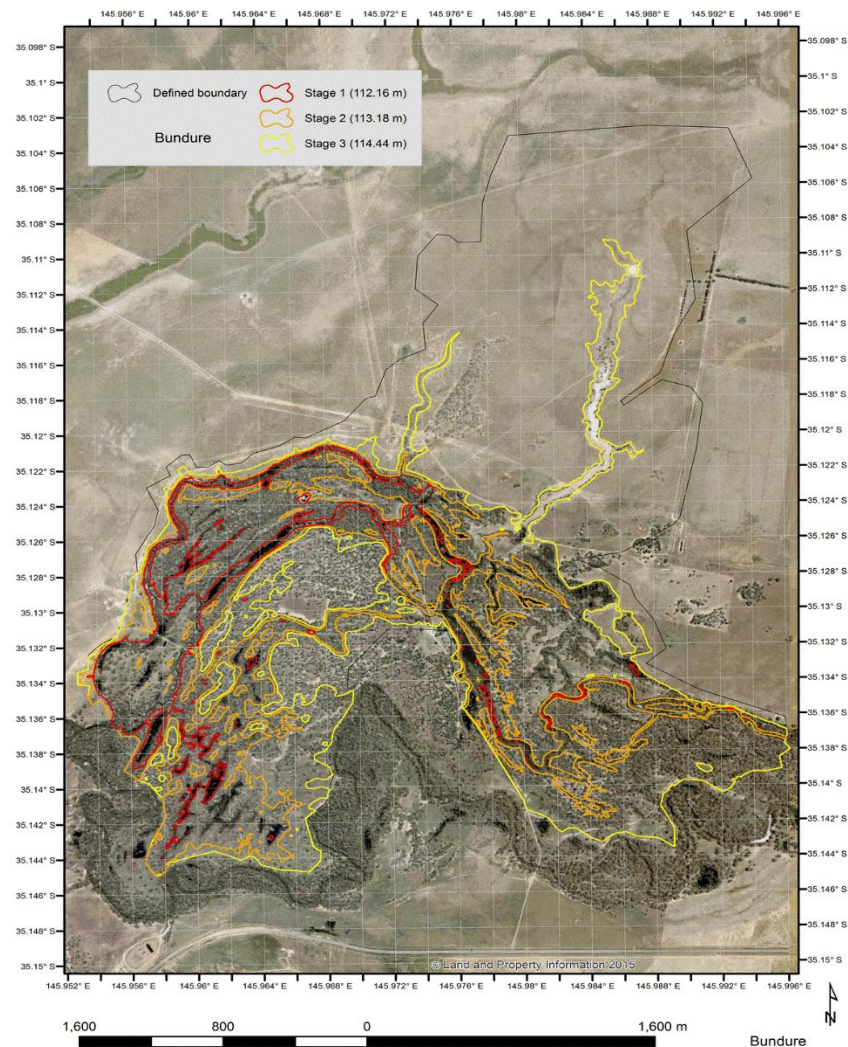
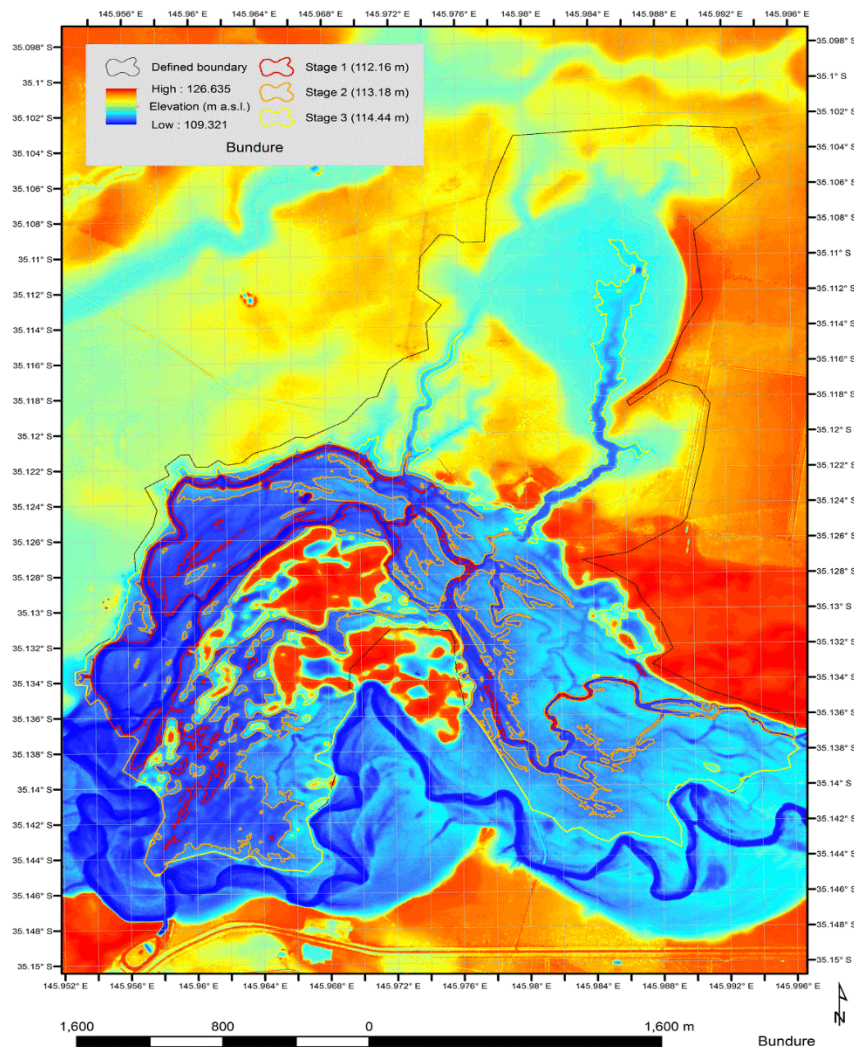


# Study sites:

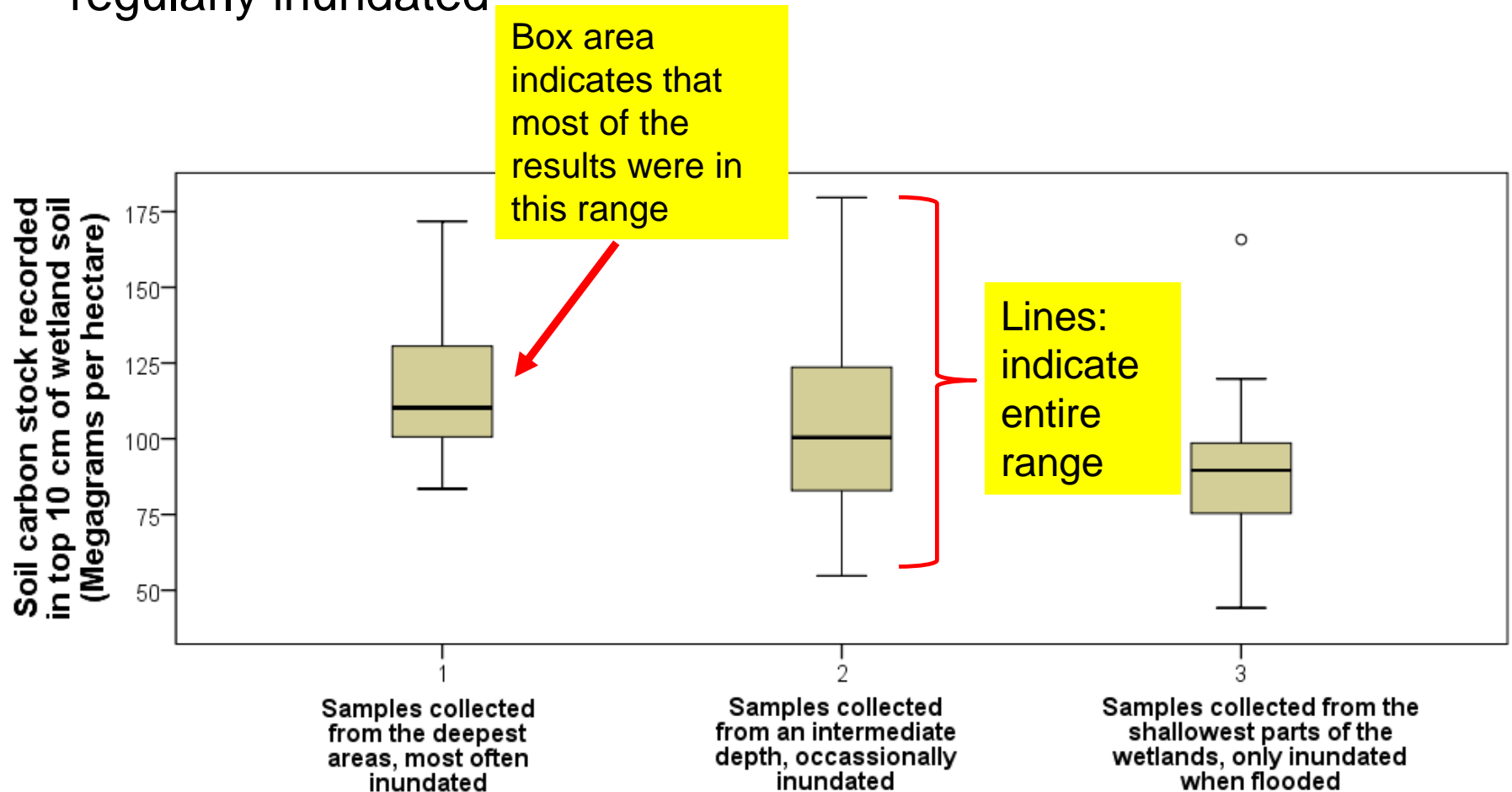




# Stratified mapping to collect soil core samples at different wetlands depths (source: Andrew Hall)

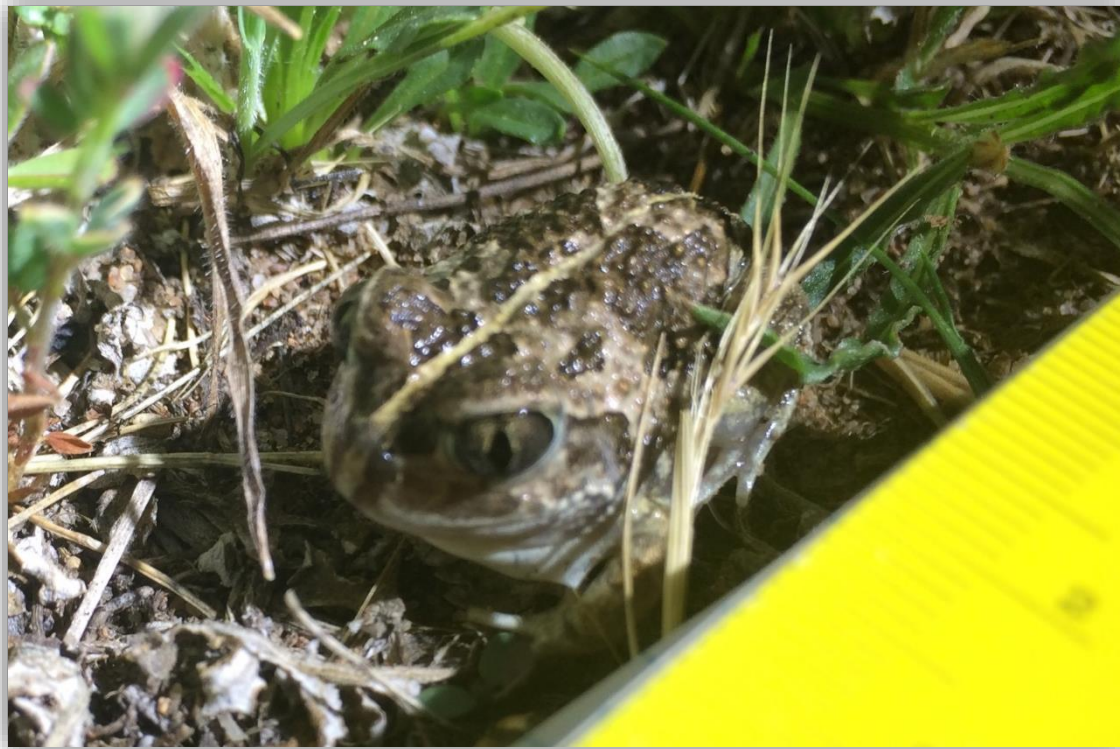


Average wetland carbon stocks were higher in areas more regularly inundated





# Frog spotting



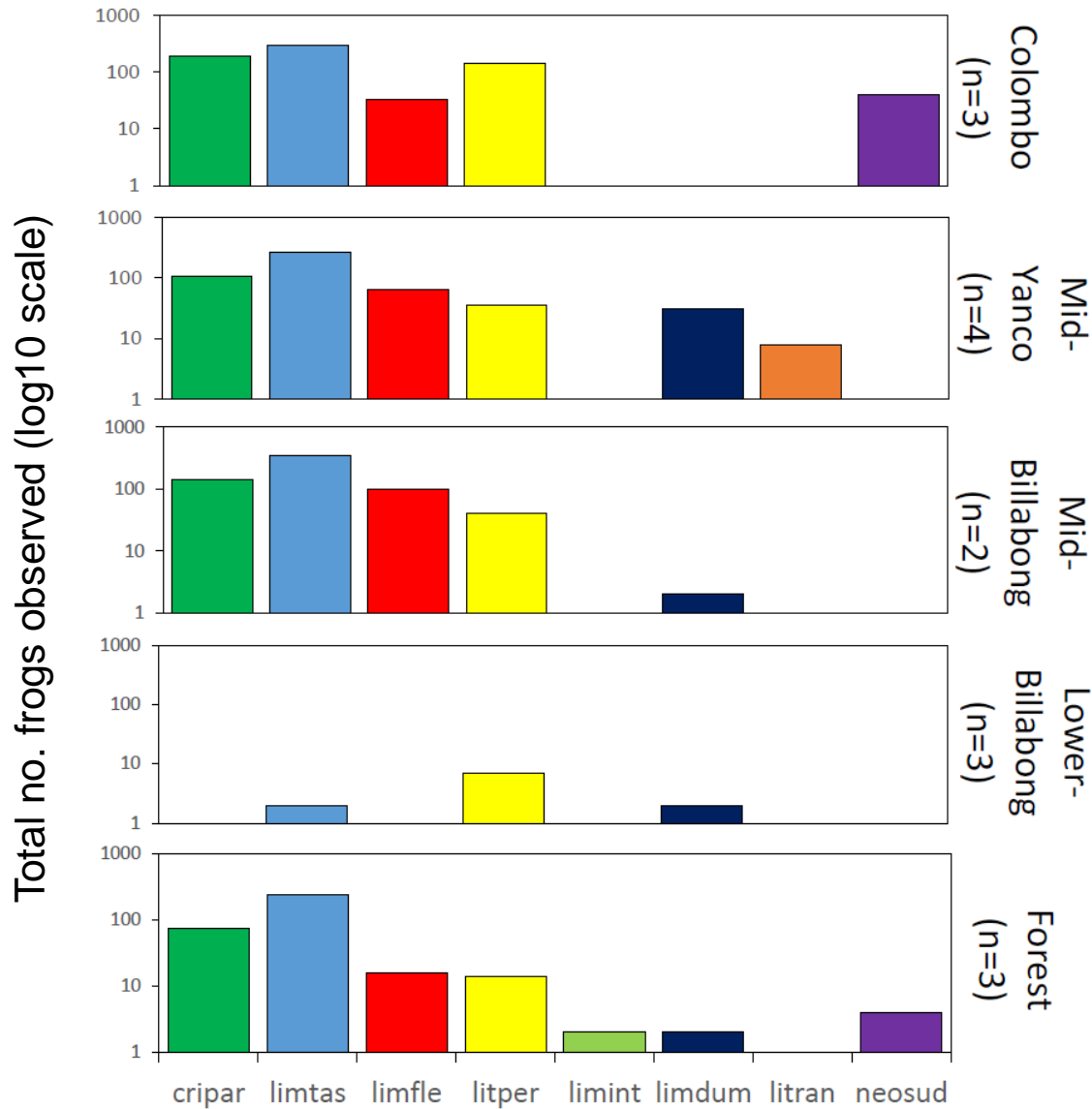
## Yanco Creek System Reaches

- |  |  |
|--|--|
|  1. Upper Yanco    |  4b. Mid Billabong  |
|  2. Mid Yanco      |  5. Lower Billabong |
|  3. Colombo Creek  |  6a. Forest Creek   |
|  4a. Mid Billabong |  6b. Forest Creek   |



Source: Alluvium (2013), Yanco Creek system environmental flow study (final report), report prepared by Alluvium Consulting Australia for State Water, Leeton NSW.

# Frog species diversity across the system reaches



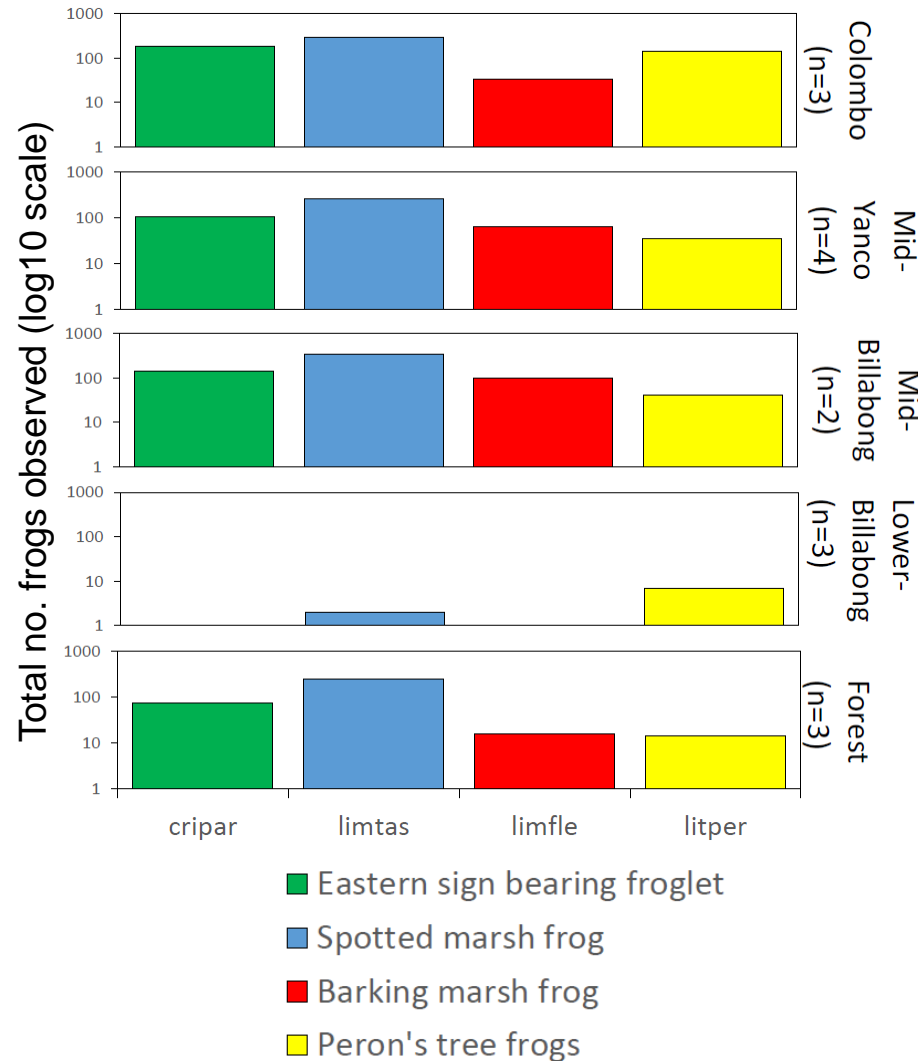
## Frog species:

- Eastern sign bearing froglet
- Spotted marsh frog
- Barking marsh frog
- Peron's tree frogs
- Giant banjo frog
- Eastern banjo frog
- Southern bell frog
- Sudel's frog

**N.B.** different number of sites surveys per system reach



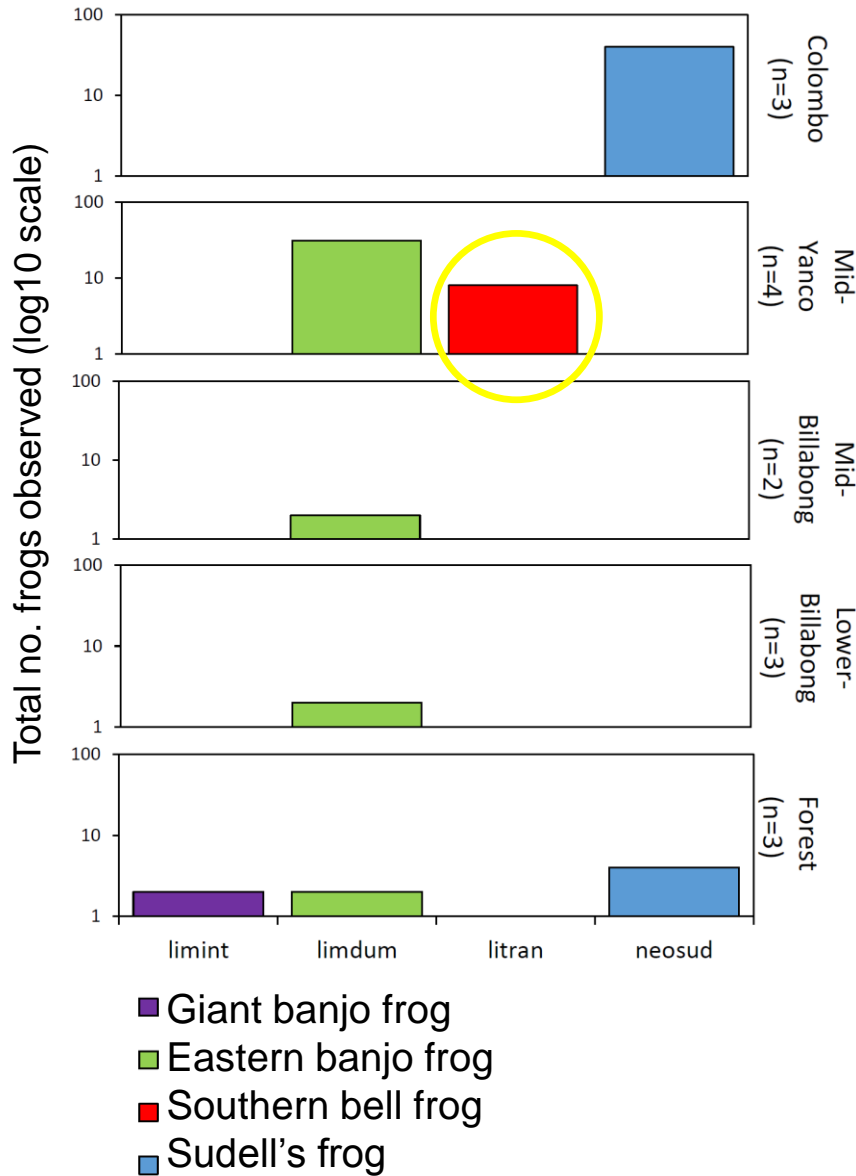
# Commonly encountered frog species (October & December 2017)



- Consistently high numbers of common, widespread generalist species
- Three ground dwelling species
- One tree frog species
- Low frog numbers in the lower billabong (limited water available at the 2 Rhyolla sites)
- N.B. number of sites per system reach vary



# Rarely encountered frog species (October & December 2017)



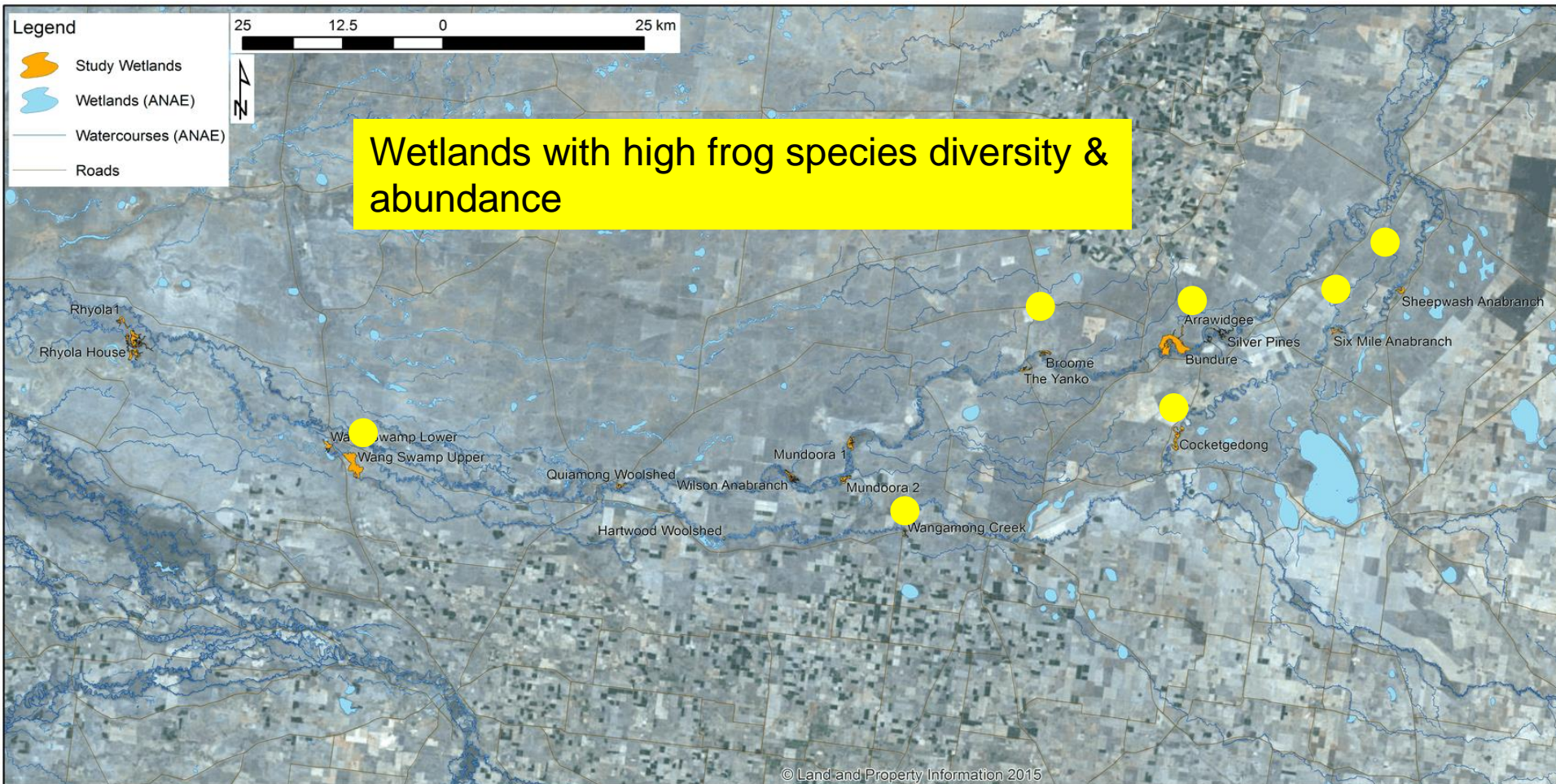
- One threatened species, southern bell frog (mid-Yanco only)
- 3 burrowing species (banjo's & Sudell's)
- Burrowers usually difficult to detect but surveys followed heavy rain when most active





# Comparing the frog habitats

Sites	Frog diversity (no. frog species per site)	Abundance (based on frogs observed)	Comments
WANU, BUND, BROO, SHEE, WANG, CCKT	5-7	118-522 (high)	Good water availability (persisted during surveys), high diversity & proportion of aquatic plants
CNNG, WILS, YANK	4-5	29-60 (low)	WILS: low water levels CNNG: poor survey timing for detection (undertaken in Feb 2018)
HART, WANGL	3	149-260 (high)	WANGL: wetland drying (during surveys)
FRST, QUIA	2-3	4-16 (low)	Little aquatic vegetation, permanent water supply
RHYolla x 2	0-3	0-6 (low)	No water available, no aquatic veg.



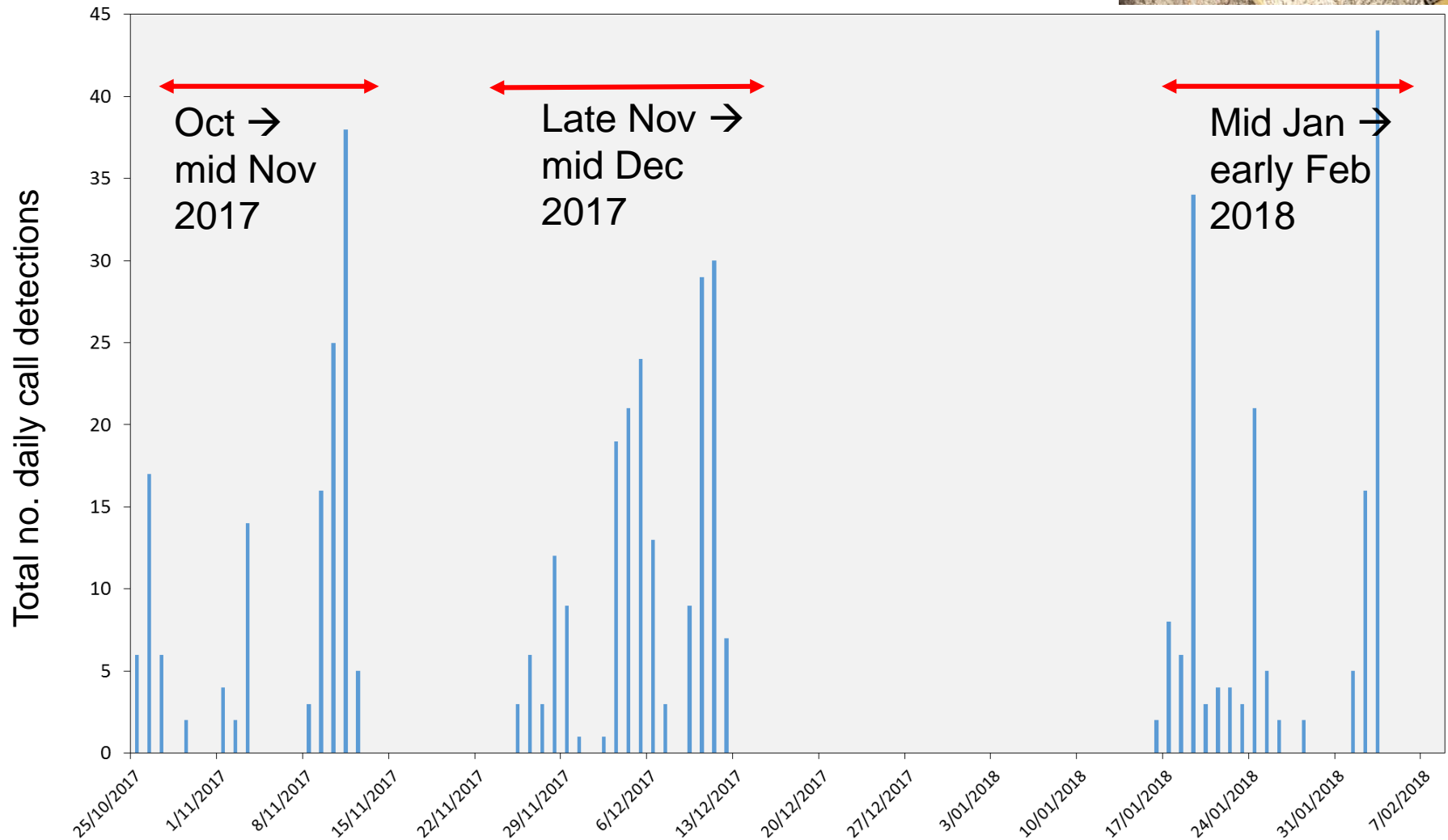


# Bundure

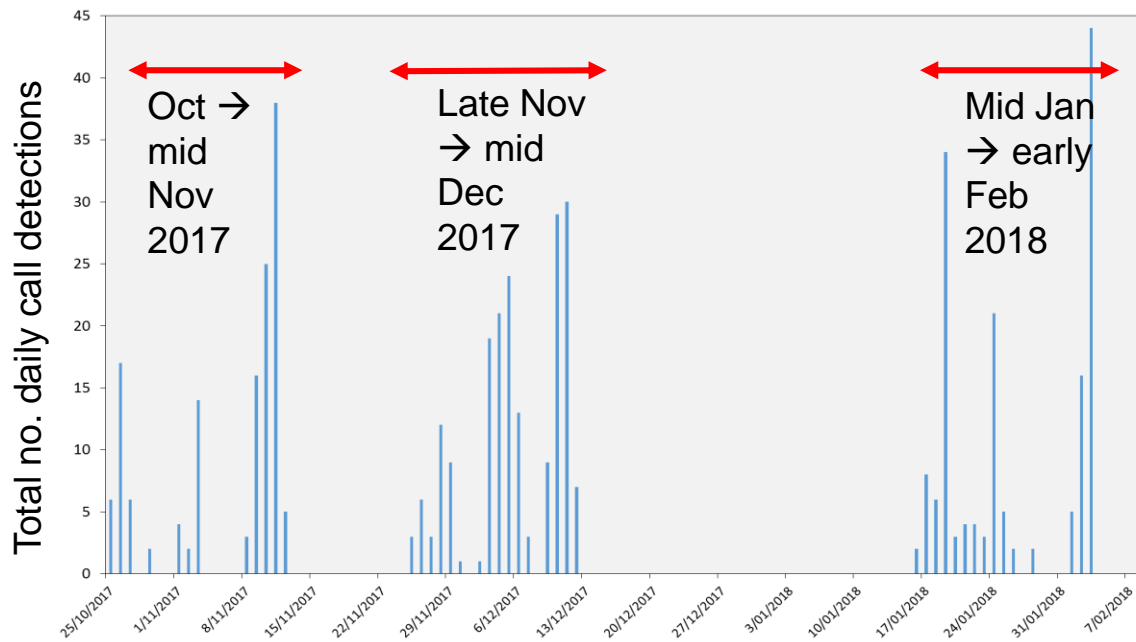


- Small population of southern bell frogs!
- High diversity of frog species
- Lots of different types of aquatic vegetation
  - Trees
  - Floating aquatic
  - Submerged aquatic
  - Fringing vegetation
  - Tall standing
  - Short standing
- Persistent water supply (in areas)

# Southern bell frog calling at Bundure



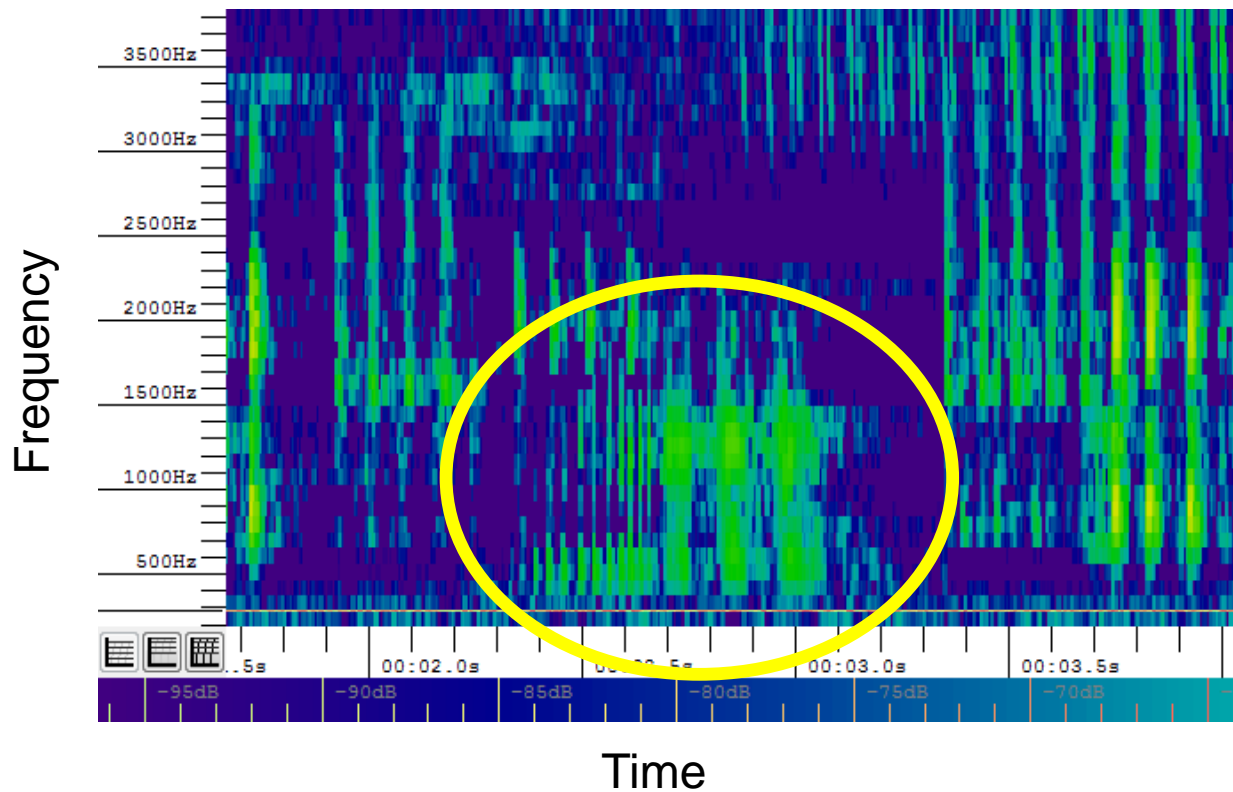




- Calling peaks indicate multiple breeding attempts at this site
- Known to move between sites (Wassens et. al)\*
- Would be interesting to look for tadpoles and metamorphs to determine recruitment success

\* Wassens Skye, Watts Robyn J. , Jansen Amy, Roshier David (2008) Movement patterns of southern bell frogs (*Litoria raniformis*) in response to flooding. *Wildlife Research* **35**, 50-58.

# Spectrogram of a southern bell frog's call







# Summary

- Provides baseline data on the frog species residing in the system.
- A higher diversity & number of frogs were observed at sites with seasonally available water and with a high proportion & diversity of aquatic plants.
- Further surveys are recommended for gaining insight into southern bell frog (threatened *sp.*) populations (especially in the mid-Yanco where detected).
- Audio data provides important insight into frog breeding times (important implications for timing of water delivery).









The ominous frog survey conditions, early December 2017

	Spotted marsh frog ( <i>Limnodynastes tasmaniensis</i> )	Barking marsh frog ( <i>Limnodynastes fletcheri</i> )	Peron's tree frog ( <i>Litoria peronii</i> )	Eastern sign-bearing froglet ( <i>Crinia parinsignifera</i> )
<b>Size</b>	Medium (3.5-4.5 cm long)	Medium (4.5-5.5 cm long)	Medium (about 5 cm long)	Small (usually <2 cm long)
<b>Call</b>	A rapid 'tok-tok-tok-tok'. Some say similar to a machine gun firing rapidly.	Low pitched 'woof' repeated regularly (similar to a dog bark, hence the name).	Low, ascending cackle.	A high pitched squelch, or 'eeeekk', can be singular or repeated rapidly.
<b>Colour range &amp; markings</b>	Green to dark brown. Commonly symmetrical regular shaped dorsal spots and a yellow, red or white stripe down the back.	Very similar to the spotted marsh frog but (mostly) lacks the pale back stripe which is common to spotted marsh frogs. Large, irregularly shaped darker brown patches. Eye lids may be rose-pink, like eye shadow.	Grey to dark brown. Green (emerald) flecking on their backs is common, as is bright yellow with black mottling on the inner hind-thighs.	Dark brown and chestnut to light grey. Tiny - the size of a thumb nail.
<b>Breeding time</b>	Late winter, spring and summer.	Peaks in spring to autumn.	Spring and summer, or when air temperatures are higher than 20°C.	Year-round following heavy rain events, particularly during the cooler months.
<b>Habitat preferences</b>	Widespread and common species, readily colonise all types of freshwater water bodies. Adults were identified across the system.	Known to live in the drier areas of inland south-east Australia, this species was found across the system.	This tree frog species requires standing timber as habitat or tall standing vegetation (e.g. cumbungi).	Widespread and common species. Prefer shallow waters, e.g. flooded grassland nearby dams or swamps. During the day time they hide amongst grasses, log, rocks and leaf litter.
				



FROGS	Southern bell frog ( <i>Litoria raniformis</i> )	Sudell's frog ( <i>Neobatrachus sudellae</i> )	Eastern banjo frog ( <i>Limnodynastes dumerilii</i> )	Giant banjo frog ( <i>Limnodynastes interioris</i> )
<b>Size</b>	Very large (6.5-10.5 cm long)	Medium (5-5.5 cm long), although quite rotund	Large (7-8 cm long)	Very large (around 9 cm long)
<b>Call</b>	Low-pitched, similar to a motorbike revving and accelerating	Similar to the spotted marsh frog but a higher pitch trill. Call while afloat	Loud 'bonk' sound repeated at regular intervals	Similar to the eastern banjo frog, the call is a lower pitched 'bonk' sound, repeated at regular intervals.
<b>Colour range &amp; markings</b>	Colour ranges from bright green (pictured) to more dull hues of green and brown. Raised brown/gold warts (don't worry they're not contagious). Large golden eyes. Turquoise blue on the inside of the hind legs. Thin brown line from nose to eye & then a paler coloured stripe extends from eye, above ear and down the body.	Pale yellow/brown to grey coloured backs with either large darker coloured patches, or numerous dark & cream coloured spots. Large, bulging eyes with a vertical, almost diamond shaped pupil. Rotund in shape.	Dark grey to brown coloured backs. Dark stripe from nose to above arm with a paler coloured orange-brown or golden) stripe above the lip. Sides of the body are usually orange-brown with mottled yellow/orange. Throat is often yellow.	Again, similar to the eastern banjo frog but larger in size.
<b>Breeding time</b>	Spring and summer	Following rainfall, late winter to summer & autumn	Mainly spring to autumn following heavy rain fall	Mainly in spring, also in summer and autumn following rainfall.
<b>Distribution throughout the region</b>	Endangered species which has suffered major declines, although still found in some rice growing areas. This large, distinct ground-dwelling frog prefers shallow, warm waters with an abundance of vegetation.	Widespread range throughout drier, inland areas. A burrowing species which prefers to live in sandy soils conducive to easy digging.		
				
				Photo courtesy of Carmen Amos