



# Murraylands and Riverland Landscape Board

## Martin Bend Monitoring Summary

### 2021-22



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National  
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## More Information

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# Monitoring update 2021-22

## 1.1 Frogs

- Frogs were monitored using aural survey methods in November of 2020 and December 2021 at 3 different survey sites (MTBFR01, MTBFR02, MTBFR04, MTBFR06)
- 5 common Riverland species were heard throughout the wetland system, including the storm water lagoon, temporary (pumped) basin and permanent lagoon.
- The abundance (how many) and diversity (number of species) observed is typical of a permanently connected system like Martin Bend.
- MTBFR06, located in temporary basin 3 had the highest species diversity where we delivered environmental water through a pump, excluding fish. Previous monitoring has indicated that presence of frogs increased in abundance and diversity when a basin receives environmental water and most fish are excluded from the system (Robinson Et al., in preparation). The exclusion of fish from this basin will have positively influenced any breeding attempts of any frog species. As the eggs, tadpoles and metamorphs produced will have experienced reduced competition for food and habitat as well as reduced predation.
- Surveys conducted were submitted to FrogWatch SA, the survey recordings are available at [www.frogwatchsa.com.au](http://www.frogwatchsa.com.au). There are also resources available to assist in identification of frog species across the regions.

**Table 1.** Frog species heard during aural surveys in 2020 and 2021

	Site Code	Spotted grass frog ( <i>Limnodynastes tasmaniensis</i> )	Peron's tree frog ( <i>Litoria peronii</i> )	Long-thumbed frog ( <i>Limnodynastes fletcheri</i> )	Eastern banjo frog ( <i>Limnodynastes dumerillii</i> )	Eastern Sign-bearing frog ( <i>Crinia parinsignifera</i> )
November 2020	MTBFR02	Few	Few	Few		
	MTBFR04	Many	Many	Few	Few	
	MTBFR06	Few	Many	Few	Few	Few
December 2021	MTBFR01		One	One		Few
	MTBFR02		Few	Few		
	MTBFR06	Few		One	One	Few

One= 1 | Few= 2-9 | Many= 10-50 | Full chorus= >50

## 1.2 Fish

- Fish assemblage was monitored in the permanent lagoon in spring 2022 at 3 sites throughout the permanent lagoon (MTBFI01, MTBFI04 and MTBFIALL). The permanent lagoon had recently undergone a full dry phase, which excluded large carp from the wetland basin. The regulator is fitted with fish screens preventing the access of any large fish, in particular carp. The exclusion of large carp will allow benefits of the dry phase to be completely realised.
- The recent dry phase and removal of large carp from the system will create favourable habitat for native species, as water clarity is maintained and aquatic vegetation is able to grow. As expected, the survey found a typical range of wetland aquatic fauna species. Including small bodied natives like the carp gudgeon (*Hypseleotris spp.*), Murray-Darling rainbow fish (*Melanotaenia fluviatilis*) and yabbie (*Cherax destructor*). Multiple long-necked turtles (*Chelodina longicollis*) were also sampled.
- Invasive species found include common carp (*Cyprinus caprio*), goldfish (*Carssius auratus*) and Eastern gambusia (*Gambusia holbrooki*). While these species were present, their numbers were low and the common carp ranged from 21 – 230 mm long. Carp of this length are not able to disturb the wetland bed so water clarity is protected. After 18-24 months, these carp will be large enough to disturb the wetland bed and the turbidity will increase.



**Figure 1.** Peron's tree frog tadpole (*Litoria peronii*) sampled in spring fish survey



**Figure 2.** Sample of species surveyed in spring including common carp (*Cyprinus caprio*), Murray-Darling rainbow fish (*Melanotaenia fluviatilis*) and tadpoles (*Limnodynastes spp.*)

### 1.3 Surface Water

- Surface water quality was monitored during frog, fish and bird surveys across the entire wetland complex. Covering the storm water lagoon, temporary lagoons and permanent lagoon.
- Surface water quality was variable but overall indicative of a healthy freshwater system and consistent with similar systems, the turbidity (NTU) levels all below 35 indicate very clear water achieved through the exclusion of large carp (*Cyprinus carpio*).
- Dissolved Oxygen (DO) did drop below acceptable levels (<5mg/L) at some survey sites. These surveys were conducted after the site had been fully dried, dense vegetation covered the permanent lagoon wetland bed when dry. It is likely the low DO may have been caused by the decomposition of this vegetation. DO is a very volatile parameter and typically drops overnight, coinciding with some of our sampling.
- Electrical Conductivity (EC) was also variable across the site with the highest reading 2300 µS/cm and the lowest 312 µS/cm. EC exceeding 1,000 µS/cm is typical within our pump sites as salts accumulate when water evaporates. The permanent lagoon, which is connected to the river through a regulating structure, had the lowest EC. This is typical of a permanently connected site as it is able to export salts over time and has permanent access to the river fresh water

**Table 2.** Surface water quality sampled during birds, fish and frog surveys in October 2021 and December 2021.

	Site	Temp (C°)	pH	EC (µS/cm)	Turbidity (NTU)	DO (mg/L)	Depth (cm)
<b>October 2021</b>	<b>MTBBI01</b>	16.72	7.47	736	1	2.85	15
	<b>MTBBI02</b>	18.25	7.1	312	34.3	3.11	100
	<b>MTBBI03</b>	16.43	9.98	1630	5	8.41	n/a
	<b>MTBBI04</b>	17.11	8.77	1140	72	7.79	35
	<b>MTBBI05</b>	17.15	7.37	1240	24.7	3.09	n/a
<b>December 2021</b>	<b>MTBFI04</b>	21.34	7.49	1180	31	1.57	30
	<b>MTBFR02</b>	25.04	6.91	913	2.3	0.51	20
	<b>MTBFR06</b>	22.11	9.48	2300	15	5.6	25

### 1.4 Birds

- In October 2021 wetland bird surveys were conducted at sites MTBBI01, 02, 03, 04 and 05.
- The species abundance and diversity was typical of the wetland complex. A peregrine falcon was sighted, and observed to be nesting. This species is considered Rare in South Australia.

**Table 3.** Bird species surveyed at Martin Bend Wetland in October 2021

Common Name	Species Name
Australian reed warbler	<i>Acrocephalus australis</i>
Grey teal	<i>Anas gracilis</i>
Pacific black duck	<i>Anas superciliosa</i>
Hardhead	<i>Aythya australis</i>
Maned duck	<i>Chenonetta jubata</i>
Silver gull	<i>Chroicocephalus novaehollandiae</i>
Grey butcherbird	<i>Cracticus torquatus</i>
Black swan	<i>Cygnus atratus</i>
White-faced heron	<i>Egretta novaehollandiae</i>
Nankeen kestrel	<i>Falco cenchroides</i>
Peregrine falcon	<i>Falco peregrinus</i>
Whistling kite	<i>Haliastur sphenurus</i>
Pied stilt	<i>Himantopus leucocephalus</i>
Caspian tern	<i>Hydroprogne caspia</i>
Blue-breasted fairywren	<i>Malurus pulcherrimus</i>
Fairywrens	<i>Malurus sp.</i>
Noisy miner	<i>Manorina melanocephala</i>
Little grassbird	<i>Megalurus gramineus</i>
Little pied cormorant	<i>Microcarbo melanoleucos melanoleucos</i>
Tree martin	<i>Petrochelidon nigricans</i>
Great pied cormorant	<i>Phalacrocorax varius</i>
Purple swamphen	<i>Porphyrio porphyrio</i>
Australasian grebe	<i>Tachybaptus novaehollandiae</i>



**Figure 3.** Little black cormorant (*Phalacrocorax sulcirostris*) resting in the permanent lagoon



## 1.5 Hydrological Regimes

Martin Bend is comprised of 2 key wetland types, permanent (pool connected) and temporary (ephemeral). The different basins can be hydrologically managed independently through regulating structures, earth banks and culverts. Hydrological phases for a pool-connected wetland, like the permanent lagoon, include being connected at pool, drawing down, partial dry, dry, and refilling. Pool-connected wetlands with regulating structures may experience any combination of these phases within a 5-year cycle.

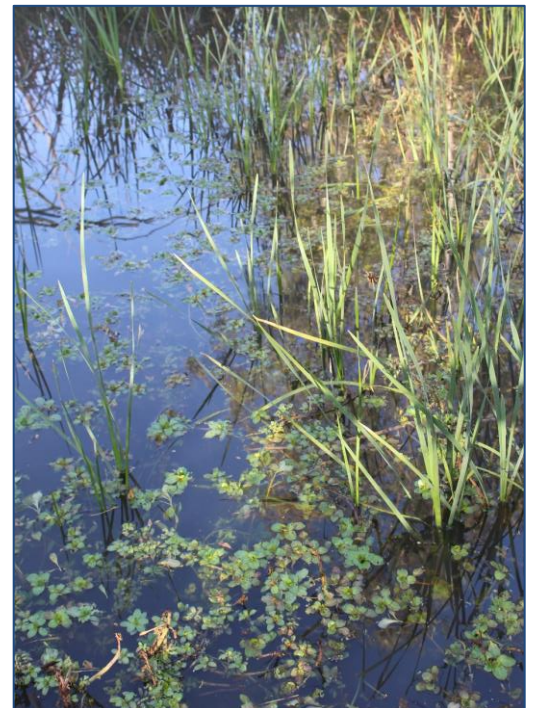
At Martin Bend permanent lagoon, the regulating structure was closed in March 2020, moving this wetland from being connected to pool to drawing down. This dry phase was implemented to achieve important ecological outcomes including, but not limited to:

- Exclusion of large common carp (*Cyprinus carpio*)
- Consolidation of the wetland bed sediment
- Creating water level variability to mimic pre-river regulation flows
- Giving long-lived vegetation a break from inundation, such as river red gums (*Eucalyptus camaldulensis*)
- Providing an opportunity for aquatic vegetation to germinate

Over 14 months, the permanent lagoon successfully dried. In May 2021, the regulator was re-opened, initiating the refill phase of the hydrological cycle. During the dry phase, the wetland bed consolidated, and a dense covering of the native slender knotweed (*Persicaria decipiens*) covered the basin. Once water returned to the basin, this vegetation decomposed, revealing beautiful water clarity thanks to the exclusion of common carp (*Cyprinus carpio*) and consolidation of the wetland bed.



**Figure 4.** Martins Bend refilling, water filtering through mud cracks and understorey vegetation.



**Figure 5.** Martins Bend, clear water and submerged vegetation response

Because Martin Bend has multiple wetland types, it receives water from numerous sources. Primarily, the permanent lagoon receives water from Class 9 Wetland Consumptive Pool. The 3 temporary basins connect naturally to the river when experiencing high flows. However, in between high flow events, delivery of environmental water to these basins using a portable pump allows for more frequent inundation. Pumping environmental water allows these basins to receive enough water to support the vegetation communities beyond the reach of the permanent lagoon, building the resilience by improving and maintaining health of the ecological communities. Pumping also allows for the exclusion of large fish (carp) from these basins resulting in excellent water quality, which creates favourable conditions for native flora and fauna.



**Figure 6.** Pump outflow into temporary basin (T1)



**Figure 7.** Pump and intake from river channel

The temporary basins have received multiple rounds and top ups of environmental water since May 2020, temporary basin 3 (T3) received 210 ML. Temporary basins 1 and 2 (T1 and T2) are connected by pipe culverts and are watered concurrently. In January 2021, watering commenced with a total delivery of 80 ML.

Top-ups occurred, with T1, T2 and T3 filled by June 2021. T3 was then drawn down, reducing to puddles in February 2022. T1 and T2 received environmental water again to maintain levels before draw down commenced. T2 completely dried by June 2022, with T1 holding persistent pools.

In July 2022, the pipe culvert connecting the permanent lagoon and T1 was removed to allow for unregulated flows to connect and fill T1, the flows across the SA Border (QSA) were sitting at 45,583 ML/day and only a small trickle was moving through the culvert. As the flows continued to peak, the fill rate of T1 also increased.

**Figure 8.** Pictorial representation of hydrological phases across the Martin Bend wetland complex from March 2020 - July 2022.  
*\*Some months have been removed where there was no change in hydrological regime.*

Basin Name	Mar-20	Apr-20	May-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22
Permanent Lagoon	Closed - Drawing Down								Opened - Filling							
Temporary Basin 1					Pumped						Top-Up					Unreg
Temporary Basin 2					Pumped						Top-Up					
Temporary Basin 3			Pumped								Top-Up	Dry				



Since July 2021, the South Australian River Murray has been experiencing unregulated flows. Flows at the SA border (QSA) most recently peaked at ~ 54,000 ML/day. At Martin Bend, these flows are inundating the wider floodplain, increasing the extent of the permanent lagoon, and beginning to fill temporary basin 1 (T1). Much of the walking trail is inundated, pictured below. A secondary inlet is now flowing, connecting to the permanent lagoon, allowing it to act as a flow through system. This will allow for nutrient and salt exchange into the main river channel, and allow for fish access. The high flows overtopped the fish screens at the permanent lagoon, the screens were opened at this time, large bodied natives and carp will be able to move through the system freely.

Once unregulated flows subside, Martin Bend will re-enter a drying phase to provide respite for long-lived vegetation that's been inundated for an extended period of time, and to exclude large carp from the system again.



**Figure 9.** Martin Bend floodplain inundation over walking trail during unregulated flows in August 2022

Martin Bend Monitoring Locations

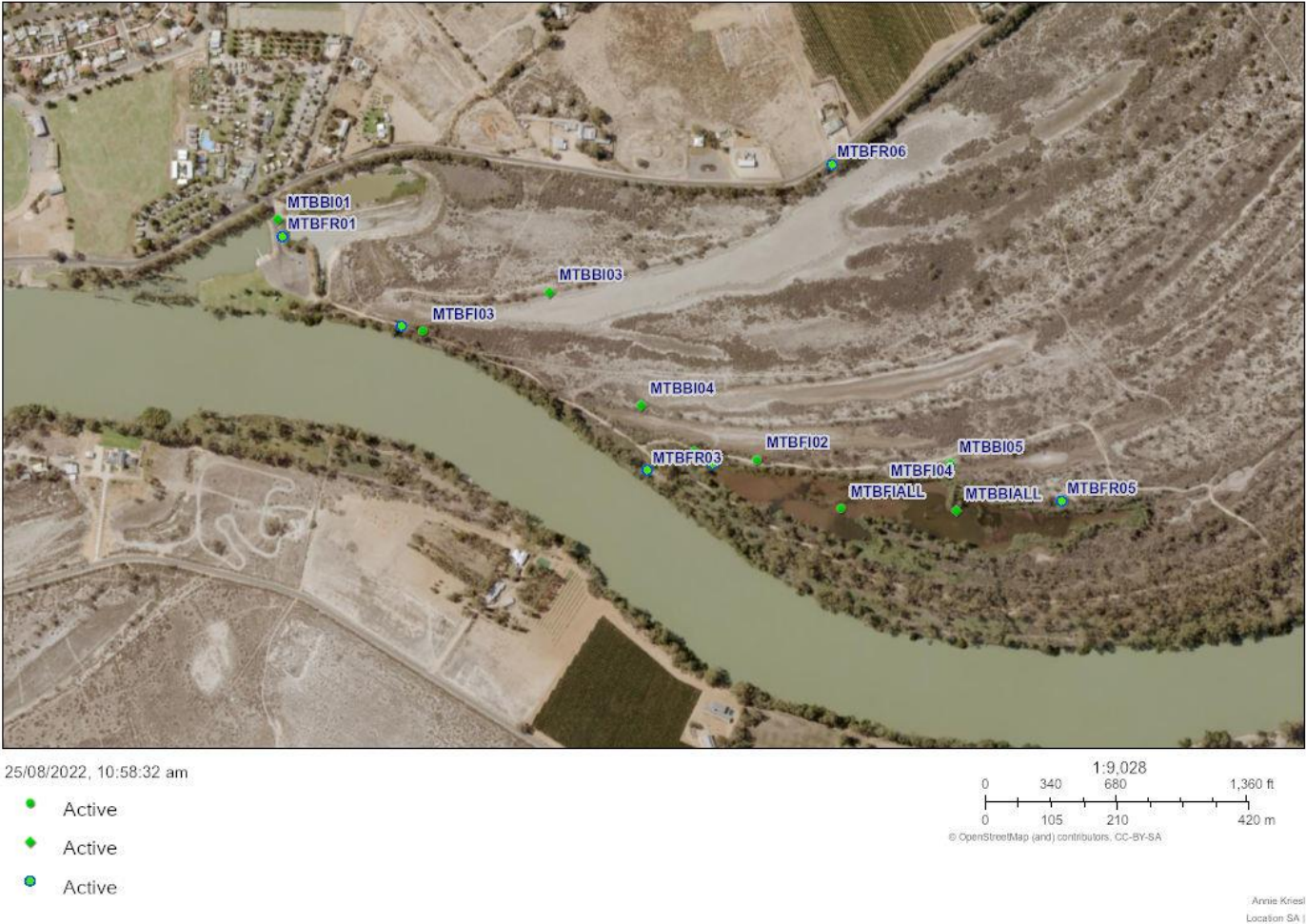


Figure 10. Martin Bend monitoring locations