Waypoint List

Datum: Datum of Loaded Map | Sort

	On Map	Name	Latitude	Longitude	A
✈	Yes	RELEASE SITE	-17 59.519	124 15.411	
✈	Yes	SECOND POOL	-17 58.806	124 17.618	
✈	Yes	MAIN POOL	-17 58.464	124 18.231	

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2 kms

Hunter Bore

average height of pindan 3 metres

•38

average height of pindan 3 metres
spinifex

landing ground

Inkata Feed Yards

Moulamen Tank

Moulamen Bore

RICE HILL

tower

•37

Willumbah Outstation

scrape

42•

•46

pabs and pinden 4 metres
negrass

RIDGE

40

Creek

Blind

WILLUMBAH

Snake

Creek

CAMBALLIN IRRIGATION AREA

MAIN POOL

SECOND POOL

quarry

Camballin

quarry

channel

•41

RELEASE SITE

Creek

numerous drains

43•

•46

625 26 27 28 29 630 31 32 33 34 635 36 37 38 39 640

15'

Rescue of entrapped Freshwater Sawfish, Blina Creek, Liveringa Station

December 2018

David Morgan, Karissa Lear and Travis Fazeldean

Report to Department of Primary Industries and Regional Development and Liveringa Station

Freshwater Fish Group &
Fish Health Unit

Murdoch University

Harry Butler Institute
MURDOCH UNIVERSITY

December 2018

Background

Following a report to the Department of Primary Industries and Regional Development (Broome Office) by staff from Liveringa Station on or about the 10th December 2018, who had observed the likely impending mortality of large numbers of fish due to high temperatures and declining water levels in a small pool on Blina Creek, Liveringa Station, the authors mobilised to the site. Mobilisation was carried out as quickly as possible and with the full support and active encouragement of Liveringa Station Beef Pty Ltd, the owner of Liveringa Station.

It was reported that many Freshwater Sawfish (*Pristis pristis*) may perish, a species that is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*, and protected under the *Fish Resources Management Act 1994*. The Fitzroy River acts as a globally significant nursery habitat for this species, and the population has been monitored in the river since 2003 through tagging and tracking studies by Murdoch University's Freshwater Fish Group & Fish Health Unit.

The Department of Primary Industries and Regional Development contacted Murdoch University's Freshwater Fish Group & Fish Health Unit on the 10th December 2018, for advice and to determine if a relocation of Freshwater Sawfish to a more suitable site was feasible in the circumstances.

Response

A team from Murdoch University, led by David Morgan, with assistance from Karissa Lear, and Looma resident Travis Fazeldean, mobilised to the Kimberley to undertake a rescue mission on the 13th December 2018. Under the *Fish Resources Management Act 1994*, Section 7, an *Instrument of Exemption* (exemption number 3212) was granted by the Department of Primary Industries and Regional Development to allow for the translocation of live sawfish and scale fish to waters several kilometres away in the Fitzroy River catchment. A live fish transport trailer was provided by Broome Tafe to facilitate the transfer of fish. Logistics was assisted by the Nyikina-Mangala Rangers. Accommodation and logistics for the rescue was provided by Liveringa Station. This was a collaborative effort on the part of all involved.

Details and findings

- Several small drying pools on the Blina Creek floodplain were investigated (see Figure 1).

- These pools have no riparian vegetation or in-pool habitat structures (e.g. snags or woody debris), and are situated on the Blina Creek black soil floodplain and are exposed to extremely high levels of solar radiation at this time of the year.
- Mean maximum air temperatures for November and December 2018 was >40^{o}C; with extremes as high as 48^{o}C recorded.
- Mean water temperature measured on the bottom of the largest pool on the 14th December 2018 (13:00h) was ~37.4^{o}C; but was likely to have reached at least 40^{o}C on the surface and in other shallower pools. Mean dissolved oxygen in this pool was 89.7%.
- Freshwater Sawfish were observed in two of four pools. In one pool (named Second Pool, see Figure 1) all sawfish were desiccated and 100% exposed away from the water's edge (this pool was highly eutrophic).
- In the larger main pool, two sawfish were alive and observed continuously swimming, a number of others were very recently deceased (estimated at 0-48 hours), while others were in various states of decay. Three Freshwater Crocodiles were deceased, two being deceased after attempting to leave the pools in search of more permanent suitable waters, one in the main pool. Other teleosts that perished on the 13-14th December 2018 included Bony Bream (*Nematalosa erebi*), Oxeye Herring (*Megalops cyprinoides*) and Lesser Salmon Catfish (*Neoarius graeffei*); the latter the last fish to rise to the surface. Freshwater mussels (*Lortiella froggatti*) were also deceased. Approximately 10 small Freshwater Crocodiles remained alive. From the 14th December 2018, there did not appear to be any living fish in either pool.

Sawfish relocation

The two live Freshwater Sawfish were captured by hand (14th December 2018), and placed in the fish transporter which contained water from the pool and was saturated with oxygen. These sawfish included one female of 1512 mm total length (TL) and 9.8 kg weight, and one male of 1410 mm TL and a weight of 8.26 kg. Each was tagged with a rototag (green tag #43 and 44, respectively). These fish were immediately transported to Uralla Creek and released (see Figure 1 for the release site). Both fish appeared strong, yet had suffered from sunburn to their rostrum and dorsal fins, and their ventral surface appeared to be somewhat cooked (presumably from the high water temperatures that they were exposed to over a long period).

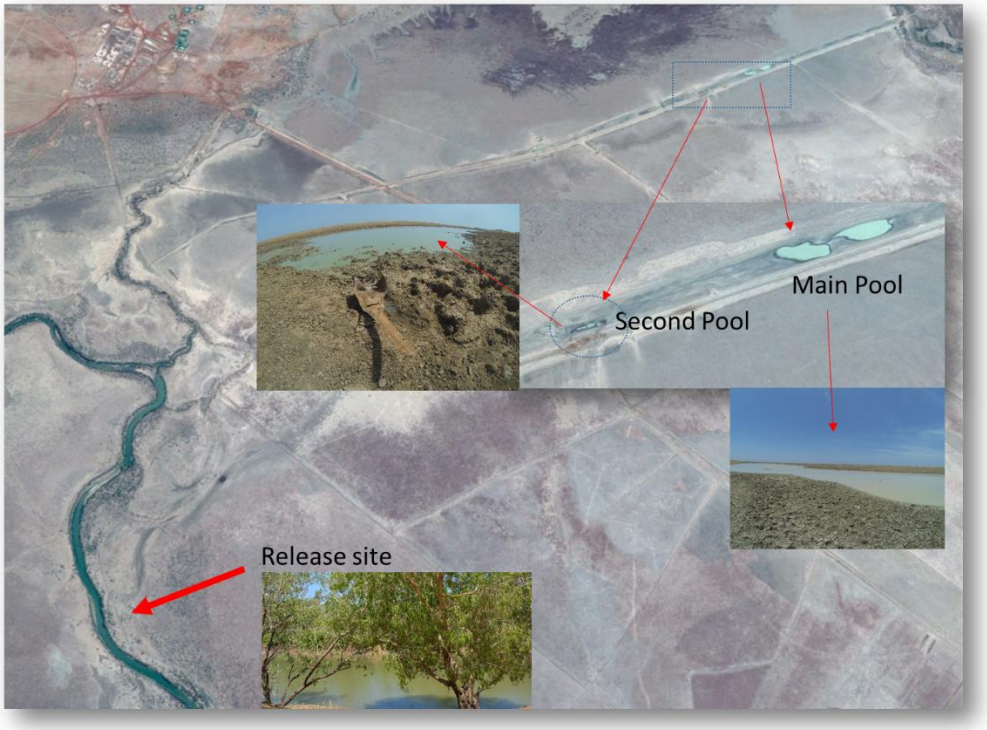

Figure 1: Satellite image from Google Earth dated 23rd November 2015 depicting the two pools examined in December 2018 (inset photos), the main difference is that at the main site the pool was larger and connected. Also shown is the release site on Uralla (Snake) Creek for the two trapped sawfish.

Figure 2: Clockwise from top left – Fish transporters provided by Broome Tafe; deceased sawfish in the main pool; a recently deceased sawfish; placing a ragged sawfish in the fish transporter; deceased sawfish in the second pool which was eutrophic; a live sawfish swimming past a deceased Freshwater Crocodile; releasing the sawfish into Uralla (Snake) Creek.

Sawfish details

Main Pool: 35 Freshwater Sawfish; including two alive and 33 deceased that were in various states of decay. These fish ranged in TL from 1330 to 1557 mm, with 13 being relatively intact and deemed to have perished in the last few days. N.B. Some fish were not able to be measured as they had disintegrated and there was evidence of predation by Freshwater Crocodiles. Vertebrae were dissected from the 33 deceased sawfish for future validation of the age classes that these fish belonged to.

Figure 3: Freshwater Sawfish in various states of decay in the main pool (above).

Second Pool: 13 Freshwater Sawfish all deceased, ranging in TL from 1120 to 1739 mm. Fish in this pool had been deceased for some time. Vertebrae were dissected from the 4 of the deceased sawfish for future validation of the age classes that these fish belonged to.

Figure 4: Freshwater Sawfish in adjacent to the second pool

Conclusions and recommendations

It is unclear as to why these sawfish become trapped in these atypical habitats, which have no riparian vegetation or instream habitat and are fully exposed to the elements. There have reportedly been at least two other occasions where sawfish have become trapped in these pools since 2008, with Liveringa Station staff conducting a previous relocation mission several years prior. Freshwater Sawfish are likely to enter the Blina Creek floodplain during the wet season, and either retreat to Uralla Creek or these permanent pools during the dry season as water levels decline (see Figure 5).

Figure 5: Blina Creek floodplain in June 2018

Although these floodplain refuge pools are likely to offer habitats that are relatively free from predators such as Bull Sharks or Estuarine Crocodiles (see Morgan *et al*. 2017), extreme heat waves appear to render the pools as unsuitable during the late dry season due to high water temperatures. As oxygen levels appear adequate for survival, the fish most likely died from exposure to the constant high ambient temperatures and resulting warm to hot water temperatures.

Recruitment of Freshwater Sawfish in the Fitzroy River is strongly associated with discharge (i.e. high discharge years results is stronger recruitment events (Morgan *et al*. 2016)). For example in 2009, 2011 and 2017 we recorded extremely high numbers of new recruits of Freshwater Sawfish in the river. Based on their total lengths, the Freshwater Sawfish in these pools are likely to belong to either the year class of 2017 or 2018; with recruitment of pups in 2017 the strongest cohort in the last 18 years (see also Morgan *et al*. 2016, Whitty *et al.* 2009, 2017, Lear, Gleiss and Morgan unpublished data). Fish in this strong year class are likely to persist in the Fitzroy River until at least 2022 (depending on sex), at which point they will leave the river to mature in marine waters offshore (see Whitty *et al*. 2009, 2017).

It is likely that higher numbers of these sawfish cohorts may be present in these pools until 2022, and also following any future years with high discharge and thus subsequent good recruitment of sawfish. It is therefore recommended that proactive monitoring of these pools, which are several kilometres away from the Fitzroy River catchment (being the area subject to Liveringa Station water licensing requirements), is conducted in mid-spring to assess the likelihood of fish kill events occurring at this location in future years when temperatures rise and water levels decline. This could be achieved through a mark-recapture study at the sites to provide an estimate of the population size. This should be performed in early spring, as water levels begin to contract. Subsequently, if a fish kill is deemed likely in a particular year we recommend that a minimum water level be set to signal Liveringa Station staff to notify the Department of Primary Industries and Regional

Development and Murdoch sawfish researchers, to expedite early extraction of sawfish from the pools, where practicable.

References

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