Impacted fish movement into tropical freshwater wetlands discharging water low in dissolved oxygen; the tail of two wetlands

Catchment Solutions

Impacted fish movement into tropical coastal wetlands discharging water low in dissolved oxygen; the tail of two wetlands

PRESENTER:
TRENT POWER

Services provided by coastal wetlands in north-eastern Australia

Ecological Services

- Resident/seasonal habitat
- Replenish groundwater
- Nutrient sink

Economic Services

- Physical buffer
- Fisheries
- Agriculture
- Tourism

Social Services

- Recreation
- Cultural values

What are ponded pasture wetlands?

Construction of expansive earth bunds

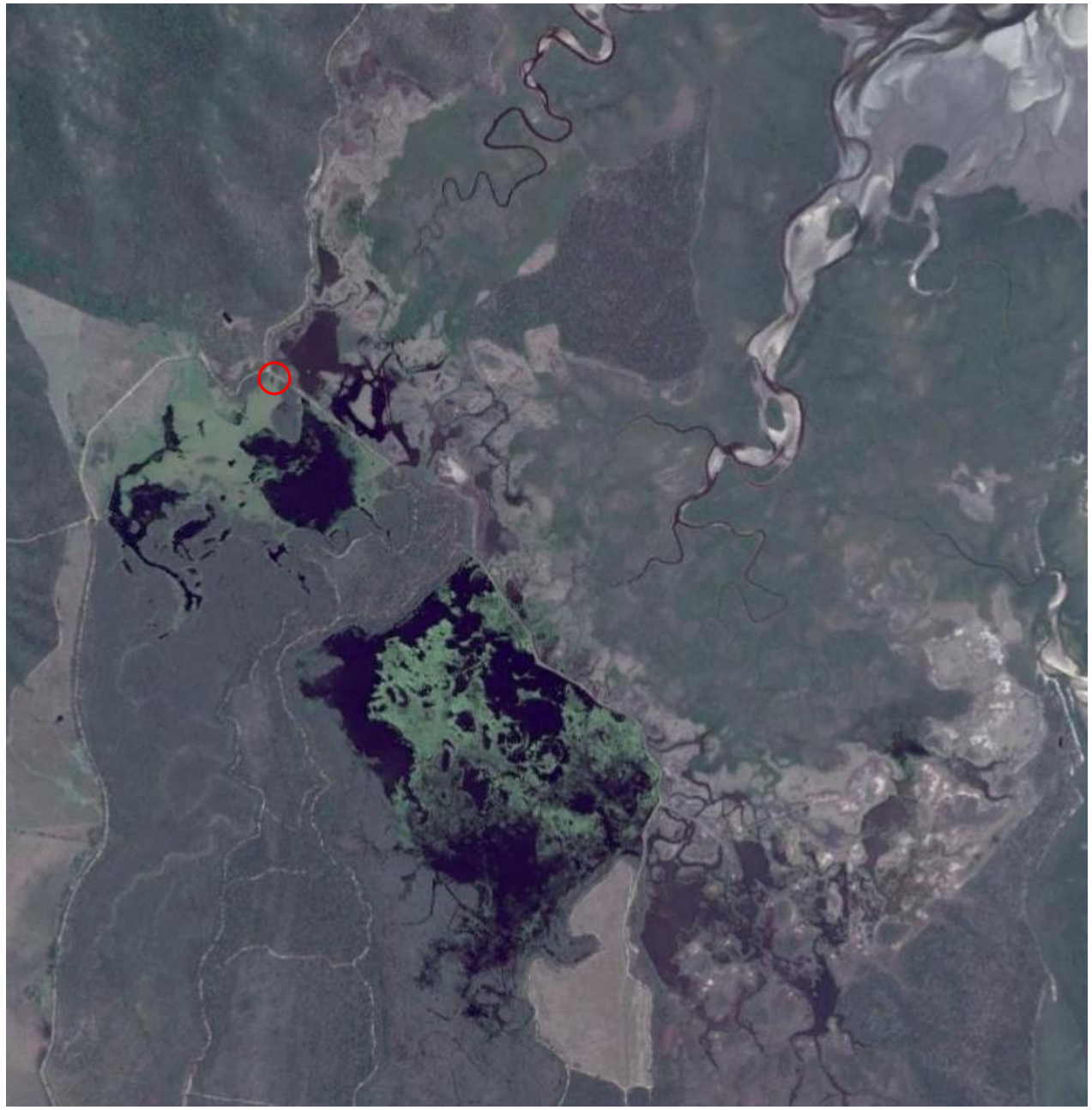
- Lower flood plains
- Salt marshes
- Upper estuary (occasionally)

Captures stream & overland flow

- Retains moisture into dry season
- Improves pasture conditions
- Increases cattle production

Modifies existing habitats

- Salt to fresh
- Increases duration & extent of flooded marshes
- Reduces vegetation diversity
- Reduces connectivity



Processes that affect connectivity

Physical Barriers

- Bunds & levees
- Flood gates
- Roads & rail infrastructure
- Weed chokes

Physiological Barriers

- Low light

Chemical Barriers

- Low dissolved oxygen

Study Area

Central Queensland

- Rocky Dam Catchment
- Wet season Dec – Apr
  - Peak migration
- Dry season May – Nov
  - Wetlands contract

Boundary Wetland

- Cattle grazing
- Bund repaired 2015
- Fishway installed 2015
- Moderate impact from weeds

Tedlands Wetland

- Cattle grazing/irrigation
- 2 fishways installed 2008 & 2015
- High impact from weeds

Boundary Wetlands

Tedlands Wetlands

Fishways

Boundary

- Cone ramp
- 0.6 m head loss
- 75 mm ridge drops
- 1.5 x 1.5 m pools
- 300 mm pool depth

Tedlands

- Rock ramp
- 0.65 m head loss
- 50 mm ridge drops
- 4 x 1.5 m pools
- 300 mm pool depth

Monitoring – Fish movement into wetlands

Boundary

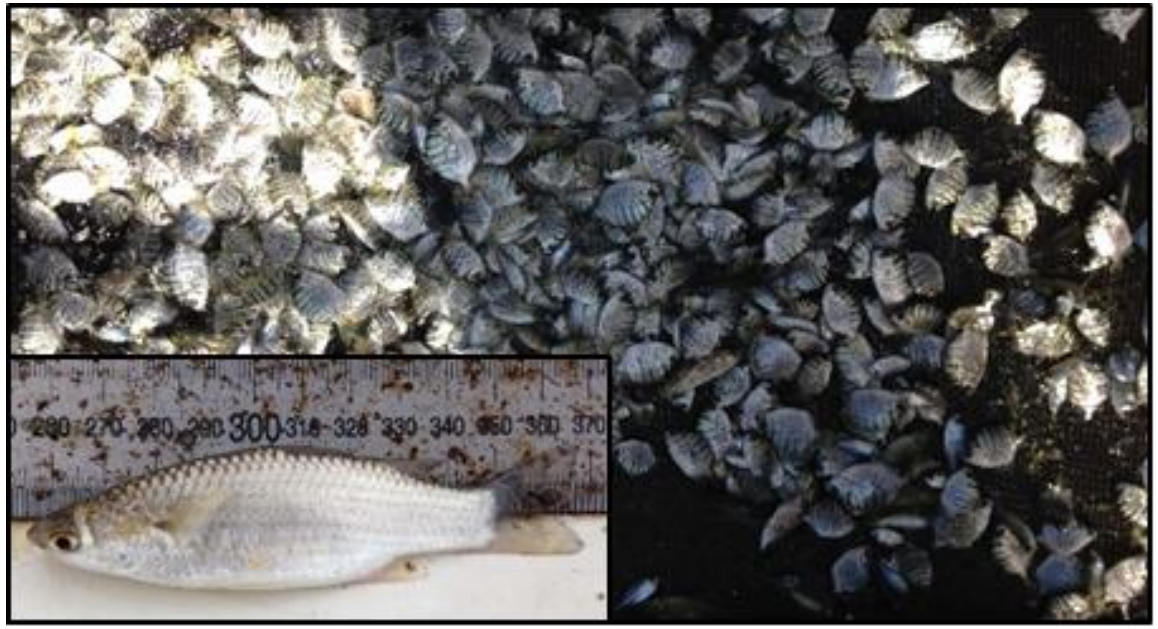
- 2016 – 2018 (yearly)
- 5 consecutive days/round
- Wet season (Jan – Mar)
- Box trap

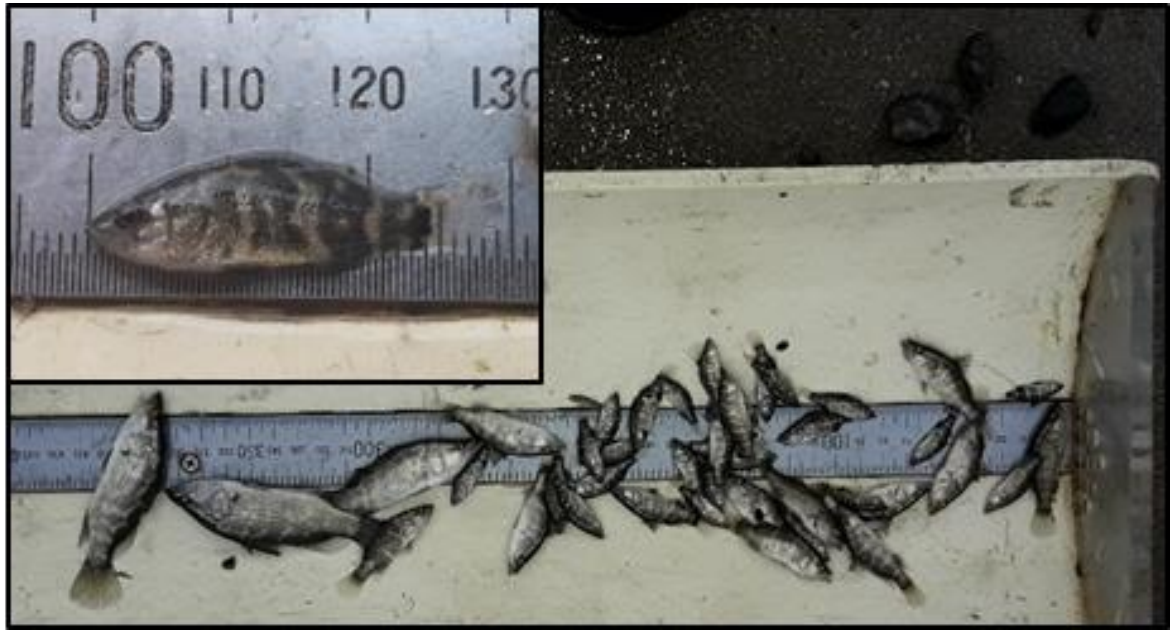
Tedlands

- 2016 – 2018 (yearly)
- 3-5 consecutive days/round
- Wet season (Jan – Mar)
- Box trap

Observations

	2016		2017		2018	
	Boundary	Tedlands	Boundary	Tedlands	Boundary	Tedlands
DO % Upstream	86.0 - 128.2	11.2 - 21.6	13.0 - 56.5	4.9 - 8.5	48.9 - 78.0	0.6 - 5.3
DO % Downstream	81.7 - 120.3	21.6 - 36.5	20.2 - 40.4	19.0 - 22.1	58.1 - 73.9	18.1 - 20.4
Average CPUE (Daily)	1181	143	1171	670	299	12
Total Species	12	9	15	5	13	2





Observations

Boundary

- 12 diadromous
- 1 marine vagrant
- 8 potamodromous

Tedlands

- 2 Diadromous species
- 7 potamodromous

Species	Boundary	Tedlands
Ambassis agassizii	1.20%	19.58%
Amniataba percoides	0.01%	
Anguilla sp.	0.04%	0.05%
Arius graeffei	0.10%	
Craterocephalus stercusmuscarum	0.04%	1.21%
Elops hawaiensis	0.03%	
Gerres filamentosus	5.68%	
Gerres subfasciatus	0.37%	
Giurus margaritacea		0.15%
Hypseleotris compressa	47.34%	75.92%
Lates calcarifer	0.84%	
Leiopotherapon unicolor	9.61%	
Liza subviridis	0.21%	
Megalops cyprinoides	0.31%	0.97%
Melanotaenia splendida splendida	9.71%	1.89%
Mogurnda adspersa	0.01%	
Mugilogobius platystomus	0.06%	
Neosilurus hyrtlii	0.03%	
Porochilus rendahli		0.10%
Pseudomugil signifer	0.01%	
Scatophagus argus	0.12%	
Selenotoca multifasciata	24.26%	
Terapon jarbua	0.03%	
*Xiphophorus maculatus**		0.15%

What does this mean?

DO levels affecting wetland recruitment?

- Lower DO levels were observed at Tedlands, also lower catch rates and species counts
- However, DO levels increased as water passed through fish way (>20% saturation @ entrance)
- Potentially something else deterring fish from entering wetland – tannins, other chemicals

Implications for ecosystem function

- Reduced species diversity and abundance
- Flow on affects through the food chain
- Reduced productivity – loss of nursery grounds
- Population vulnerability

Socio-economic impacts

- Reduced productivity – commercial/recreational fisheries
- Reduced amenity – people won’t value the area as much

The culprits

Hymenachne amplexicaulis

Eichhornia crassipes

Typha sp.

Salvinia molesta

Pistia stratiotes

Myriophyllum sp.

Improving connectivity

Fishways are not enough!

- Presence of excessive aquatic vegetation also impacts fish movement
- Physical barrier – weed chokes
- Chemical barrier – Low DO, other chemical deterrents

Short term

- Poison – costly, chemical residue, decaying plants
- Mechanical removal – Costly, logistically prohibitive
- Controlled grazing – effective in some areas, not always at the right time of year
- Aeration – Costly, only provides refuge

Long term

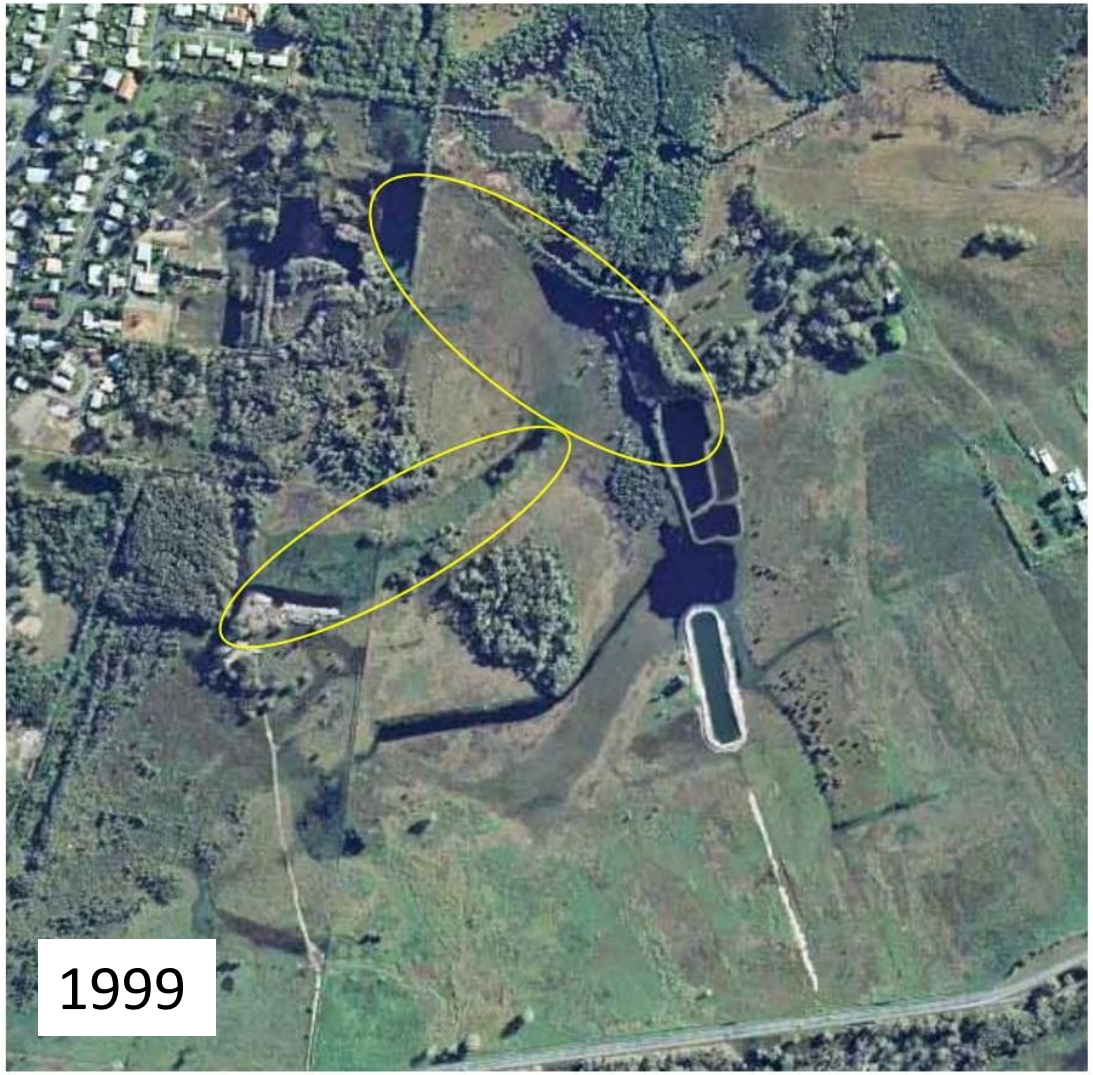
- Restore tidal movement – reduces grazing productivity
- Riparian revegetation – May be effective in some locations
- Modify wetland to maximize oxyenisation – Dig refuge pools (> 3m), align with prevailing wind, provide access points for cattle to reach wetland islands
- Address excess nutrient load – Improved land use management

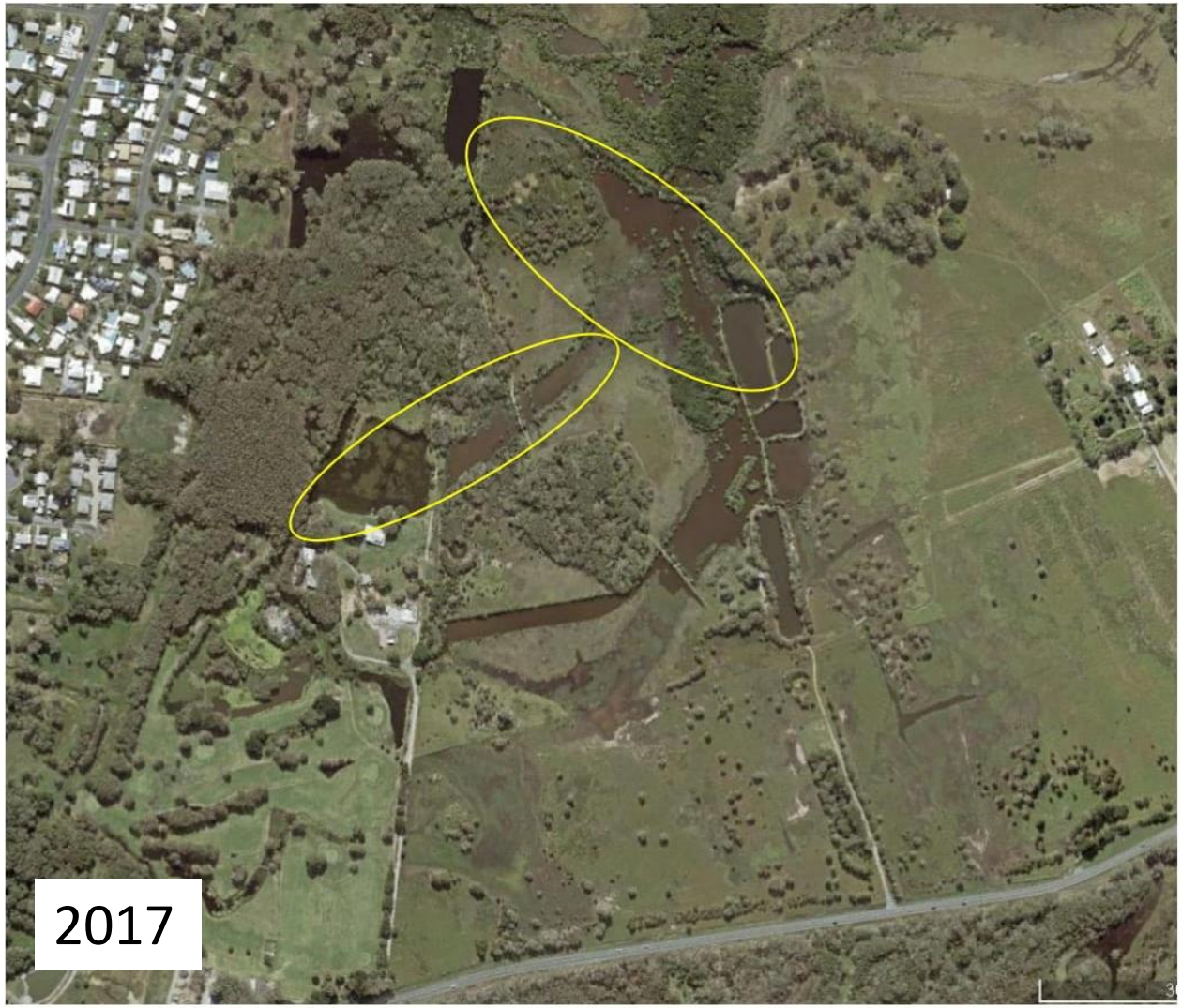
Mungalla Wetland – Ingham, QLD

Before - Sept 2013

After - Dec 2015

Walk-about Wetland – Mackay, QLD





Thank you