Fish and connectivity in the regulated sub-tropical Boyne River, Queensland, Australia

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Background:

- Water ACT 2000
- Boyne River Basin Water Resource Plan 2000
- Boyne River Basin Resource Operations Plan 2006

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Study area:

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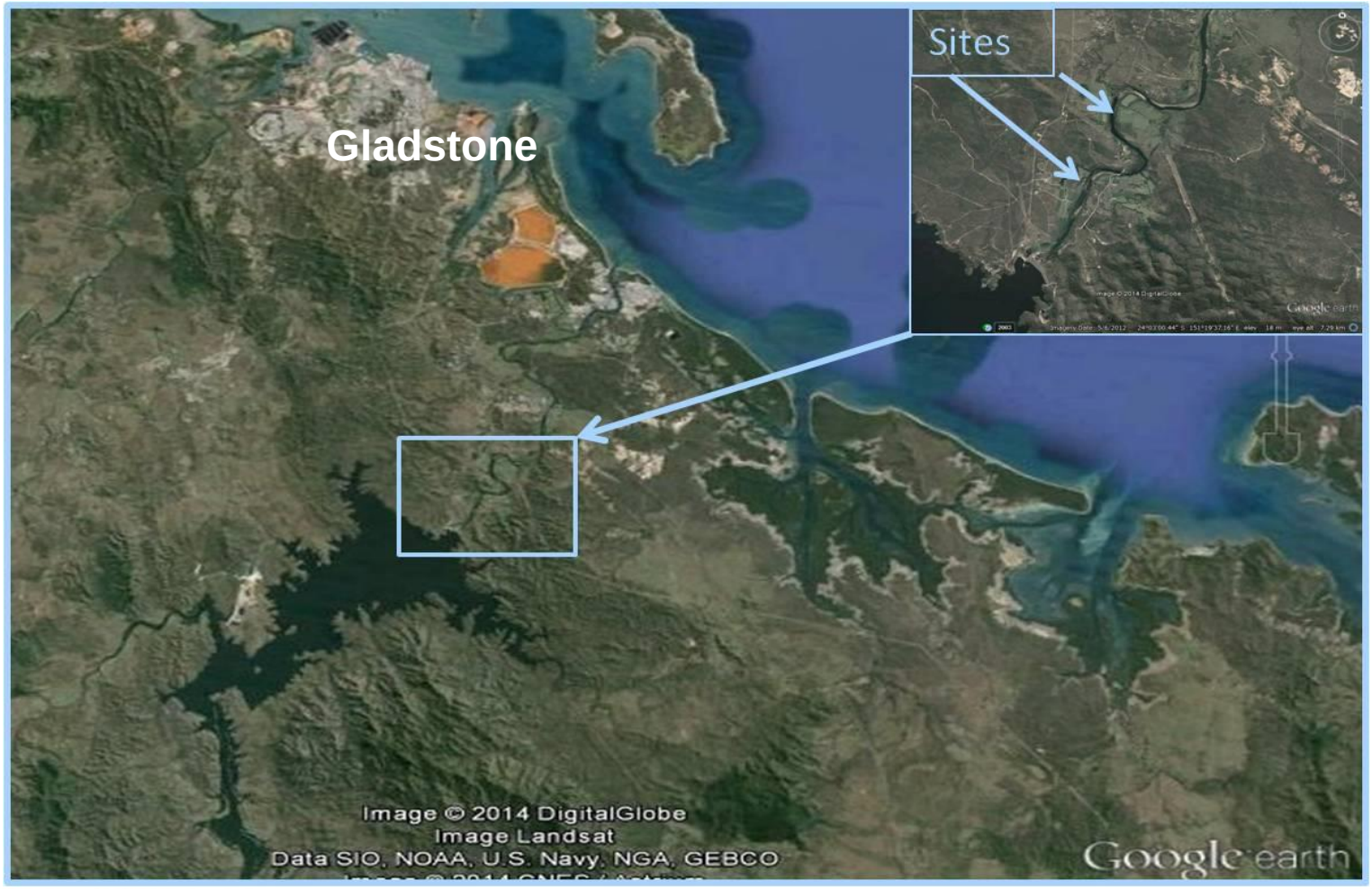
Study area:



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Central Theme of 2006 ROP:

- Connectivity plays a significant role in forming the fish community composition
- “River flows are to managed to allow marine and FW fish around Mann’s Weir”
- GAWB Aquatic Ecosystem Monitoring Program from 2004 – 2013 …..including specific fish monitoring

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What creates connectivity?

< 200 ML/day, previously a natural anabranch, now a concrete spillway channel

>200 ML/day, the weir eroding away

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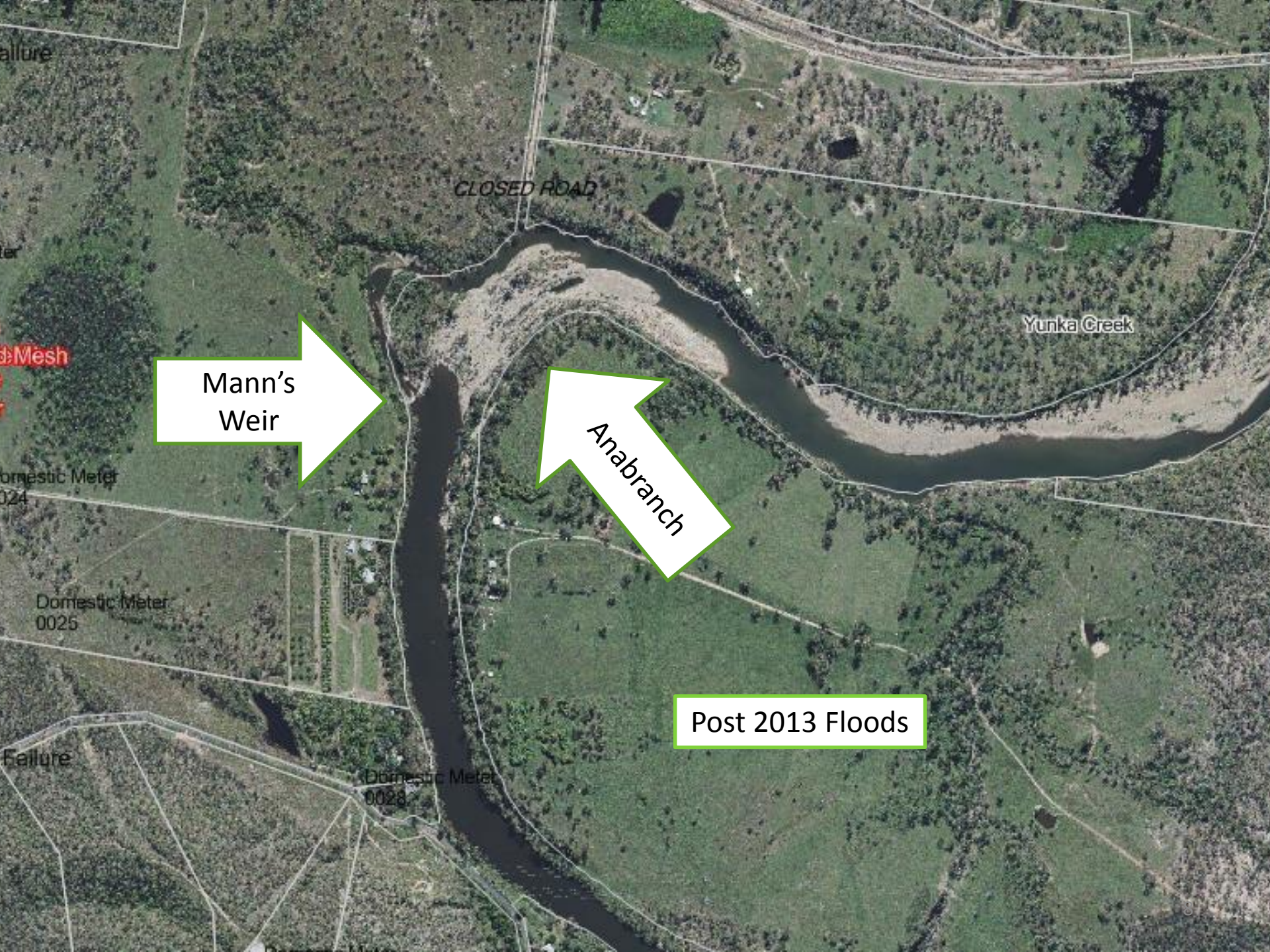
Boyne River
Anabranch
Mann's Weir
Pre- 2013 Floods


CLOSED ROAD
Yunka Creek
Mann's Weir
Anabranch
Post 2013 Floods
Domestic Meter 0025
Failure
Domestic Meter 0028

River flow is important for connectivity!

- Environmental flows:
  - Base flow releases
  - Trigger flows (aka flood simulation releases)
  - Major overtopping events

The above need sufficient rainfall to generate environmental flows

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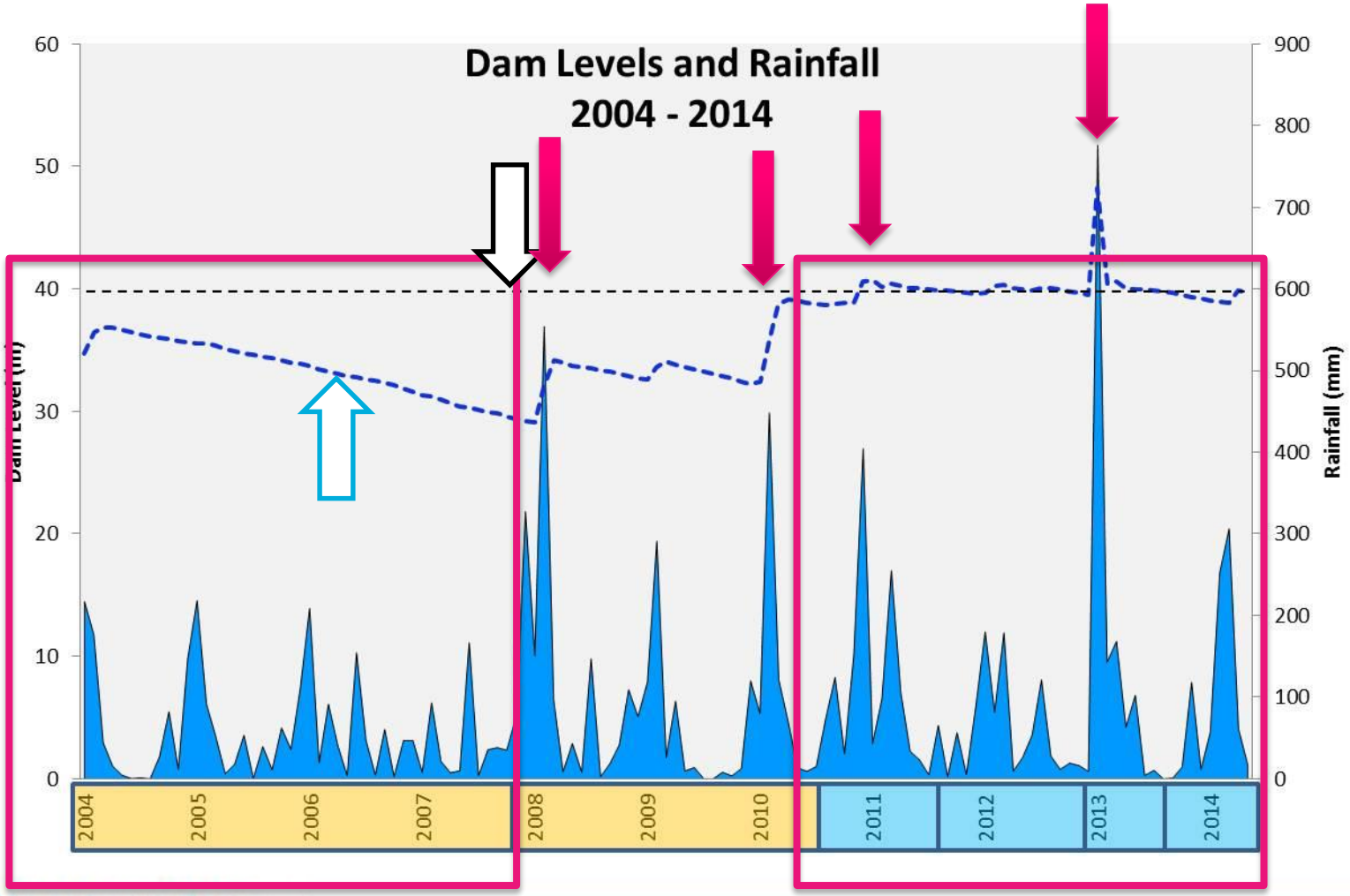
Rainfall and Dam Levels



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GAWB Fish methodology:

A range of capture methods to enable a better estimate of the fish communities present

Freshwater sites	Estuarine water sites
• Boat electrofishing 2100 seconds • Fyke netting • Bait traps • Gill netting	• Seine netting • Gill netting • Cast netting • Fyke netting

A bias – Difference of sampling methods between FW and EW sites

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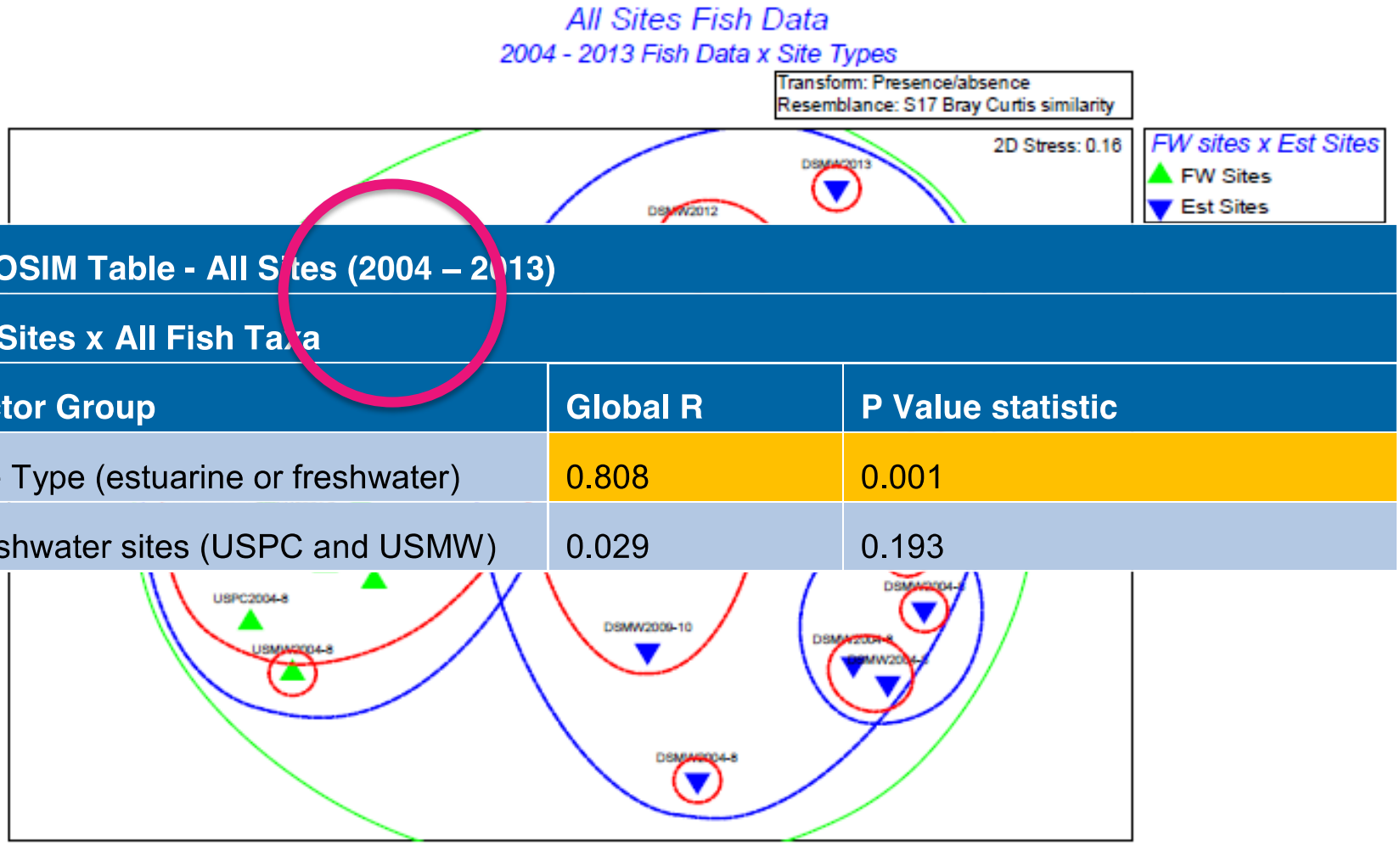
Estuarine vs. freshwater



ANOSIM Table - All Sites (2004 – 2013)		
All Sites x All Fish Taxa		
Factor Group	**Global R**	**P Value statistic**
Site Type (estuarine or freshwater)	0.808	0.001
Freshwater sites (USPC and USMW)	0.029	0.193

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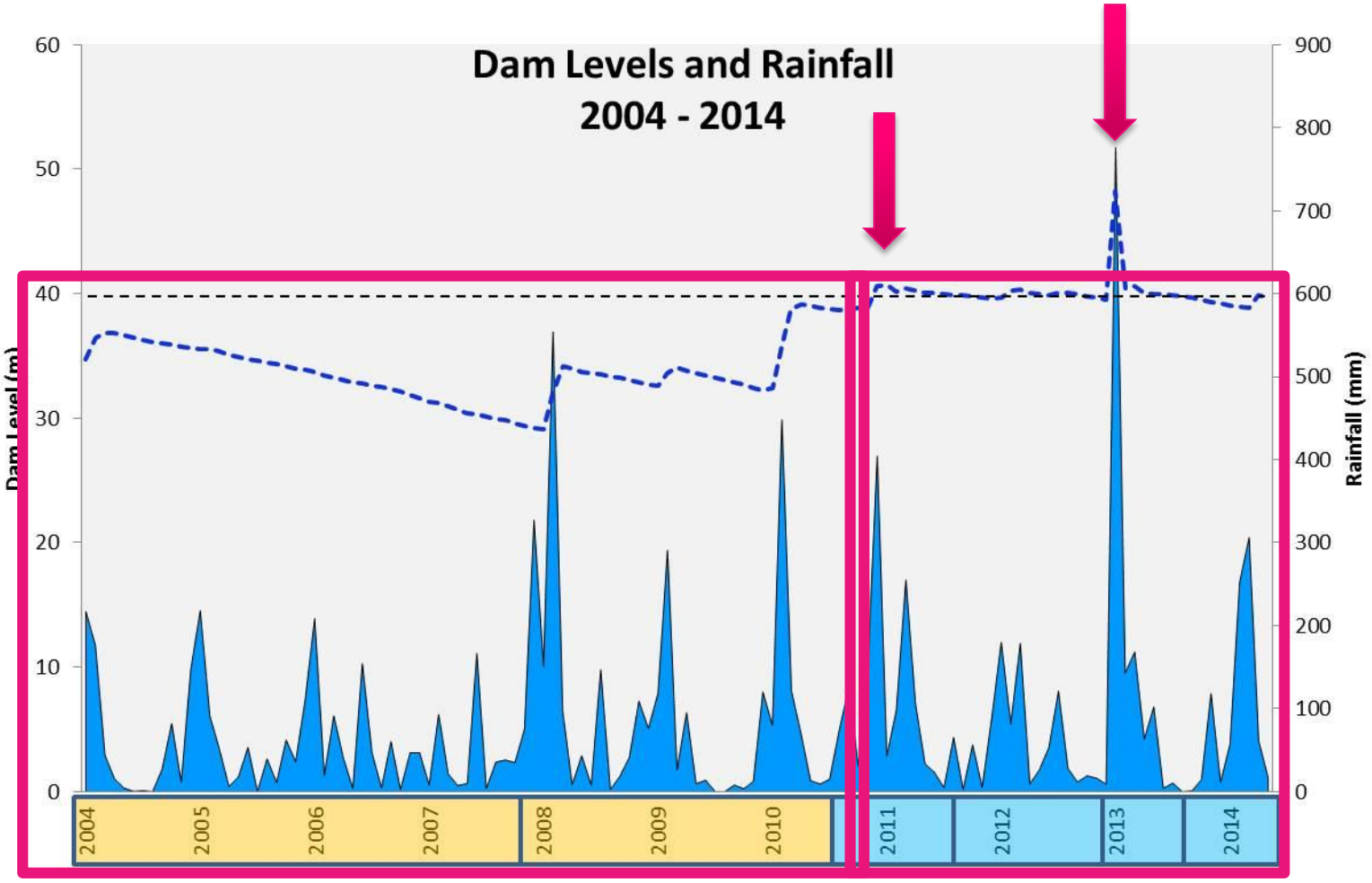
Rainfall and Dam Levels



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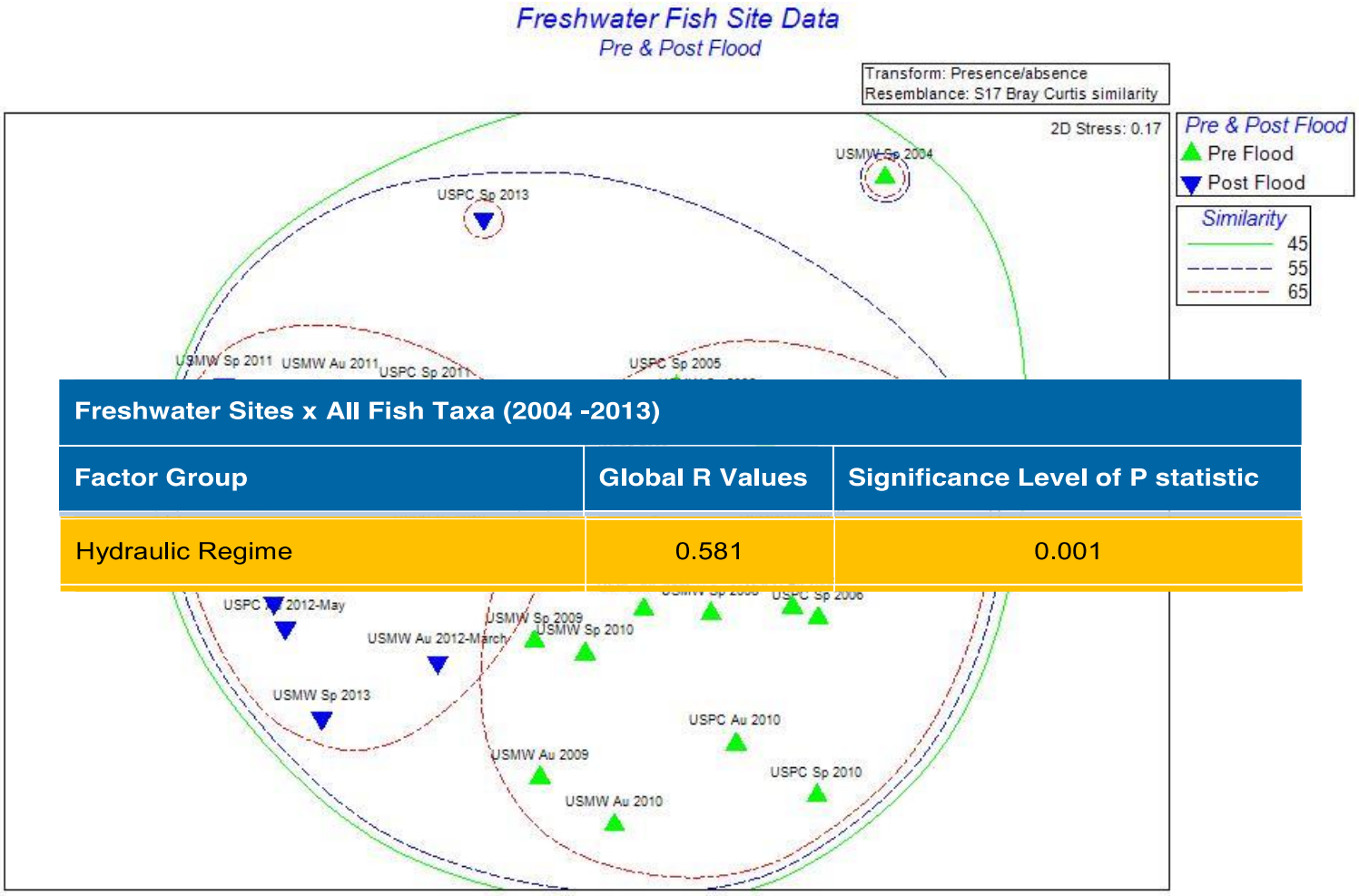
Pre and post floods



Freshwater Sites x All Fish Taxa (2004 -2013)		
Factor Group	**Global R Values**	**Significance Level of P statistic**
Hydraulic Regime	0.581	0.001

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What was driving change between pre and post floods?

- Loss of some freshwater fish species (Eel tailed Catfish, Rendal's Catfish, Hyrtl's Tandan) due to loss of aquatic plants, sediments and debris.

- But a large increase in estuarine fish species in the freshwater sites (Black Bream, Mangrove Jack, Goby's, Garfish) due to connectivity

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Conclusion:

- That connectivity created a significantly different fish community in the freshwater reaches, and;
- That connectivity was created by the repeated washing out of Mann's Weir during the 2011 and 2013 post flood periods

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Implications for the dam operator

Compliance with the requirements of the WRP/ROP.

Better targeting and investment policies for the ecosystem monitoring program.

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Implications for the regulator

Assessing the effectiveness of environmental flow release program

Gain an understanding of the aquatic system below awoonga dam

Monitor changes in the downstream environment

To help inform future flow release strategies

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Opportunities

This data would contribute towards a model for assessment of the river health based on three main elements:

1. Hydraulic regime
2. Connectivity between EW and FW
3. Fish community composition

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Anabranch before flood 2013

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Anabranch after flood 2013

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Changes in the design of the weir

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Weir spillway – an opportunity?

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    - Adrian Dickson (GHD)

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Questions?

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