

Normanby River Water Quality

 2006-2013 Monitoring Results

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**Sediment Sinks Sources & Drivers
in the Normanby Basin**



The Normanby-Laura River System

- Fourth largest river system in Great Barrier Reef catchment
- 3rd largest mean annual discharge to the GBR
- Highly unmodified mid & coastal catchment area
- Extensive freshwater lagoons and coastal salt flats
- Rich commercial and recreational fisheries
- High biodiversity value
- Princess Charlotte Bay: Healthy Coral Reef & Seagrass ecosystems... supports large turtle & dugong populations
- Numerous Sacred Sites and strong cultural connections associated with the rivers and PCB

PRINCESS CHARLOTTE BAY



What do we know about water quality in the Normanby Catchment ?

AIMS 1997-2000 wet season	Kalpower Crossing (50km from mouth)	<ul style="list-style-type: none"> • Turbidity, water level • Nutrients & TSS (1999-2000)
DERM/ DSITIA 2006-2013 Wet season	Kalpower Crossing	<ul style="list-style-type: none"> • Suspended sediment and nutrient concentrations and loads • Some data from other gauging stns
CYMAG 2006-2010 Ambient and some flood event	10 Freshwater & estuary sites	<ul style="list-style-type: none"> • Ph, DO, conductivity, salinity, temp • Turbidity, nutrients & chlorophyll-a • Metals, petroleum hydrocarbons, herbicides
Howley / Griffith / Reef Rescue MMP 2012& 2013 flood event monitoring	Catchment wide & Princess Charlotte Bay flood plumes	<ul style="list-style-type: none"> • Nutrient and suspended sediment concentrations and loads • Geochemical tracing of sediments • Nutrient isotope analysis

Water Quality Monitoring Results CYMAG 2006-2010 & Howley/ Griffith 2011-2013



Compared to more developed regions, the Normanby River has relatively good water quality.

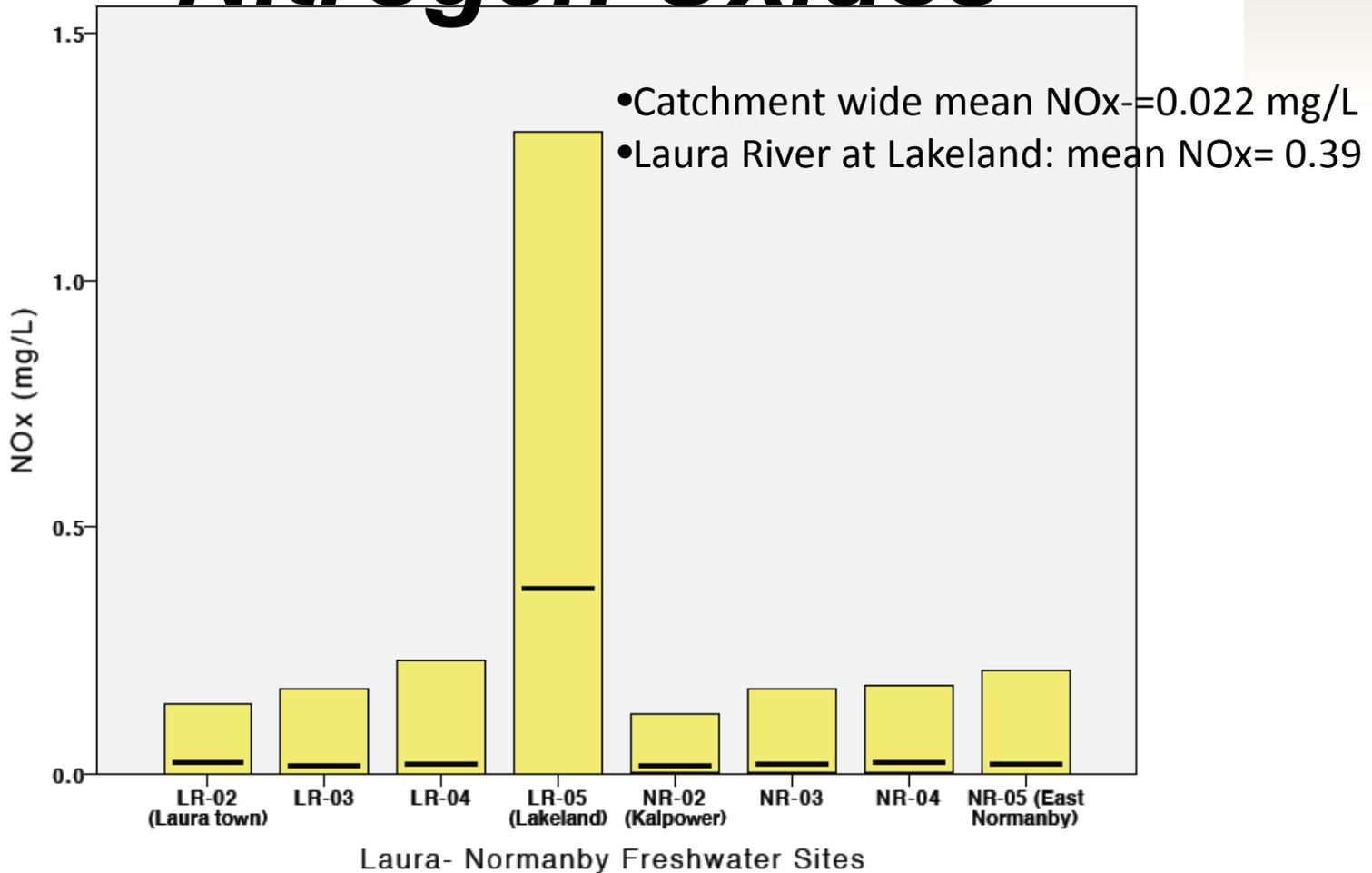
- Natural flows & connections (dams only on upper Laura)
- Non-detect or very low levels of contaminants (herbicides, pesticides, metals, hydrocarbons)
- Nutrient levels in the East Normanby & Normanby comparable to ranges detected in rivers with limited development (Brodie & Mitchell 2005)

However, water quality has been impacted by land use in some areas:

- Cattle grazing & feral cattle- across the catchment
 - Accelerated erosion= increased sediment loads
 - Gully erosion hotspots- upper East & West Normanby & Laura R.
- Erosion from roads, fences and other land clearing
- Farming at Lakeland Downs, Laura River: increased nutrients
- Feral pigs, feral cattle and horses in wetlands- high nutrients, bacteria and turbidity, disturbance of acid sulphate soils



Nitrogen Oxides



Nutrient levels in the Laura River at Lakeland were significantly higher than the rest of the Normanby River

Laura River – Broken Dam Stn, Lakeland Jan 2010



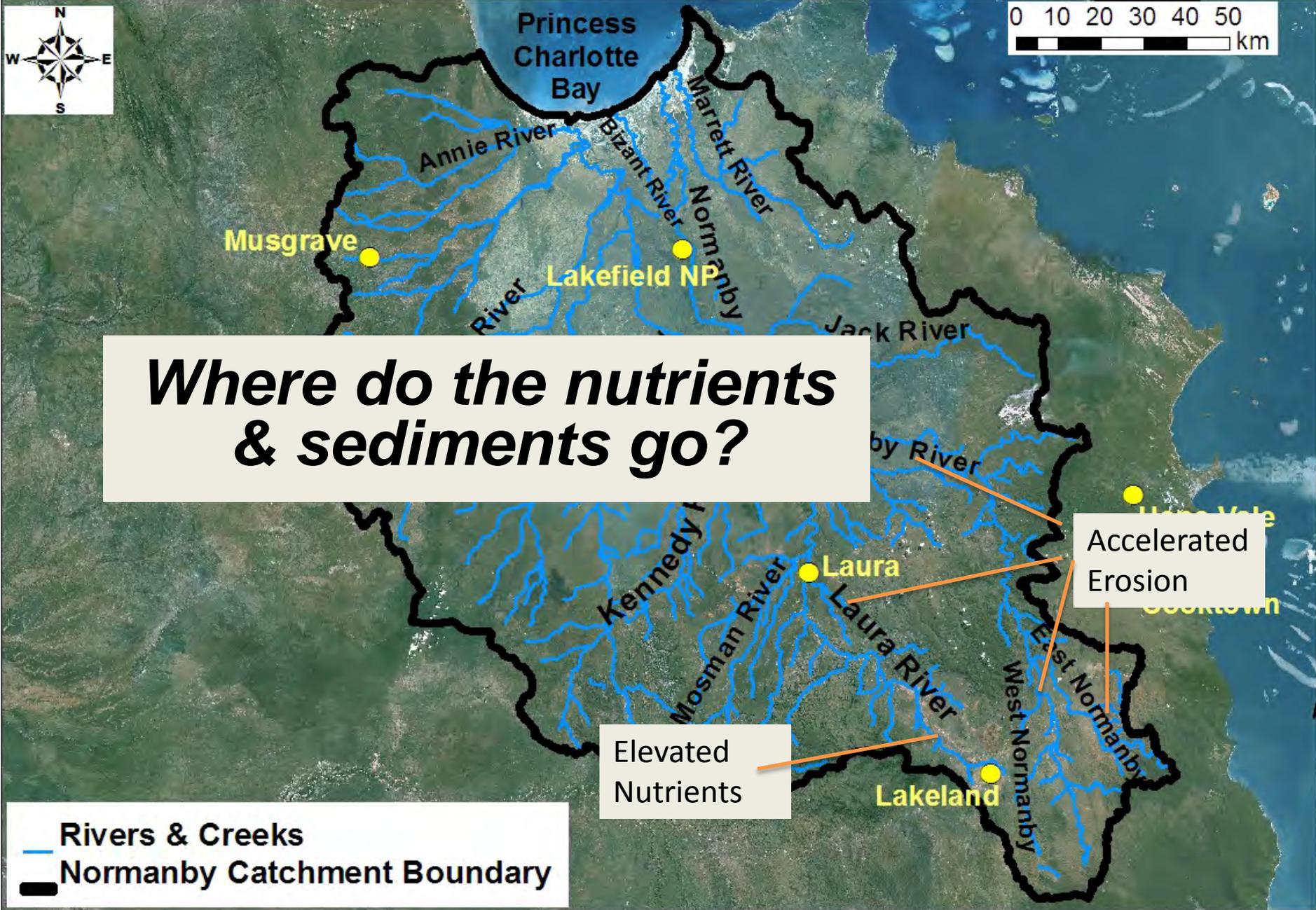
Pesticides & Herbicides

Herbicides detected in Laura River
grab samples and/ or passive samplers:

Herbicide	Concentration detected (ug/L)	Guideline Value ug/L
Phenoxyacetic Acid Herbicides: <ul style="list-style-type: none">• 2,4 D• 2,4,6-T	<ul style="list-style-type: none">• 0.05• 0.09	-140 µg/L -No guideline
Diuron	0.019	No guideline
Simazine	0.00099	200
Atrazine	0.099	700
Tebuthiuron	ND (<0.0003)	20



None detected at Kalpower Crossing or Normanby estuary
over 4 wet seasons





Flood Event Monitoring River to Reef

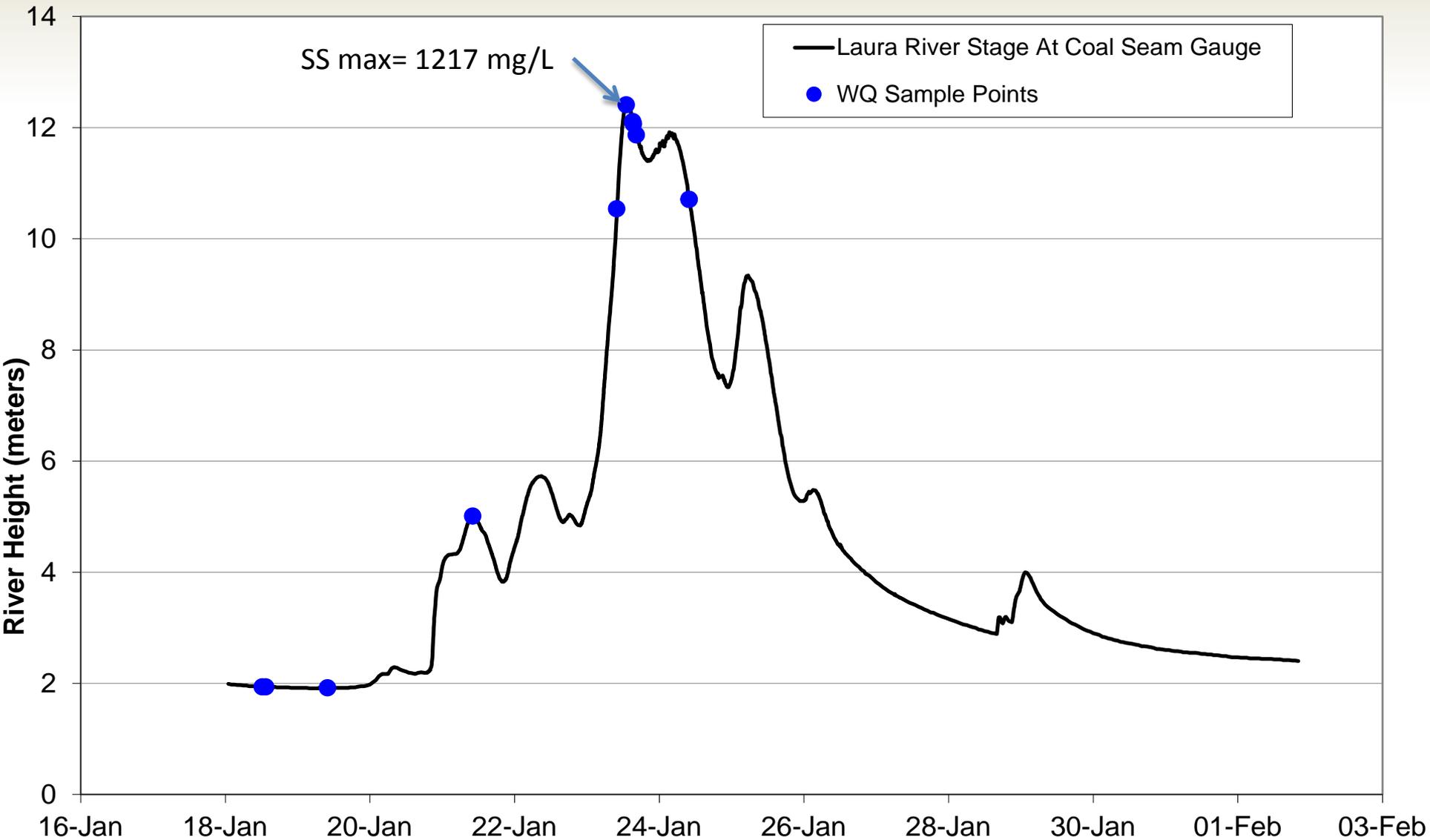
Jan 2013 Flood Event Monitoring

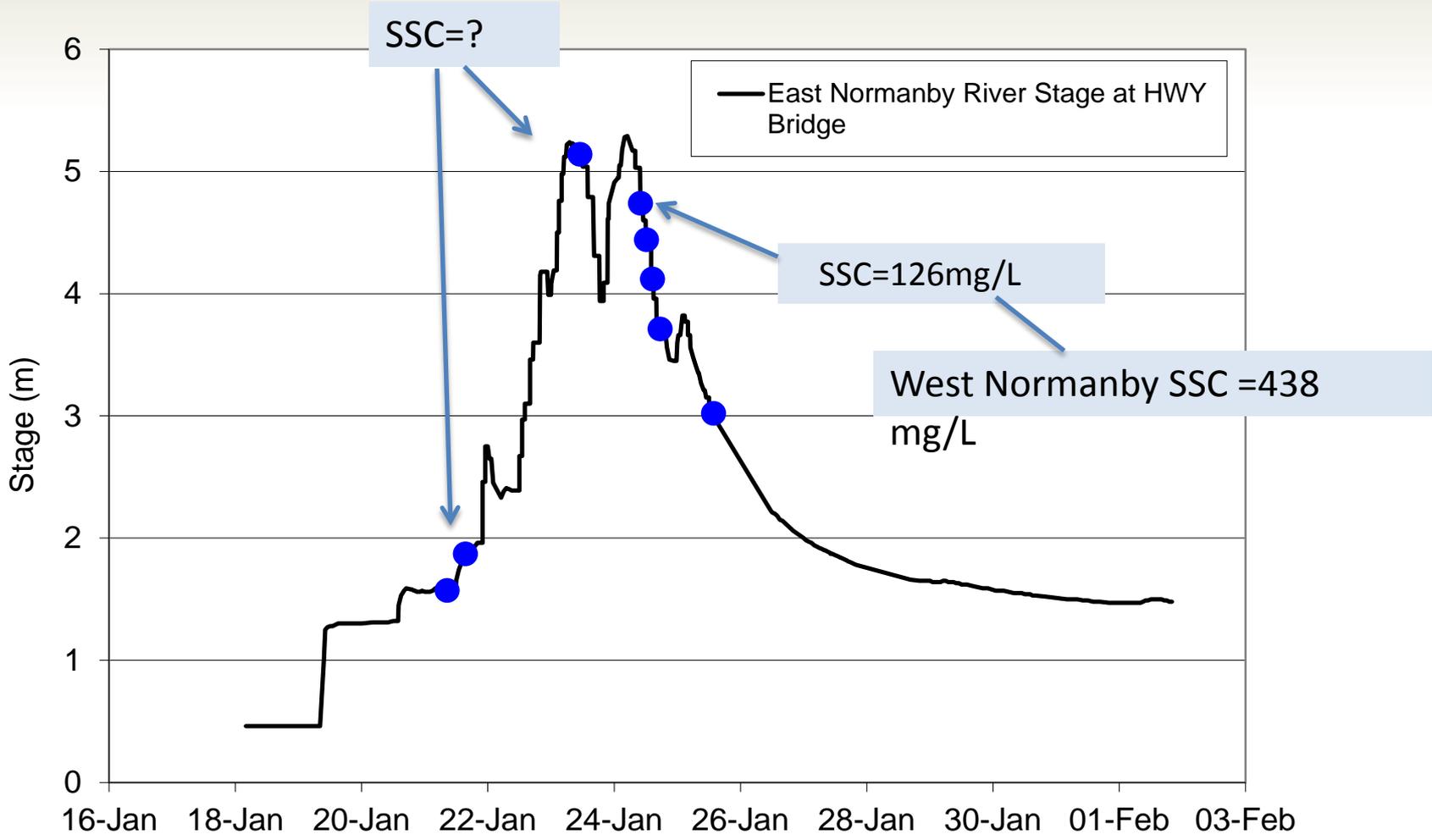
Monitoring of Flood Waters across the flood hydrograph at 10+ sites across the catchment and Flood Plume sampling at PCB

- 360+ samples collected over 10 days:
- Total and Dissolved Nutrients
- Suspended Sediment Concentrations / TSS
- Geochemical tracing of flood plume waters
- Nutrient Isotope Analysis
- Flood plume analyses by JCU as per MMP

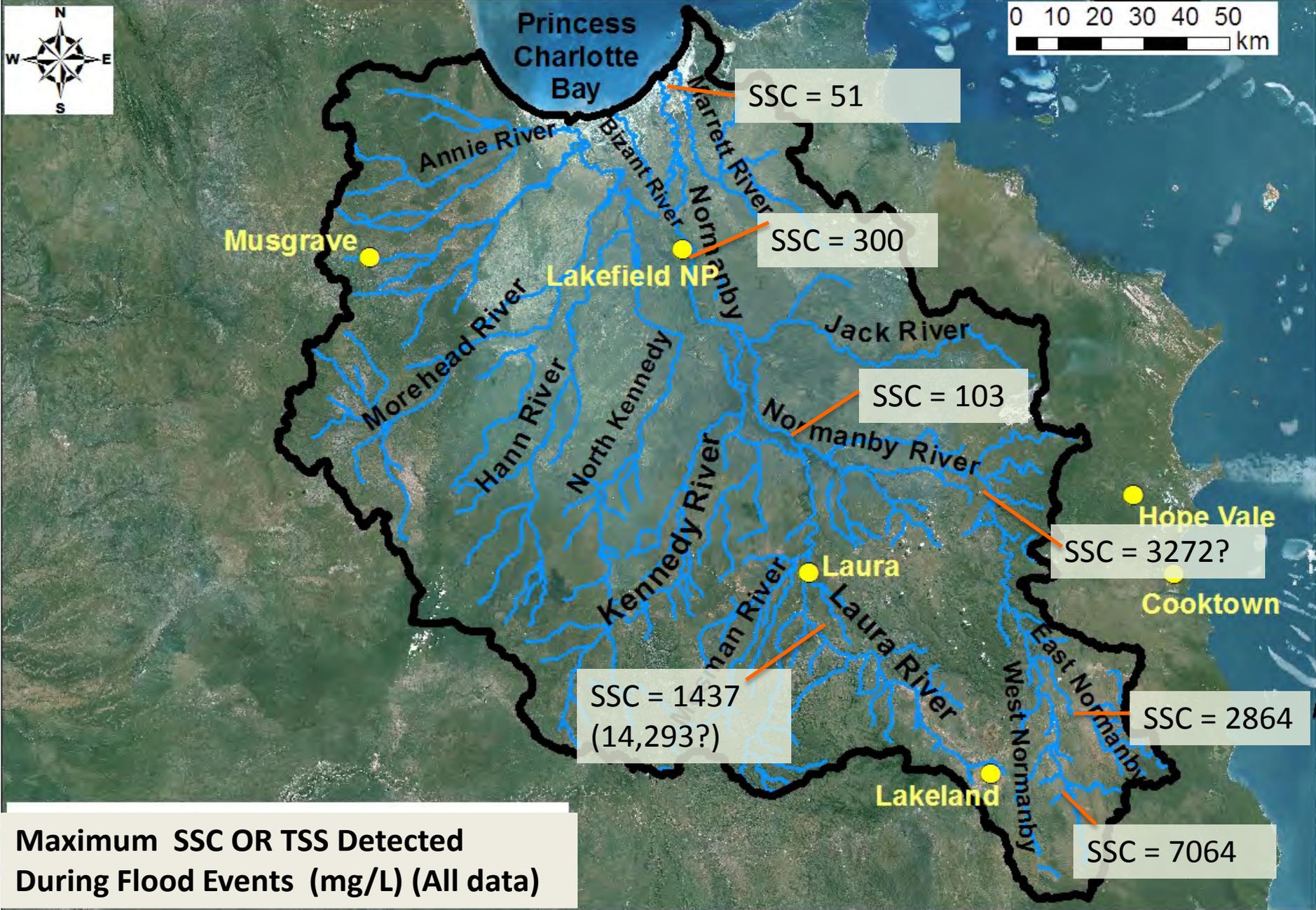
Flood Event Sampling: C. Howley, J. Shellberg (GU) & Laura Rangers

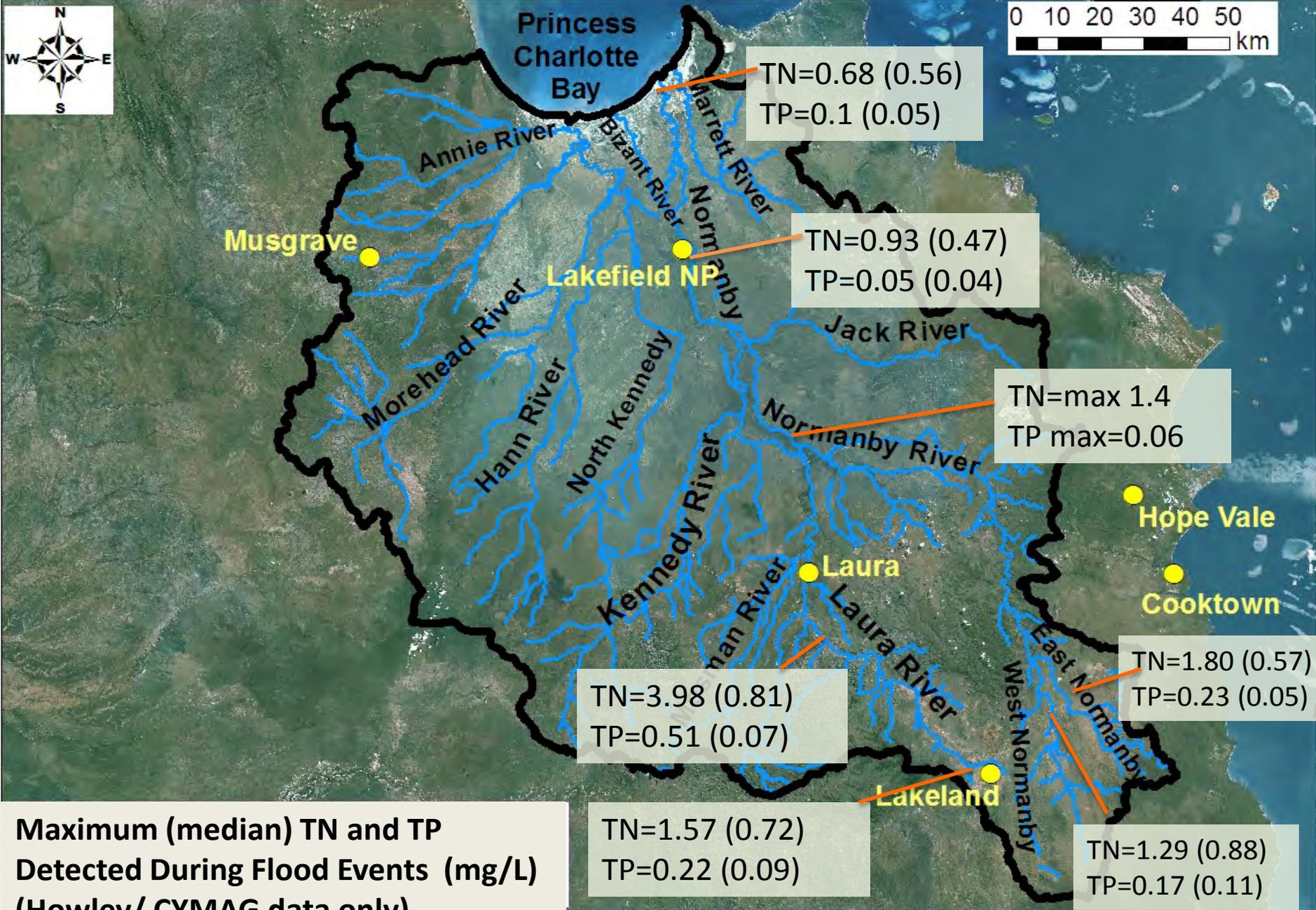
Project Funding and Analysis: Reef Rescue MMP, Griffith University, JCU, DSITIA, South Cape York Catchments & Lama Lama Rangers





East Normanby River
Jan 2013 Flood Hydrograph





Estimates of Nutrient & Sediment Loads Delivered to PCB

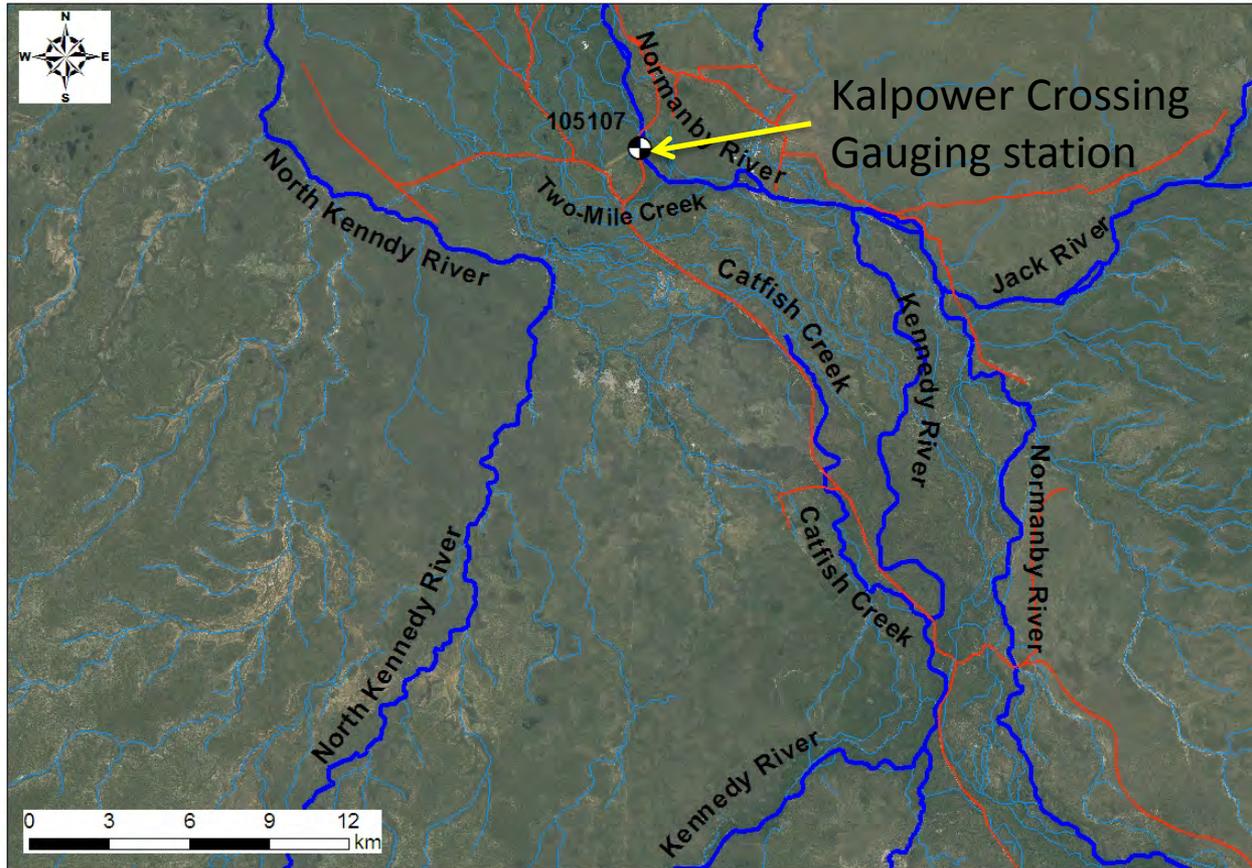
Estimates of annual suspended sediment loads at the Kalpower gauge between 2006 and 2012

Water Year (WY, July-June)	Annual Total Suspended Sediment Load (tonnes/yr) This Study, Pooled DERM TSS Data, One Rating Curve	Annual Total Suspended Sediment Load (tonnes/yr) Joo et al. (2012), DERM TSS Data, Loads Interpolated and Calculated at Event Scale
2006	145,270	N/A
2007	70,355	59,000
2008	175,037	211,000
2009	89,184	104,000
2010	109,165	N/A
2011	264,125	N/A
2012	28,967	N/A

Compiled by Jeff Shellberg, Griffith Uni from this study & Joo et al., 2012 (Brooks et al 2013)

Comparison of mean total and dissolved nutrient concentrations- Kalpower & Normanby estuary

	TN mg/L	TPN mg/L	DON mg/L	NH4 mg/L	NOx mg/L	TPP mg/L	DOP mg/L	DIP mg/L	TP mg/L	TDP mg/L
Kalpower	0.607	0.150	0.357	0.031	0.072	0.040	<0.02	0.019	0.077	0.037
Estuary	0.635	0.285	0.27	0.047	0.04	0.072	<0.02	0.014	0.086	0.025



Map produced by Jeff Shellberg, in Brooks et al, 2013

PCB Flood Plume, Jan 2013

