

# How important are freshwater flows for Gulf estuaries? A study of the effect on food supply for migratory shorebirds

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# Acknowledgements



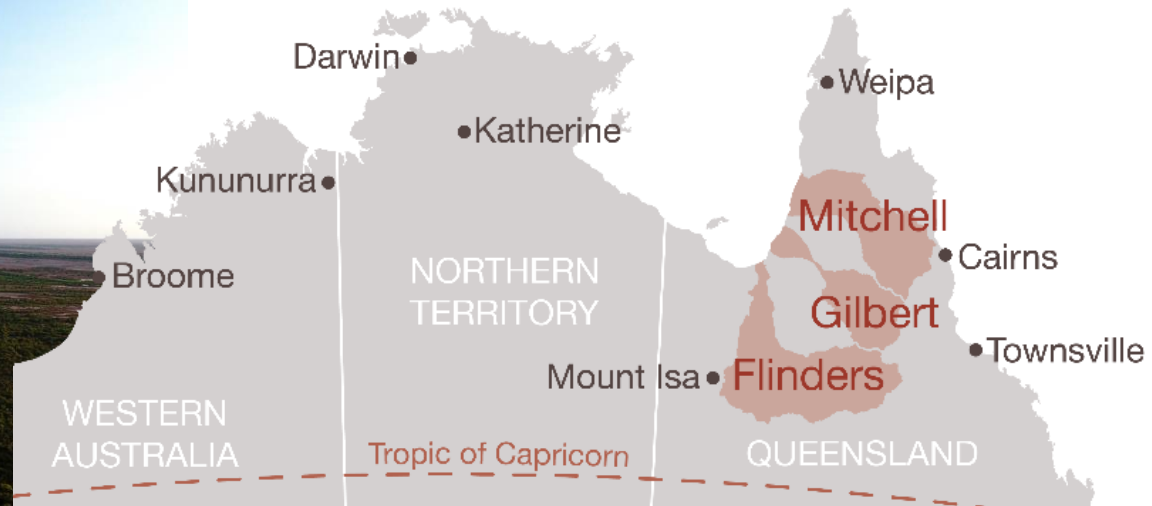


# Water development is occurring in Gulf rivers - Flinders, Gilbert and Mitchell Rivers

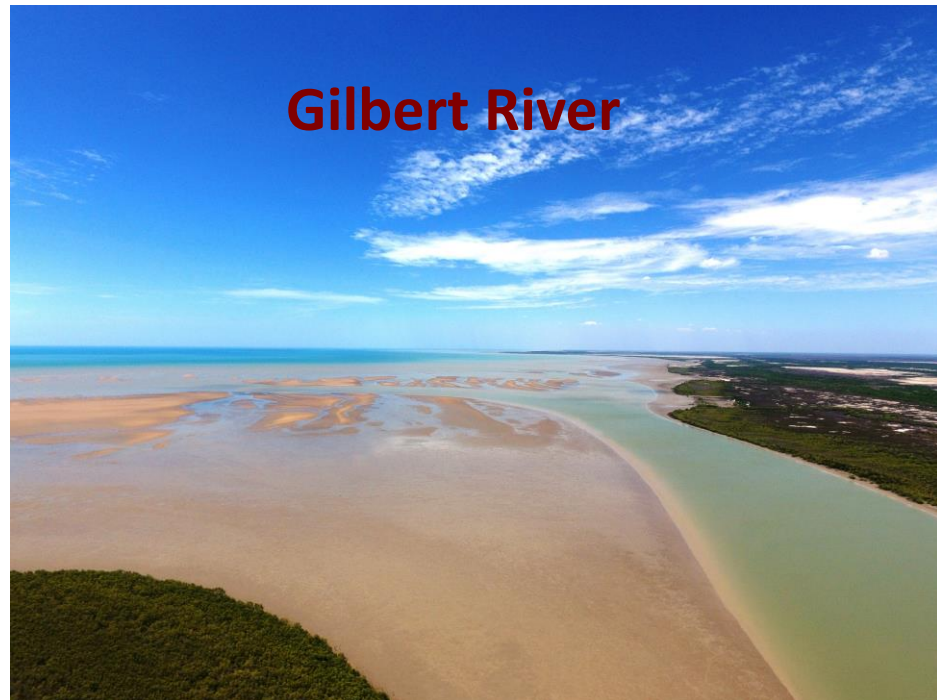
- How will water development impact on the food supply for migratory shorebirds?
- Can we get more recent data on shorebird numbers?



## Mitchell River



## Gilbert River



## Flinders River

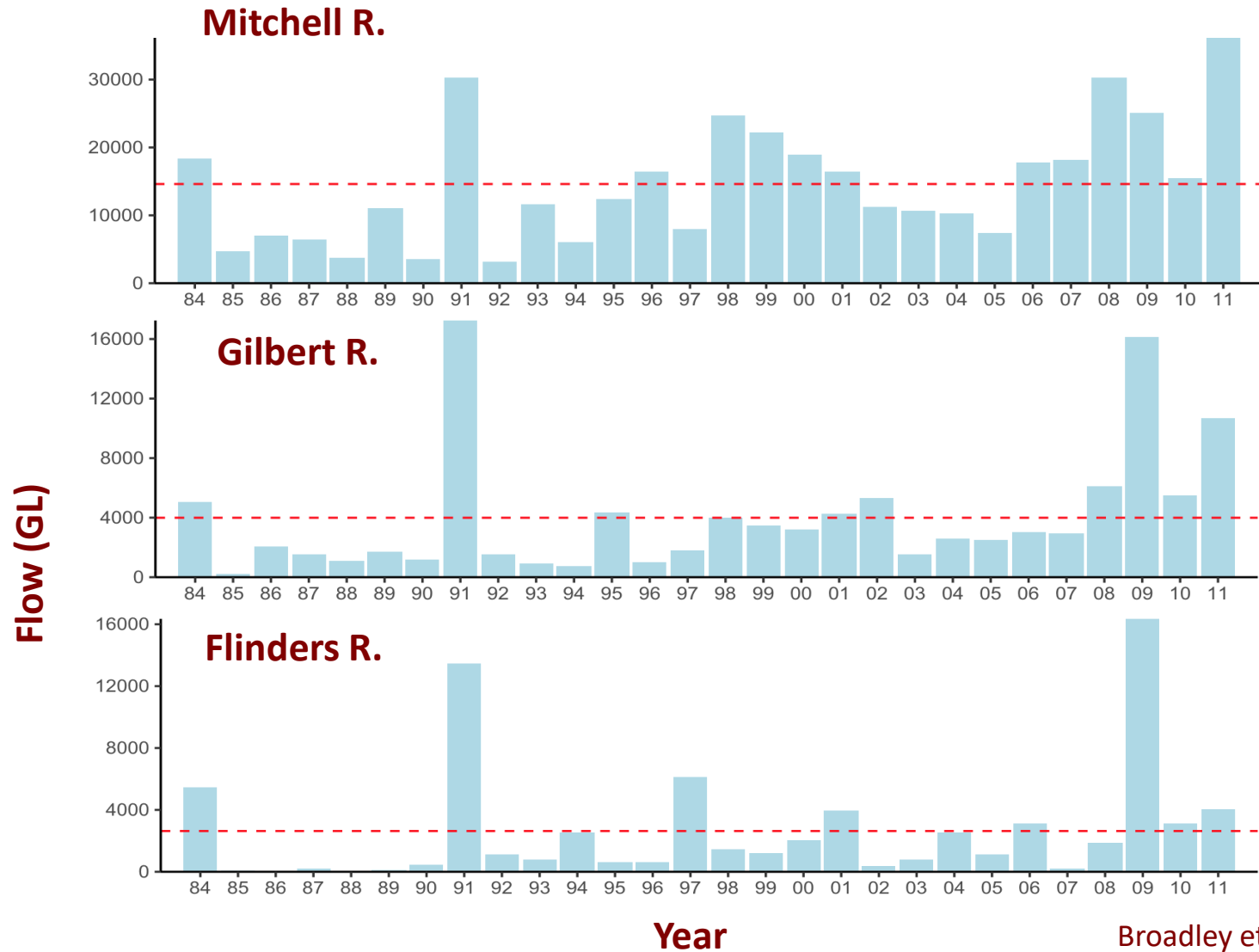








# Mean annual flow



# Importance of southern Gulf for shorebirds

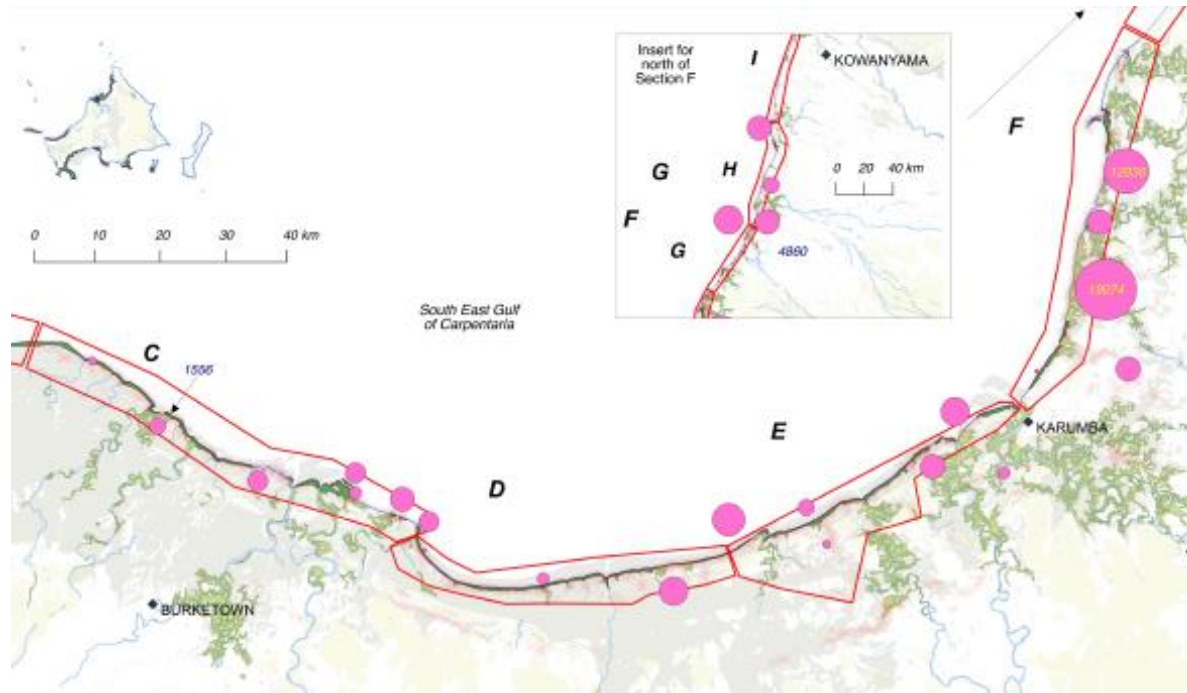
- 2<sup>nd</sup> most important shorebird site of International importance in Australia
- 50% (ca. 2,000,000) use Gulf from Oct-March
- Endangered & critically endangered species



# Historical knowledge

- 1998 survey including Gilbert & Mitchell R areas

Flinders R surveys  
1998-2013





Water = nutrients = food in the mud = birds

## **Surveys in Flinders R estuary**

Carpentaria Land Council  
Aboriginal Corporation (CLCAC)

Jan, April, Sept 2019,

Apr 2020 (limited data)

## **Surveys on Mitchell, Flinders, Gilbert R estuaries**

Queensland Wader Study Group

Mar/April 2019, Dec 2019



## Mitchell

**1019 shorebirds (Mar2019)**

**7255 shorebirds (Dec 2019)**



## Queensland Wader Study Group

March 2019

Dec 2019



## Gilbert

**5283 shorebirds (Mar 2019)**

**3165 shorebirds (Incomplete,  
Dec 2019)**



## Flinders

**2244 shorebirds (Mar 2019)**

**851 shorebirds (incomplete, Dec  
2019)**





# Gilbert & Mitchell R

## Low tide feeding sites

- Internationally significant (>1%)
  - Black-tailed Godwit
  -
- Nationally significant (>0.1%)
  - Black Tailed Godwit
  - Red Neck Stint
  - Bar-Tailed Godwit
  - Greater Sandplover
  - Lesser Sandplover
  - Sharpe-tailed Sandpiper
  - Whimbrel
  - Eastern Curlew



# CLCAC – high tide Flinders counts

January 2019

15,090

March 2019

2513

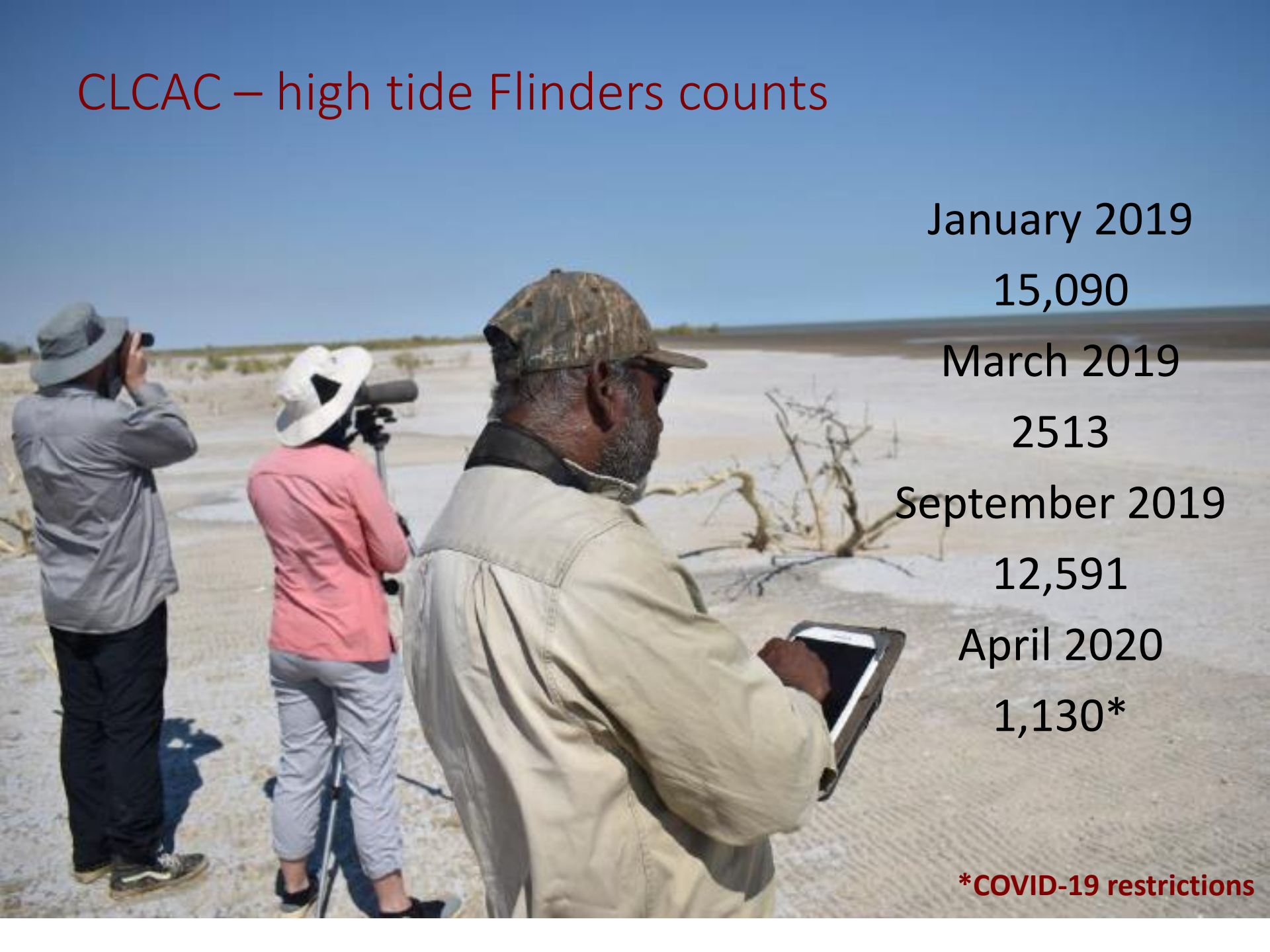
September 2019

12,591

April 2020

1,130\*

**\*COVID-19 restrictions**







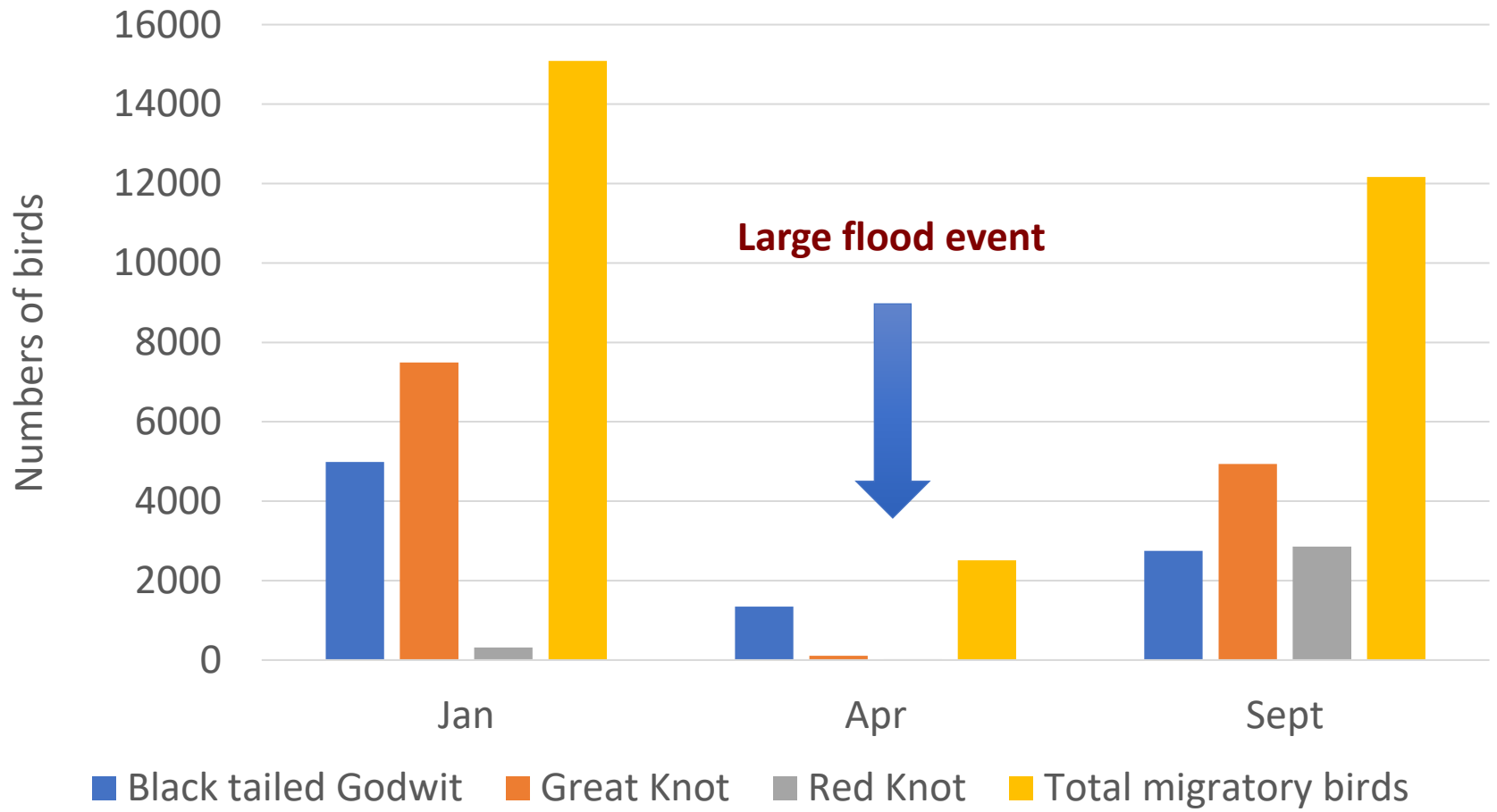
# Flinders R

## High tide roost sites



- Internationally significant
  - **Great Knot**
  - **Red Knot**
  - **Black tailed Godwit**
  - Bar Tailed Godwit
  - Curlew sandpiper
  - Eastern Curlew
  - Greater & Lesser Sand Plovers

# Bird counts over study - Flinders





# Flinders flood Feb/March 2019



# Food for shorebirds



Bivalves



Crustaceans



Forams



Gastropods



Nematodes



Ostracods



Polychaetes





How much mud- and sandflat habitat is in each estuary/nearshore area?

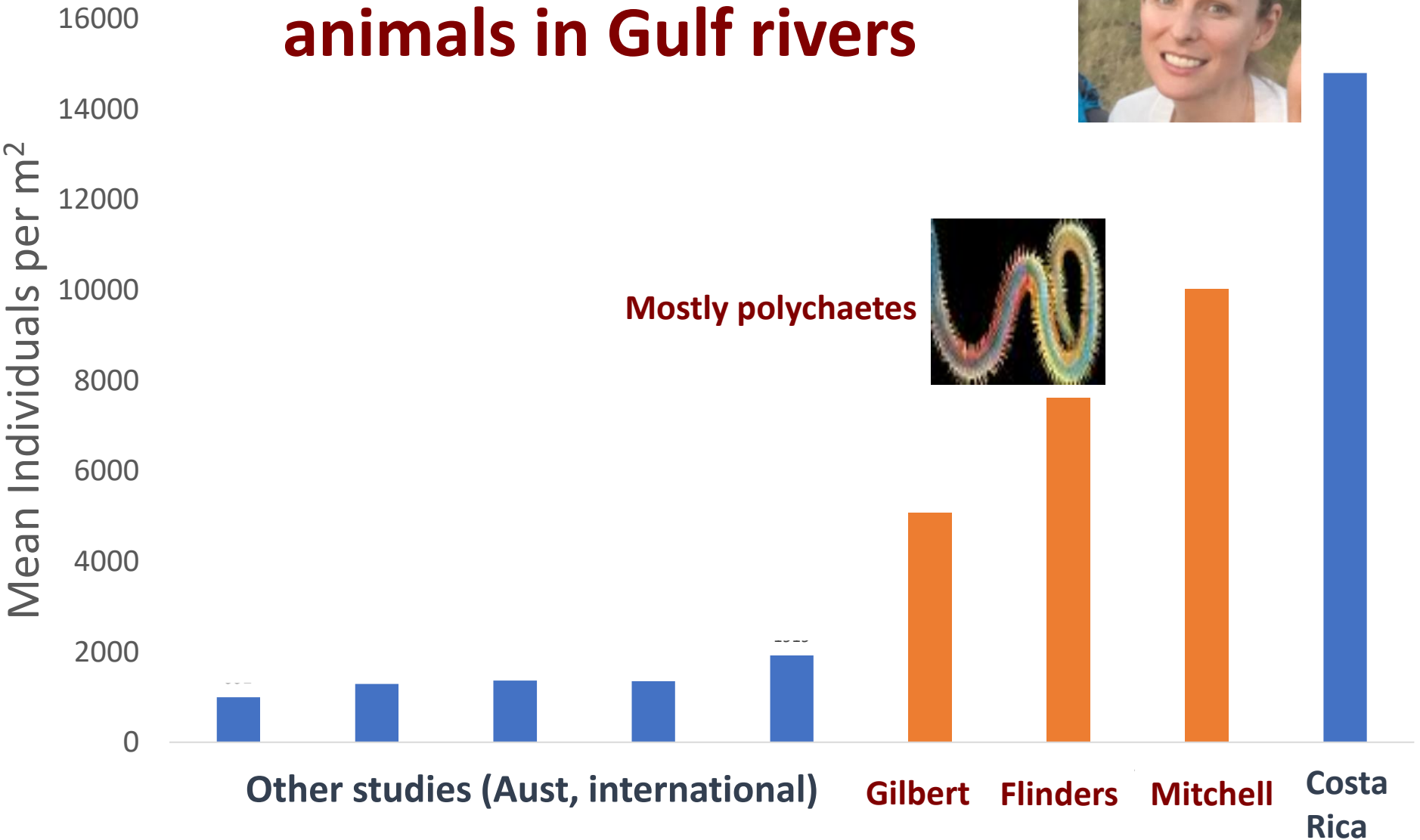


**Mitchell River**  
**7.5 km<sup>2</sup>**

**Gilbert River**  
**7.5 km<sup>2</sup>**

**Flinders River**  
**14.6 km<sup>2</sup>**

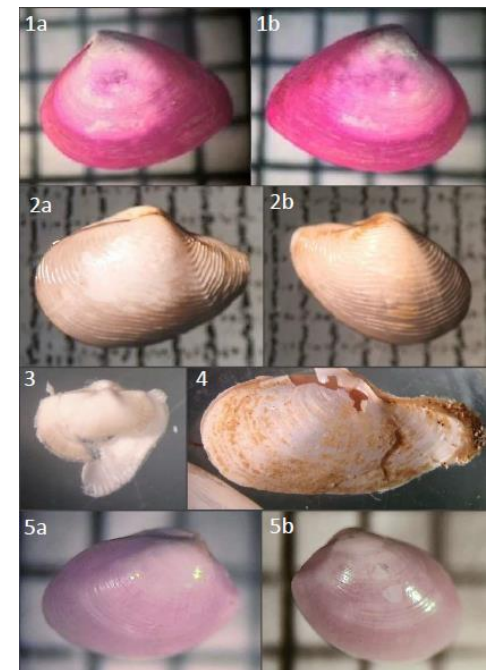
# High abundance of benthic animals in Gulf rivers



Vikki Lowe, honours student

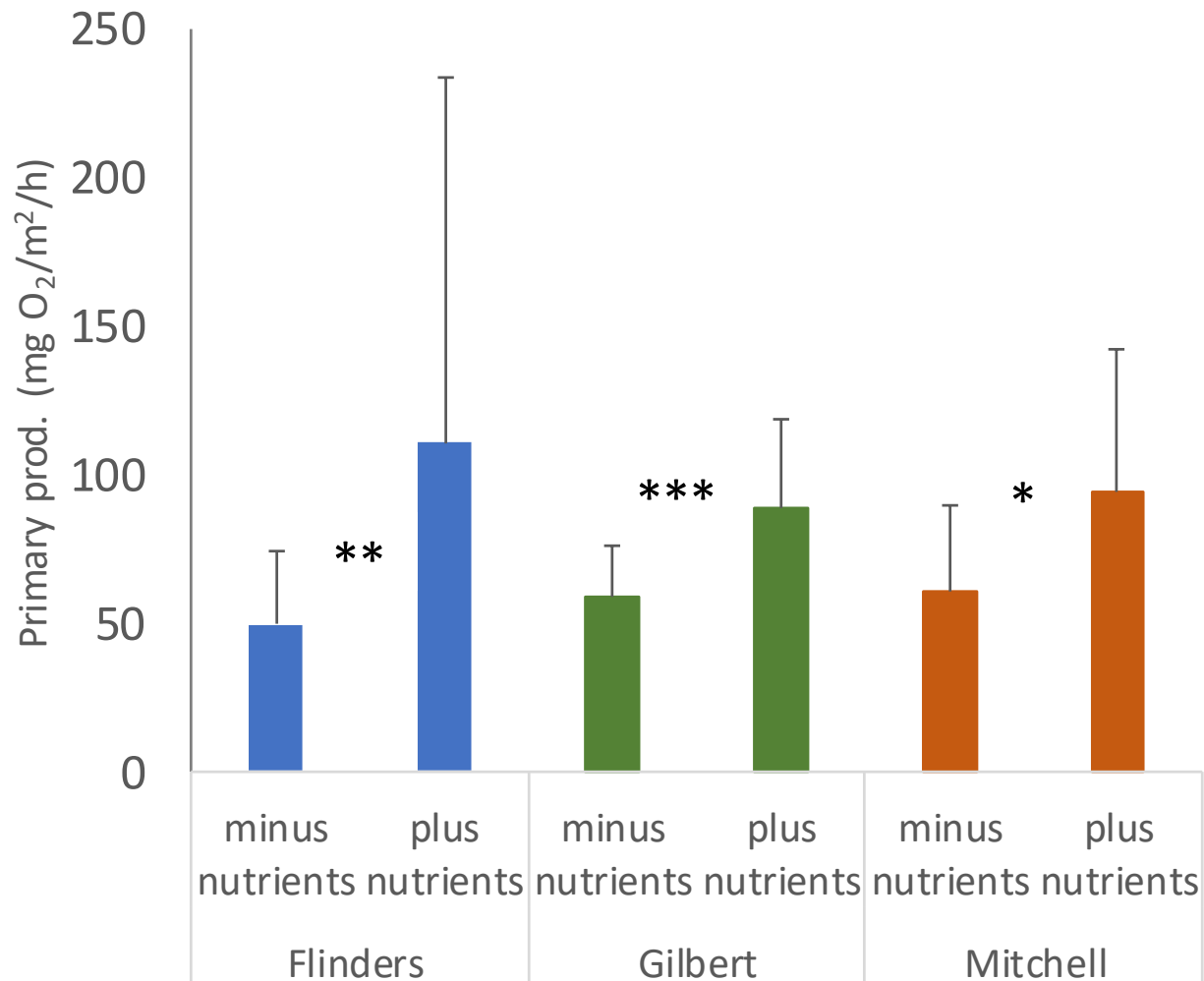
# Effect of freshwater flow

- Polychaetes
  - large species = long lived
  - Burrowing buffers low salinity
  - Densities do not change substantially after flooding
  - Longer billed birds can still access
- Bivalves
  - Close valves, cease pumping
  - Densities change substantially after flooding
  - Favourite food of knots

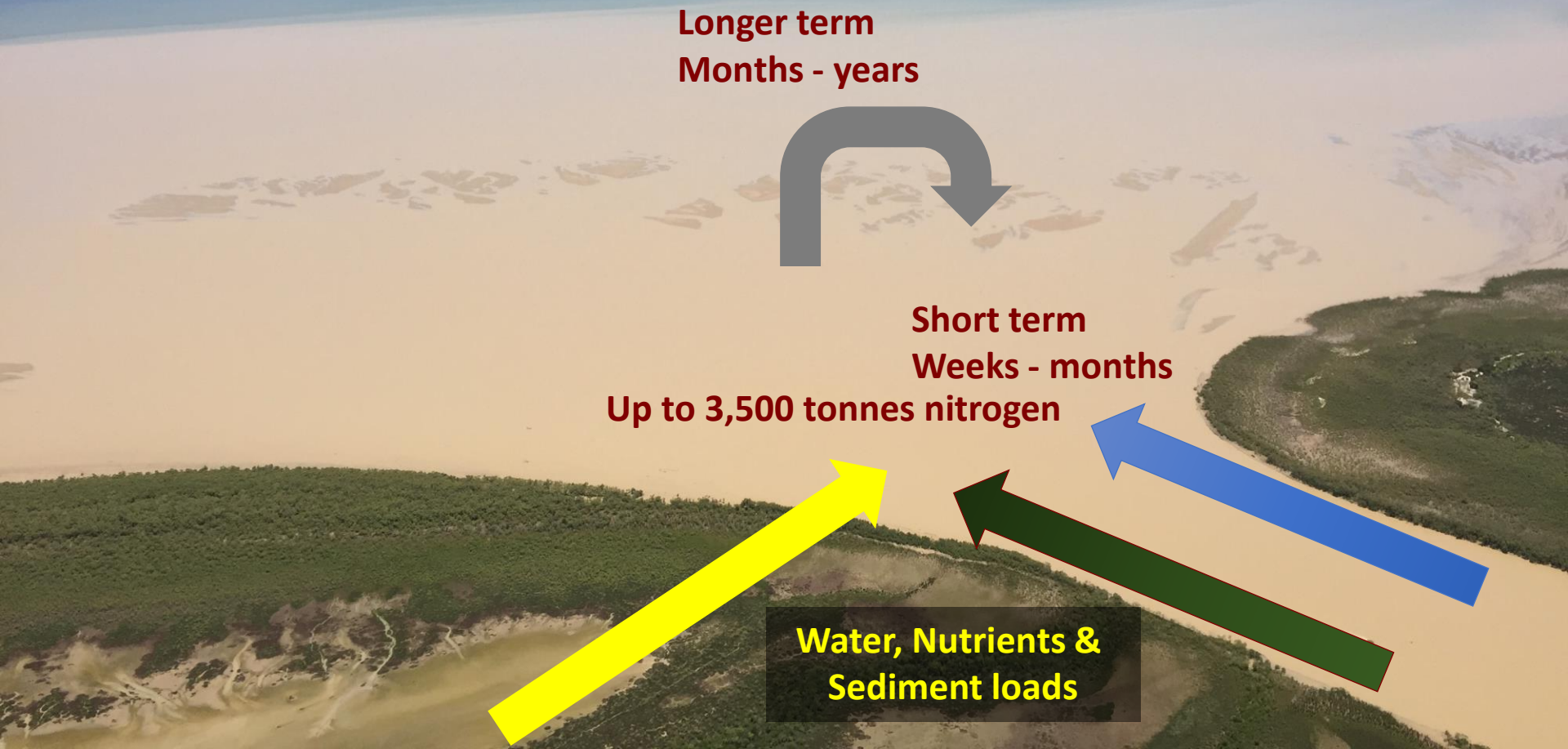


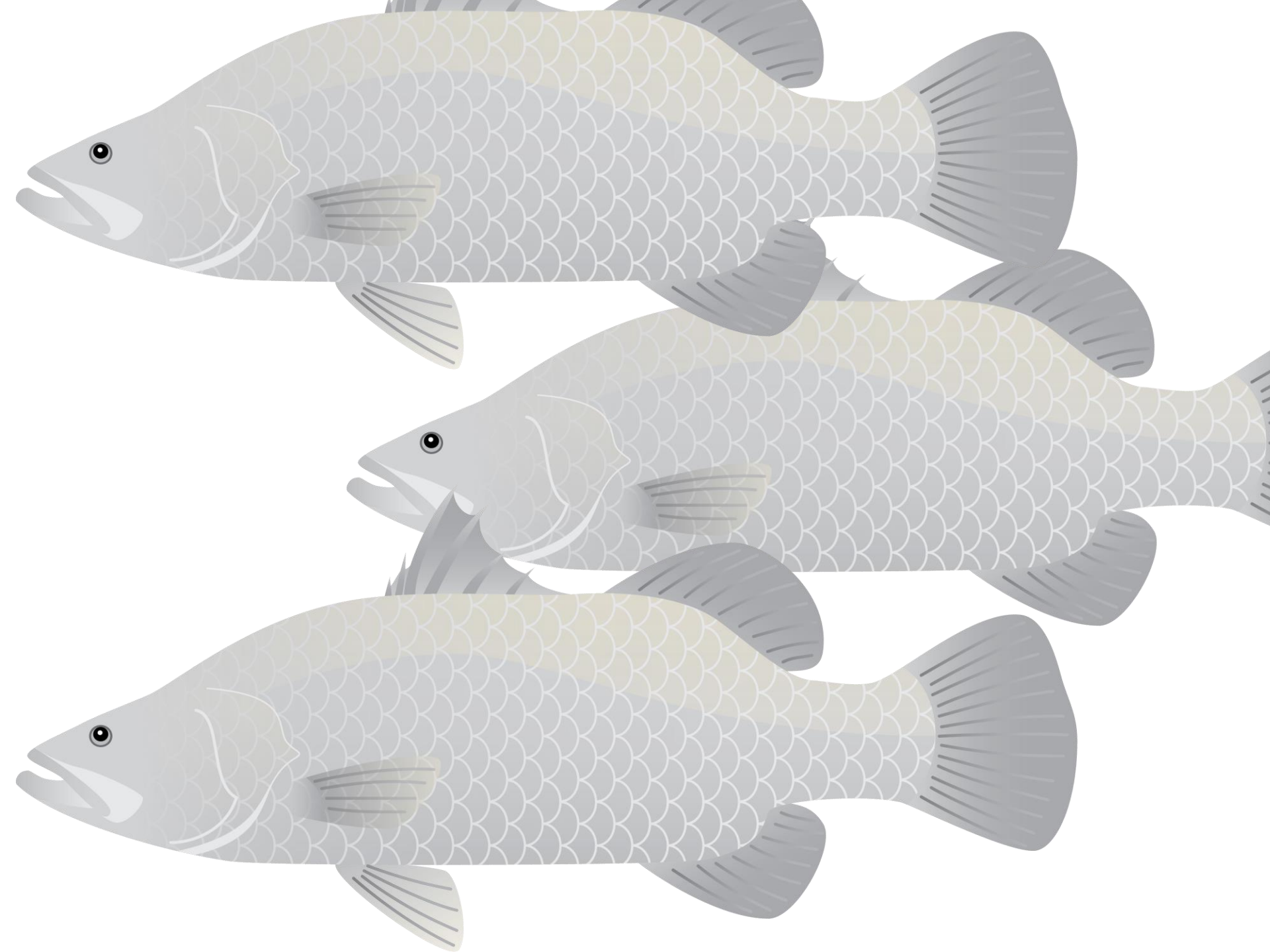


# Nutrients stimulate algal growth on mudflats



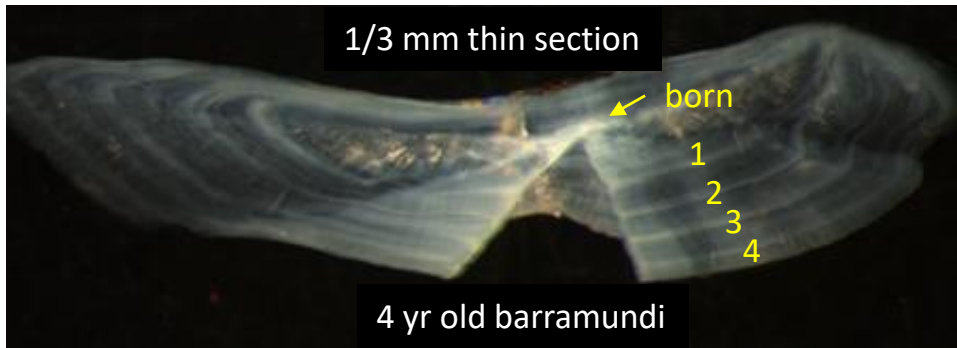
# Floods bring nutrients & sediment which fuel productivity







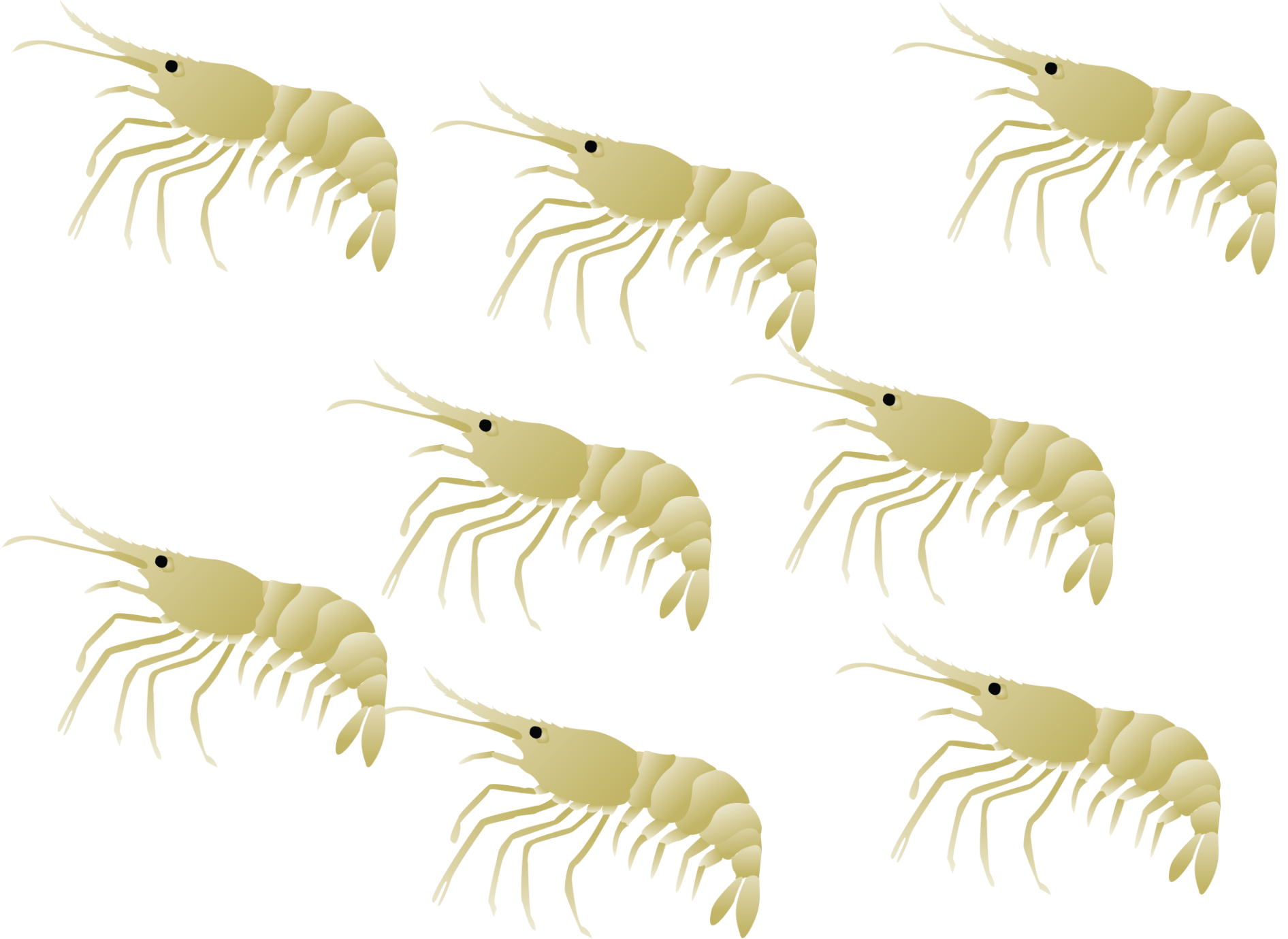
# Using ear bones to look at age and growth



Distant between bands =  
annual growth



- Growth significantly & positively related to flow, after accounting for age
- Sequential pattern of river flow over multiple years is an important driver of barramundi population dynamics
- Growth rates linked to flow. More extraction equals smaller fish



- What is the relative importance of each estuary for juvenile banana prawns??





How many prawns in each estuary in Nov 2016?

**Mitchell**

**1.96 million**



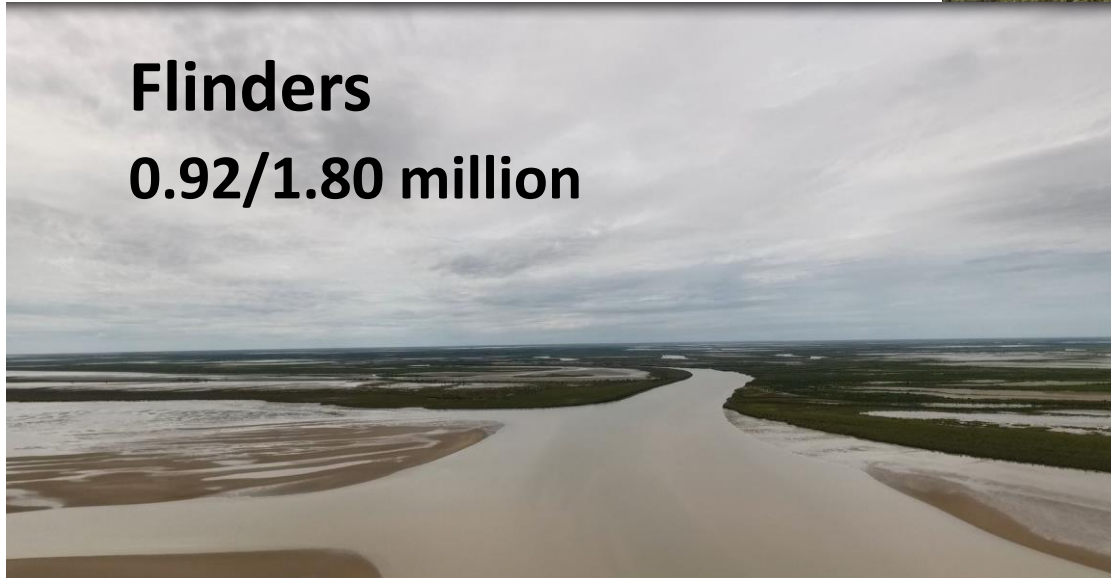
**Gilbert**

**0.64 million**



**Flinders**

**0.92/1.80 million**



R. Kenyon, S. Faggotter

How many prawns in each estuary in Nov 2017?

## **Mitchell**

**1.96 million**

**0.75 million**



## **Gilbert**

**0.64 million**

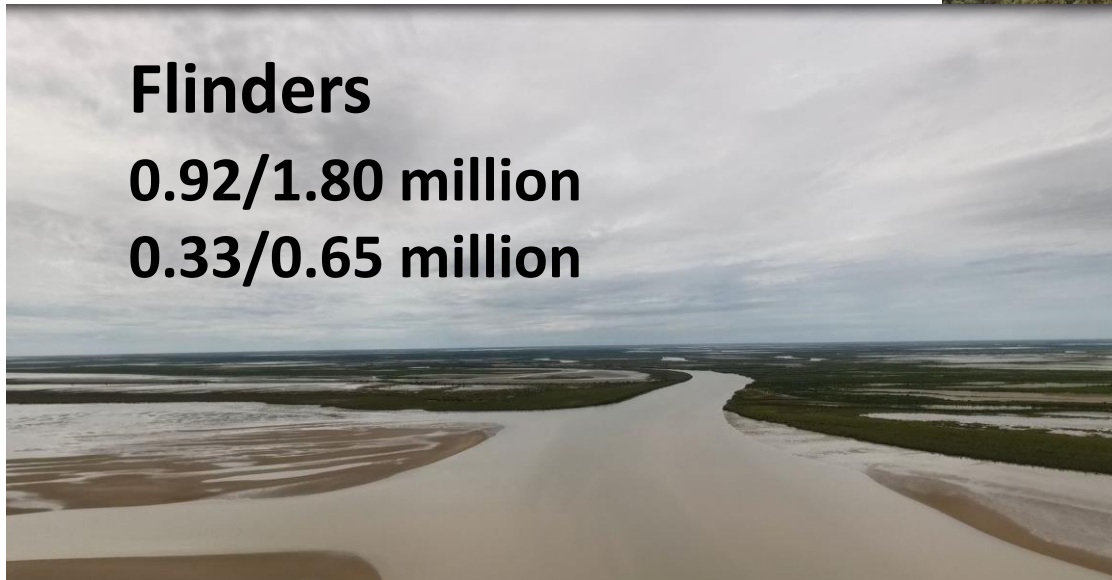
**1.55 million**



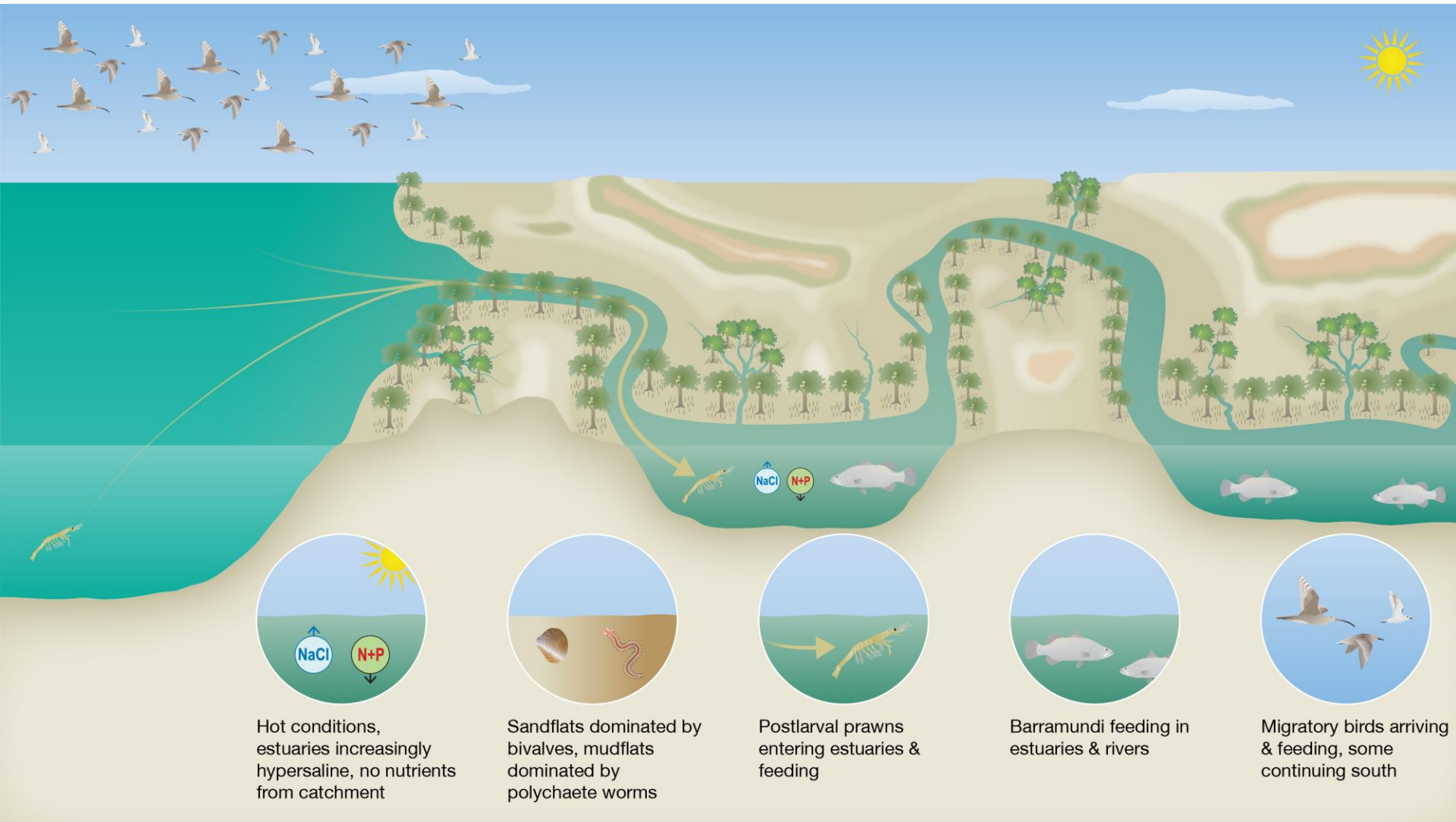
## **Flinders**

**0.92/1.80 million**

**0.33/0.65 million**

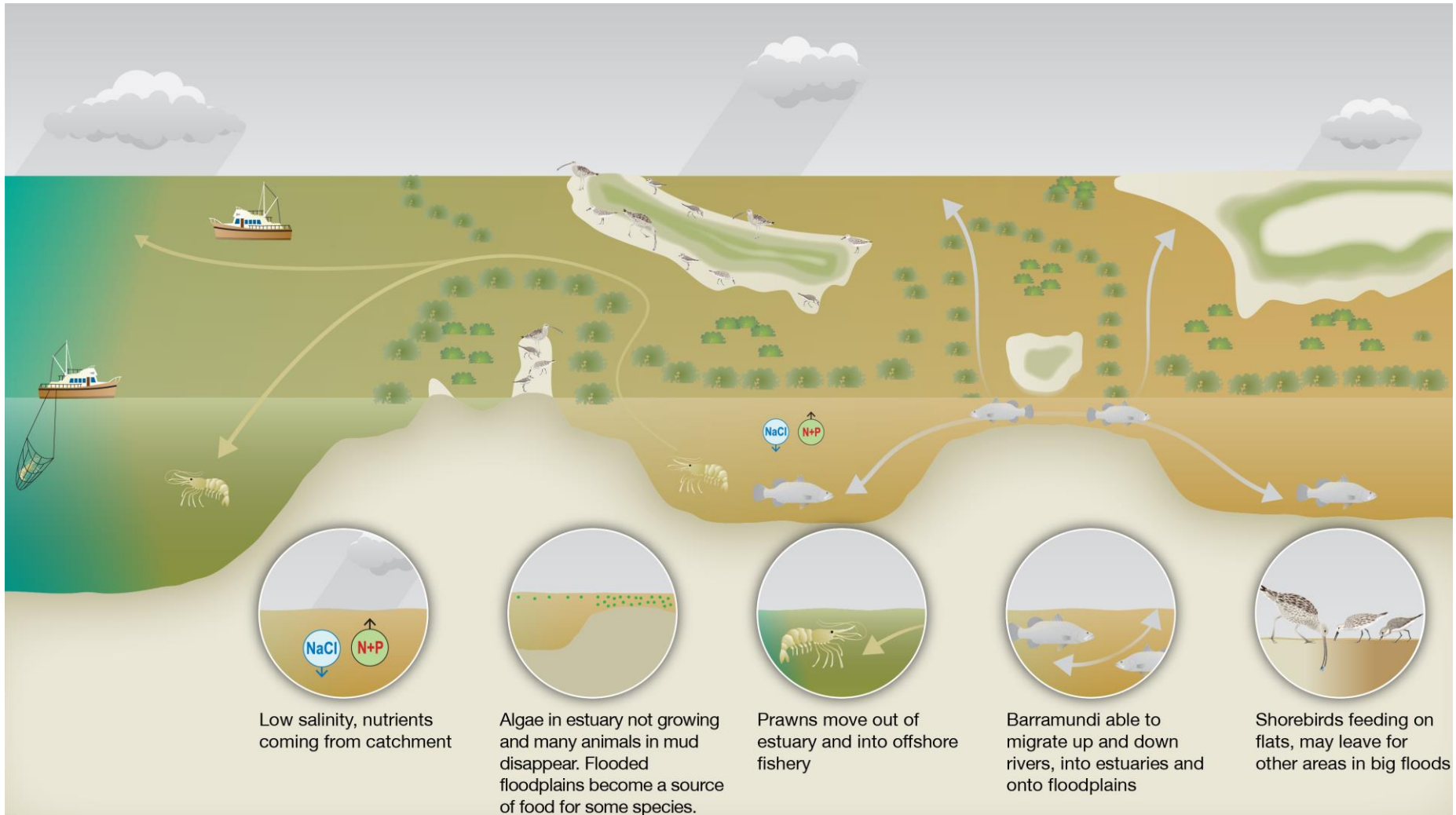


# Late dry season

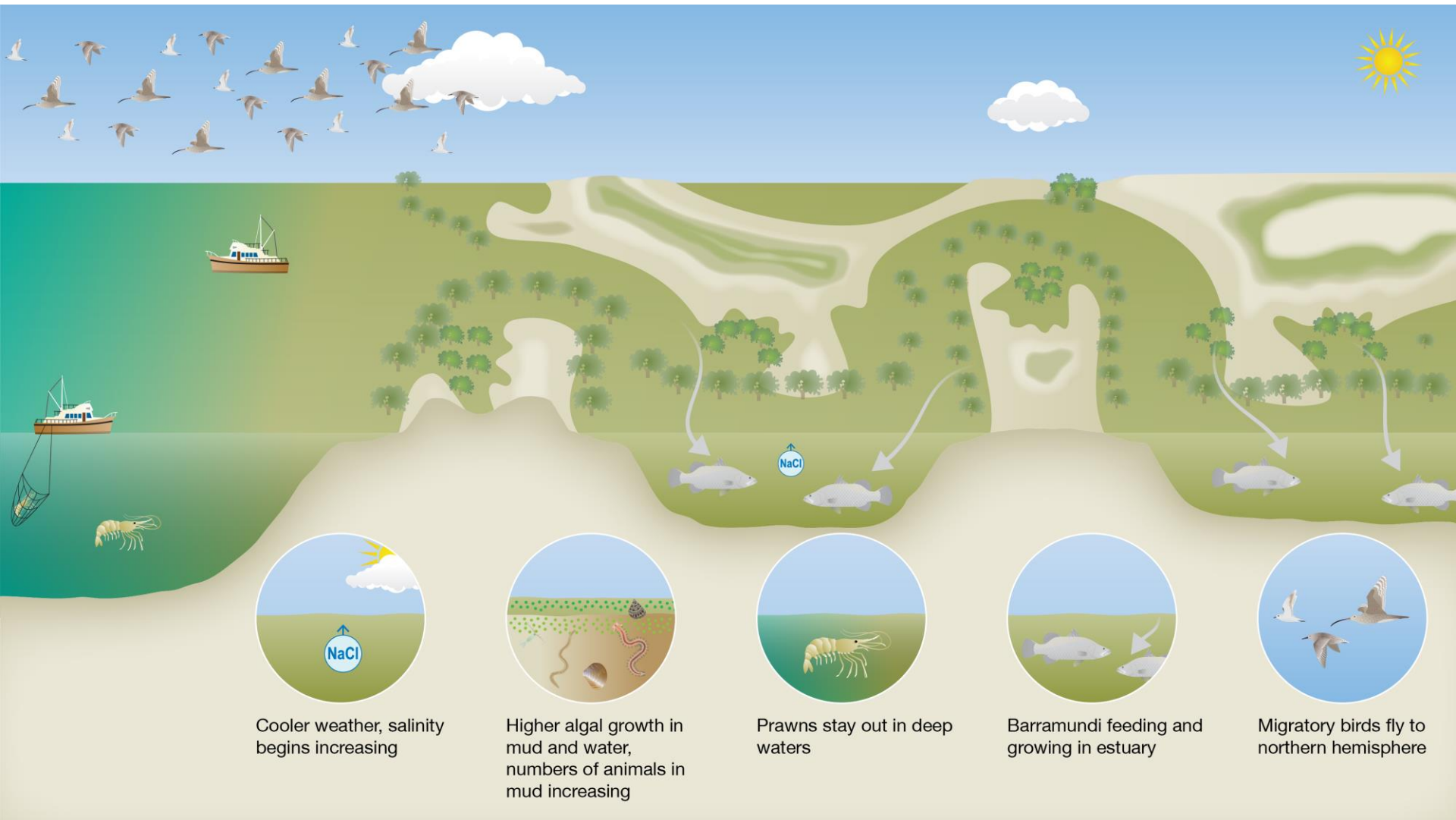




# Wet season



# Post wet season



# Summary

- Short term
  - Floods reduce food availability for birds
- Long term
  - Floods bring crucial nutrients to stimulate productivity
  - Flow is most critical in years of moderate to low flow
  - Flinders seems to be most productive & likely most vulnerable to development





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Queensland  
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