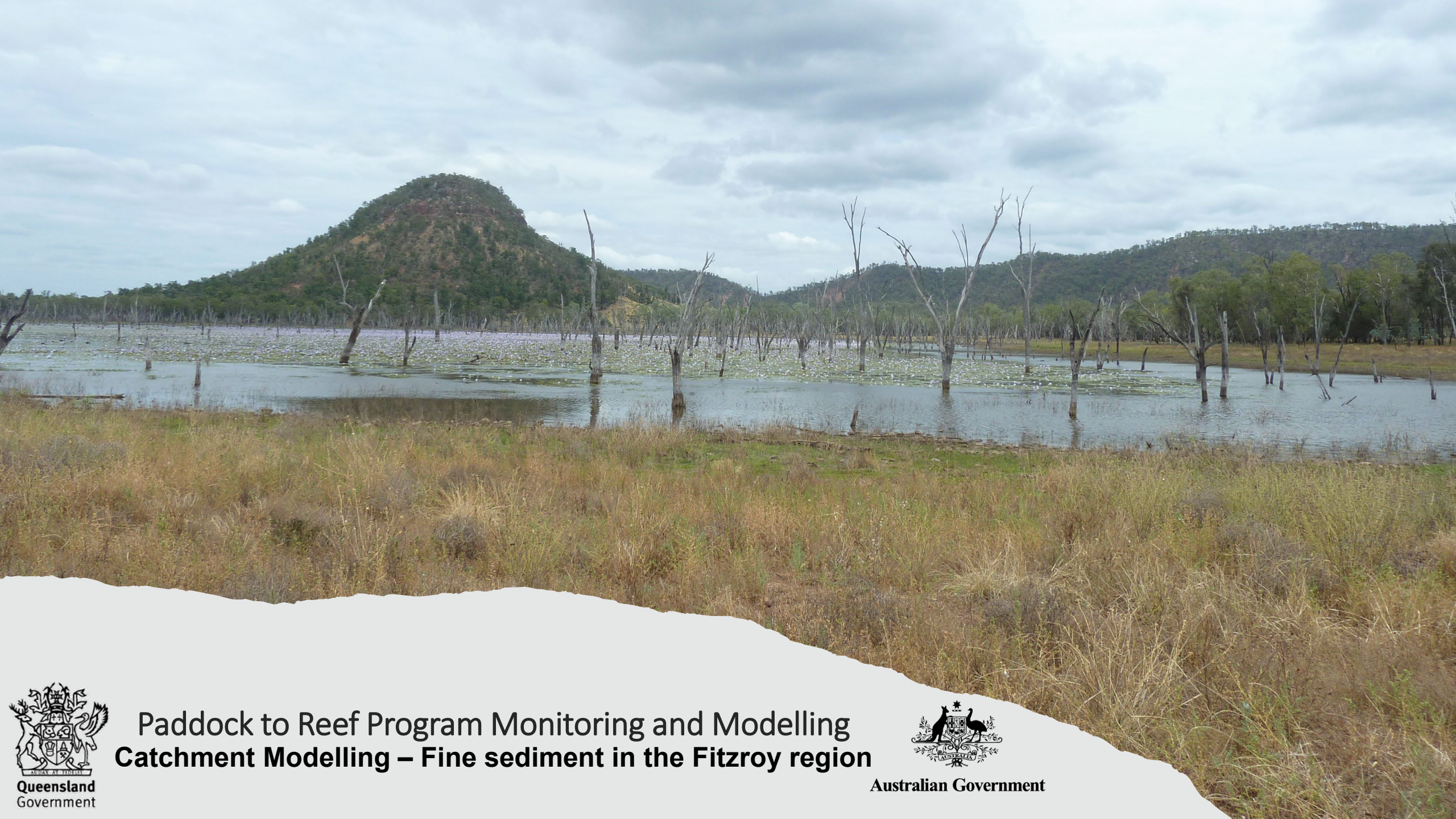


Queensland Government

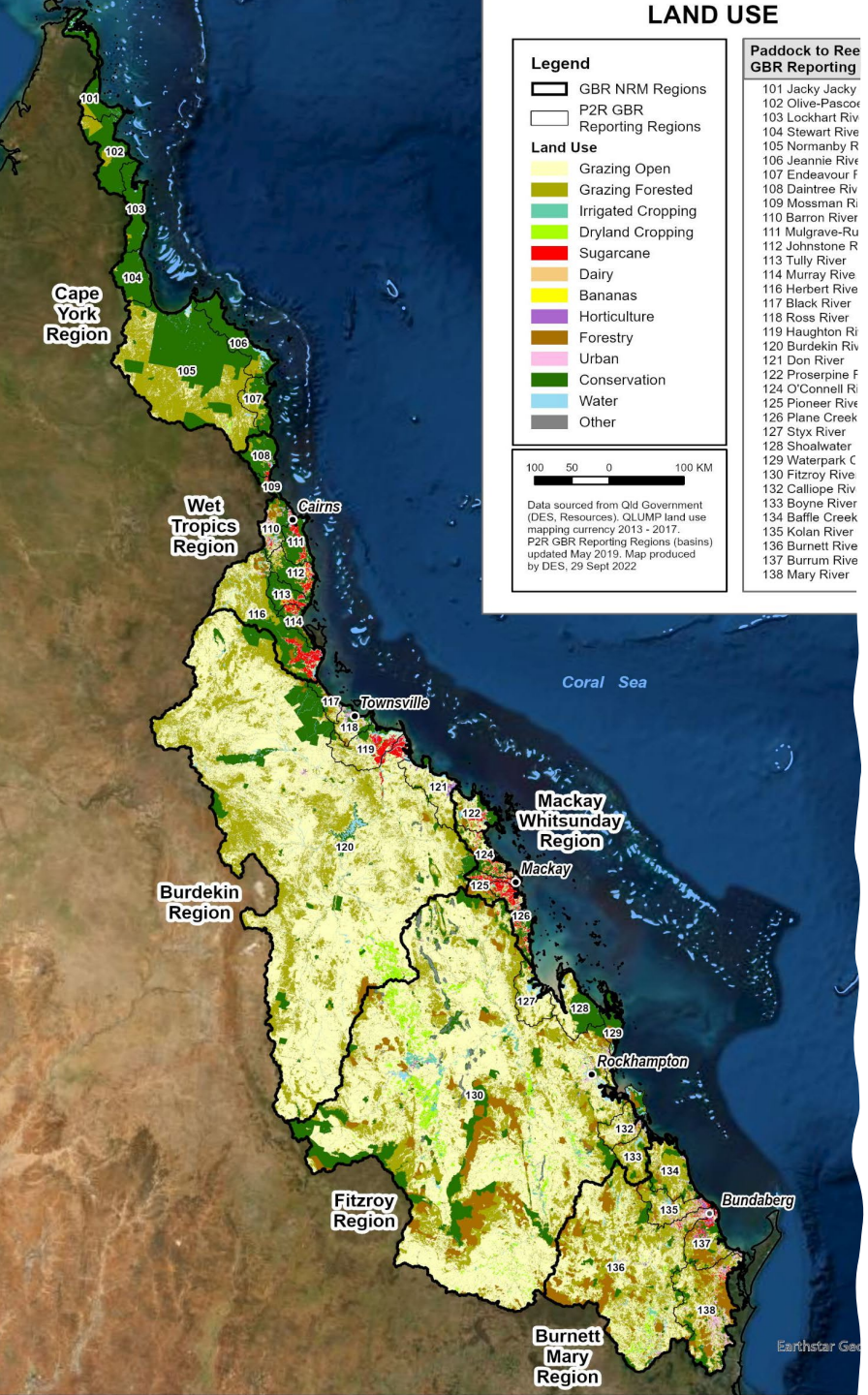
Paddock to Reef Program Monitoring and Modelling

Catchment Modelling – Fine sediment in the Fitzroy region

Australian Government

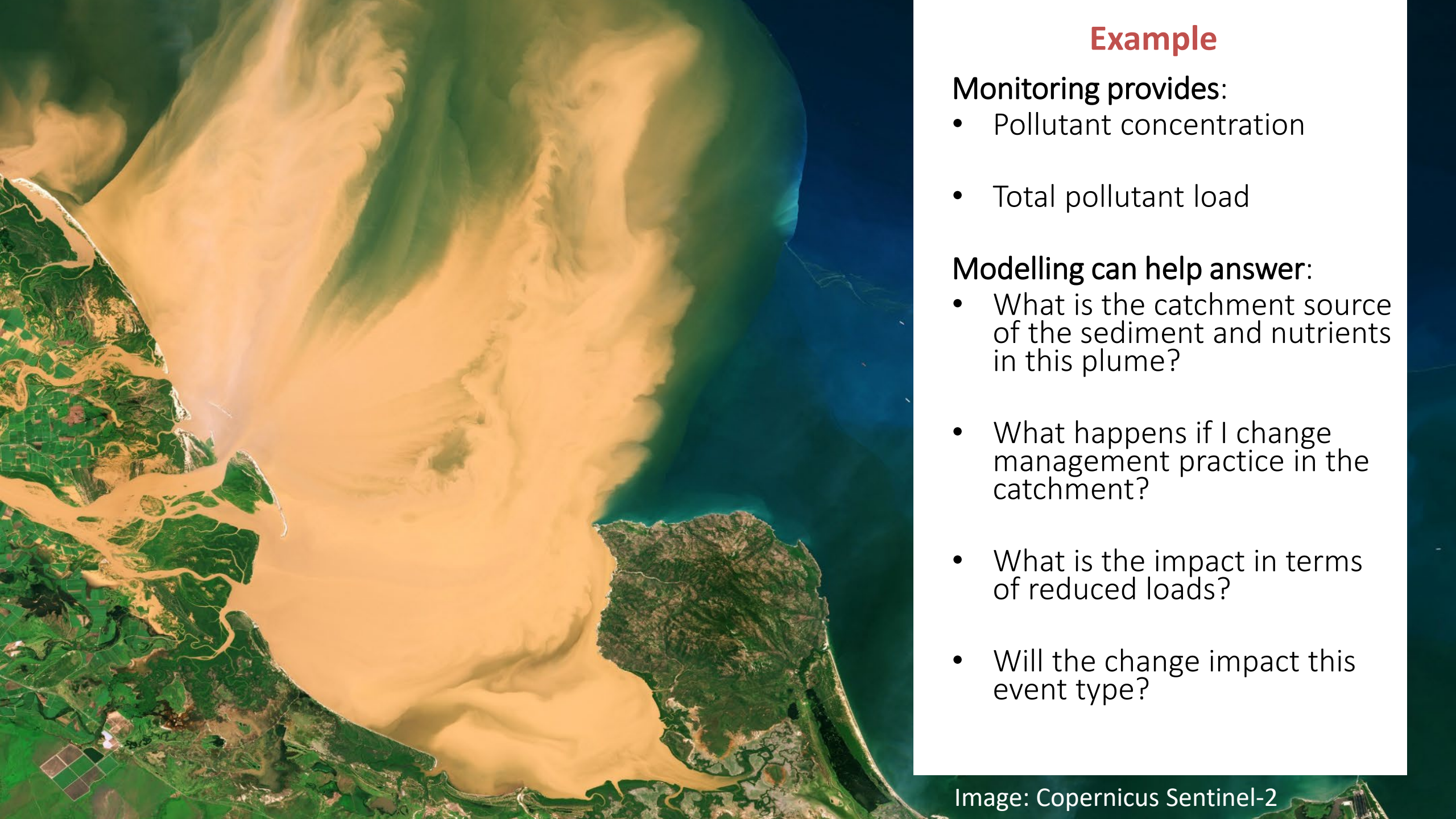
Outline

- Why we use models
- Paddock to Reef program
- Outline how we model
- How do we know the models are useful
- Examples of model outputs – fine sediment



Why model, and not just use monitoring?

- Pollutant loads vary with climate
- Load reductions due to improvement management practice
- Explore future scenarios
  - what will happen if we change management practices



Example

Monitoring provides:

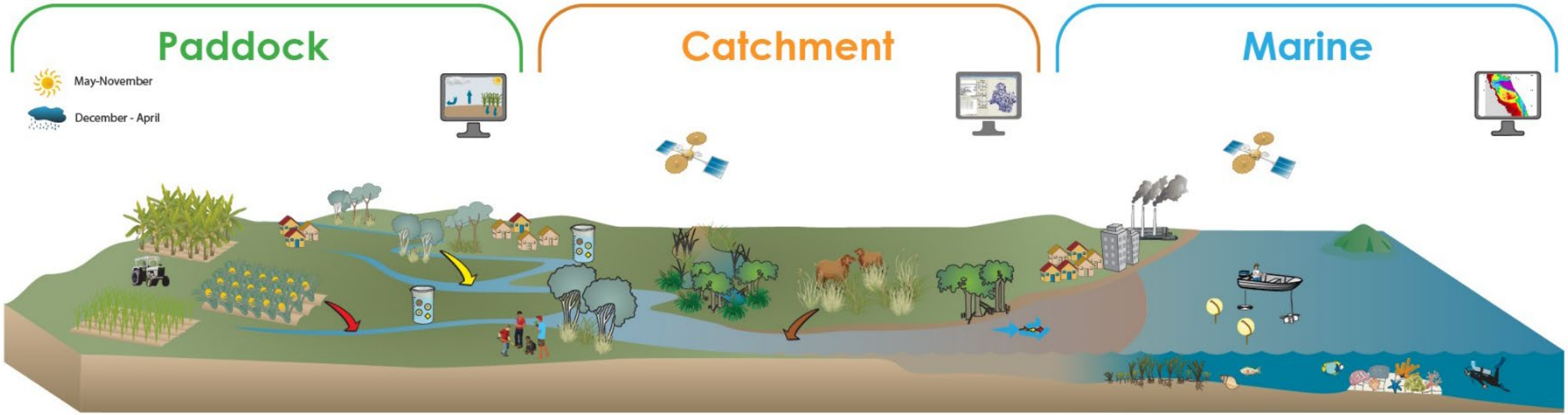
- Pollutant concentration
- Total pollutant load

Modelling can help answer:

- What is the catchment source of the sediment and nutrients in this plume?
- What happens if I change management practice in the catchment?
- What is the impact in terms of reduced loads?
- Will the change impact this event type?

Image: Copernicus Sentinel-2

Paddock to Reef Integrated Modelling, Monitoring and Reporting Program



Agriculture
- Paddock monitoring
- Paddock modelling

Catchment monitoring

Catchment modelling

Catchment indicators
- Riparian extent
- Wetland condition
- Wetland extent
- Ground cover

Seagrass monitoring

Water quality monitoring

Coral monitoring

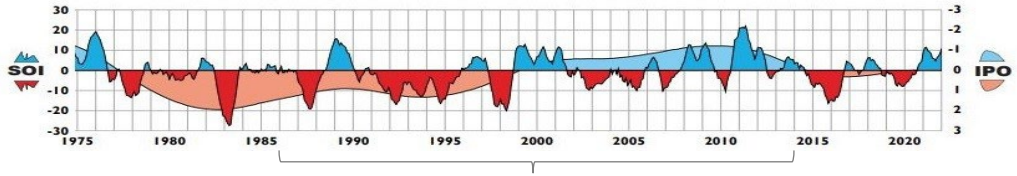
eReefs marine modelling

Stewardship
- Agriculture
- Urban
- Industrial
- Public lands

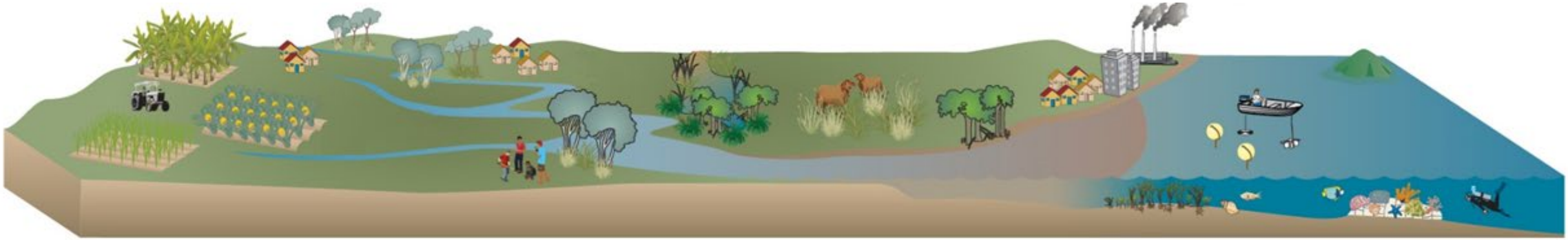
www.reefplan.qld.gov.au

How do Catchment models work?

Baseline Model

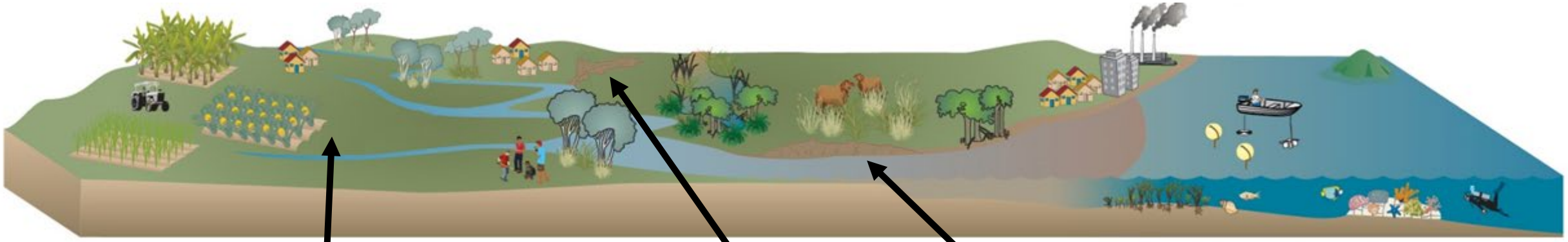


28 year Climate Period



How do Catchment models work?

Baseline Model



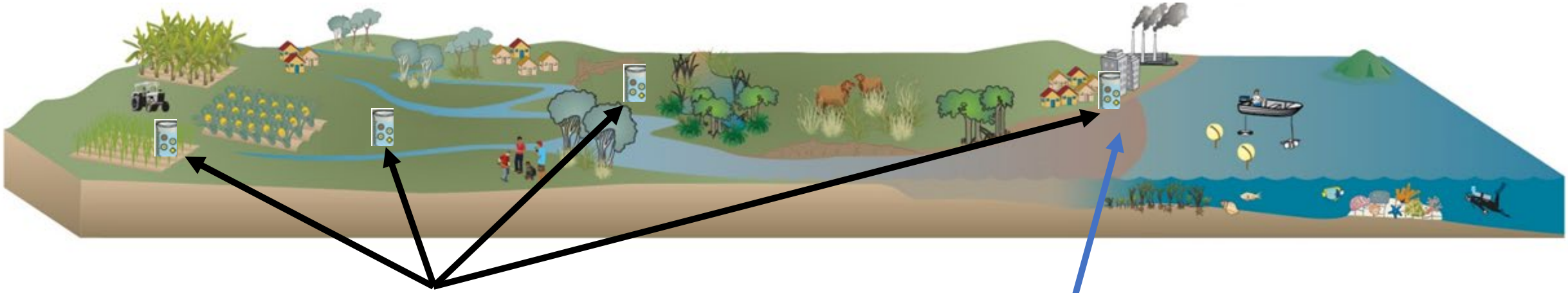
Hillslope Erosion

Gully Erosion

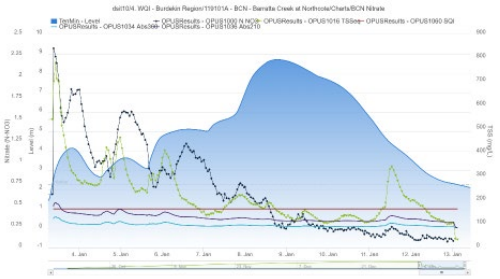
Streambank Erosion

How do Catchment models work?

Baseline Model



WQ Monitoring



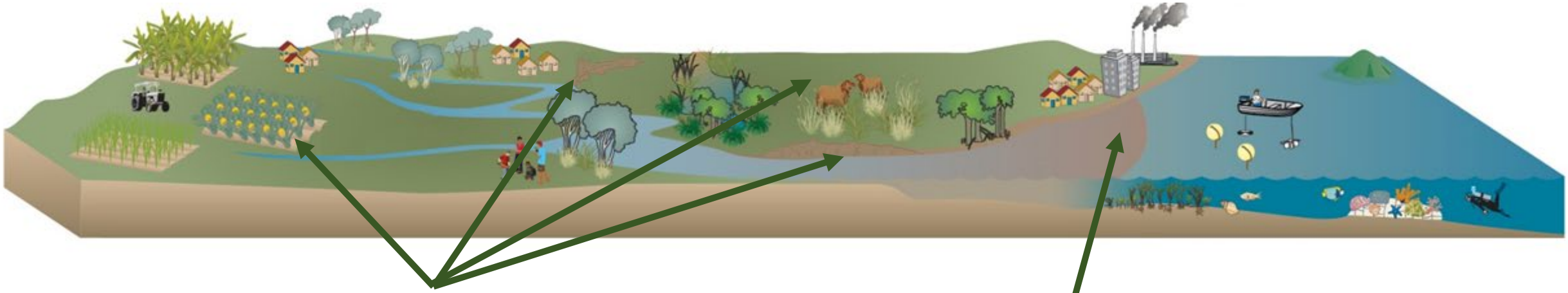
- Site
- Catchment
- End of System

Basin Average Annual Loads

- **Baseline**
  - Fine sediment
  - Nutrients
  - Pesticides

How do Catchment models work?

Change Model



Practice Change / Landscape repair

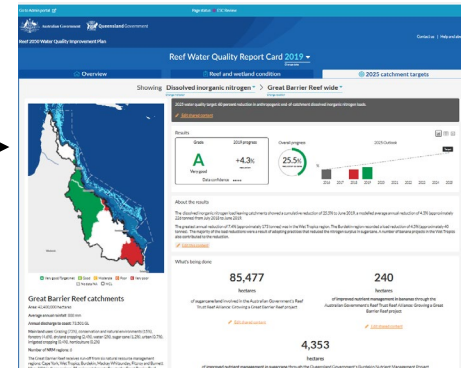
- Improved fertiliser application
- Improved grazing practices
- Gulley rehabilitation
- Streambank rehabilitation
- …

Basin Average Annual Loads

- **Change Load**
  - Fine sediment
  - Nutrients
  - Pesticides

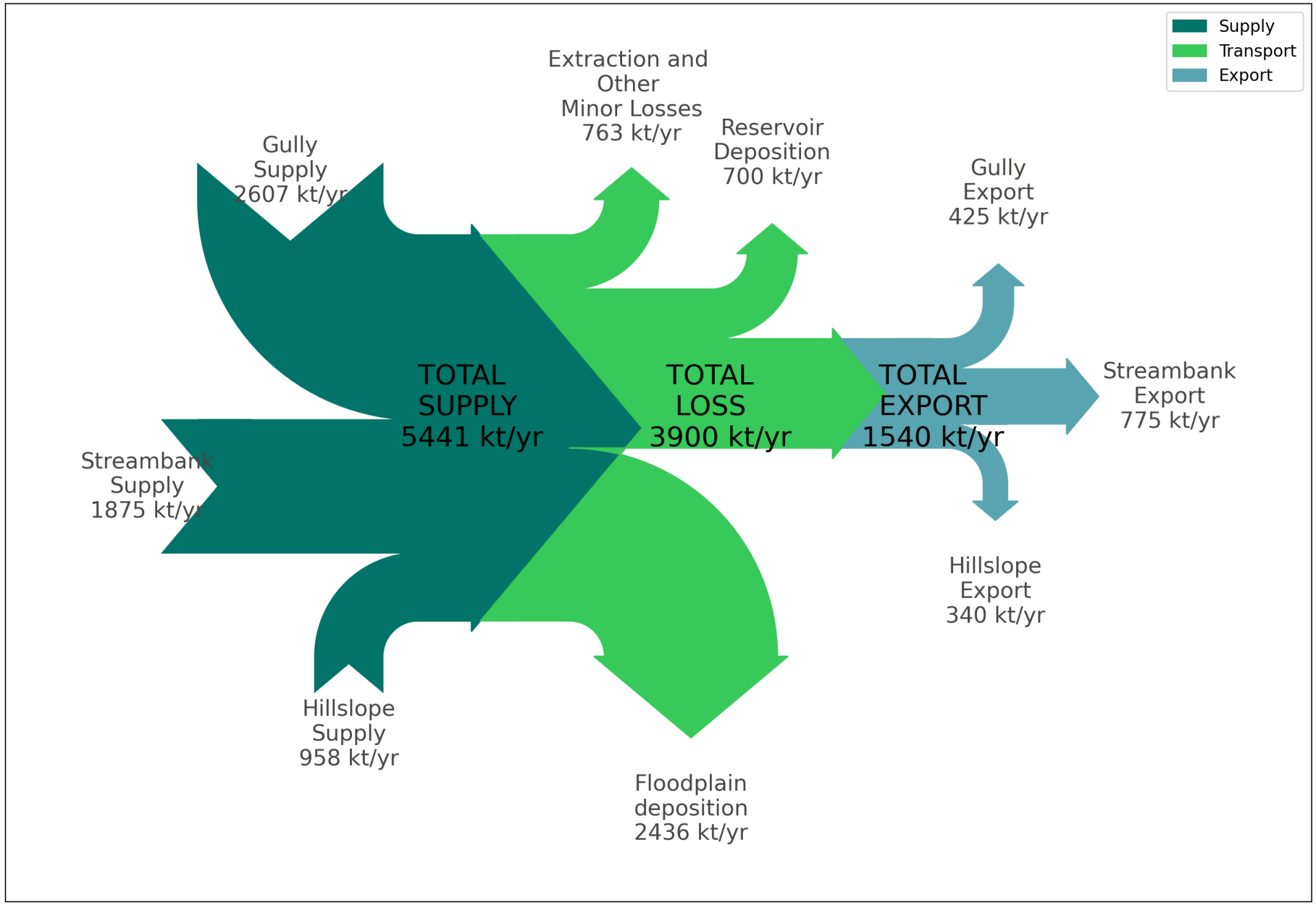
Baseline – Change = Load Reduction

Reef Water Quality Report Card

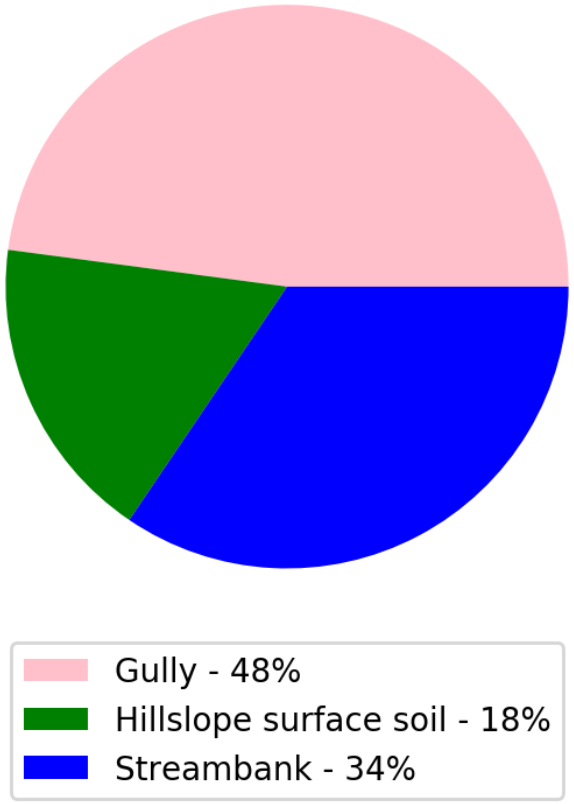


Model Results

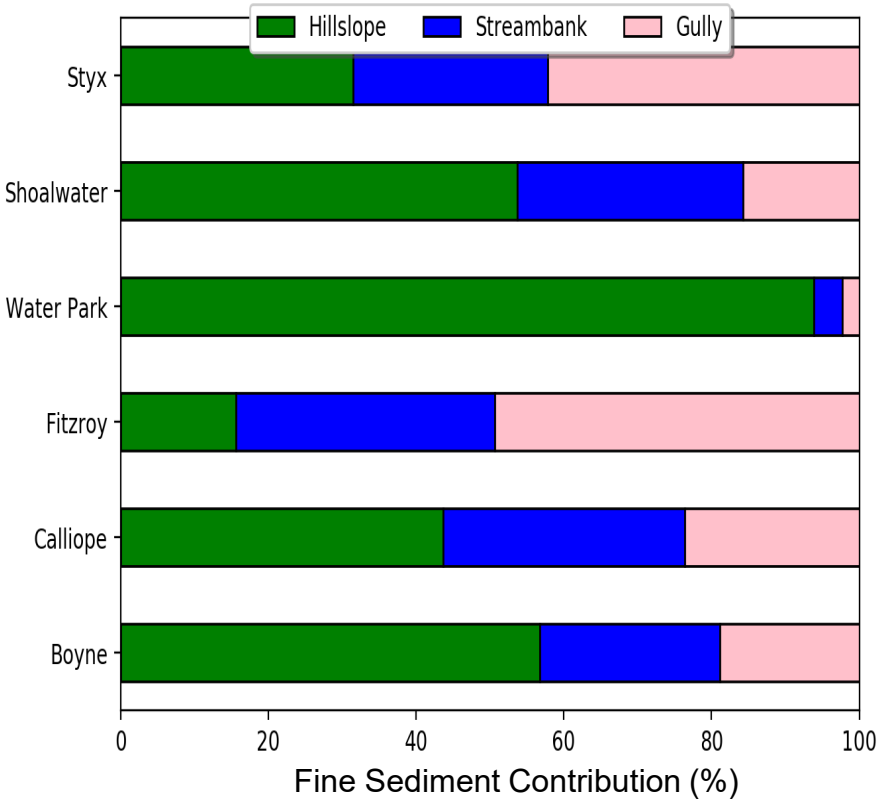
Model Outputs: Fitzroy Fine Sediment Budget



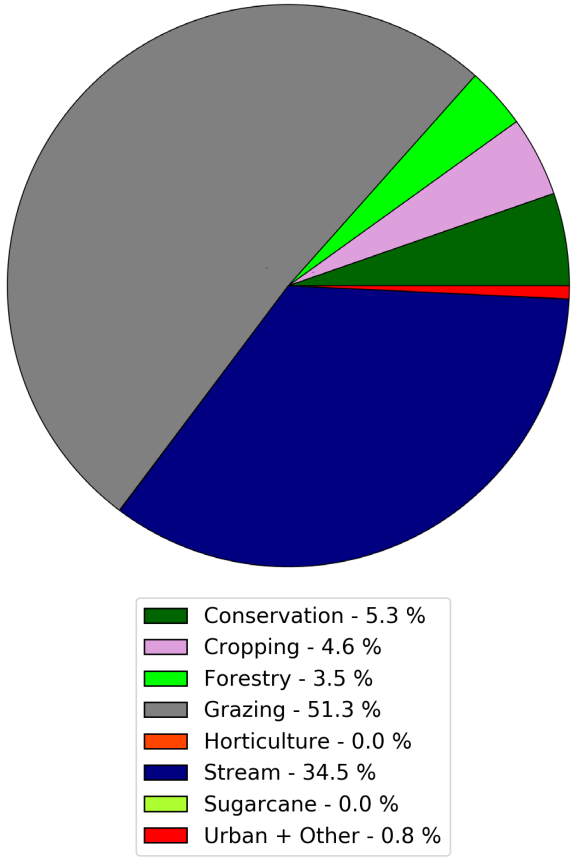
Model Outputs: Fine sediment supplied to stream



Contribution by Process



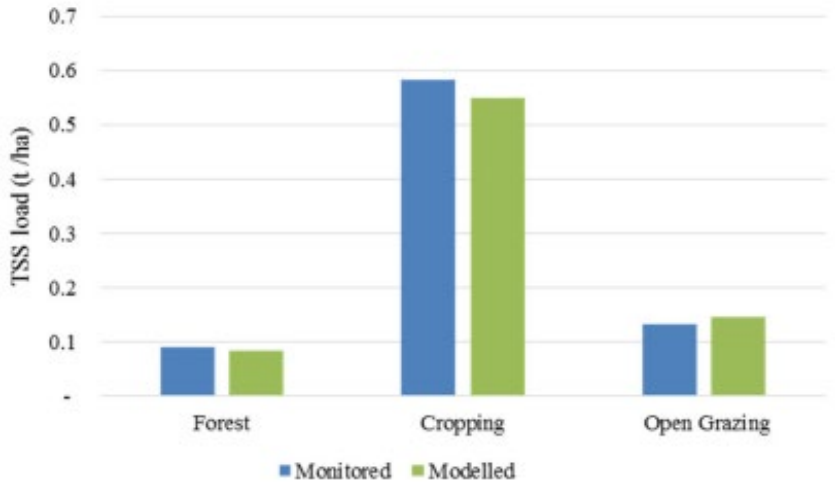
Contribution by Process



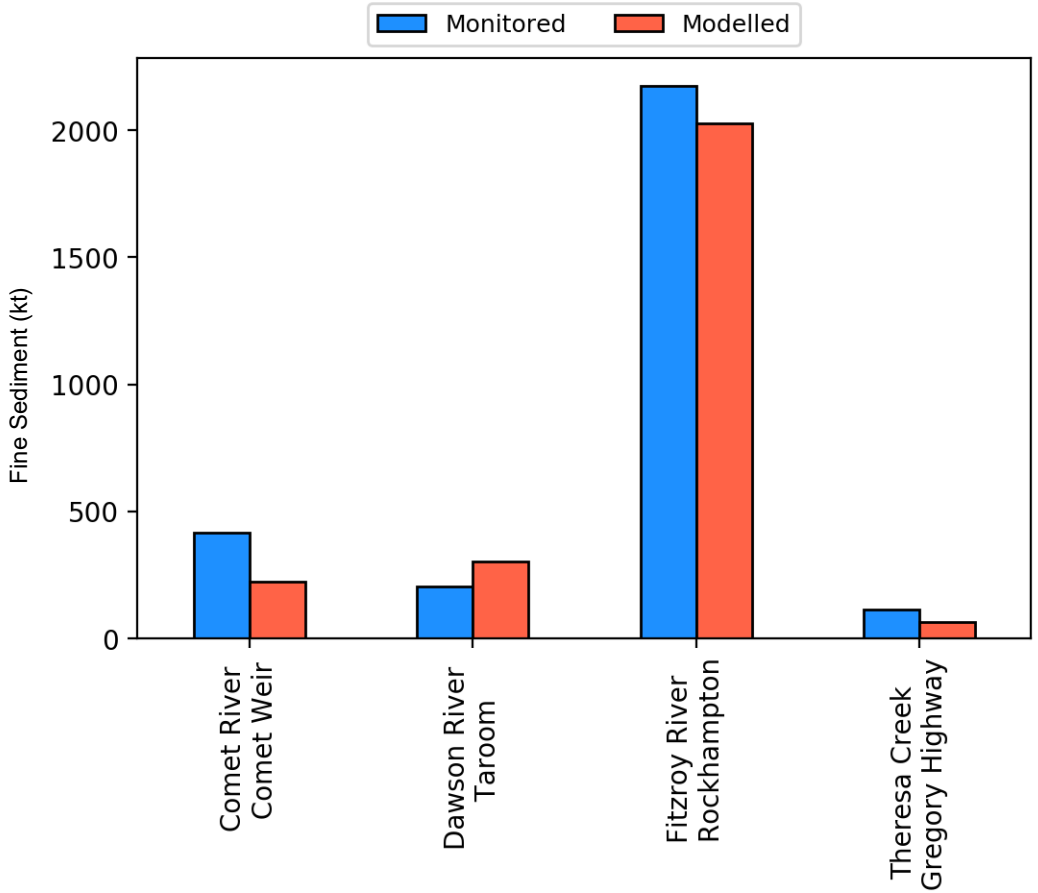
Contribution by land use

Model Validation

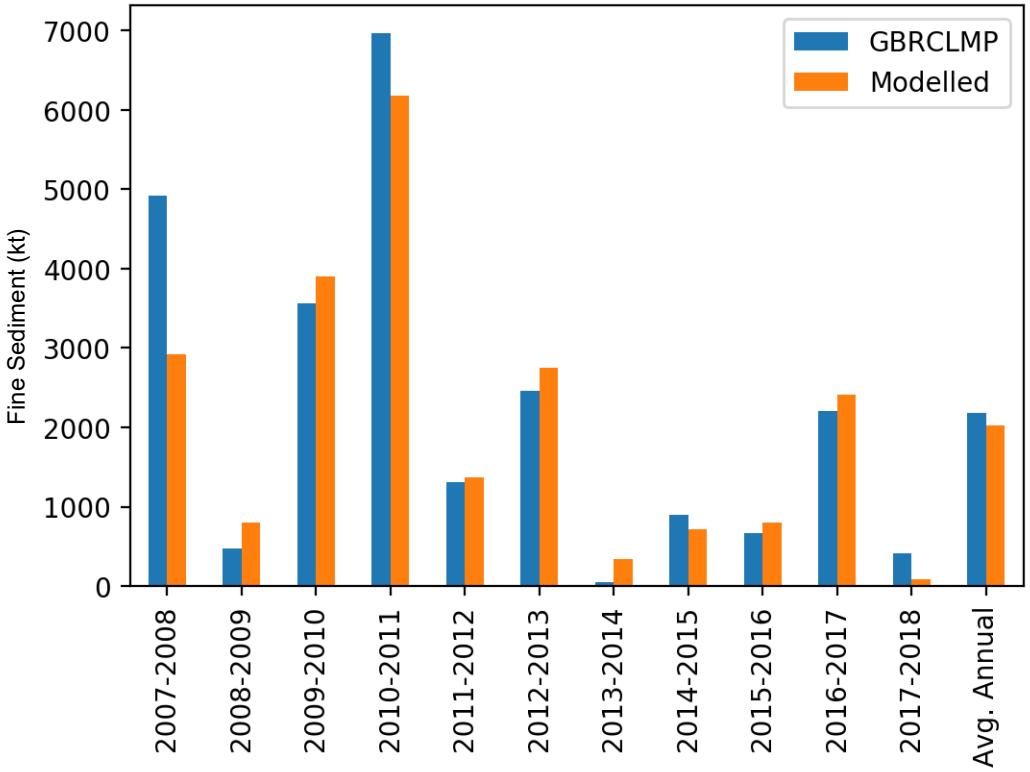
Baseline Validation: Site based (Brigalow Research Station)



Baseline Validation: Regional



Average Annual Fine Sediment Loads

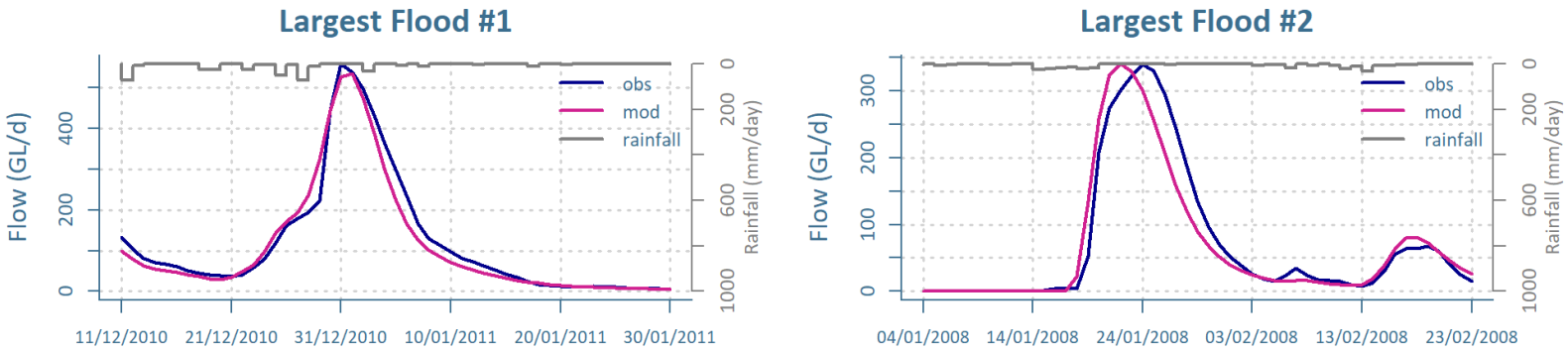


Rockhampton Annual Fine Sediment Loads

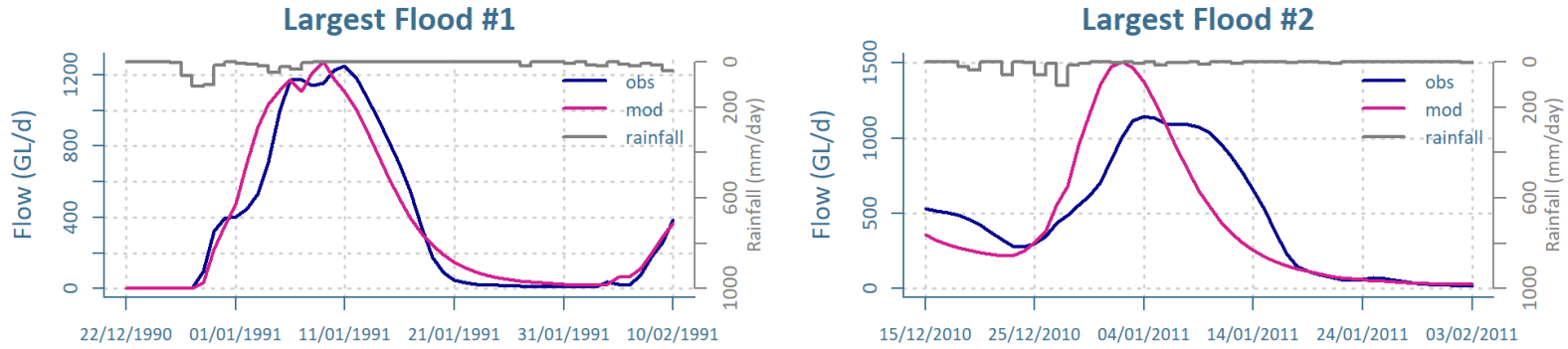
Baseline Validation: Event

Event Analysis

Mackenzie River at Riley's Crossing (130113A)



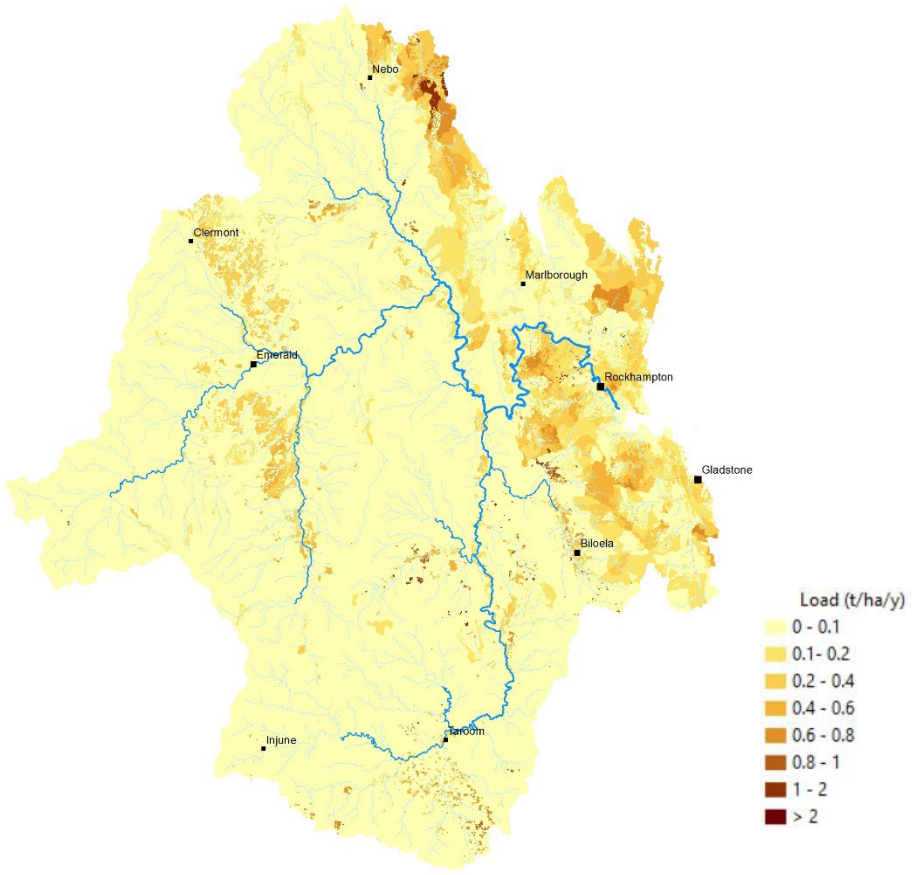
Fitzroy River at The Gap (130005A)



Model Outputs

Model Hot Spots: Hillslope Erosion

Supply



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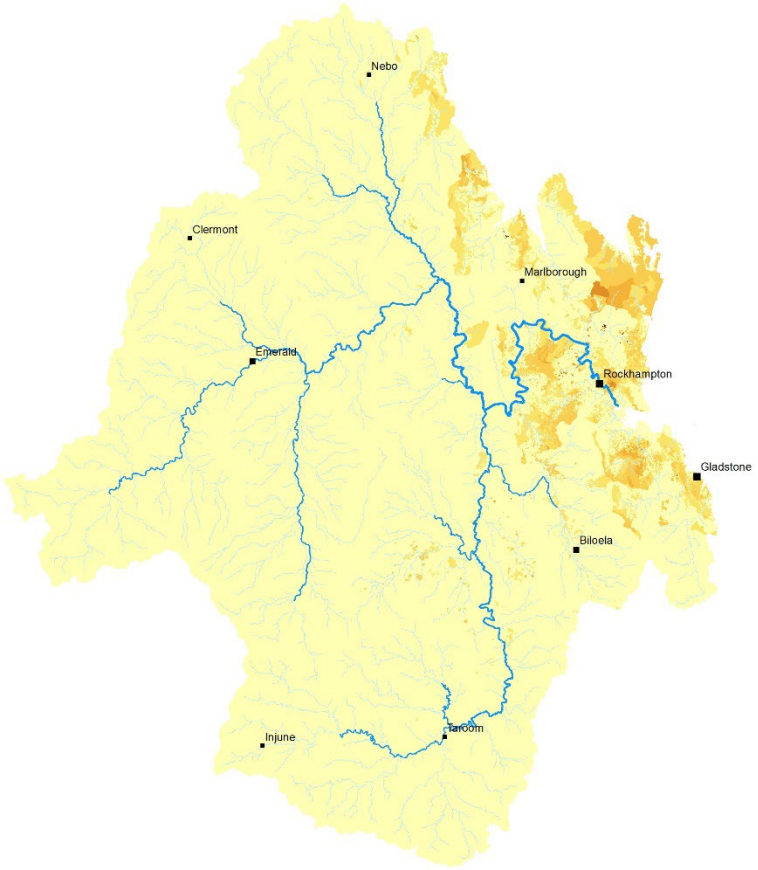
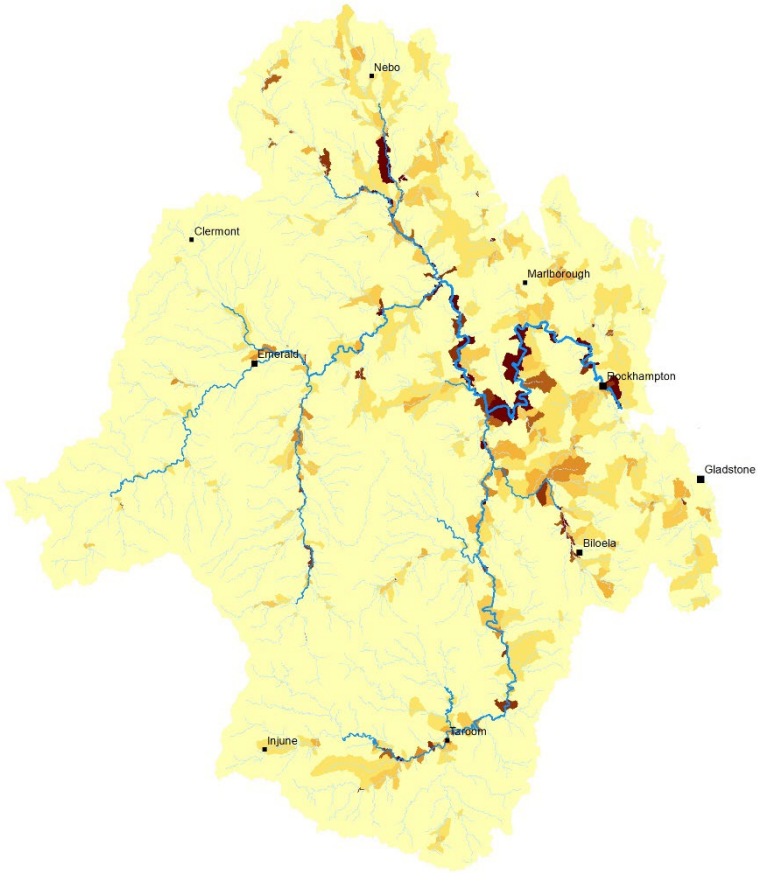
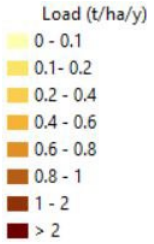


Model Hot Spots: Streambank Erosion

Supply





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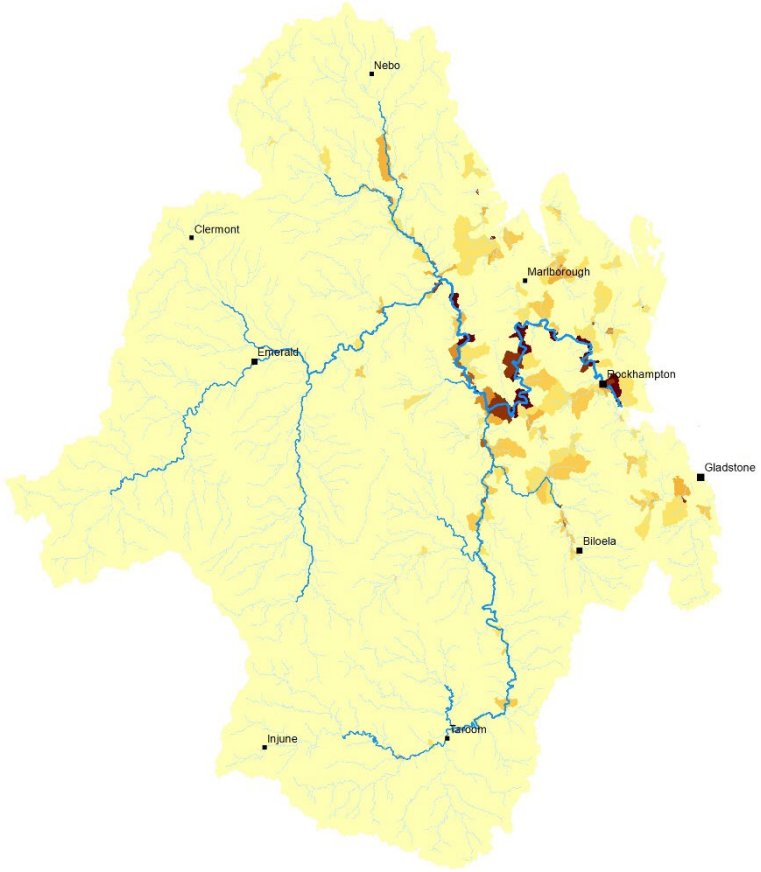
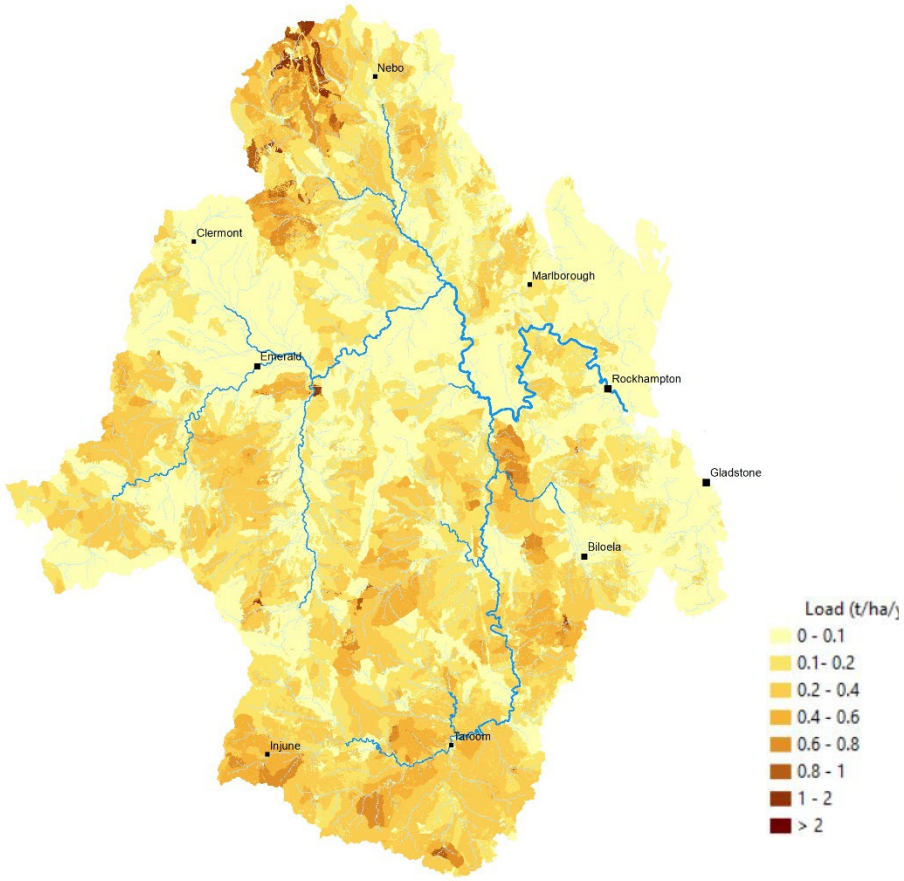


Model Hot Spots: Gully Erosion

Supply



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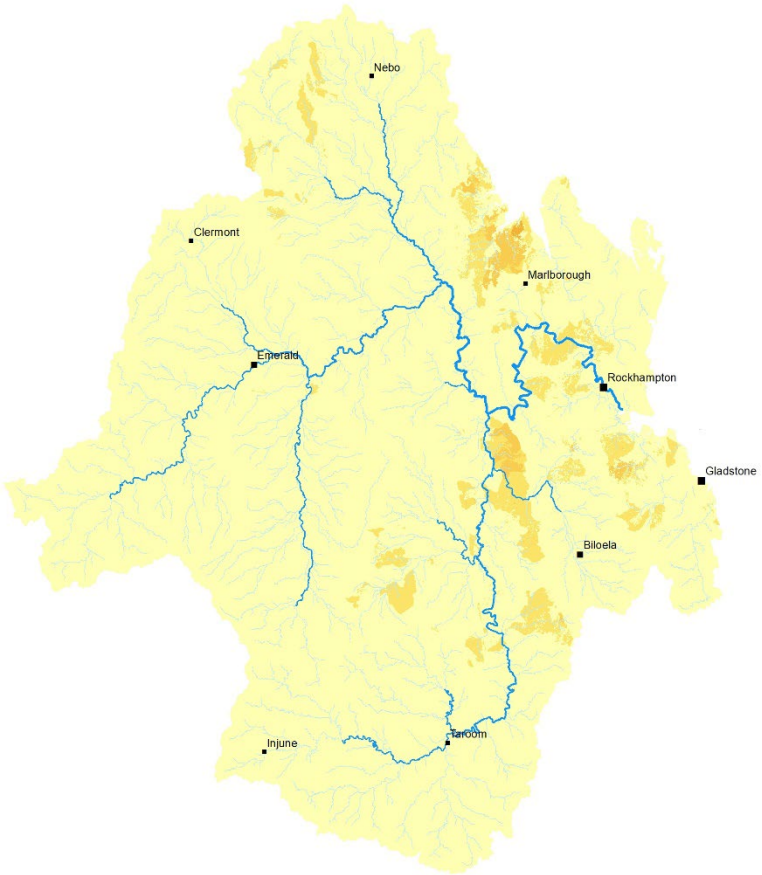
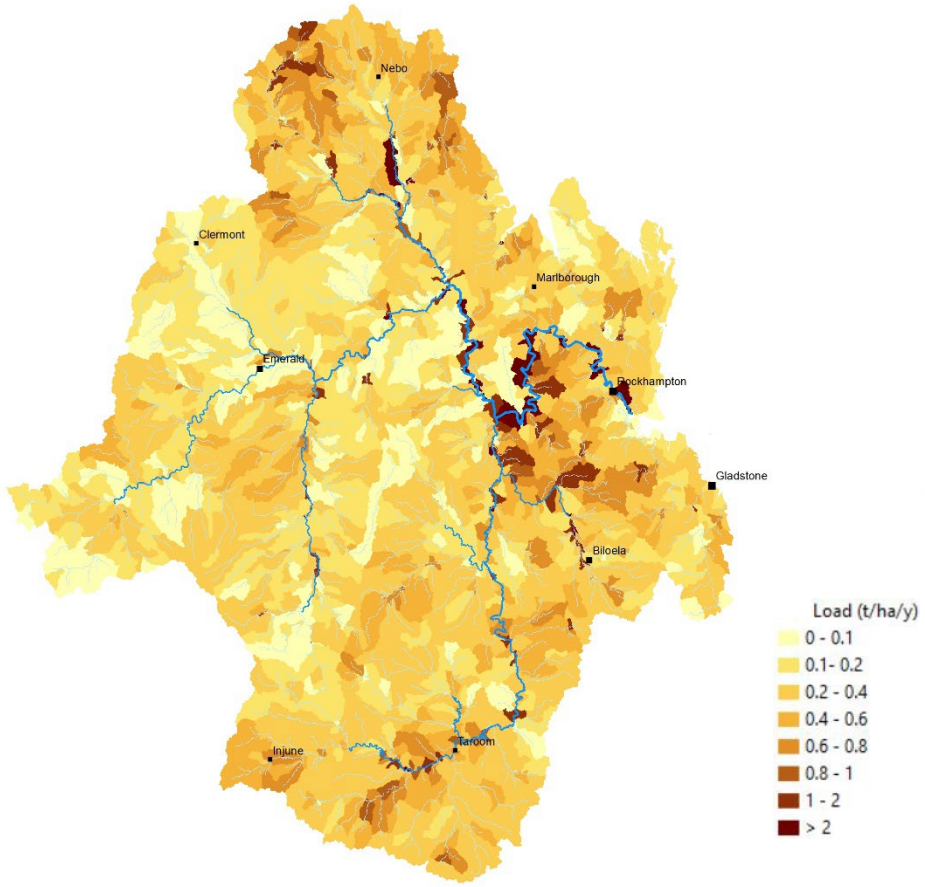
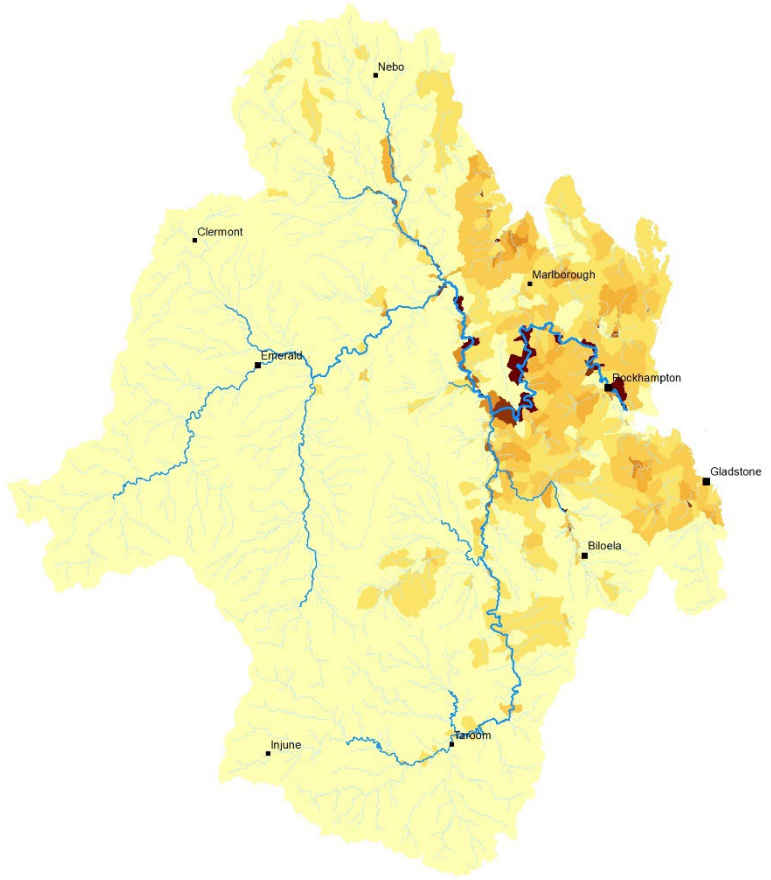


Model Hot Spots: Total Load

Supply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