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Project No RRRD030:
Pollutant load estimation for Great Barrier Reef
(GBR) catchments: Accounting for uncertainty

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Department of Agriculture, Fisheries and Forestry





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Summary of Issue

- Requirement to reduce the export of nutrients, sediments and pesticides to the GBR lagoon.
- Current approach feeding into the P2R baseline report card uses a mixture of
 - catchment model estimates (deterministic)
 - estimates from a statistical model based on monitoring data (stochastic)
- Require an approach that **integrates** the catchment model processes with monitoring data that explicitly captures uncertainties (i.e. model processes, data, parameters).





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Project objectives

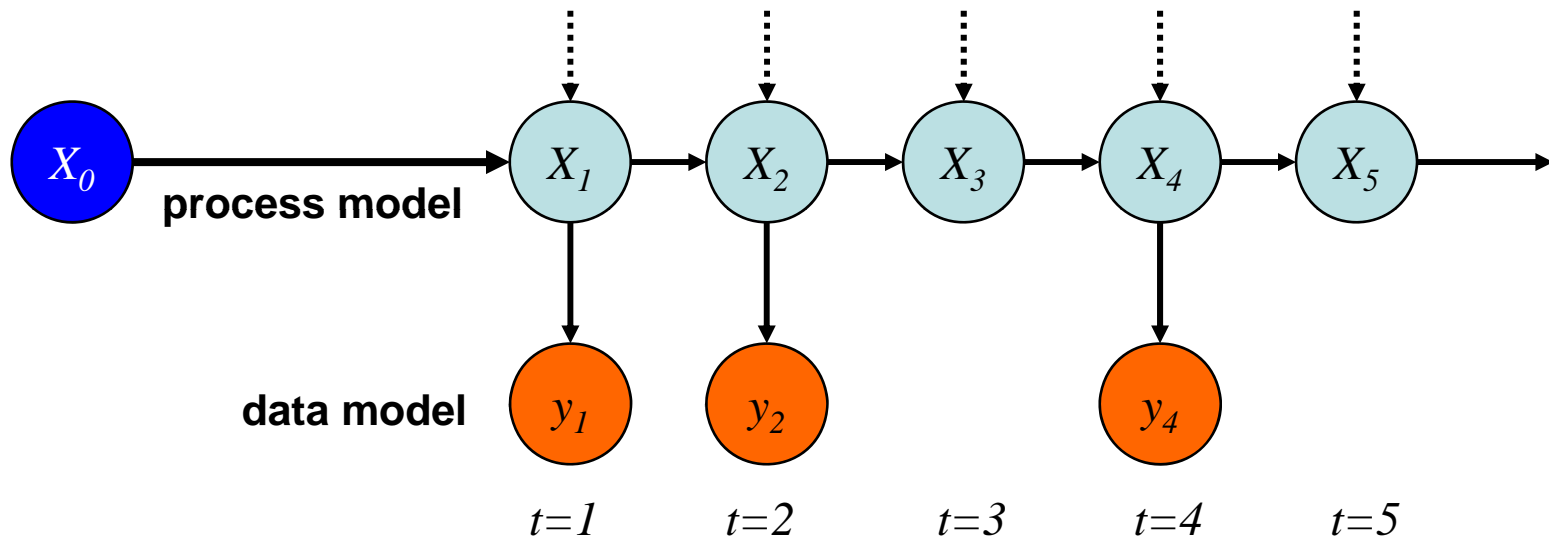
1. Provide a robust framework for integrating the physical processes with monitoring data that explicitly accounts for uncertainty.
2. Illustrate the methodology using a trial area in the GBR catchment area (e.g. Burdekin)
3. Develop realistic management scenarios for the trial area within the modelling framework. Investigate changes due to management.
4. Engage with DERM modelling and monitoring staff to ensure outputs conform with reporting requirements.





Approach: Team, Methods

Hierarchical Bayesian Modelling framework



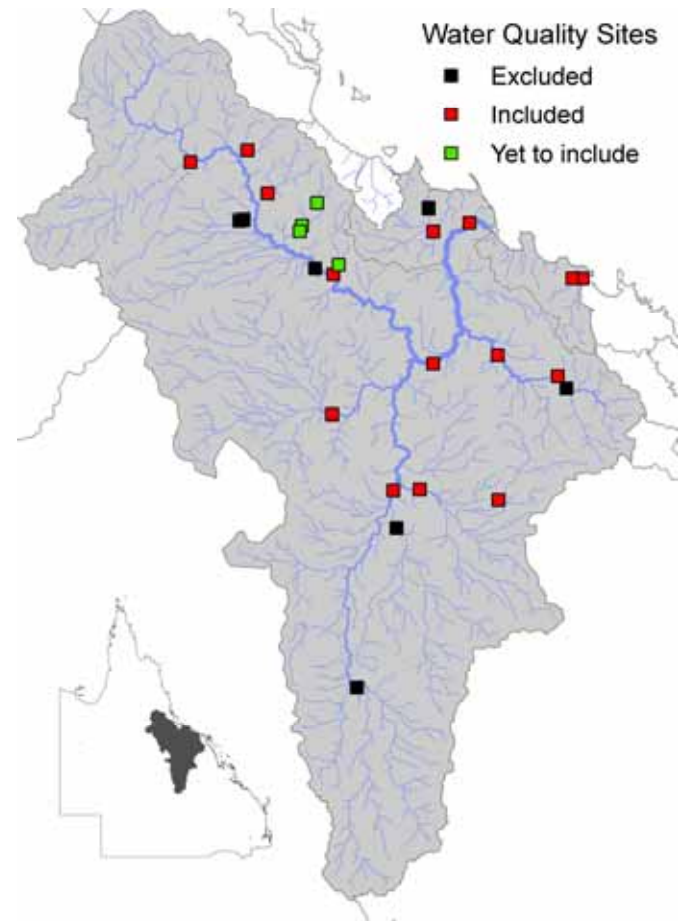
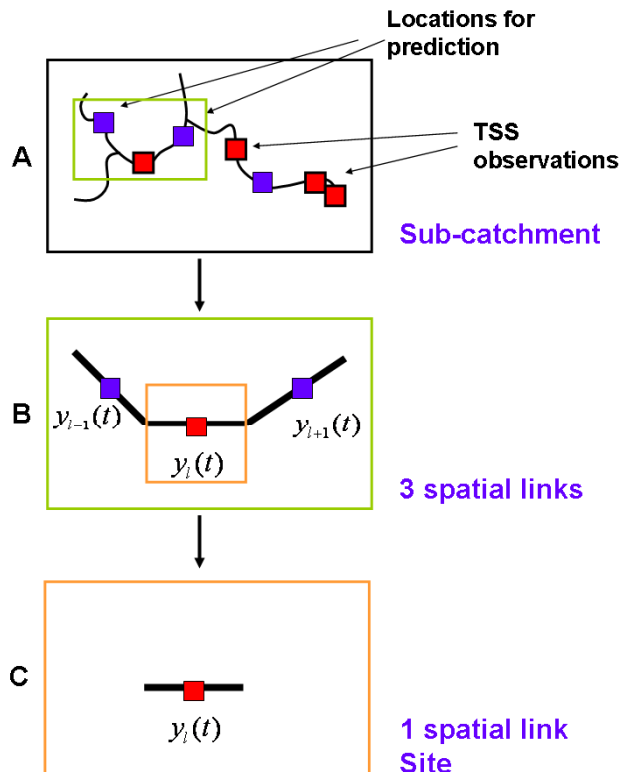
- Research Team:
 - Petra Kuhnert and Erin Peterson (CMIS)
 - Zoe Bainbridge, Stephen Lewis, Jon Brodie (ACTFR)
 - DERM – Cameron Dougall, David Waters, Rob Ellis and Ryan Turner
 - Contributions from Rebecca Bartley and Scott Wilkinson





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Geographic scope





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Outputs

1. Workshops with key collaborators regarding methodology and implementation
2. Statistical methodology that is spatially and temporally explicit, includes uncertainty.
3. Papers
 - showcasing the statistical methodology on pilot areas within the Burdekin catchment
 - review and synthesis paper
 - ecological management paper
4. Input into report cards and advice regarding target setting





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Synergies – Reef Rescue & external

- RR Requirement to report on loads and assess under prescribed targets for nutrients and sediments
 - This work will aim to assist reporting and provide uncertainty estimates for loads that are interpretable
 - Investigate management scenarios in the presence of uncertainty
 - Assimilate all sources of available information
 - Assess monitoring requirements and identify where more data is required or better information about the parameters of the physical process are needed.





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Management Implications

- Better way of interpreting uncertainty
 - Interpreting uncertainty in a probability framework e.g. the probability of exceeding a load of X tonnes is 0.01
 - Helping set better and more informed, scientifically based guidelines and targets
- A way to assess management scenarios in the face of uncertainty





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End user engagement & delivery

- Planned workshops throughout the funding time-frame to ensure end user involvement and engagement throughout the process
 - Discussion around suitable datasets
 - Management scenarios
 - Outputs from models that are useful for reporting
 - Interpretation of models

