e-Flow Synthesis Project:
enhancing uptake of environmental flow research for water planning
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Overview

• Much current (& past) research on ecological responses to changes in river flows in northern Australia (~ flow-ecology response models)

• But research is often limited to particular catchments, small spatial extents/scales, particular species and/or over relatively short time periods

• This project will identify constraints and opportunities for transferring this flow-ecology knowledge to new areas, different species, and over different space/time scales.

• This will help decision-makers make the best use of available knowledge and understand where knowledge could be improved to reduce uncertainty

• Critical for robust, defensible and environmentally sustainable water planning in northern Australia.
Opportunities

Qld Water Resource Planning

Qld Wetlands Program

Ecohydrological risk assessment

Focus regions for flow-ecology research
(through NESP, NERP, etc)

Example projects:

*Current (NESP)*
- Environmental water needs for key ecological assets in the Mitchell / Daly / Fitzroy River
- Links between Gulf rivers & coastal productivity

*Past (NERP)*
- River to landscape connections sustaining biodiversity and productivity in Kakadu wetlands
- Water, sediment and nutrient movement in the Alligator Rivers estuaries
- etc...
Flow-ecology response models

Different types:
- Narrative reviews
- Conceptual models
- Ecohydrological rules
- Maths/Stats models, etc

Based on information/data from:
- field studies,
- laboratory experiments,
- expert opinion,
- desktop reviews

Each approach is valid but each has strengths and weaknesses in terms of:
- Inferential strength (how true?)
- Transferability (where/when else?)

Understanding knowledge uncertainty can help to:
- efficiently prioritise science information needs and priorities
- improve robustness and defensibility of decision-making

\[ \mu_{jk} = \beta_0 + \beta_{j1}X_{jk1} + \beta_{j2}X_{jk2} \ldots + \beta_{jI}X_{jkI}. \]
Approach

- Is flexible (depends on respective jurisdiction priorities & interests)
- But constrained by capacity, information availability, etc...

In general, will use a series of targeted Expert/Stakeholder workshops and desktop analyses to...

1. characterise and synthesise flow-ecology responses developed through current/past projects in northern Australia (i.e. geographic location, type, scope, scale, etc)

2. characterise and quantify spatial similarity in ecohydrologic characteristics to inform transfer of flow-ecology responses

3. identify key considerations, challenges and opportunities for transfer of flow-ecology responses

4. generate maps, conceptual models and other products to evaluate and communicate transferability of key flow-ecology responses from current/past e-flow research
Project outputs

Outputs will be tailored to relevant water management agencies in each jurisdiction (i.e. Federal, Qld, NT, WA)

Can include:

- Flow-ecology conceptual models with guiding principles to evaluate and communicate transferability of key flow-ecology response models
- Ecohydrologic rules and Threshold of Concern for key environmental assets (for WRP’s)
- Maps of ecohydrologic classifications/regionalisations to facilitate flow-ecology model transferability
- Stakeholder presentations, factsheets, publications, etc

To best inform water planning & wetland management in Queensland, project outputs will be:

- Developed in collaboration with Qld DES scientists & planners
- Presented in a form suitable for decision support tools & models (e.g. ecohydrologic risk models, wetland Info conceptual model updates?)
Timelines

Feb – Sep 2018

• **Expert/Stakeholder Workshop # 1** to identify, review and synthesise existing flow-ecology response models and their utility

• Commence desktop review and data analyses to inform transfer and scaling of flow-ecology responses

Oct 2018 – Mar 2019

• **Expert/Stakeholder Workshop # 2** to identify key considerations, challenges and opportunities for transfer & scaling of flow-ecology responses

April – Sept 2019

• Complete desktop review and data analyses to inform transfer and scaling of flow-ecology responses

• **Expert/Stakeholder Workshop # 3** to review and refine draft project outputs
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The inferential strength of ecological response relationships generated at a particular scale will decline with increasing departure from the spatio-temporal domain(s) from which data were collected and the ecological response generated.
- Overview the project with a focus on links between assets and freshwater flows (what’s important – flushing of poor quality after dry season; overbank flooding for food stocks; connectivity between fresh and marine; persistence of waterholes as critical habitat in dry season).

- What products will be generated (eg report, model, communications tools, assessment matrices etc)?

- Timing of when the work will be ready (including draft reports or critical points in the project).

- What can the project do to help us in decision making and planning?

- What can DNRME water staff do to help ensure the research is relevant to regional needs (eg regional DNRME needs, regional stakeholder needs) and to ensure that regions get good input from projects along the way. Can DNRME assist with contacts etc, can we provide regular updates etc?
Partners

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Focus regions

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Hub research projects

Planning for development
• Environmental water needs for the Mitchell River
• Environmental water needs for the Fitzroy River
• Environmental water needs for the Daly River
• Links between Gulf rivers & coastal productivity
• Multiple objective planning in northern Australia
• Tools & models to support sustainable development decisions
• Waste & marine debris in remote communities

Indigenous natural resource management
• Knowledge brokering for Indigenous land management
• Multiple benefits & knowledge systems of Indigenous land management programs
• Indigenous water needs in the Fitzroy catchment
• Indigenous natural resource management in Kakadu National Park
• Identifying research priorities for Indigenous Protected Areas
• Economic values of Indigenous Protected Areas
Hub research projects

Mapping, monitoring, measuring

- Developing eDNA methods for tropical waters
- Remote environmental monitoring techniques
- Prioritising threatened species in north Australia
- Methods to measure temporal change to soil carbon
- Savanna carbon sequestration method
- Mapping, monitoring & safeguarding West Kimberley bilbies
- Mapping to manage littoral rainforest
- Assessing Gulf of Carpentaria mangrove dieback

Ferals, weeds and fire

- Defining metrics of success for feral animal management
- Fire and weeds in the Top End
- Managing savanna riparian zones
- Kakadu National Park’s threatened species
- Protocols for Indigenous fire management
- Investigating feral cats and small mammal decline
Guiding documents

Northern Australia Environmental Resources Hub

Draft Indigenous Research Collaboration Strategy

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Knowledge Brokering and Communications Strategy

Contents

Introduction

Objectives

Target Audiences

Communications Activities

Communication Activity

Objectives

Providing Timely Advice to Decision Makers

Synthesis and analysis of research

Project level communications

Resourcing the Strategy

Performance Measures

Monitoring and Evaluation Plan

For the National Environmental Science Programme (NESP)

2 June 2015

Prepared by Viola Advisory (Caroline Spencer, John Howley and Hayley Share) with the assistance of Marine Partners (Norman Long and Kimberly Smart)

Northern Australia Environmental Resources Hub

Version Control History

Table of Contents
World-class research to support sustainable development in northern Australia