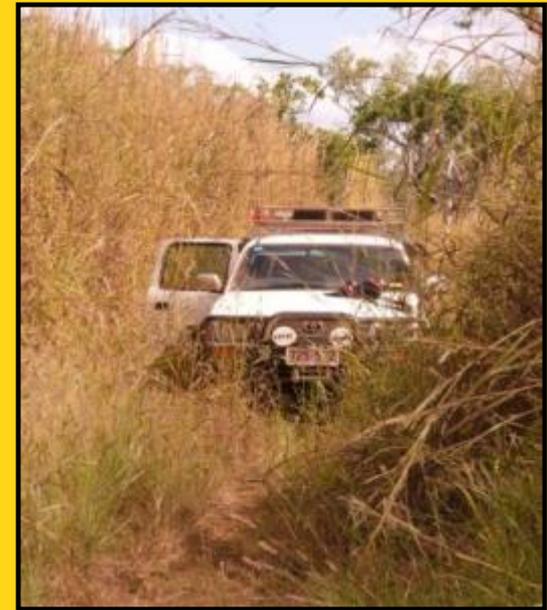




bushfire&natural  
**HAZARDS**CRC

## PROJECT B1.1.2 FLAMMABLE GRASSY WEEDS

Management of flammable high biomass  
grassy weeds in the northern Savannas



**Assoc Prof Samatha Setterfield & Dr Natalie Rossiter-Rachor**

School of Environment, University of Western Australia, WA  
School of Environment, Charles Darwin University, NT

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Australian Government  
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AUSTRALIA**

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UNIVERSITY**

# HIGH BIOMASS GRASSY WEEDS ARE INVADING NORTHERN AUSTRALIA



**Perennial mission grass**  
*Cenchrus polystachion*



**Grader grass**  
*Themeda quadrivalvis*



**Gamba grass**  
*Andropogon gayanus*



**Buffell grass**  
*Cenchrus ciliaris*

# HIGH BIOMASS GRASSY WEEDS ARE INVADING NORTHERN AUSTRALIA

- Introduced for pastoral production
- Spreading rapidly
- Invading range of ecosystems
  - Savanna, riparian, wetlands
- Driving large changes in fire regimes (esp frequency & intensity)
- Significant consequences
  - Ecological, economic, social, cultural
- Resulted in weed declarations
  - Weeds of National Significance (WoNs)
  - Key threatening processes



# GAMBA INCREASES FUEL LOADS



$\sim 1 - 6 \text{ t ha}^{-1}$

# GAMBA INCREASES FUEL LOADS



~ 1 - 6 t ha



**Gamba grass**

# GAMBA INCREASES FUEL LOADS



~ 1 - 6



Up to 30 t ha<sup>-1</sup>



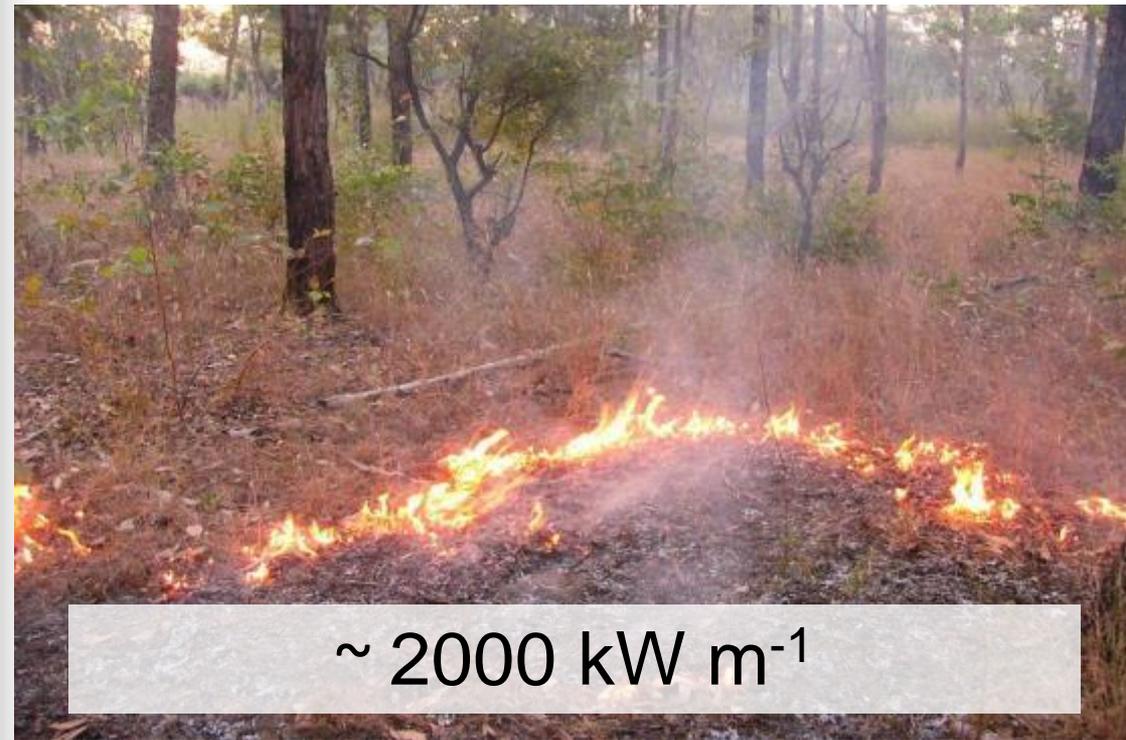
# GAMBA INCREASES FLAME HEIGHT & RATES OF FIRE SPREAD

*Even in the early dry season:*

- Flames above the tree canopy
- Complete canopy combustion
- High rates of spread
  - Documented  $\uparrow$  **3 m/sec** (Bushfires NT, unpublished data)

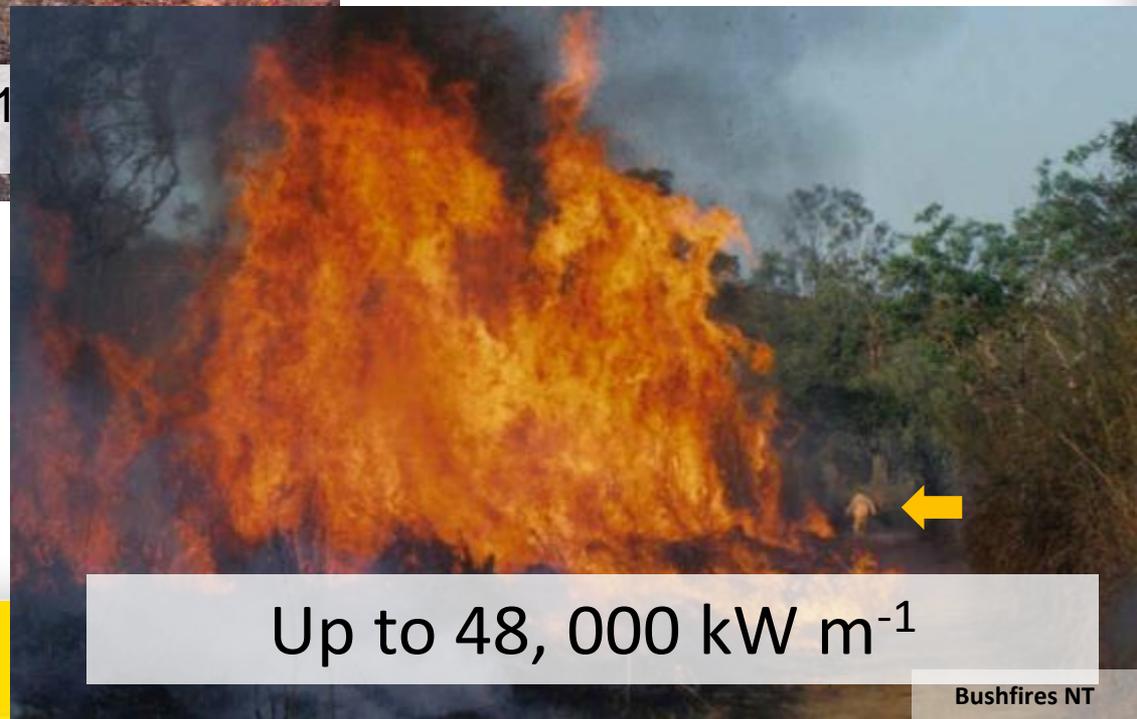


# GAMBA INCREASES FIRE INTENSITY



~ 2000 kW m<sup>-1</sup>

# GAMBA INCREASES FIRE INTENSITY



# Gamba fire behaviour (Late dry- Oct)



Photo Credit: Bushfires NT

# GAMBA FIRES TRANSFORM ECOSYSTEMS



Burn riparian corridors



Impact on biodiversity

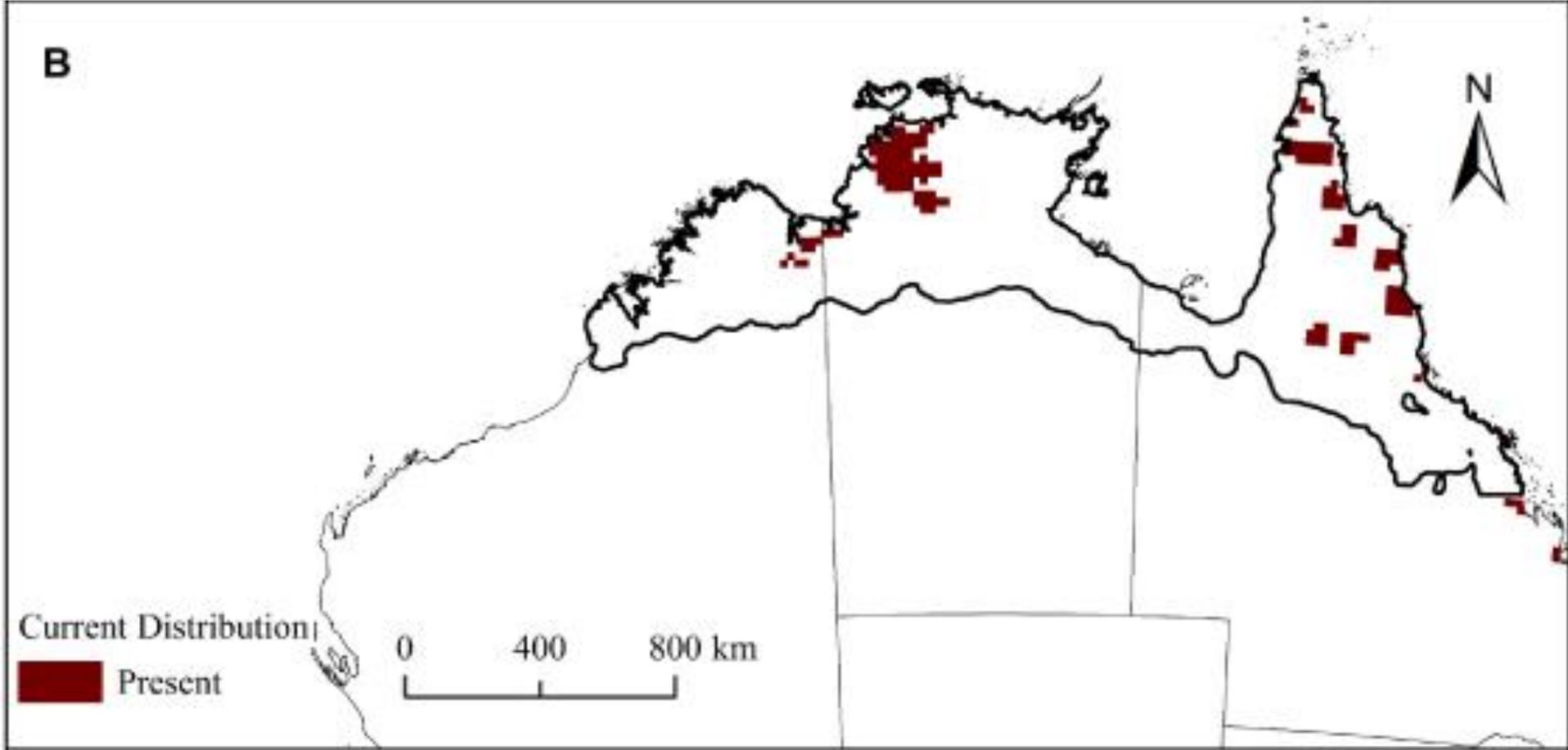
# TURNING SAVANNA INTO GRASSLAND



# TURNING SAVANNA INTO GRASSLAND

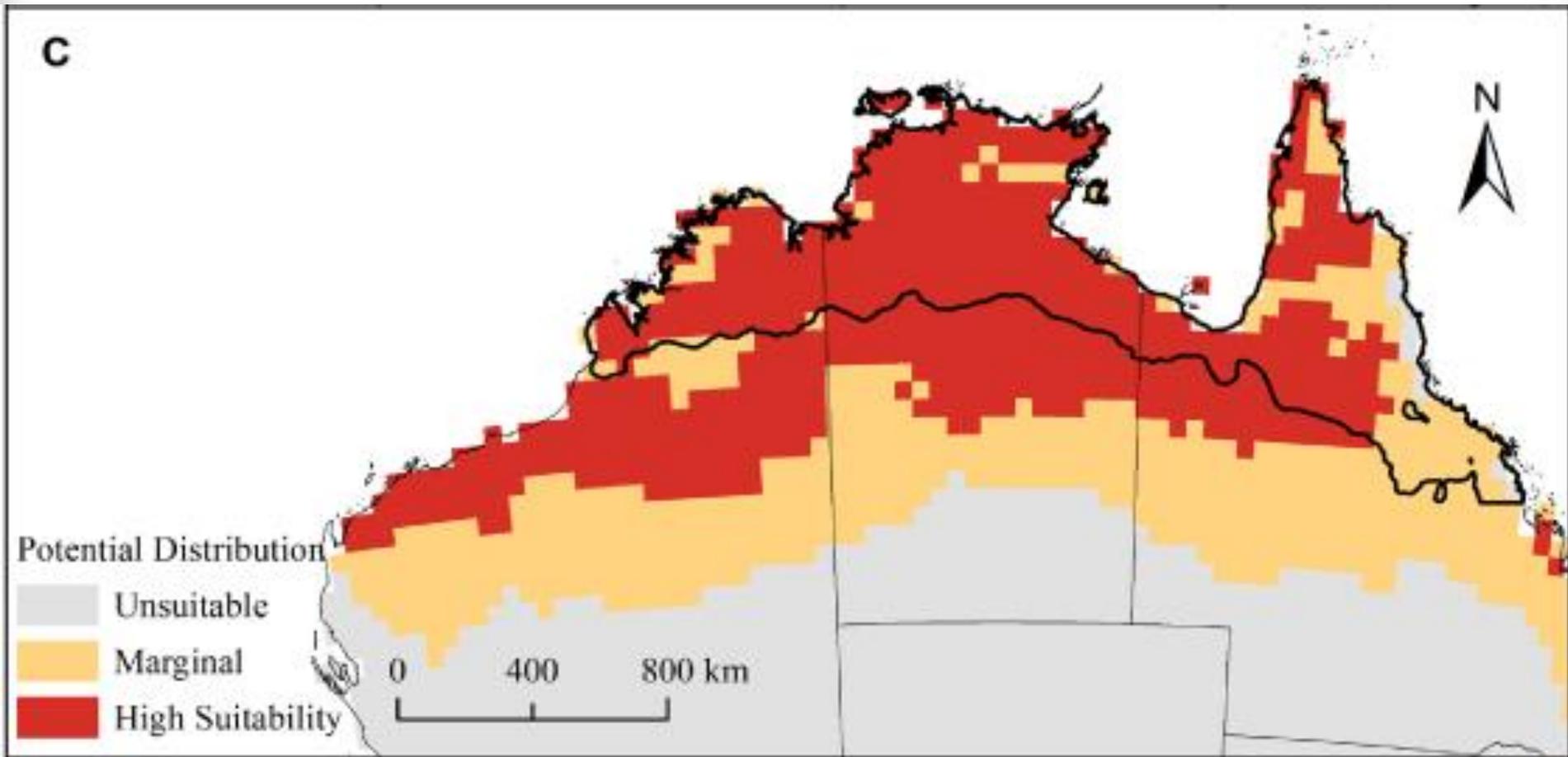
The problem is going to get a lot worse without active management

# CURRENT GAMBA GRASS DISTRIBUTION



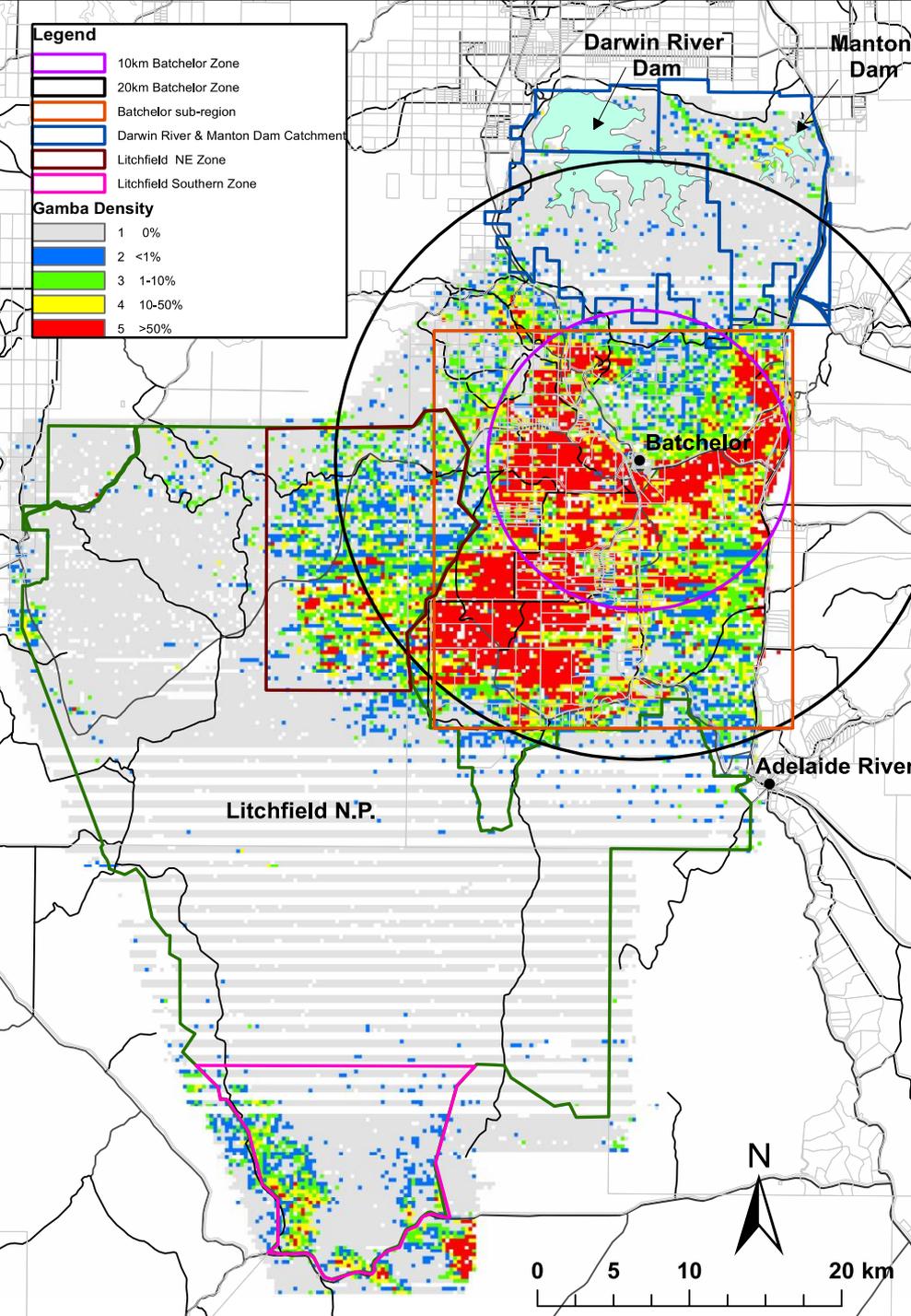
**Adams & Setterfield (2013)**

# POTENTIAL GAMBA GRASS DISTRIBUTION



**Adams & Setterfield (2013)**

# 2014 Gamba Aerial survey



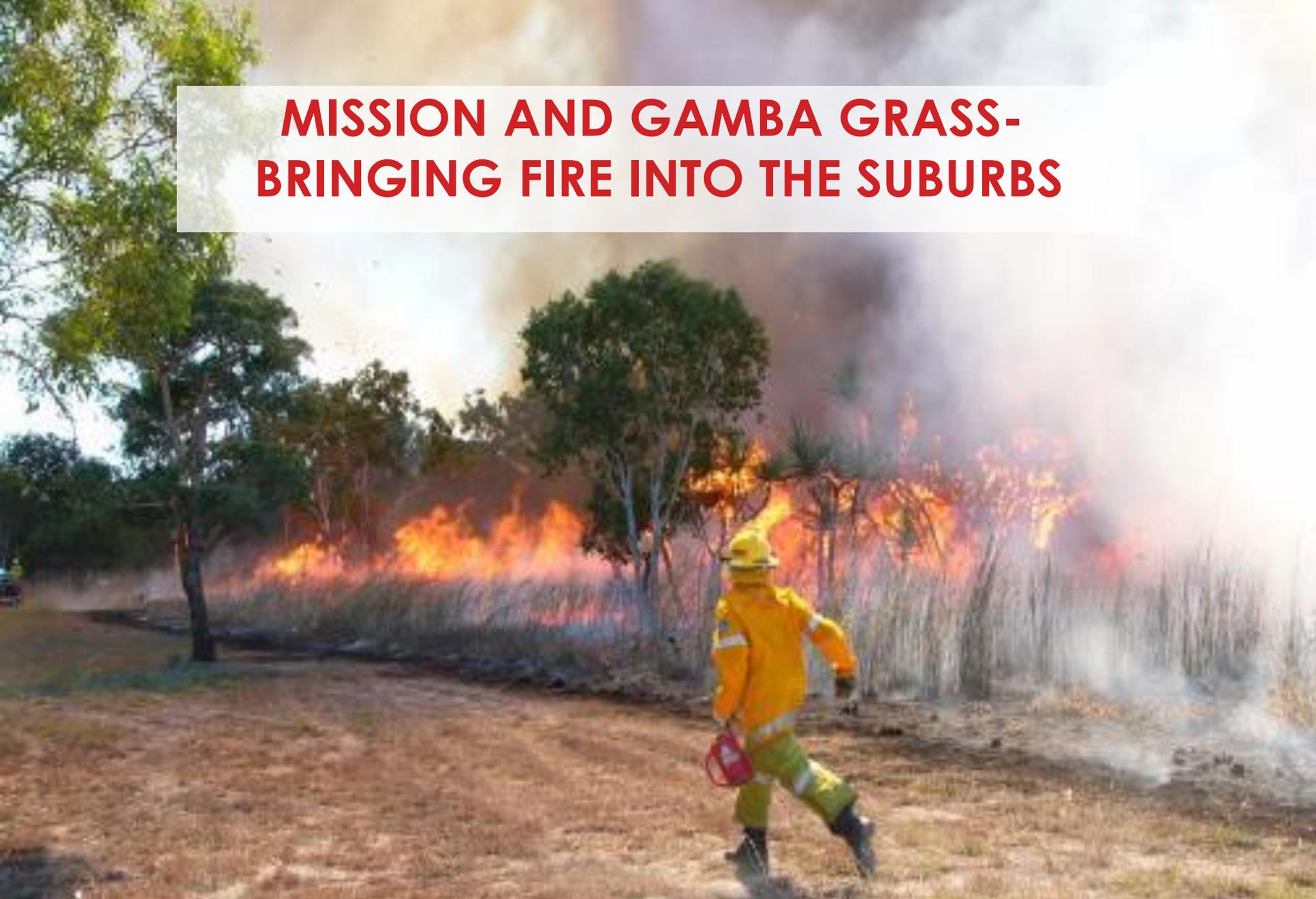
Collaboration between

- 1) CDU
- 2) Bushfires NT
- 3) Weed Management Branch
- 4) Territory NRM
- 5) NT Parks and Wildlife



National Environmental  
Research Program

# MISSION AND GAMBA GRASS-BRINGING FIRE INTO THE SUBURBS



# NEED TO MANAGE INCREASED FIRE RISK- BUT HOW?

- Major risk to:
  - Environmental assets
  - Human Life,
  - Infrastructure
  - Cultural assets
  - Tourism
- Risk will vary with exotic grass species (fuel load, fuel continuity, distribution)
- Currently not being managed strategically
- Lack of decision support tools/models to inform management
  - Do nothing?
  - Regional eradication?
  - Containment?



Bushfires NT



Bushfires NT

# AIMS

## 1. Assess the risk

- Likelihood, magnitude & consequence of **risk** of grassy weeds to fire regimes in tropical savannas

## 2. Provide information for policy/planning

- Prioritisation of weed **risk** for fire management planning



# OUTPUTS

## 1) Maps of altered fire risk

- Current/potential distribution of range of grassy weeds
- **Current** areas of altered fire severity risk
- **Predicted areas** of future greatest risk

## 2) Case studies of spatially-explicit risk assessment to inform strategic management

- Assessment of **fire risk to assets** (community, pastoral & environmental assets)
- Costed **management scenarios** to reduce risk (Costs & types of fire management actions- do nothing → eradication)
- **Decision support tools** (allow benefit/costs analysis of risk reduction; costing out consequences of fire damage)

## 3) Prioritisation framework for risk management

# BUSHFIRES NT (END USER) RESEARCH PRIORITIES

(ONLY EXOTIC GRASS PRIORITIES LISTED)

Exotic grass risks	
Fuel mapping of exotic grassy weeds	<input type="checkbox"/>
Develop risk/hazards tools to better manage high fuel load	<input type="checkbox"/>
Use risk to prioritise actions	<input type="checkbox"/>
Quantify impacts on life, property and economy	<input type="checkbox"/>



- Success in working with end users / stakeholders to design research programs and projects

# BUSHFIRES NT (END USER) RESEARCH PRIORITIES

(ONLY EXOTIC GRASS PRIORITIES LISTED)

Exotic grass risks	
Fuel mapping of exotic grassy weeds	<input checked="" type="checkbox"/>
Develop risk/hazards tools to better manage high fuel load	<input checked="" type="checkbox"/>
Use risk to prioritise actions	<input checked="" type="checkbox"/>
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# DELIVERING OUTPUTS FOR OTHER STAKEHOLDERS

## For example, NT Parks & Wildlife

- Utilise information for policy/planning
- Costing impact of ↑ fire risk to National Parks
- E.g Cost of closing areas in NP to keep tourists safe *Versus* costs avoided if grassy weeds are managed



# PROJECT UPDATE

- Project commenced 3 months ago (finishes Dec 2017)
- Detailed project plan being developed
- Stakeholder consultations occurring
- Baseline data on grassy weeds being collated
- Literature review being conducted
- Scoping sites for case studies (NT/QLD)



# ADDITIONAL OPPORTUNITIES

## Connection with National Environmental Research Program (NESP) Project 2.3: Weed invasion, fire and ecosystem failure

- Rossiter-Rachor and Setterfield *et al.*(2016-2019)



Glenn Edwards



## **SUMMARY**

### **Exotic grassy weeds are:**

- Spreading rapidly across Northern Australia
- Altering fire behavior

### **This project will:**

- **Assess the fire risk**
- **Develop tools/methods to inform on-ground management as well as policy & planning.**