Incentivising fire management in fire-prone eucalypt and miombo savanna systems—opportunities and challenges

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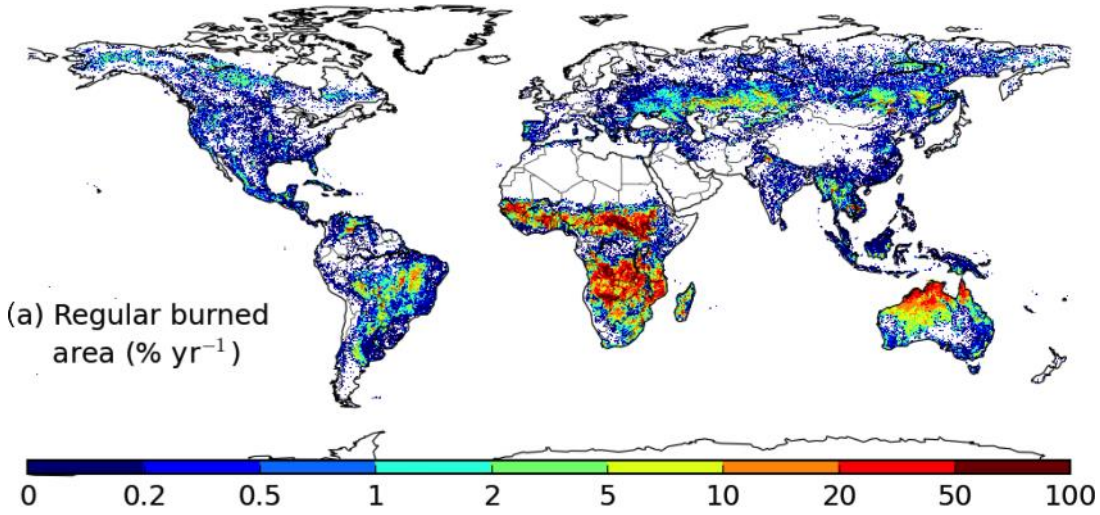
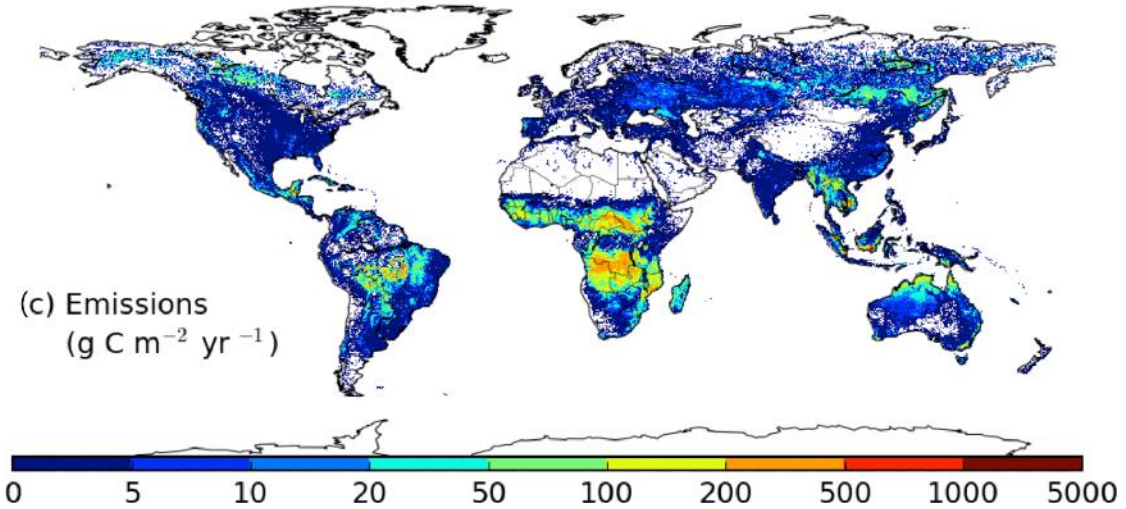
Proportion of area burnt, 2003-2016, per 0.25^0 cells



GHG emissions from fires—1997-2016

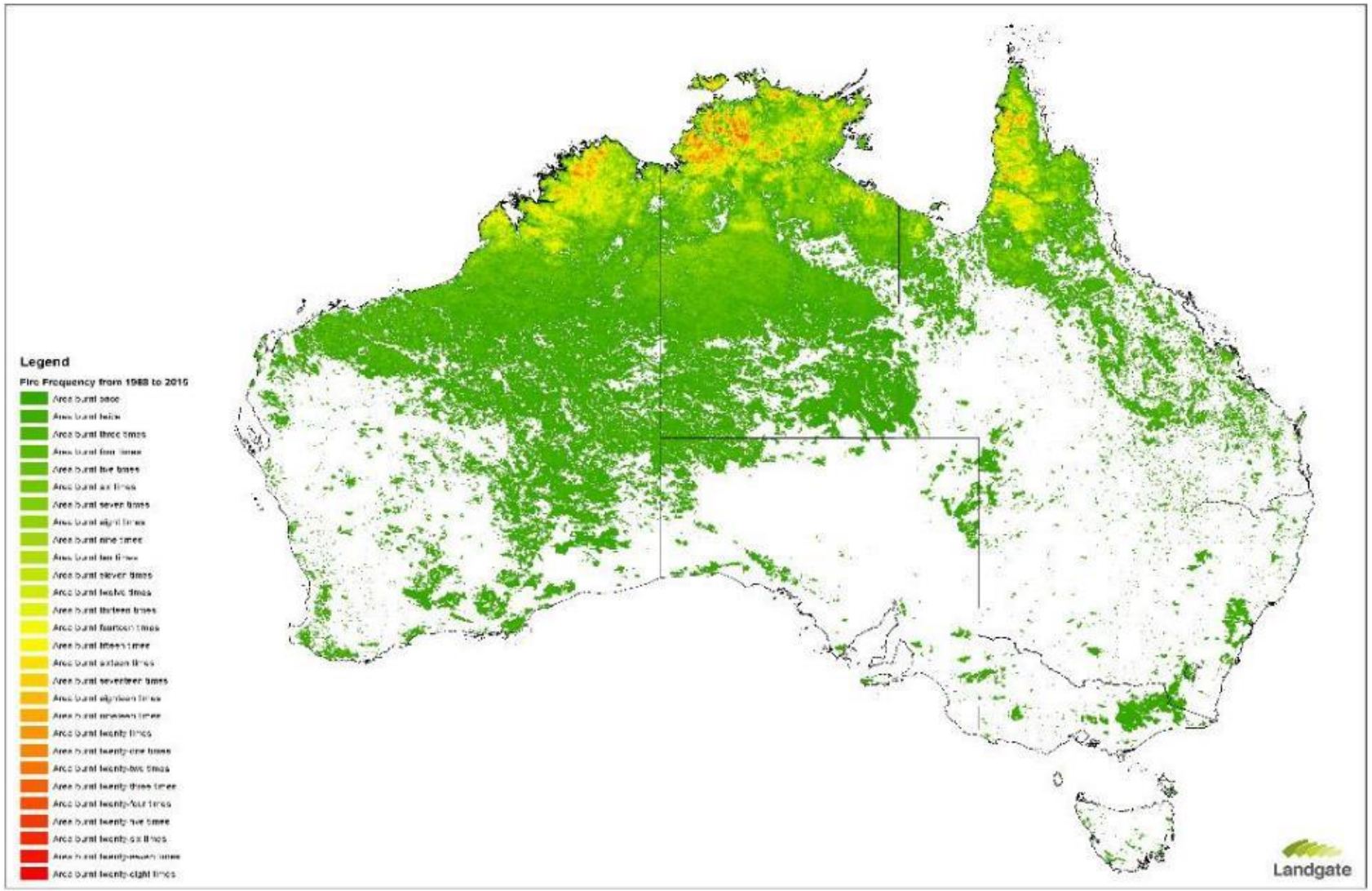
62% of global fire emissions come from savannas



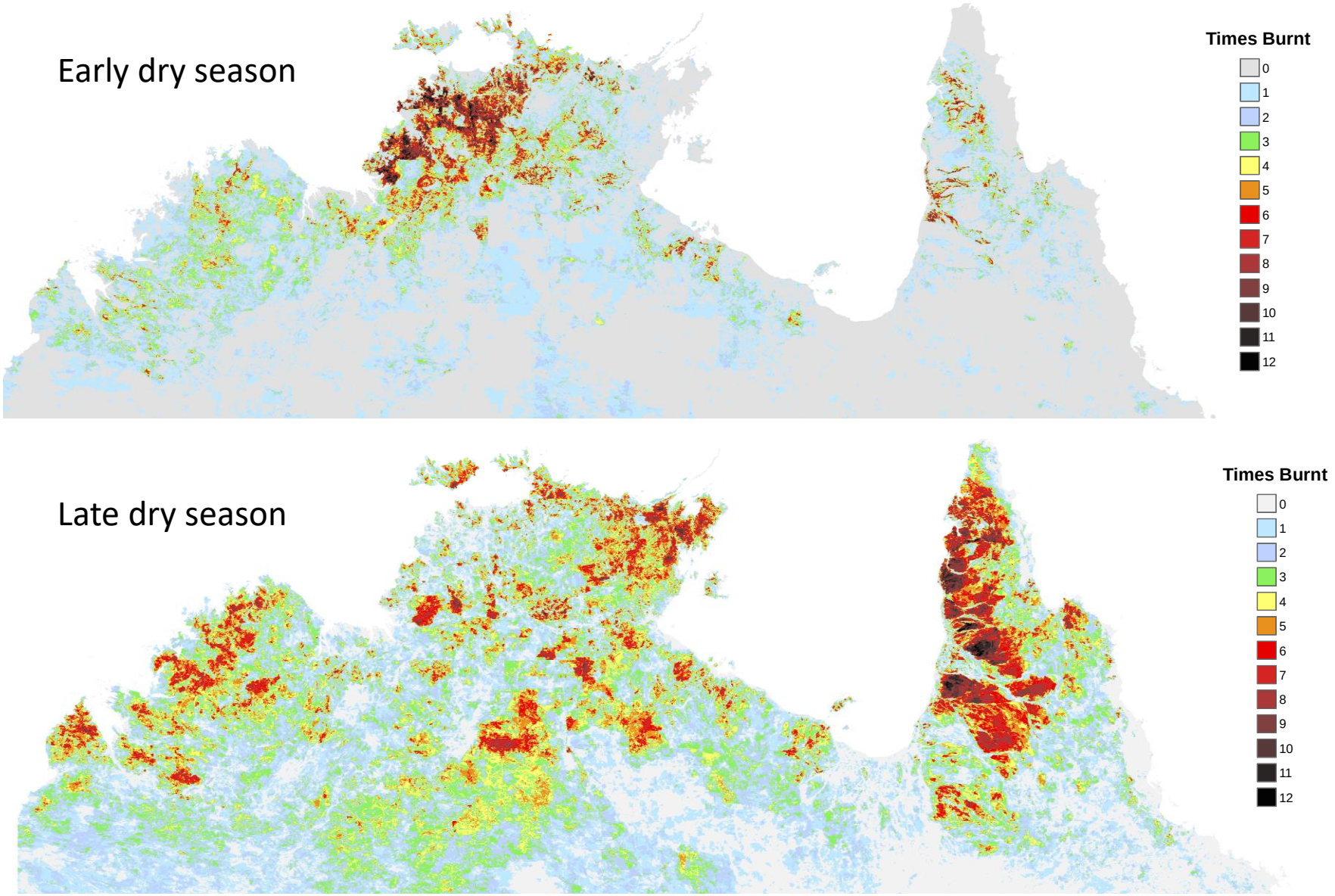
van der Werf et al. 2017

Fire frequency 2000-2015

derived from MODIS 250m imagery



Fire frequency 2000 – 2011, derived from MODIS imagery



Early dry season (EDS), pre-August, prescribed fires

Scorch mostly <2 m

Patchily burnt

Late dry season (LDS), after August, unplanned / wildfires

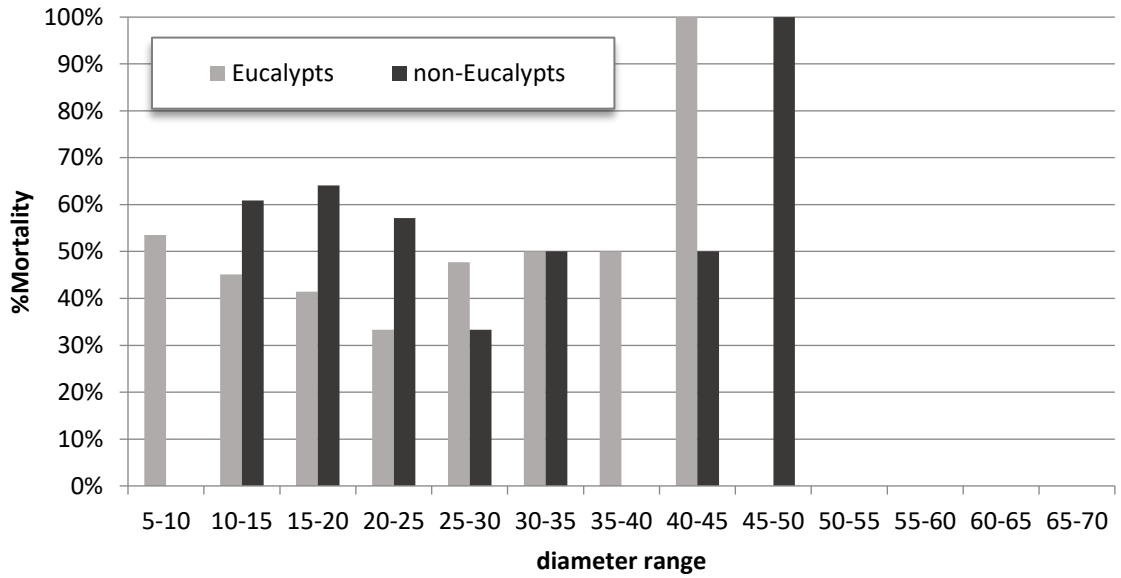
Tree canopy scorched

Not Patchy

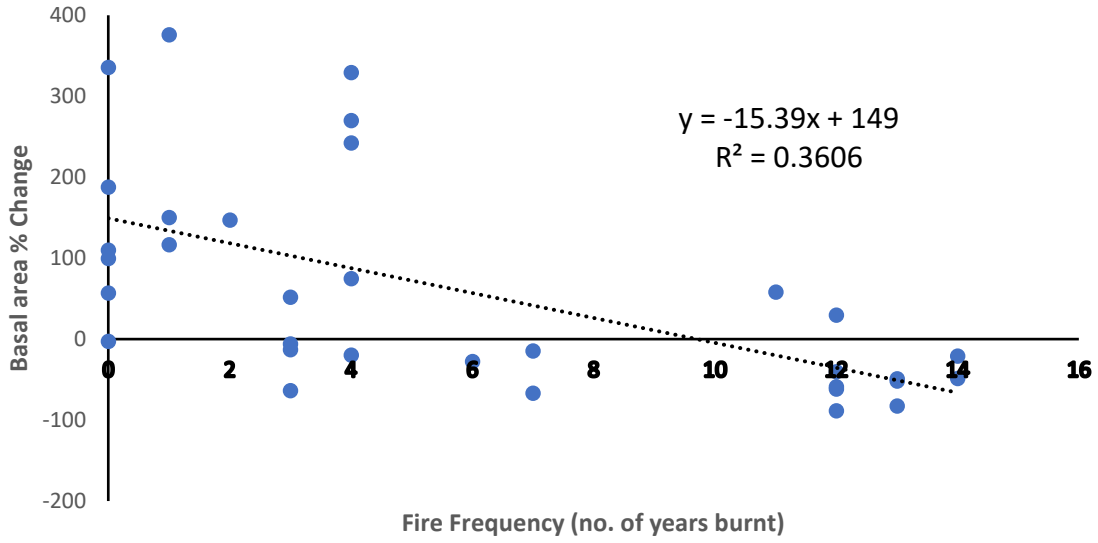
Early dry season fire emissions—Chobe, Botswana

Late dry season fire emissions—Tsodilo, Botswana

Very severe late dry season fires can result in significant stem mortality (including eucalypts) over very large areas



Edwards et al. 2018



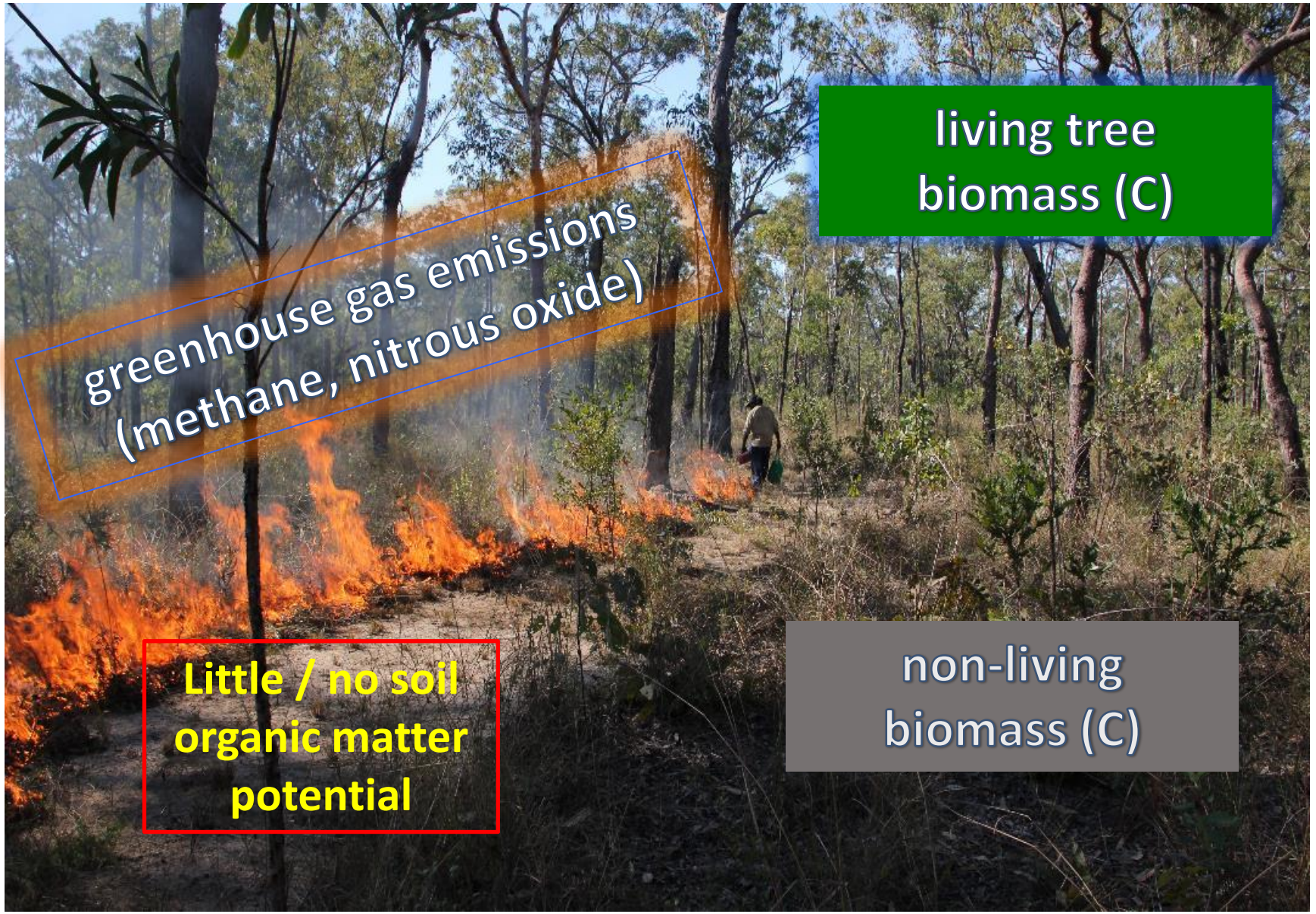
Lekoko, unpublished

Chobe Forest Reserves, Botswana–

- Change in tree Basal Area ($m^2.ha^{-1}$) between original census 1992 and 2022, at 44 permanent sampling plots
- >95% of all fires occur in LDS

Savanna burning accounting methods,

as applicable to Australian conditions



Australia's savanna burning emission reduction methodology (2013,2015,2018)

For methane, CH_4

$$E_{oc} = M_o \sum_{pk} \left(A_{pk} P_k \sum_{l} \left(EF_{pl} FL_{npl} CC_l \sum_{m} \left(S_m BEF_{klm} \right) \right) \right)$$

For nitrous oxide, N_2O

$$E_{on} = M_o \sum_{pk} \left(A_{pk} P_k \sum_{l} \left(EF_{pl} FL_{npl} CC_l NC_l \sum_{m} \left(S_m BEF_{klm} \right) \right) \right)$$

Where the subscripts:

o = *greenhouse gas species o (oc*= CH_4, *on*= N_2O);

p = *vegetation class*

k = *fire season*

l = *fuel size class*

m = *fire severity class*

n = *number of years since the patch of land was last burned*

and parameters:

E_{oc} = Emission (Gg) of CH_4;

E_{on} = Emission (Gg) of N_2O;

M = Ratio of molecular mass to the elemental mass

A = Fire affected (scar) area (ha)

P = Patchiness

EF = Emission factor (% of fuel elemental content released in fire)

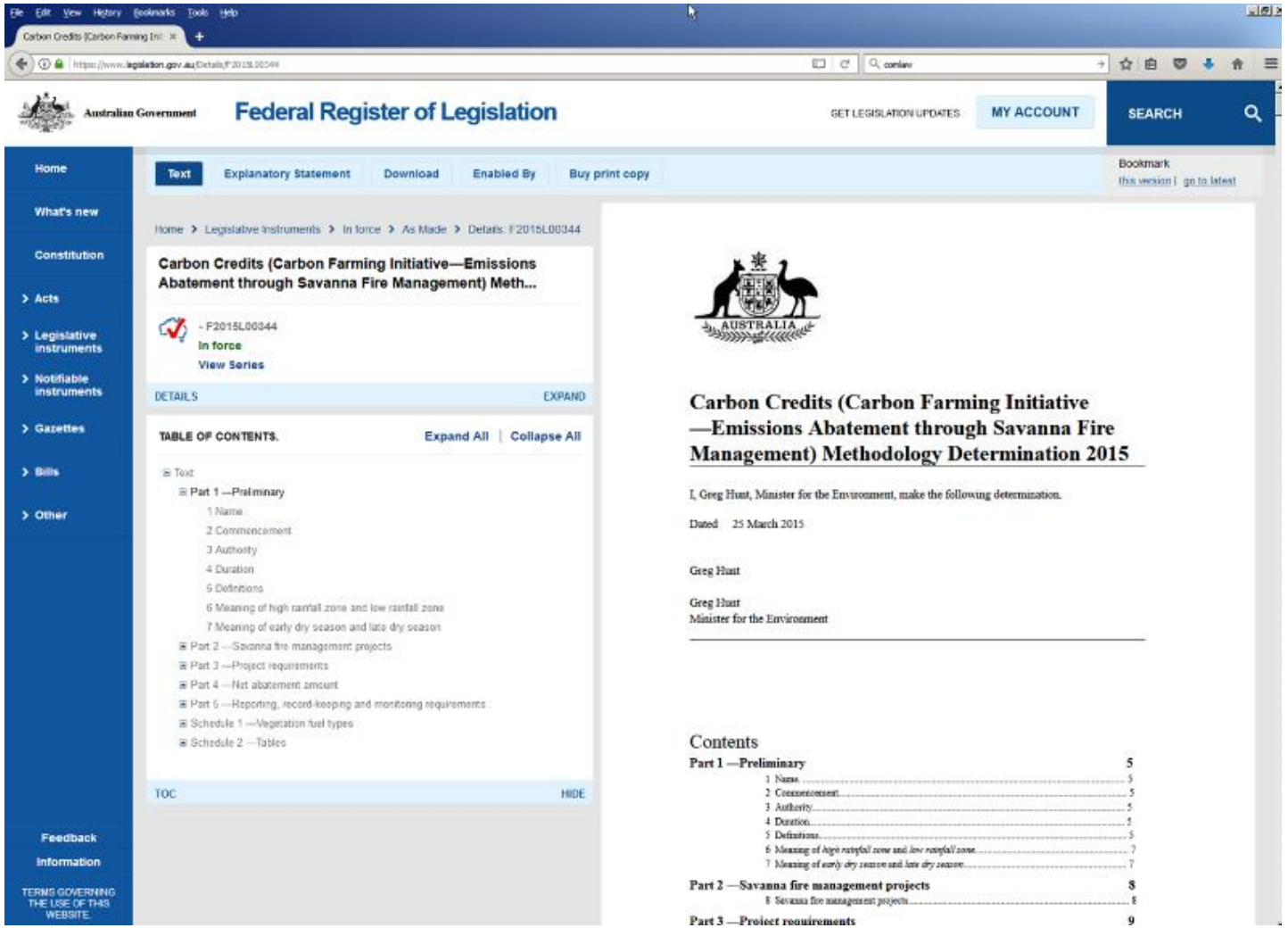
FL= Fuel load (t dry matter ha^{-1})

CC = Carbon content of fuel (gram of carbon per gram of dry fuel)

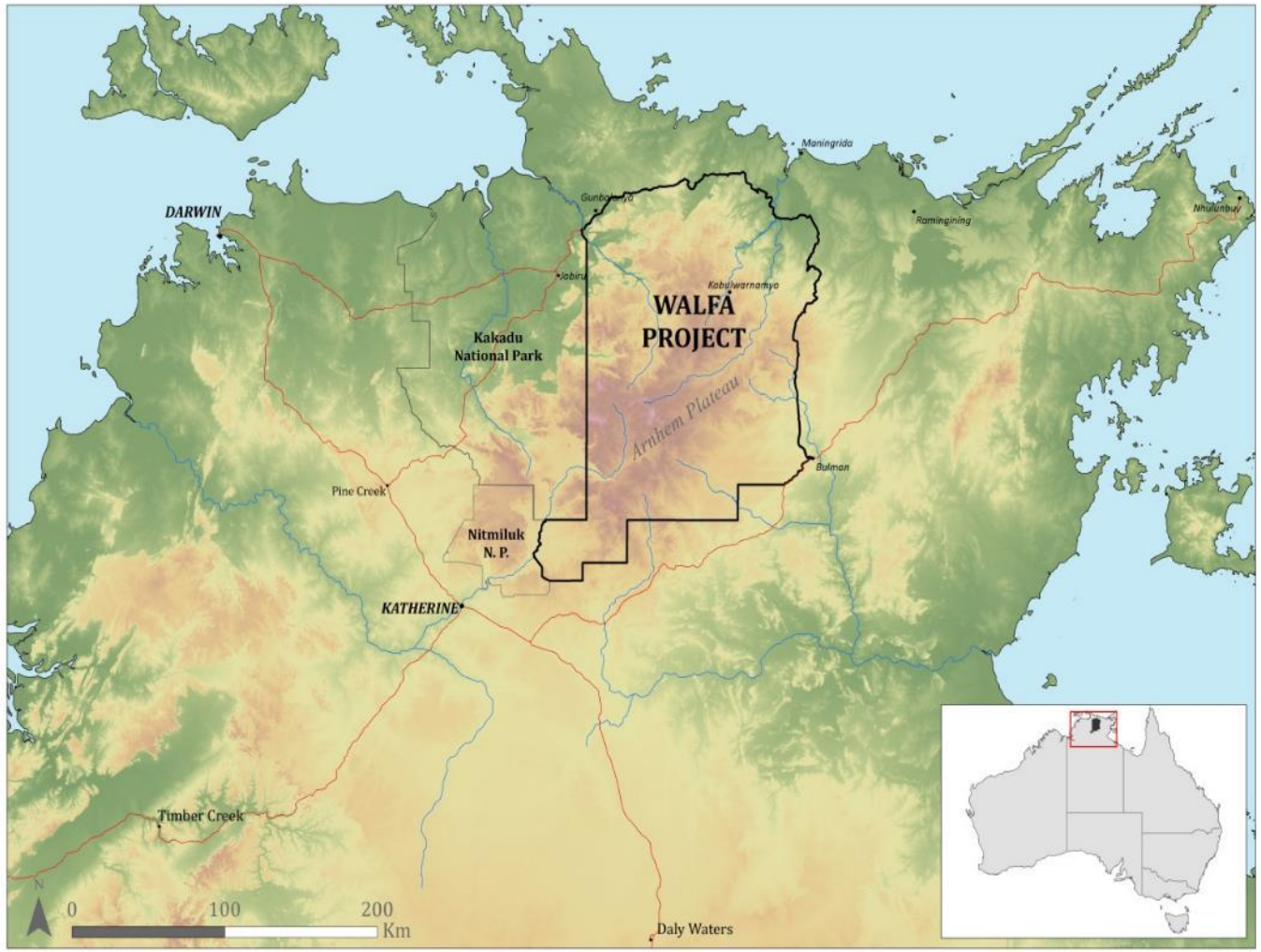
NC = Elemental nitrogen to carbon ratio

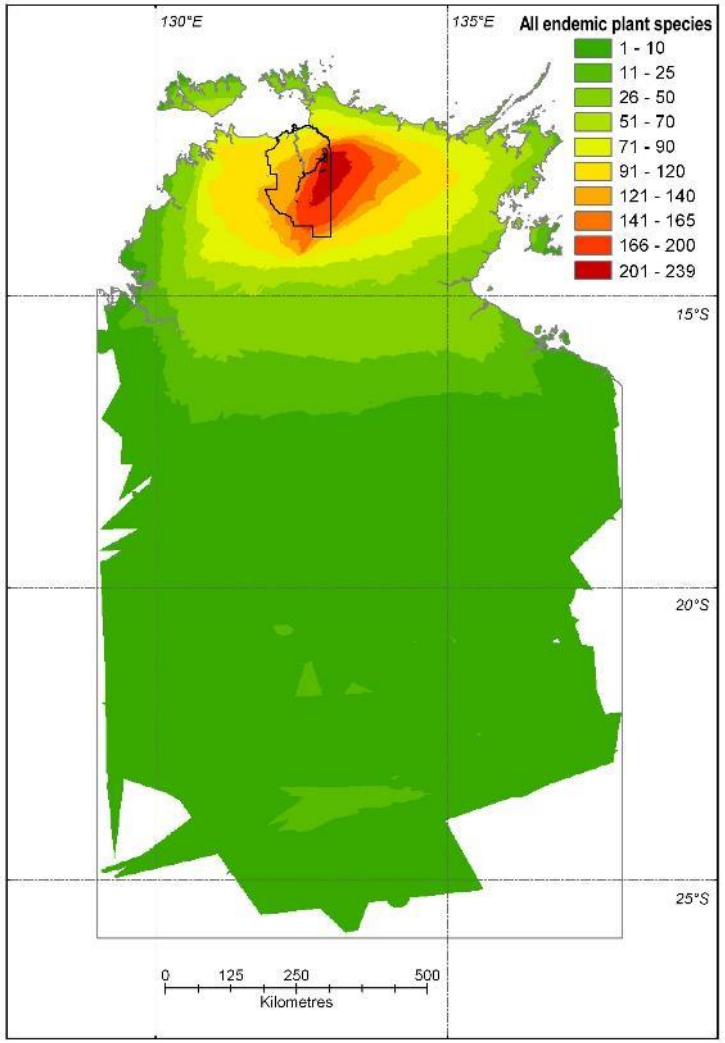
S = Severity class (fraction of fires of severity class *m* in fire season *k*)

BEF = Burning efficiency



NT Endemic plant species

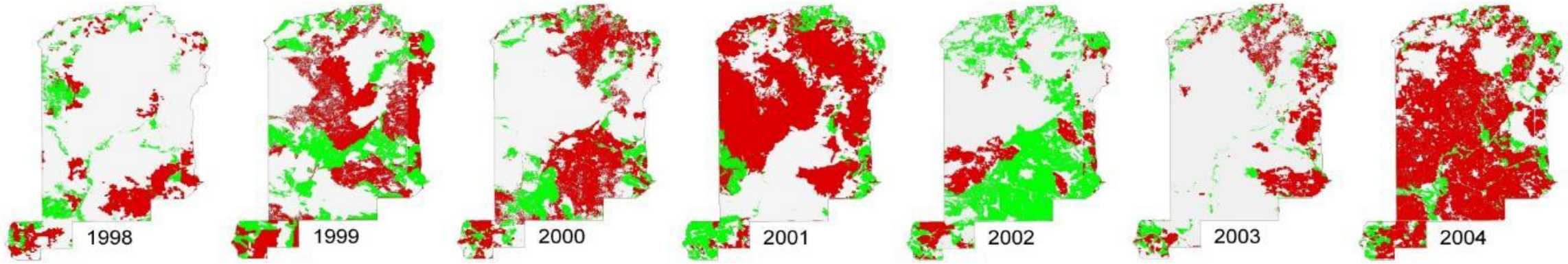




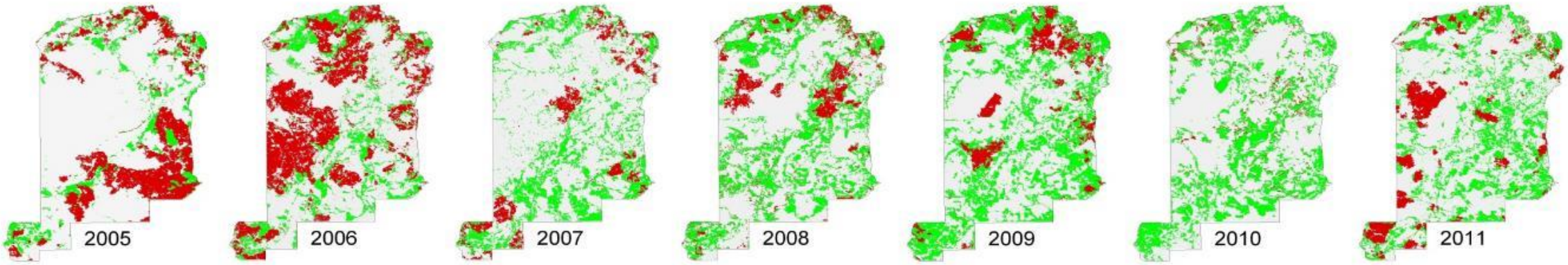
Project example—Western Arnhem Land (28,000 km^2)

PRE-PROJECT 1998-2004

EDS LDS

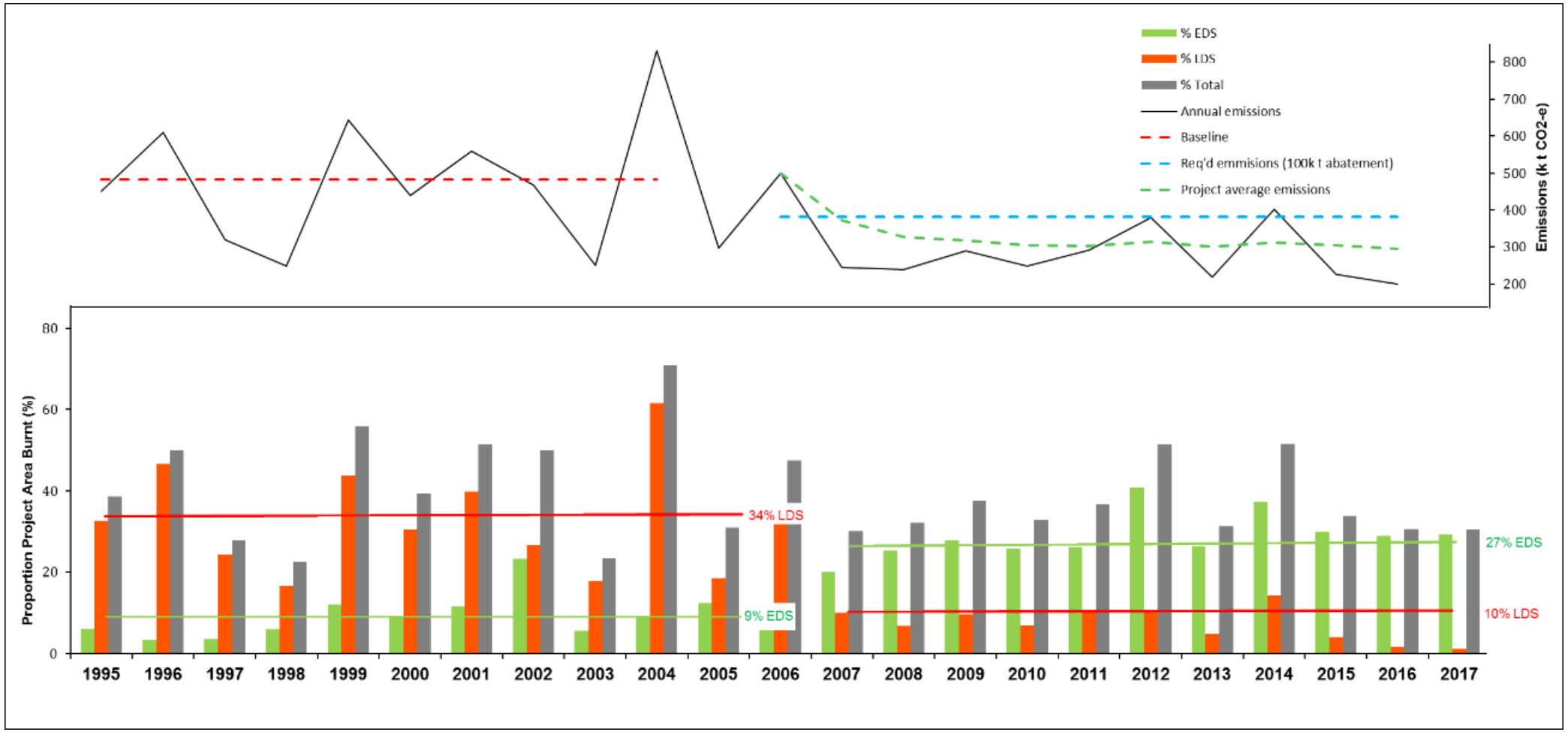


WITH PROJECT 2005-2011



Project example—Western Arnhem Land

Pre-project **With project**



Australian Government

SavBAT

Savanna Burning Abatement Tool 2.2

1. Welcome | 2. Upload Map | 3. Confirm Map | 4. Select Process | 5. Project Details | 6. Results

About SavBAT 2.2

Version 2.2 of the Savanna Burning Abatement Tool (SavBAT 2.2) automates GIS processes and mathematical calculations required to estimate greenhouse gas emissions abatement in accordance with the Carbon Credits (Carbon Farming Initiative—Emissions Abatement through Savanna Fire Management) Methodology Determination 2015 (the Determination). SavBAT 2.2 is an enhanced version of SavBAT and includes:

1. Two mapping options for a project area or a potential project area:
   a. The user uploads their own raster dataset for vegetation fuels type (see **Mapping Option A** below); or
   b. The user uploads a vector boundary of their potential project area and the tool uses the government-supplied base map for vegetation fuel types (see **Mapping Option B** below). Note this map is not validated in accordance with the methodology requirements. Users should seek professional, independent advice about the data on this website and any entitlements or obligations in relation to a relevant program administered by the Department of the Environment.
2. Estimation of abatement for a hypothetical future year under different scenarios.

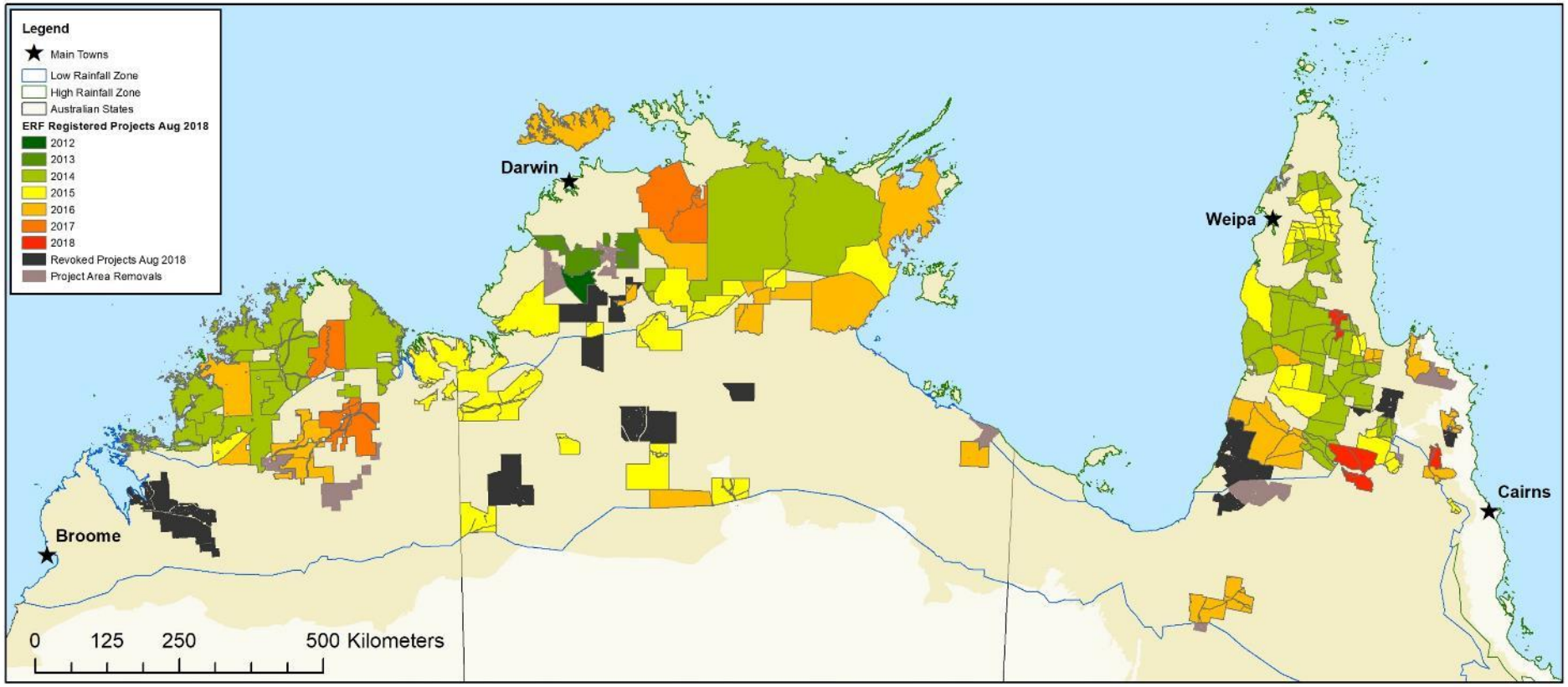
Carbon Credits (Carbon Farming Initiative) (Reduction of Greenhouse Gas Emissions through Early Dry Season Savanna Burning—1.1) Methodology Determination 2013 (ComLaw ID: F2013L01165).

SavBAT 2.2 Requirements - Pre-prepared project data for vegetation fuel type:

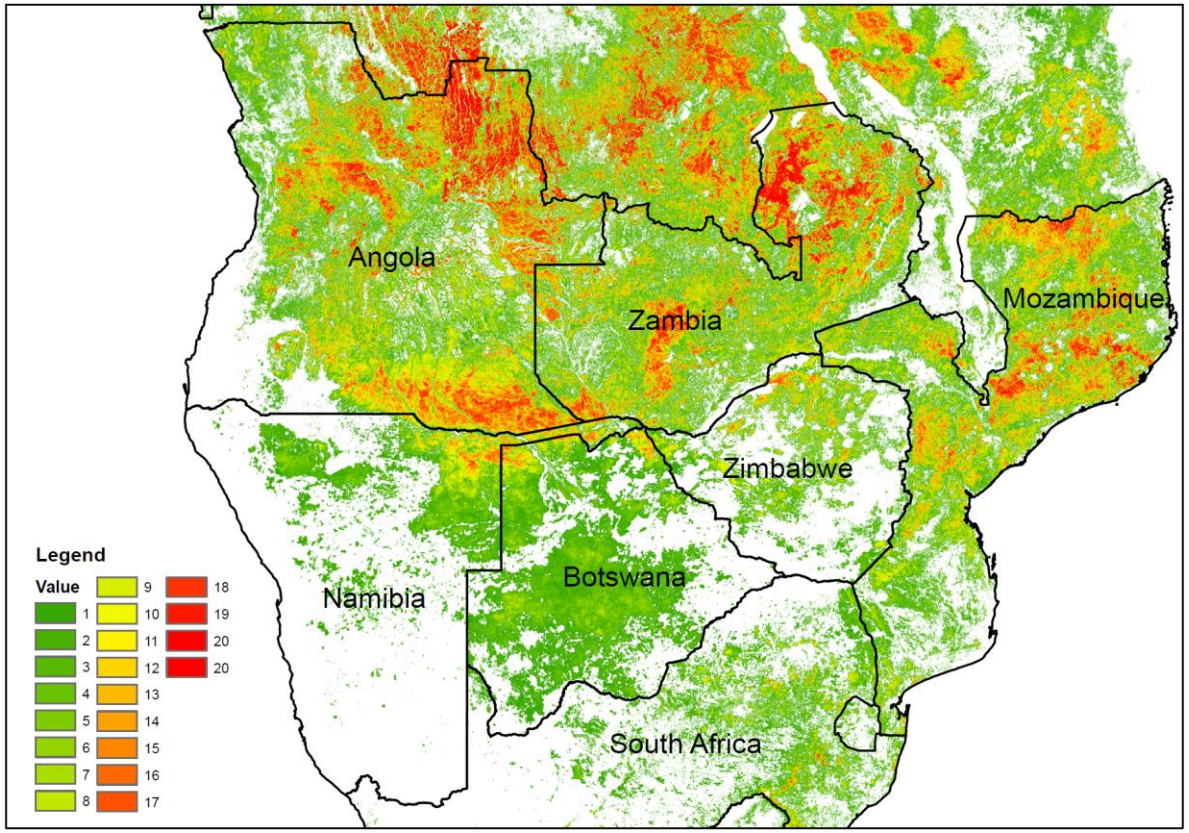
I agree and next >

ERF-Registered Savanna Burning projects, Aug 2018

Covering 25% of 1.2M km^2 eligible northern savanna region

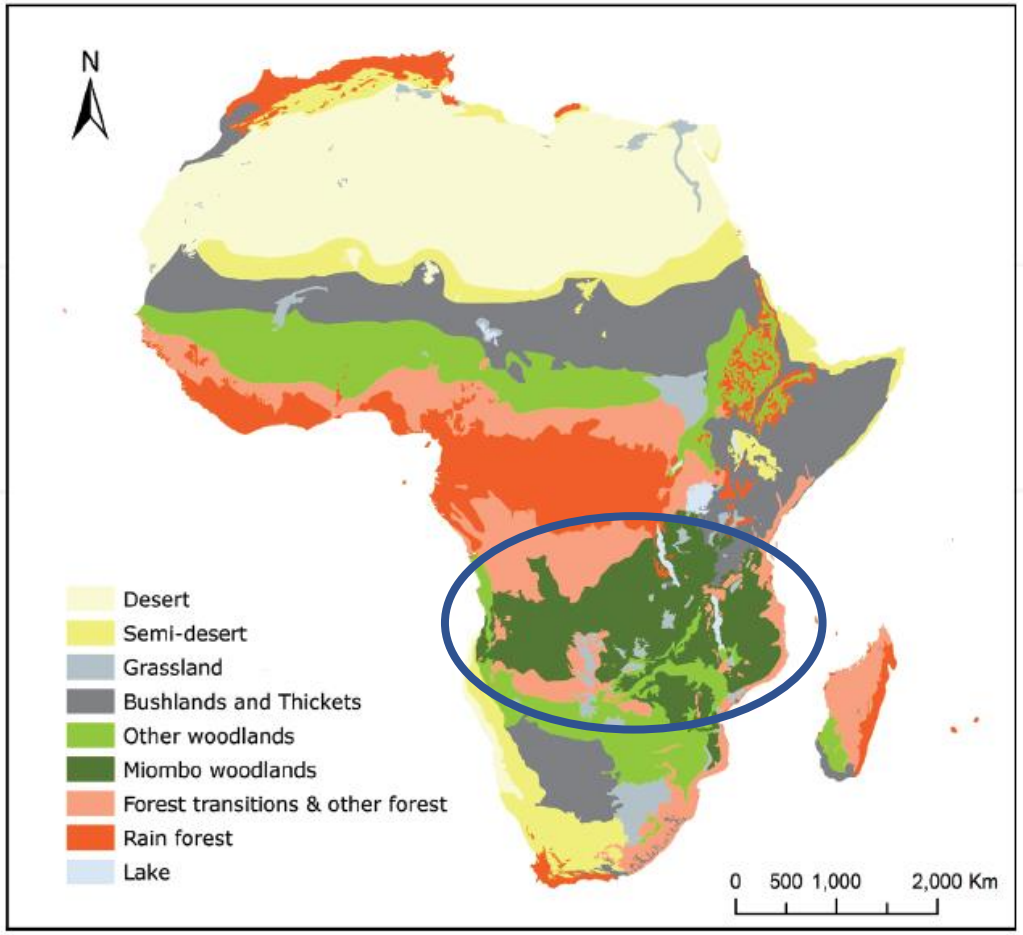


Fire frequency 2000-2020
(derived from MODIS 500 m automated product)



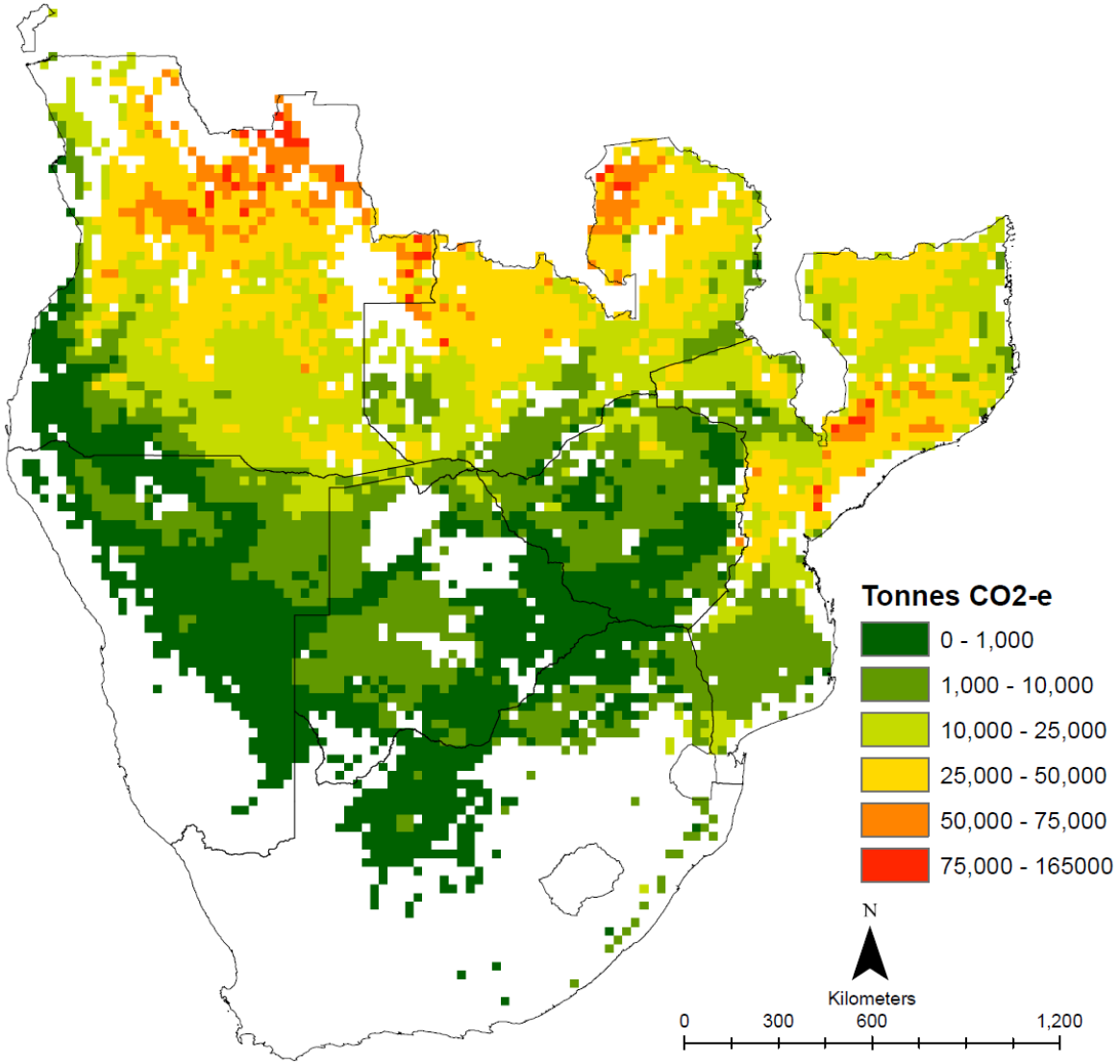
Source: Russell-Smith et al. 2021

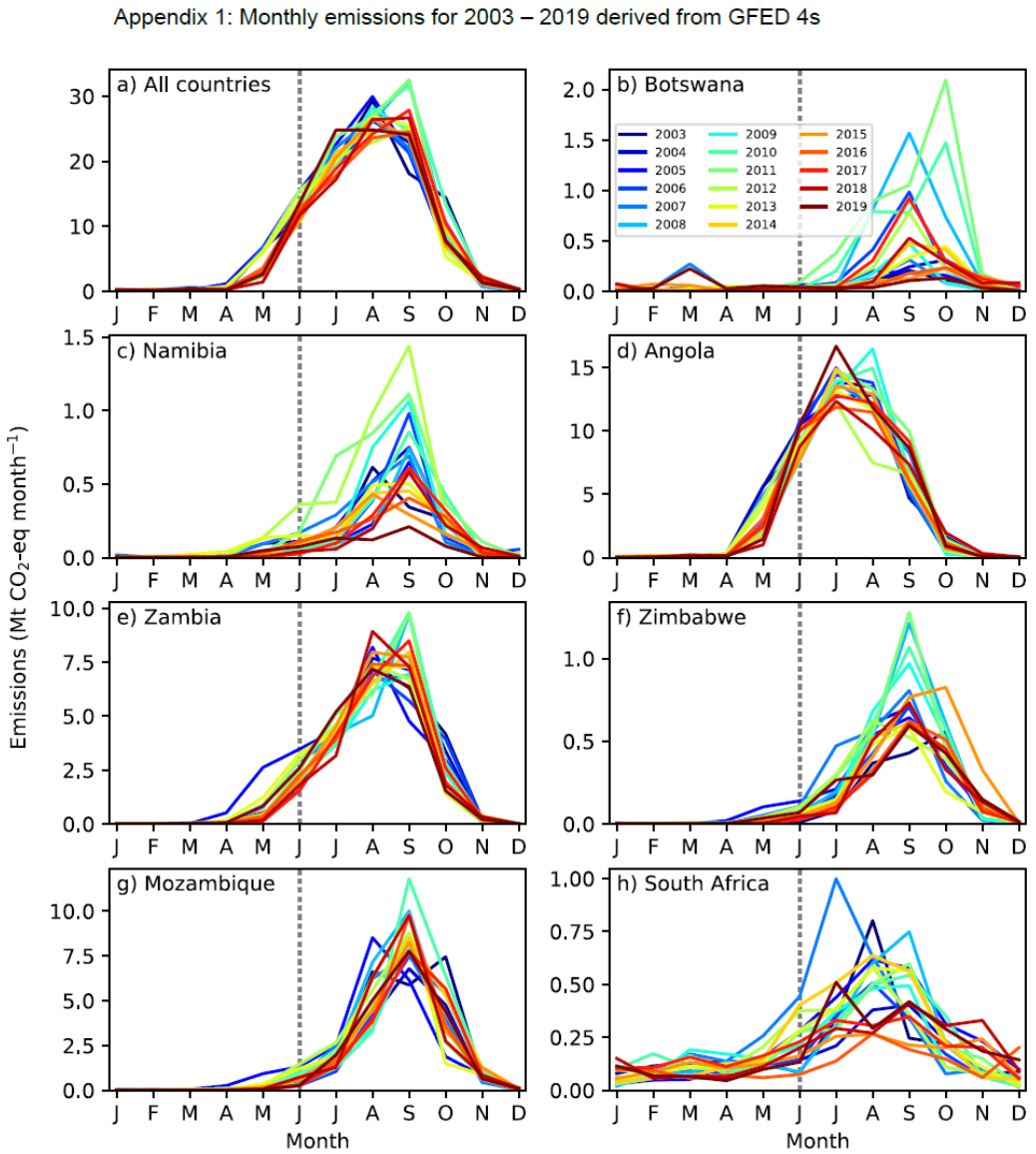
Fire-prone Miombo and related savanna woodlands



Source: Ribeiro et al. 2015 (after White 1983)

Emissions from southern African fires 2003-2019





Source: Russell-Smith et al. 2021

Current (2023) program for *Savanna Burning* projects undertaken through the International Savanna Fire Management Initiative

Region	Country	Activity	Principal funders
Australia / Indo-Pacific	**Australia**	Living tree biomass sequestration methodology	Australian Govt
		Extending GHG abatement methodology to <600 mm MAR conditions	Indigenous organisations
	Papua New Guinea	Opportunity assessment	Australian & PNG Govts, Green Climate Fund
	Timor-Leste	Opportunity assessment	Australian & TL Govts
	Eastern Indonesia	Opportunity assessment	Australian Govt, GIZ
Southern Africa	**Angola**	Decadal-scale project development	Green Climate Fund
	Botswana	Pilot development, including living tree biomass sequestration	Australian Govt & Green Climate Fund
	Mozambique	Pilot assessment & development	Green Climate Fund
	Zambia	Pilot assessment & development	Green Climate Fund
Central America	**Guatemala**	Opportunity assessment	Green Climate Fund
	Belize	Opportunity assessment	Green Climate Fund