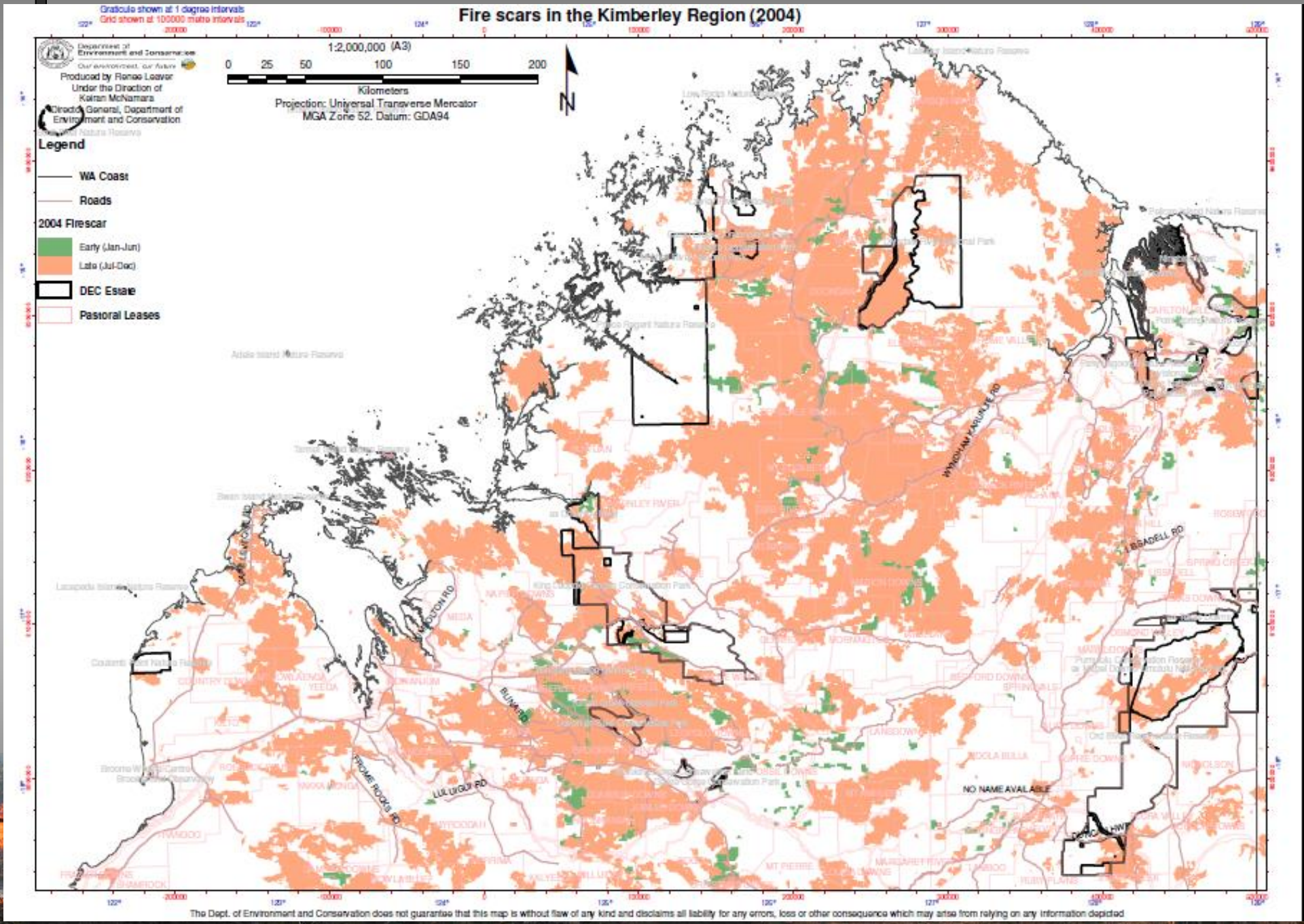
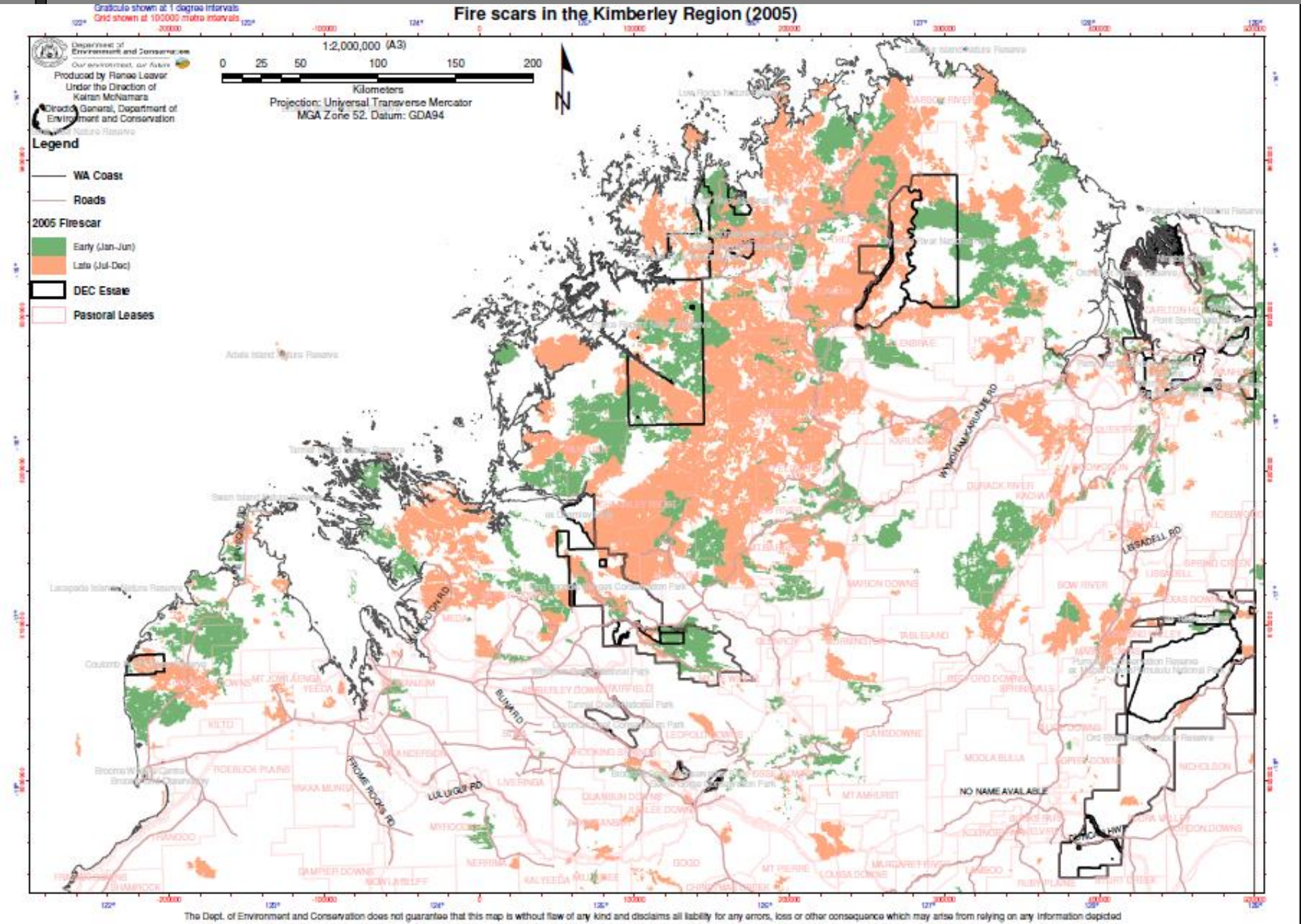
Fire Management in the Kimberley


Graticule shown at 1 degree intervals
Grid shown at 100000 metre intervals
Fire scars in the Kimberley Region (2004)
Department of Environment and Conservation
Our environment, our future
1:2,000,000 (A3)
0 25 50 100 150 200
Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52. Datum: GDA94
N
Produced by Renee Leaver
Under the Direction of
Kieran McNamara
Director General, Department of
Environment and Conservation
Legend
WA Coast
Roads
2004 Firescar
Early (Jan-Jun)
Late (Jul-Dec)
DEC Estate
Pastoral Leases
GIBB RIVER RD
WYNDHAM KARUNJIE RD
GIBB RIVER
BUNDA RD
LULUGLY RD
PROME ROCKS RD
NO NAME AVAILABLE
The Dept. of Environment and Conservation does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence which may arise from relying on any information depicted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Fire scars in the Kimberley Region (2005)
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Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52. Datum: GDA94
Produced by Renee Leaver
Under the Direction of
Kieran McNamara
Director General, Department of
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Legend
WA Coast
Roads
2005 Firescar
Early (Jan-Jun)
Late (Jul-Dec)
DEC Estate
Pastoral Leases
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WYNDHAM-KARUNJIE RD
IBBADELL RD
BUNARIDI
FROME ROCKS RD
LILLIGUT RD
NO NAME AVAILABLE
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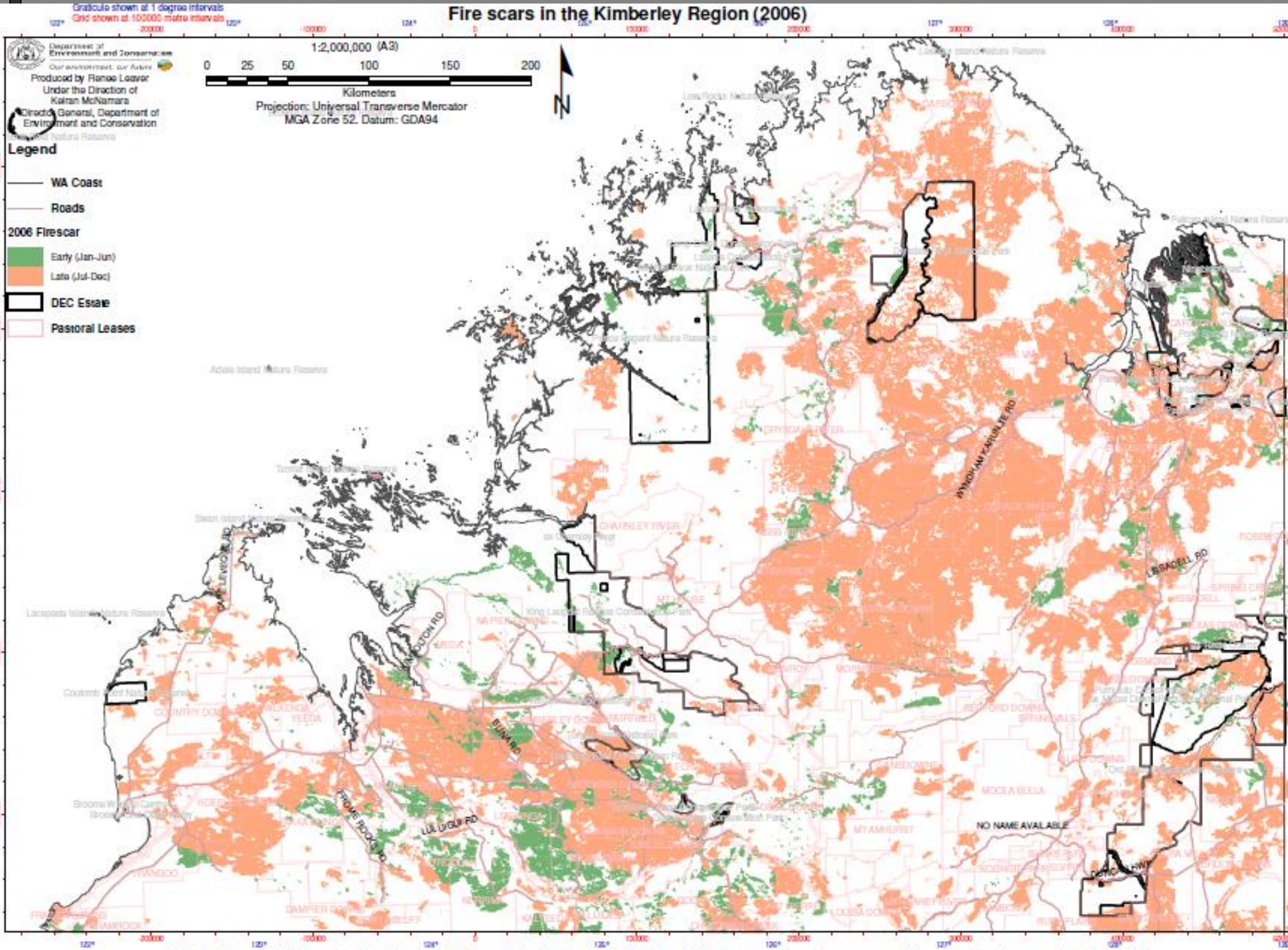
Fire scars in the Kimberley Region (2006)



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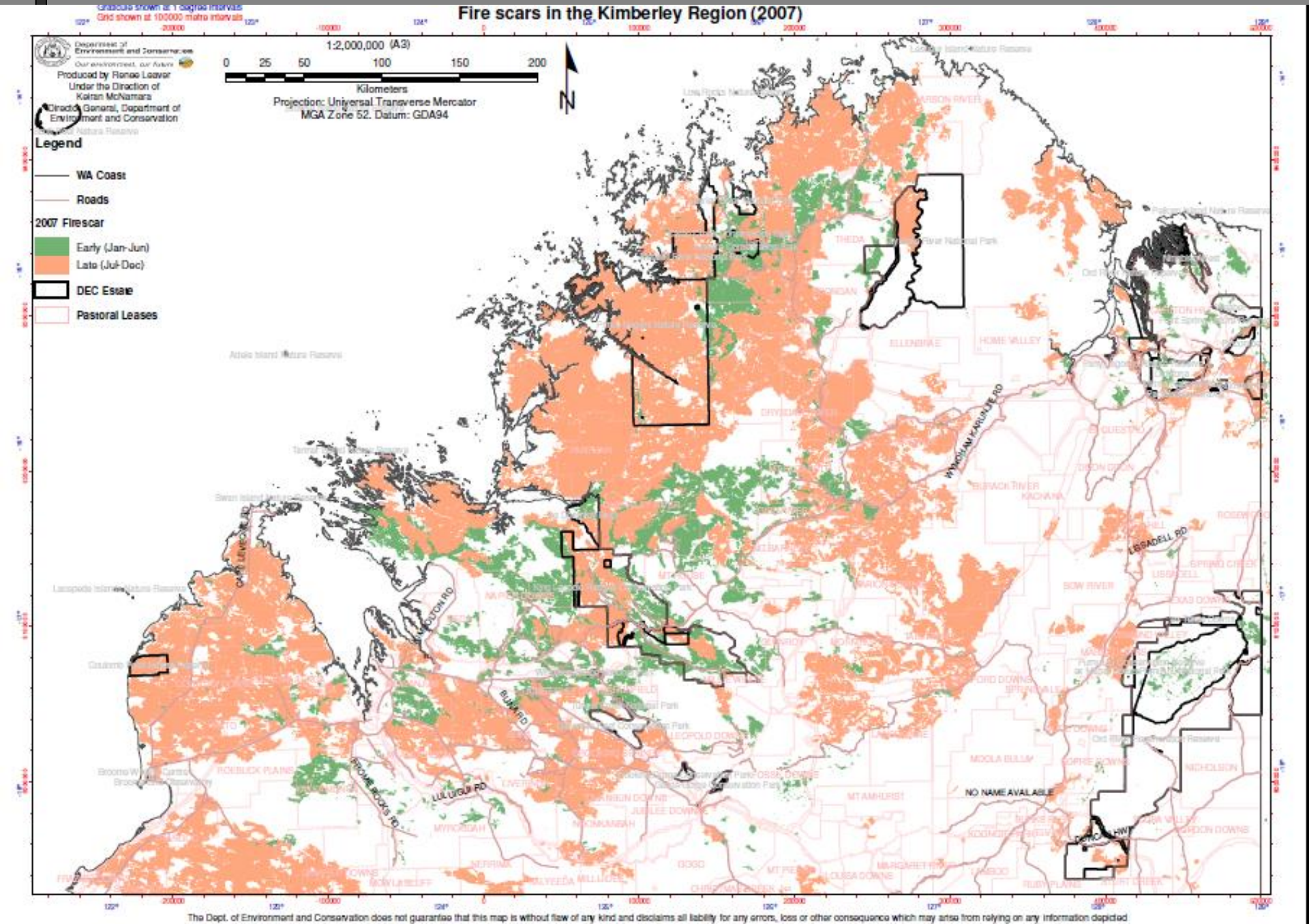
Fire scars in the Kimberley Region (2007)
Graticule shown at 1 degree intervals
Grid shown at 100000 metre intervals
Department of Environment and Conservation
Our environment, our future
Produced by Renee Leavar
Under the Direction of
Keiran McNamara
Director General, Department of
Environment and Conservation
1:2,000,000 (A3)
0 25 50 100 150 200
Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52. Datum: GDA94
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Legend
WA Coast
Roads
2007 Firescar
Early (Jan-Jun)
Late (Jul-Dec)
DEC Estate
Pastoral Leases
WYNDHAM KARUNJIE RD
LISSADELL RD
GREAT NORTHERN HWY
NO NAME AVAILABLE
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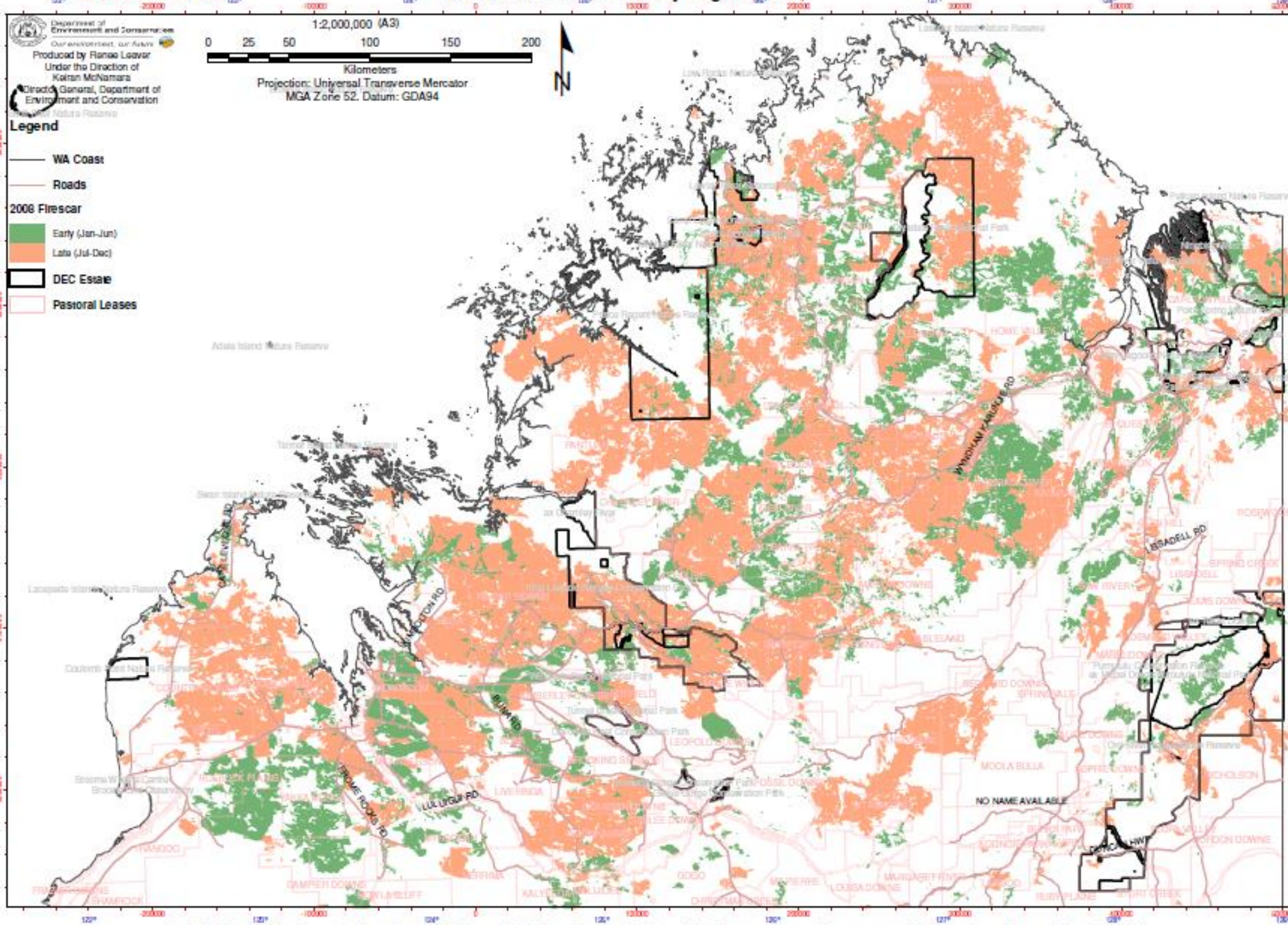
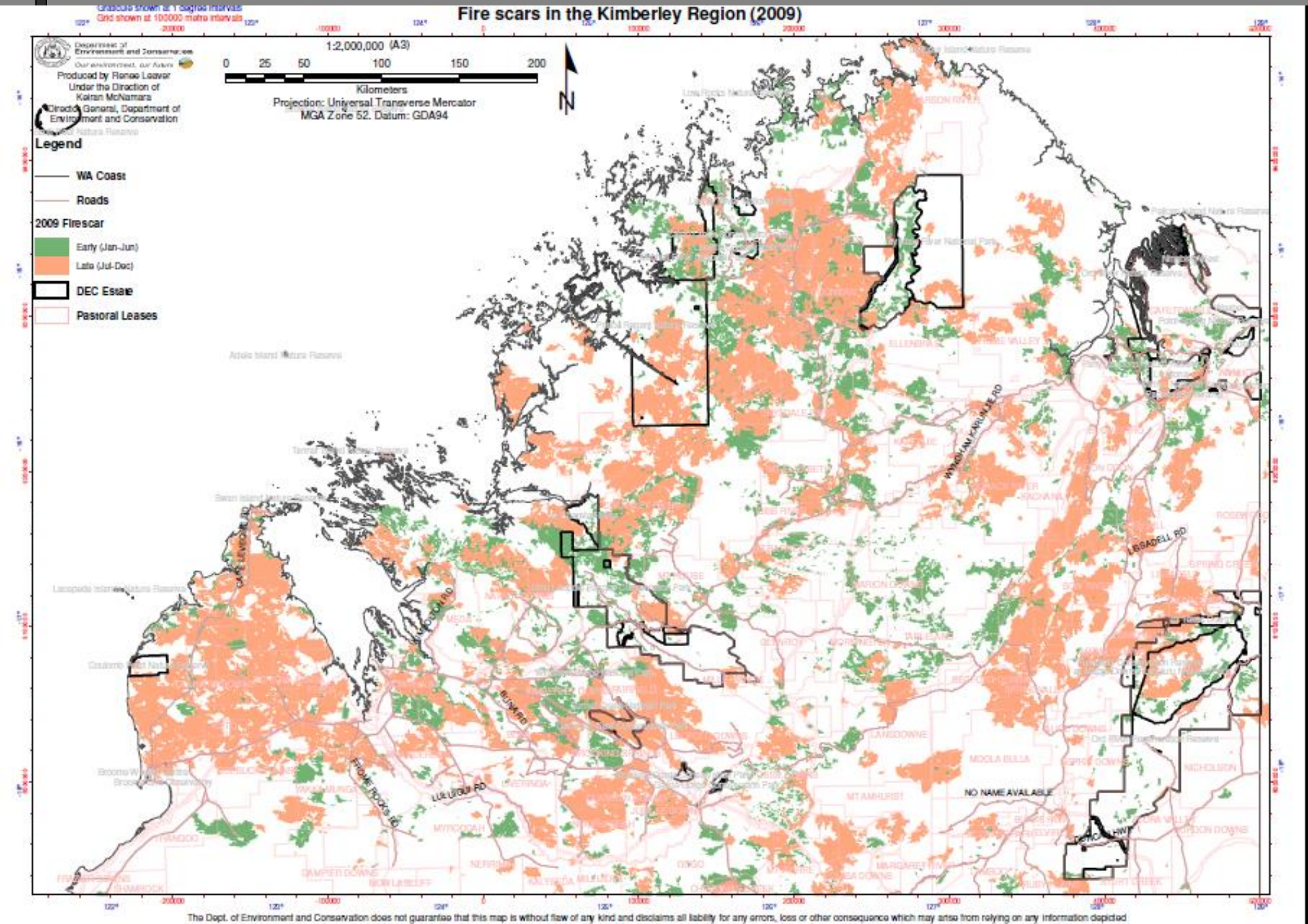
Fire scars in the Kimberley Region (2008)




Fire scars in the Kimberley Region (2009)
Graticule shown at 1 degree intervals
Grid shown at 100000 metre intervals
Department of Environment and Conservation
Our environment, our future
Produced by Renee Leaver
Under the Direction of
Kieran McNamara
Director General, Department of
Environment and Conservation
1:2,000,000 (A3)
0 25 50 100 150 200
Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52. Datum: GDA94
N
Legend
WA Coast
Roads
2009 Firescar
Early (Jan-Jun)
Late (Jul-Dec)
DEC Estate
Pastoral Leases
WYNDHAM KNOWLE RD
LISSADELL RD
BUNNARE
FROME ROCKS RD
LUE LUDDI RD
NO NAME AVAILABLE
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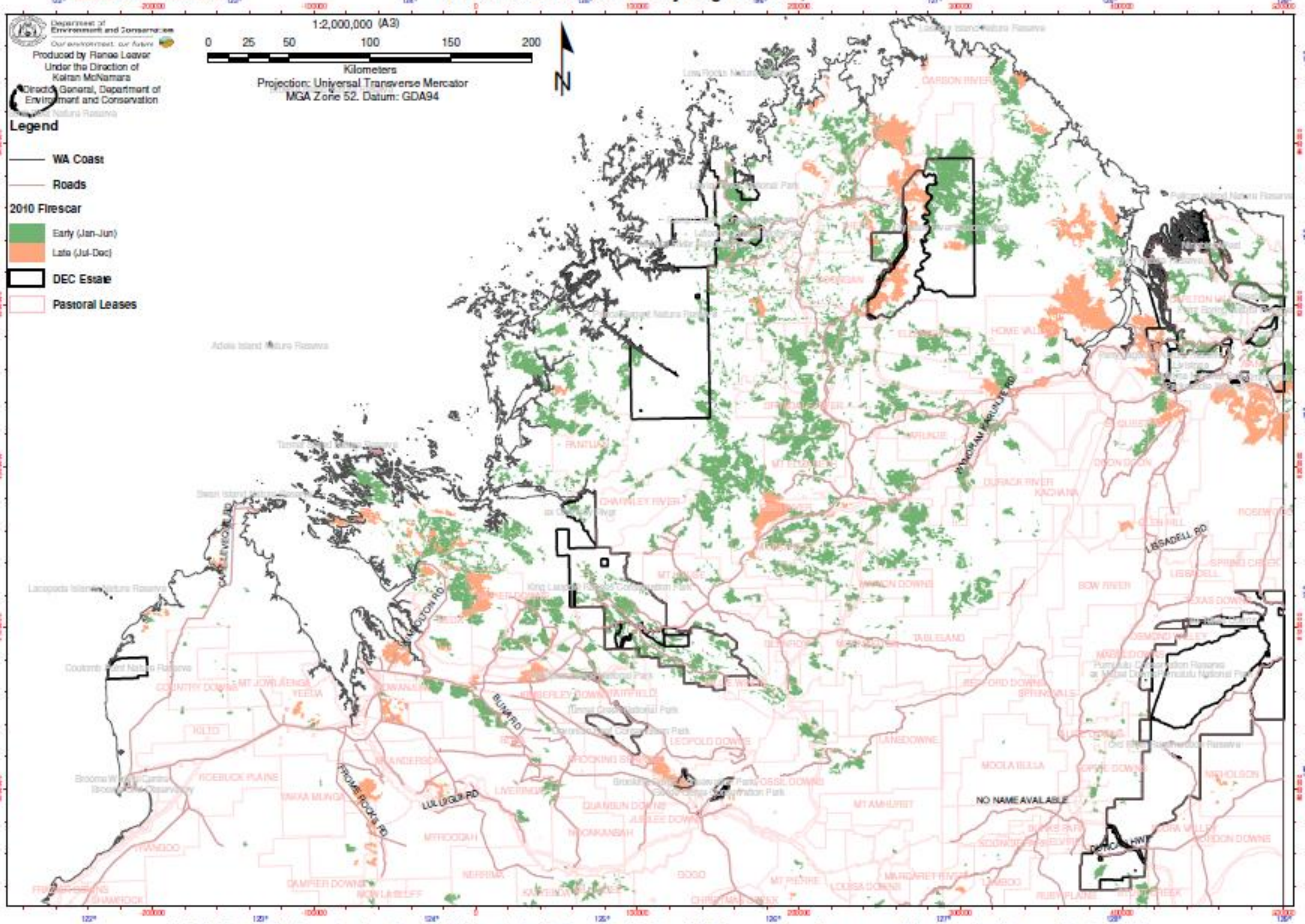
Fire scars in the Kimberley Region (2010)



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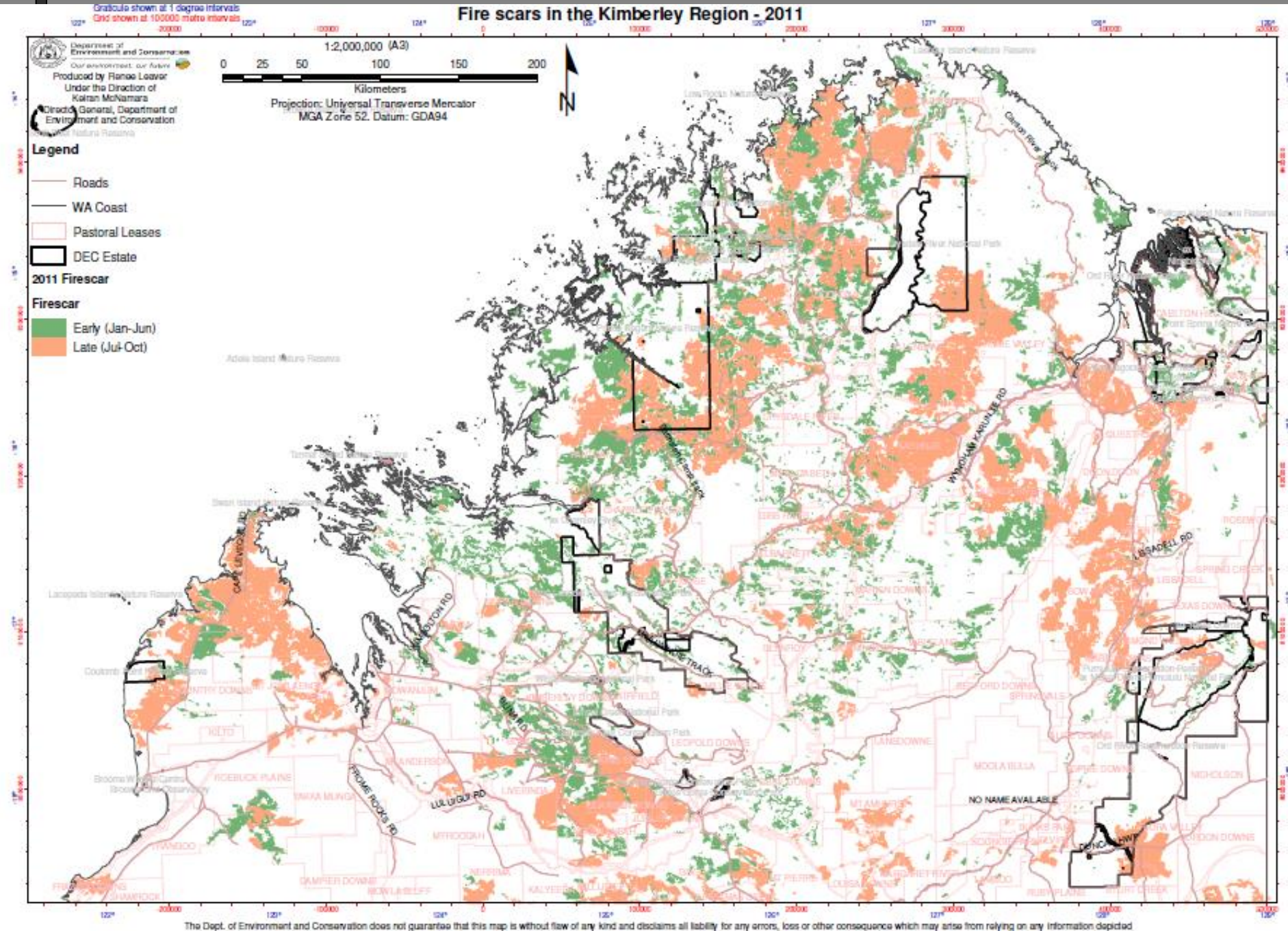
Fire scars in the Kimberley Region - 2011
Graticule shown at 1 degree intervals
Grid shown at 100000 metre intervals
Department of Environment and Conservation
Our environment, our future
1:2,000,000 (A3)
0 25 50 100 150 200
Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52. Datum: GDA94
N
Produced by Renee Leaver
Under the Direction of
Keiran McNamara
Director General, Department of
Environment and Conservation
Legend
Roads
WA Coast
Pastoral Leases
DEC Estate
2011 Firescar
Firescar
Early (Jan-Jun)
Late (Jul-Oct)
WYNDHAM KARUNJIE RD
LISSADELL RD
CAPE LEVEQUE RD
DERBY WYNDHAM RD
MUNRO RD
KROME ROCKS RD
LULUGUI RD
NO NAME AVAILABLE
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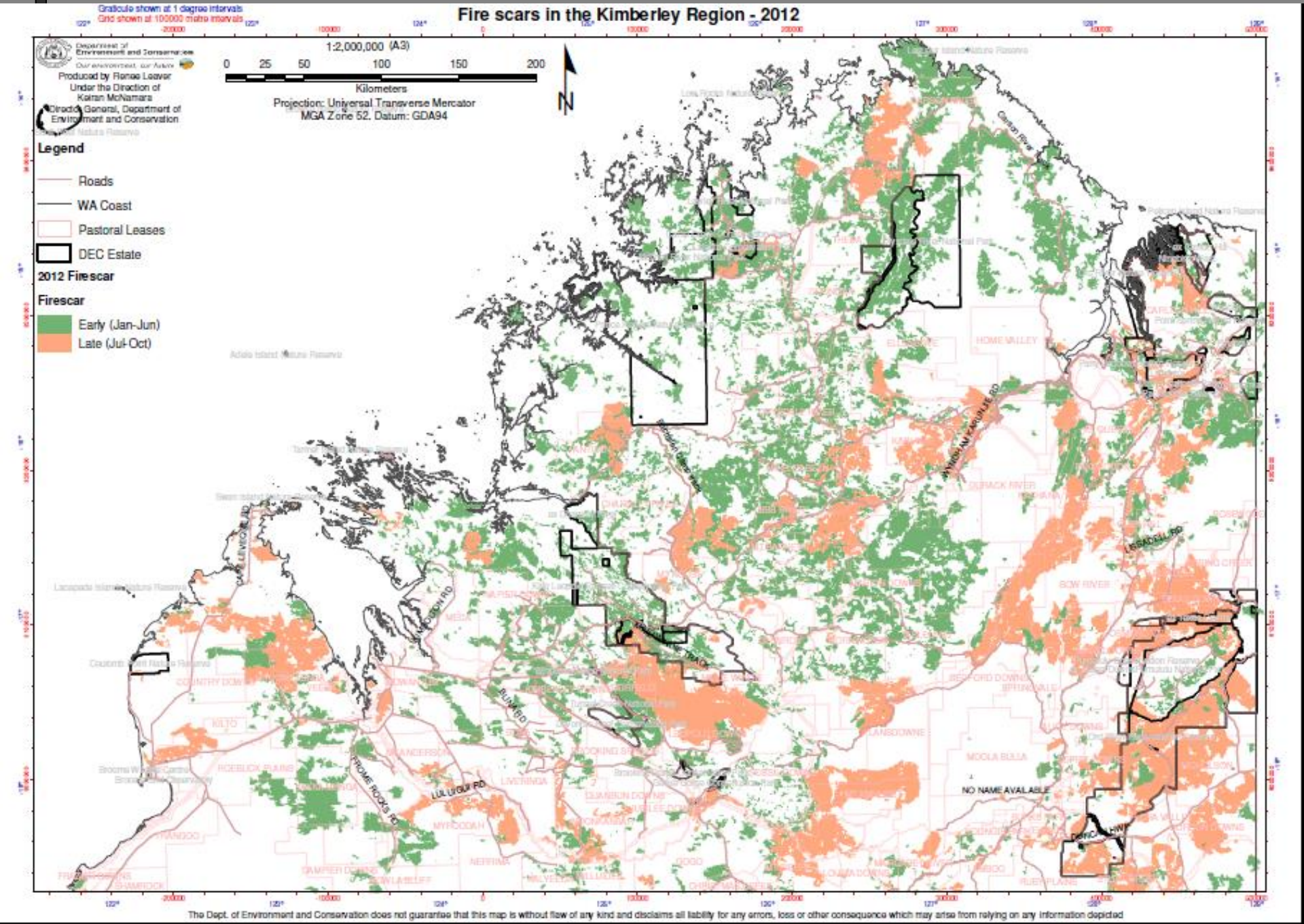
Fire scars in the Kimberley Region - 2012
Graticule shown at 1 degree intervals
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1:2,000,000 (A3)
0 25 50 100 150 200
Kilometers
Projection: Universal Transverse Mercator
MGA Zone 52, Datum: GDA94
Produced by Renee Leaver
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Kieran McNamara
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Environment and Conservation
Legend
Roads
WA Coast
Pastoral Leases
DEC Estate
2012 Firescar
Firescar
Early (Jan-Jun)
Late (Jul-Oct)
N
DAVENPORT RANGE RD
LISADELL RD
BUNNEY RD
PROME ROCKS RD
LULUGUI RD
NO NAME AVAILABLE
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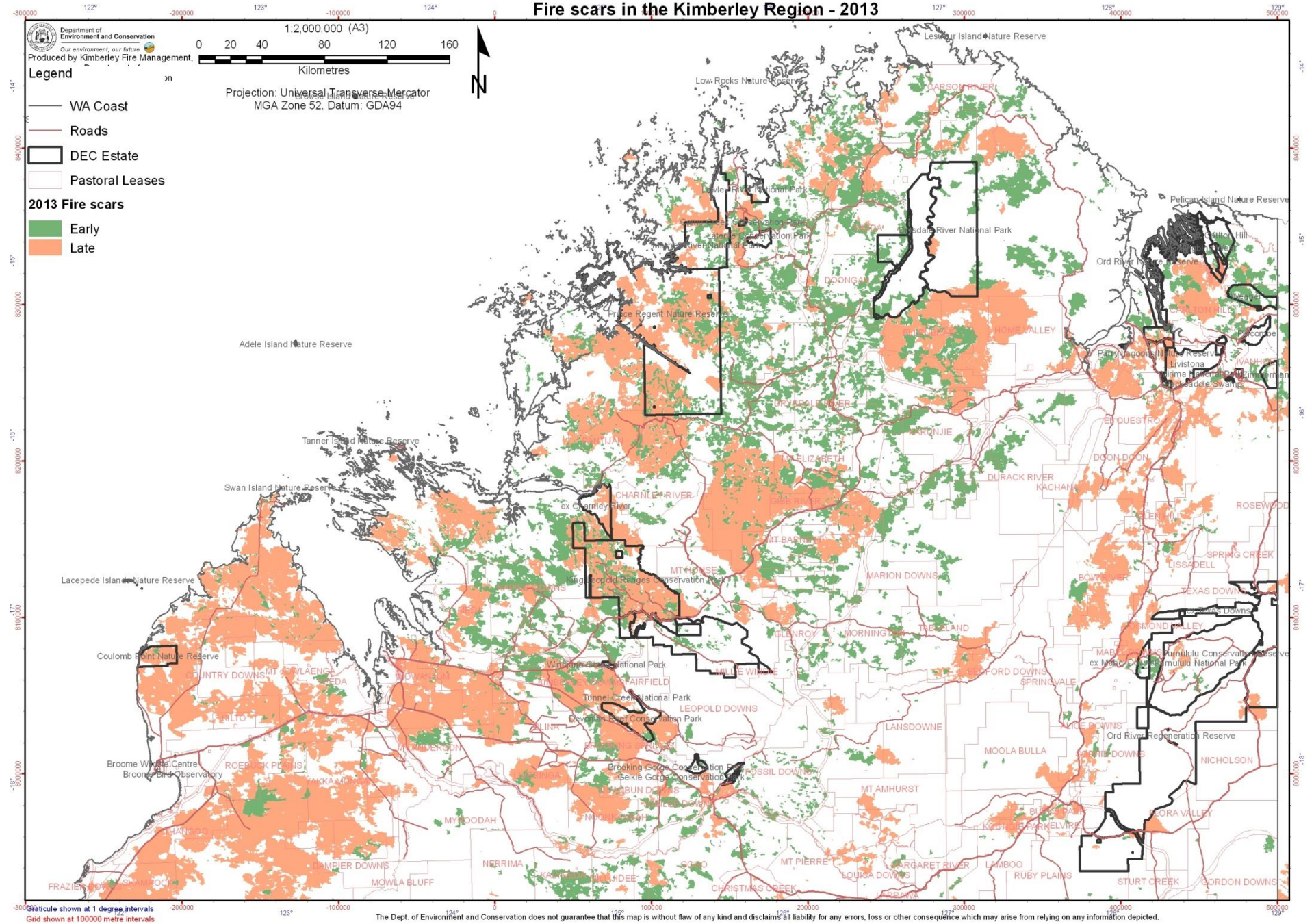
Fire scars in the Kimberley Region - 2013



Graticule shown at 1 degree intervals
Grid shown at 100000 metre intervals

Evolution of management

- Initial Focus on breaking the Boom / Bust Cycle of extensive late season fires
- Transition into refining the fire program to meet a variety of objectives (Carbon & Biodiversity)
- Determining the level of management required annually to meet these objectives.
- Ongoing commitment to capacity building and engagement with traditional owners to meet the aspirations of healthy country plans


Right way fire management

Contemporary Ignition Methods

- Making the transition from flying large circuits dropping incendiaries to targeted fire management for specific outcomes.
- Driven by timing, vegetation structure, composition and the desired objectives

Fire Planning with Traditional owners

- Making fire plans on maps to better facilitate outcomes on country.
- Planning where to go based on the vegetation map and fuel ages
- Helps determine “when to go burning” “how much fire to put in”
- Tells us what country is where in the landscape

Sandstone Heaths

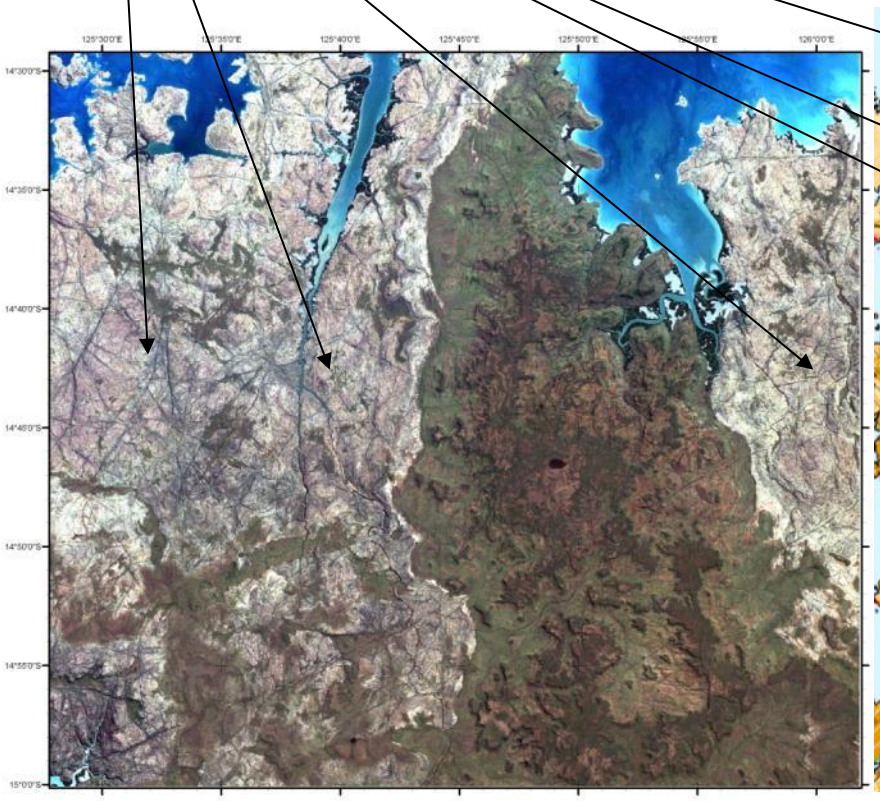
- **Has lots of spinifex**
- **Burns hot if burnt later**
- **Can burn early before grass in valleys cures**
- **Has lots of special plants and animals that need longer time between fires**
- **Many cultural sites in this country**

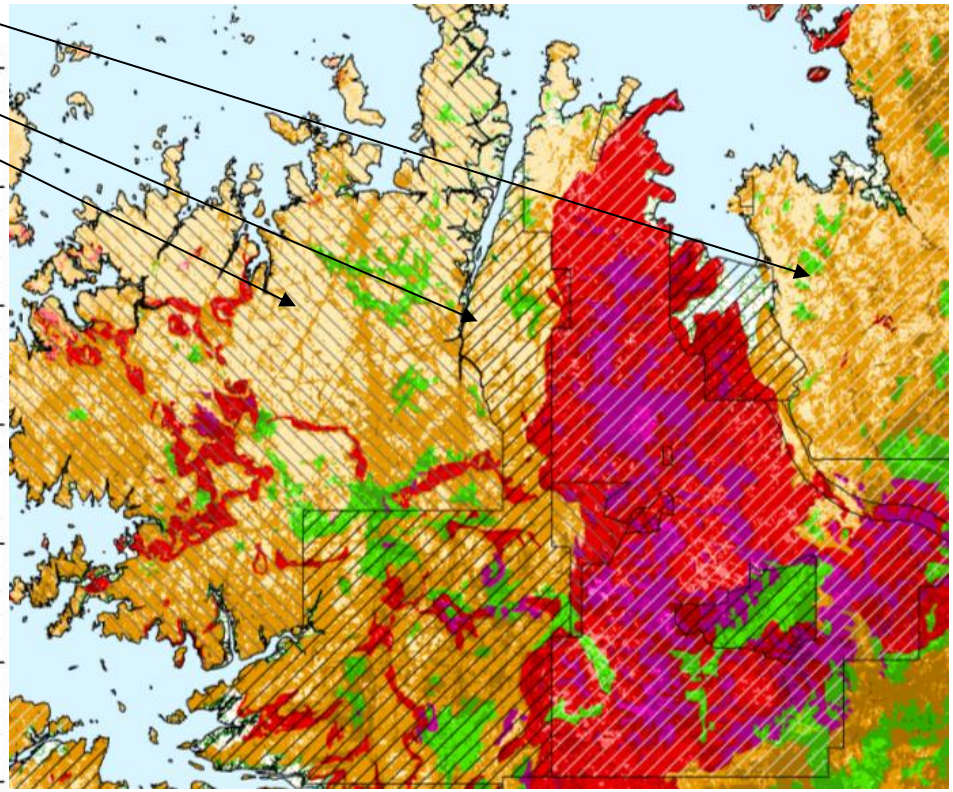
Tall open forest and volcanics

- Lots of grass growth that dries later than heaths
- Can carry fire frequently in the late season
- Can with stand cooler fires more often
- Burns very hot in late season
- Good emu country

Vegetation map & satellite image

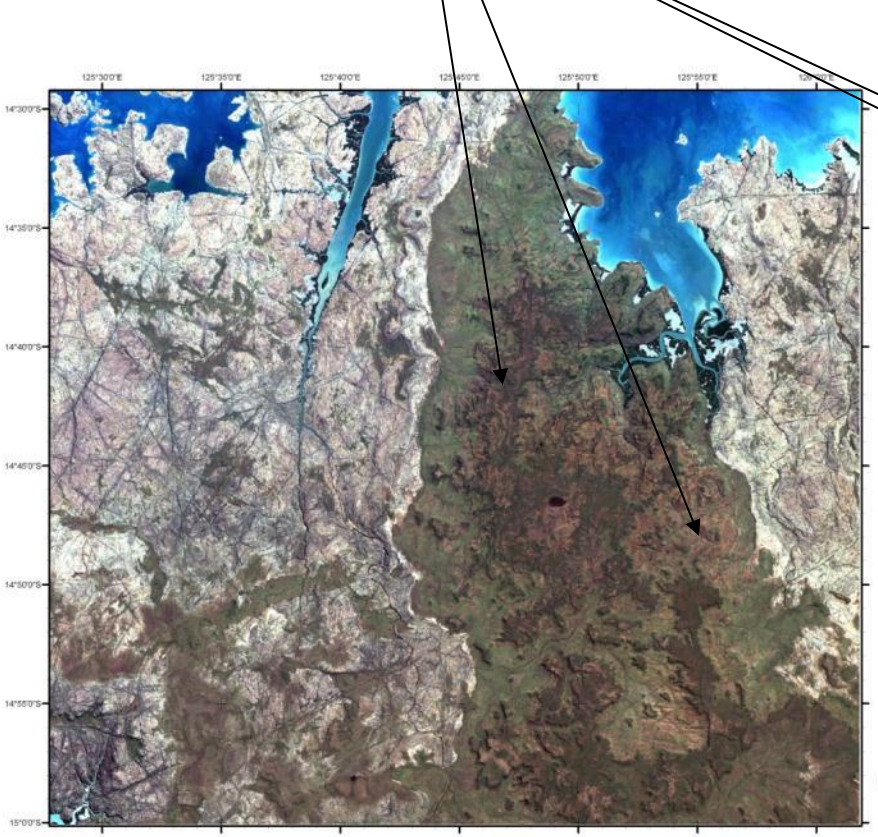
Sandstone Heaths

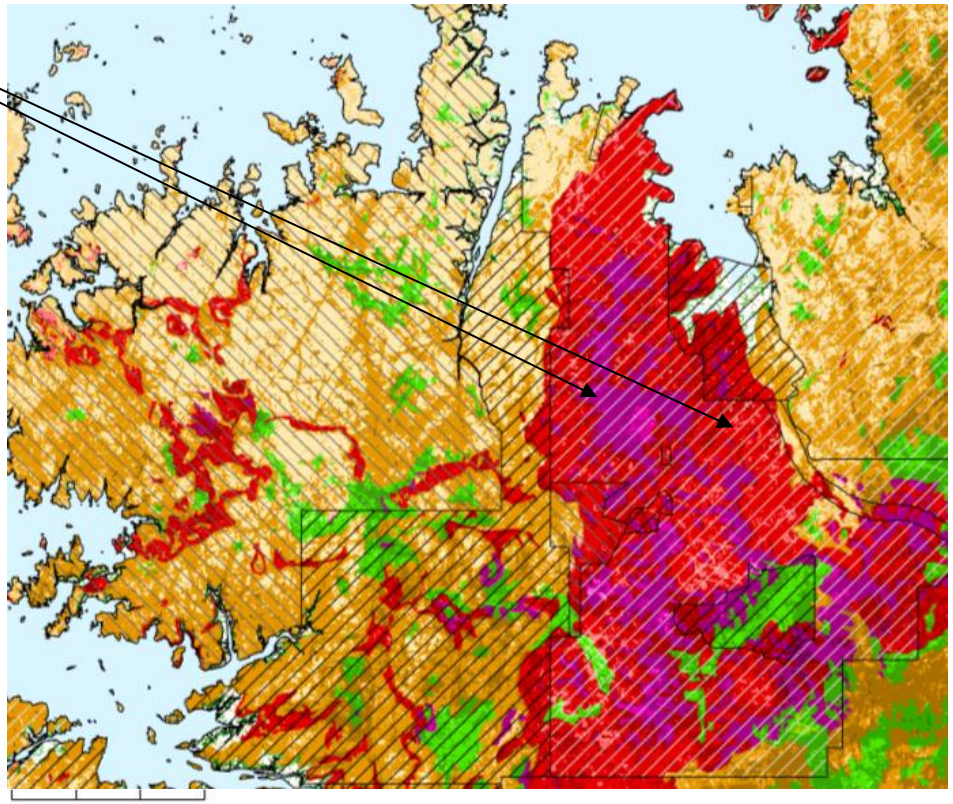




Vegetation map & satellite

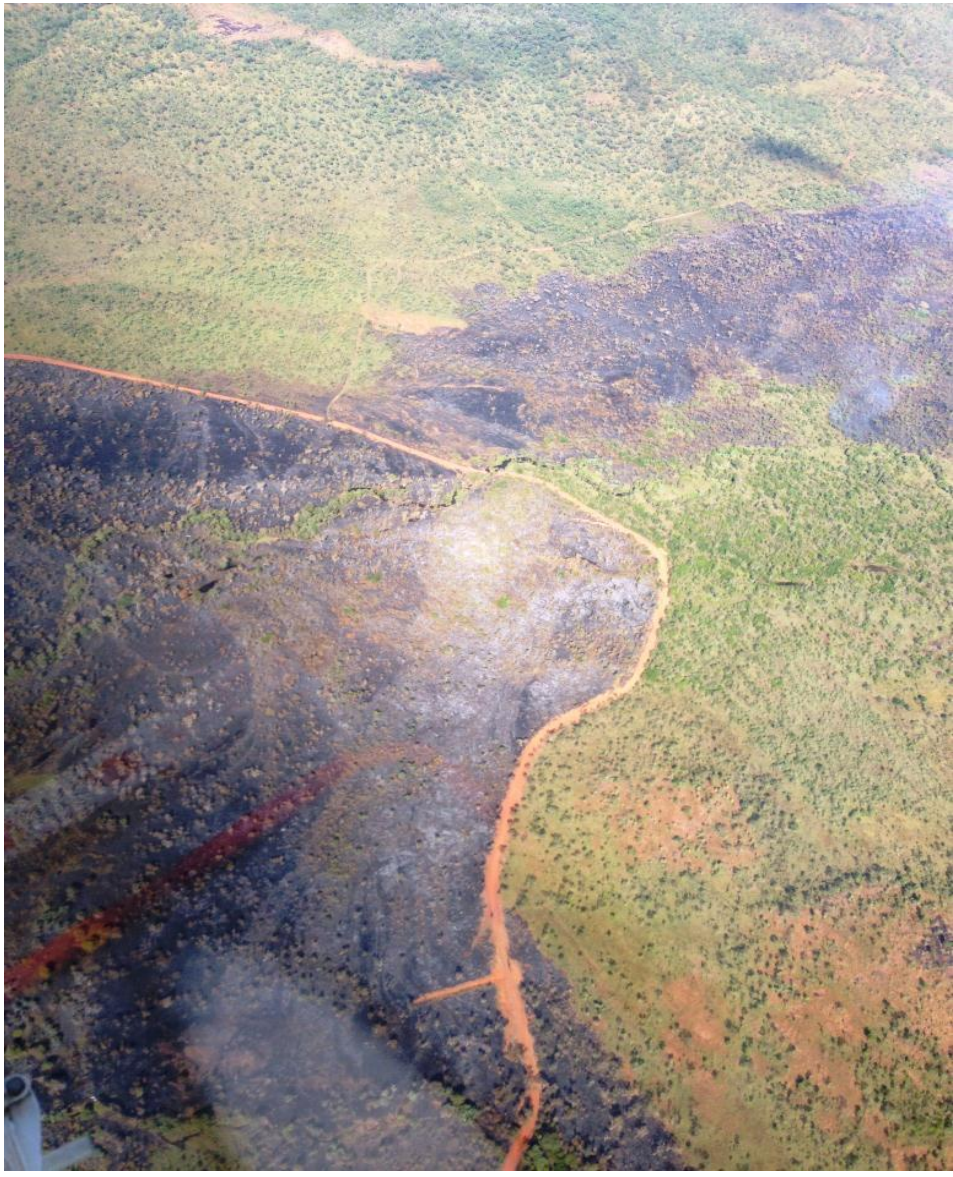
Tall forest and grass's





Translating maps to what we see from the aircraft

Creating Landscape scale mosaics




VH-FBQ

Fire and Greenhouse Gas Abatement

- Reducing greenhouse gas emissions through better fire management - which in turn will have biodiversity conservation and social-cultural and economic benefits of getting people back on country
- To effectively run and deliver ACB annually will require significant capacity increases.
- This capacity will need to be trained, skilled, and committed every year.
- Capacity building combined with increased participation to achieve social outcomes is very resource hungry and less efficient

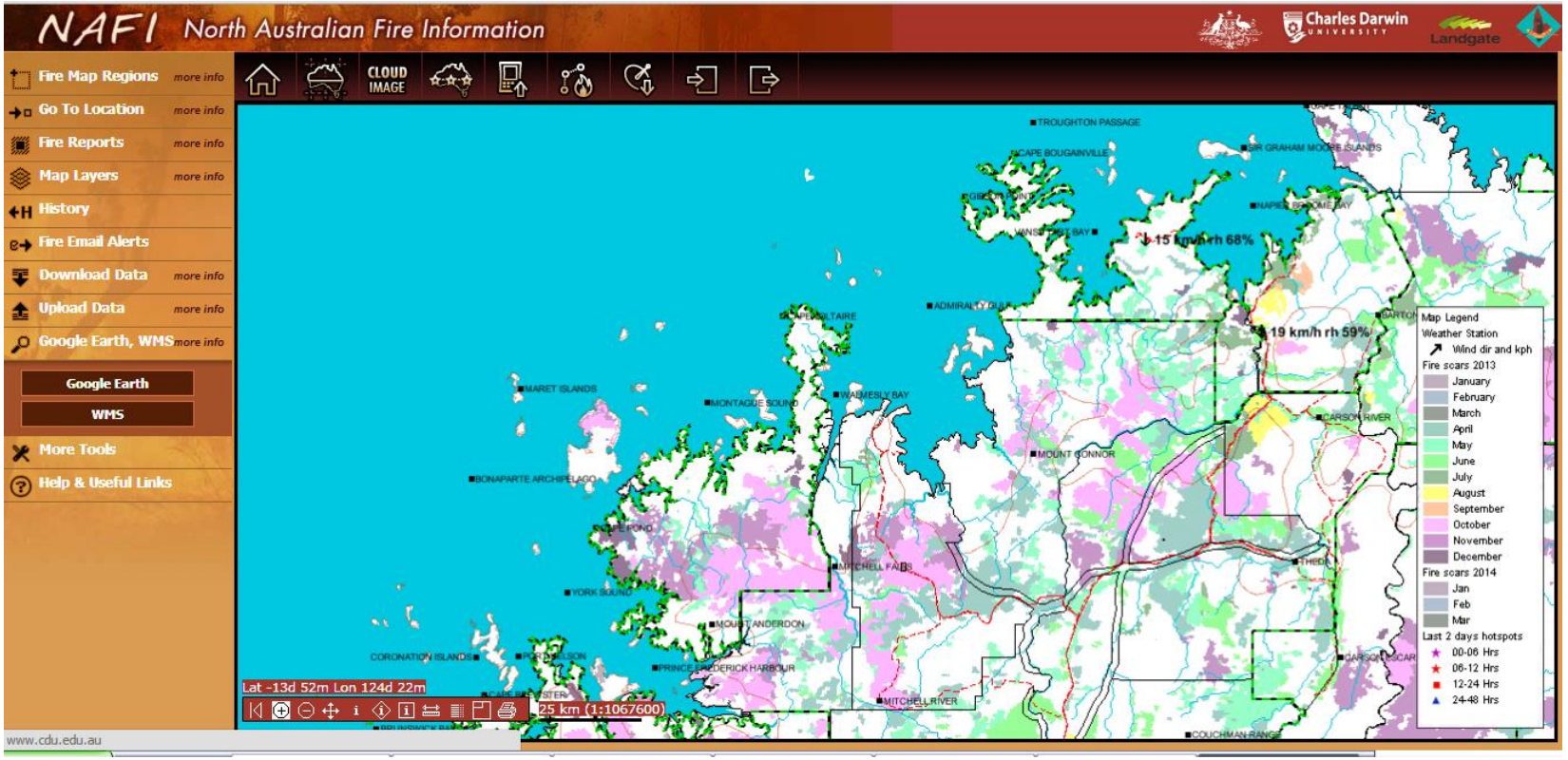
Carbon abatement and Biodiversity

- Healthy Country Plans for each claim group identify managing fire as a key outcome.
- Maximising opportunities to earn income through Carbon abatement is also a key objective for Traditional owners.
- Carbon abatement and managing for biodiversity are not mutually exclusive – right time & right way fire underpin a successful fire program that can still deliver a potential carbon abatement return.
- Focus on developing a fire program that achieves both objectives and recognises that the northern Australian landscape is extremely fire prone due to lightening.

DPaW monitoring – guiding fire management

- We use two methods for monitoring fire management:
  1. NAFI
  2. Biodiversity indicators
  3. Guiding fire management decisions based on scientific data

NAFI



Everyone across northern Australia uses NAFI (e.g. KLC, WG, DPaW, WALFA)

This tells us:

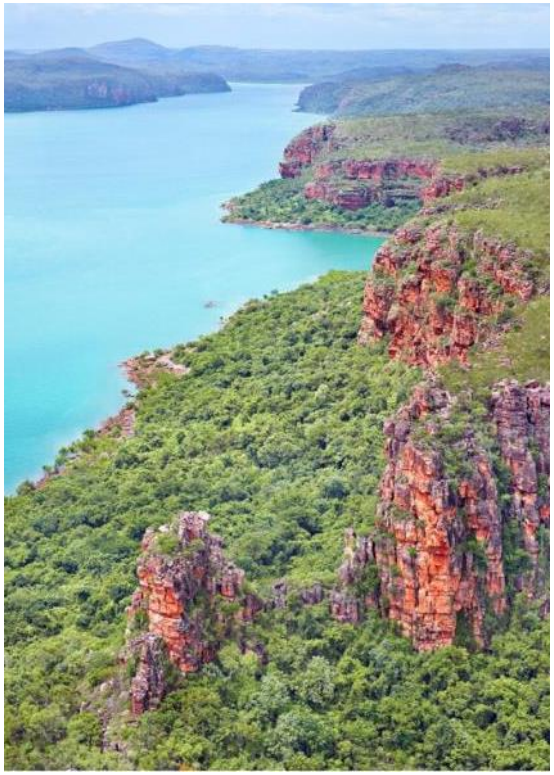
- How much country was burnt?
- When it was burnt?
- How often it was burnt?
- …….but not what impact this is having on biodiversity.

BUT, does not tell us much about plants and animals...

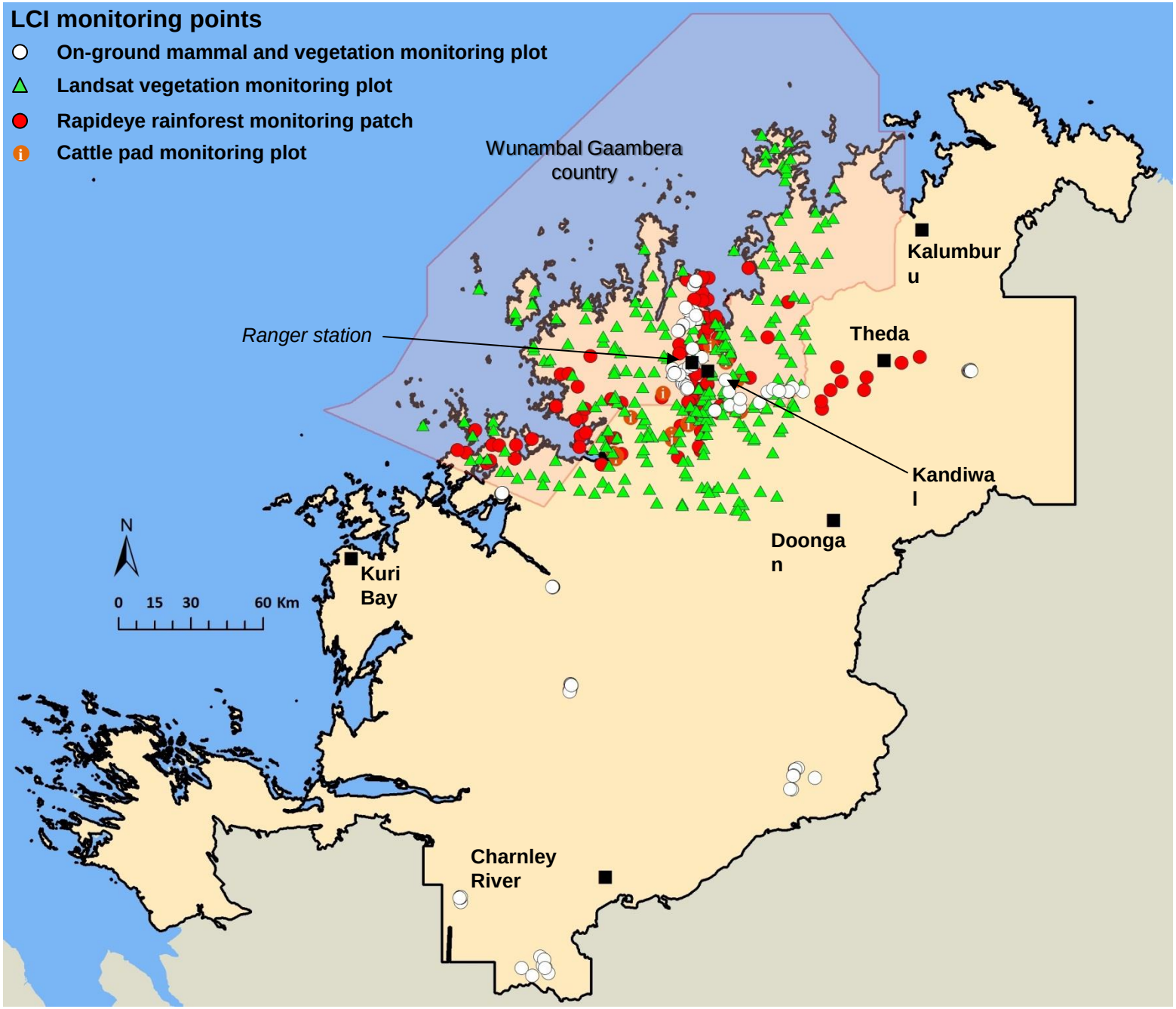
Biological indicators

Native vegetation

Rainforest patches



Small-medium sized mammals


LCI monitoring points
On-ground mammal and vegetation monitoring plot
Landsat vegetation monitoring plot
Rapideye rainforest monitoring patch
Cattle pad monitoring plot
Wunambal Gaambera country
Ranger station
Kalumburu
Theda
Kandiwal
Doongan
Kuri Bay
Charnley River
N
0 15 30 60 Km

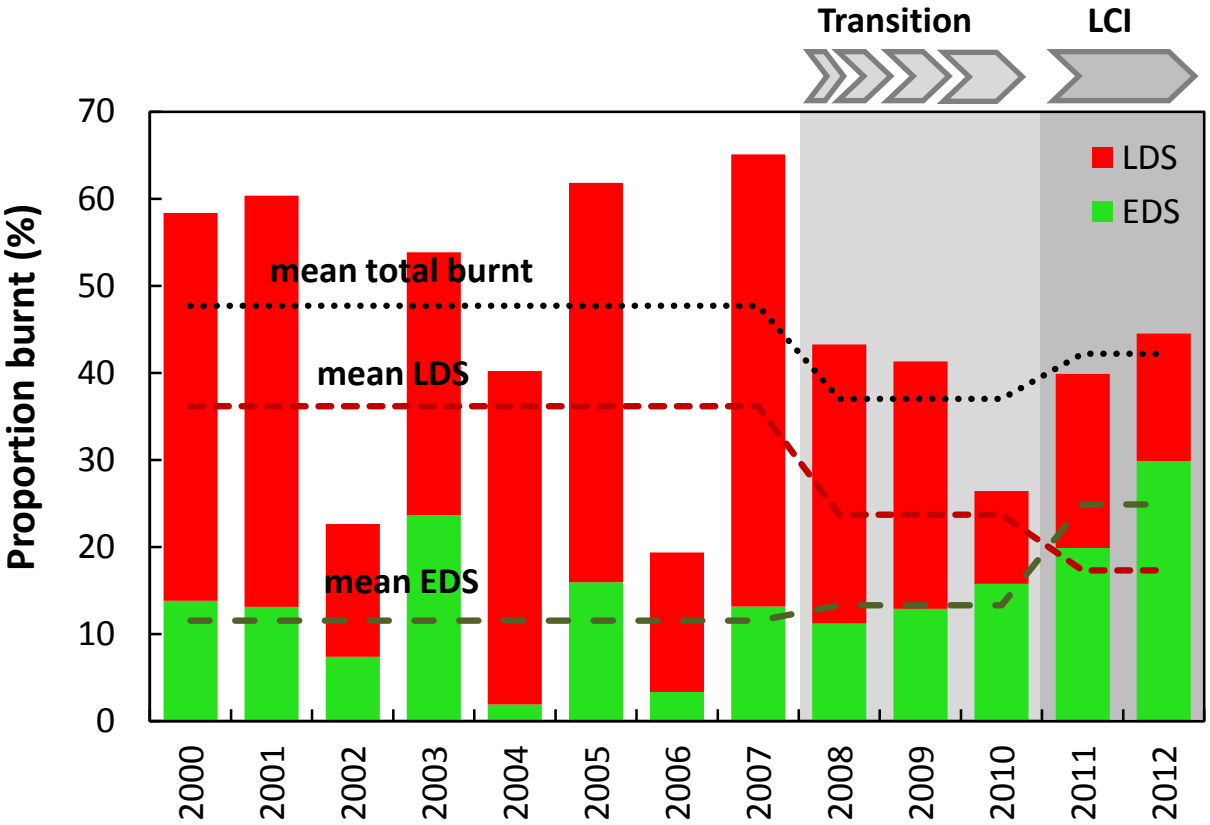
Fire management targets

1. Decrease the proportion of area burnt annually
2. Increase the proportion of fires that burn in the early dry season
3. Decrease the distance between burnt and unburnt vegetation
4. Increase the proportion of older aged (> 3 years old) vegetation

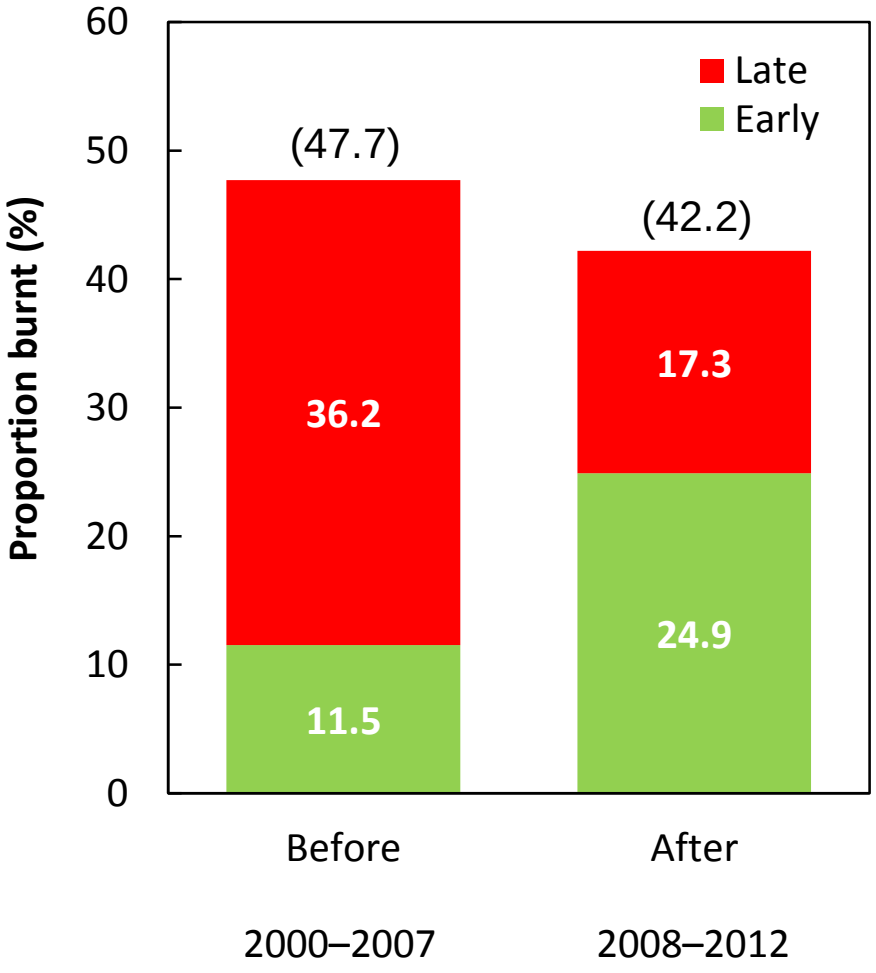
- Achieved via aerial incendiary and on-ground burning program that operates in the late wet and early dry seasons
- Satellite imagery and GIS used to map and analyse fire scars

What is monitoring telling us?

Management of fire is improving



Early vs. late fires and total area burnt



- Better management of fire has shifted the seasonality of fire from late to early dry season – reducing both the intensity and size of fire and thus the impacts on biodiversity

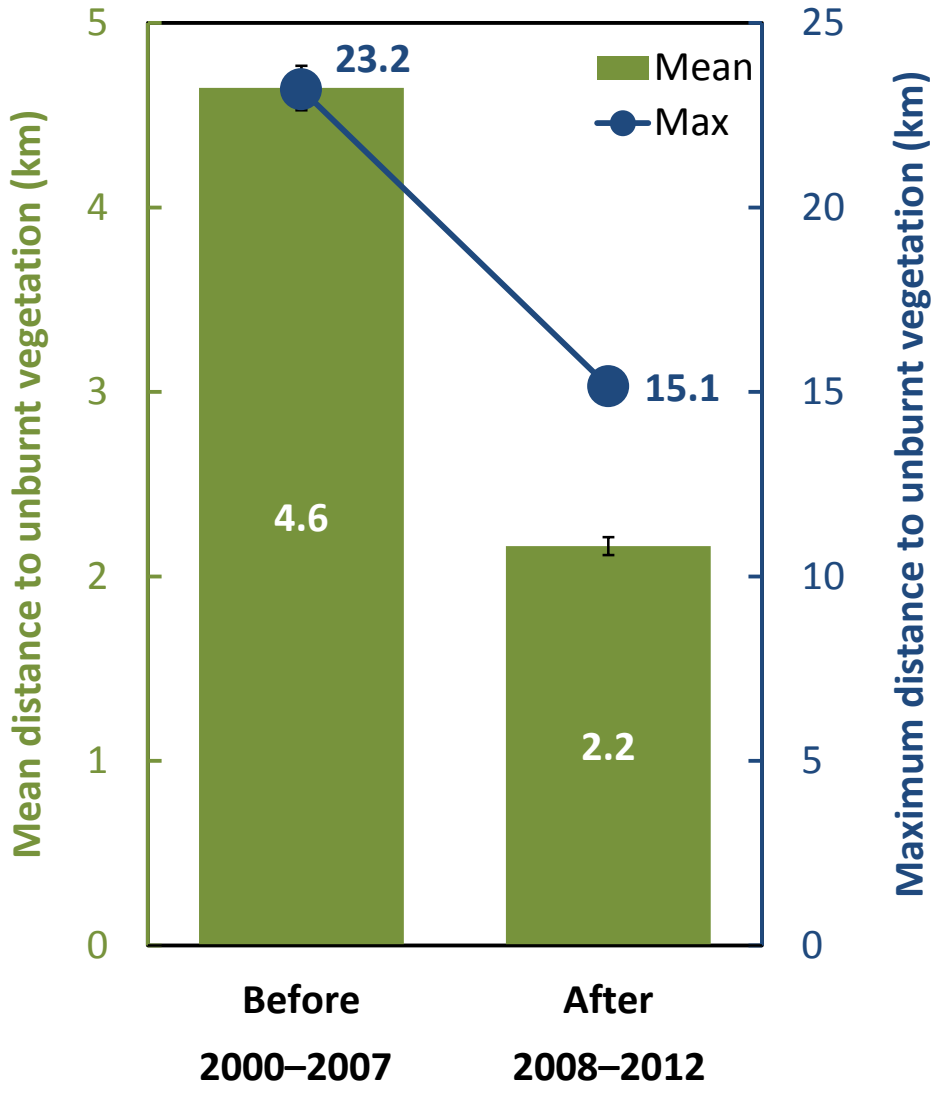
- On average:

  18.9 % less country is burnt by late fires

  13.4 % more country is burnt early

  5 % less of the country is burnt

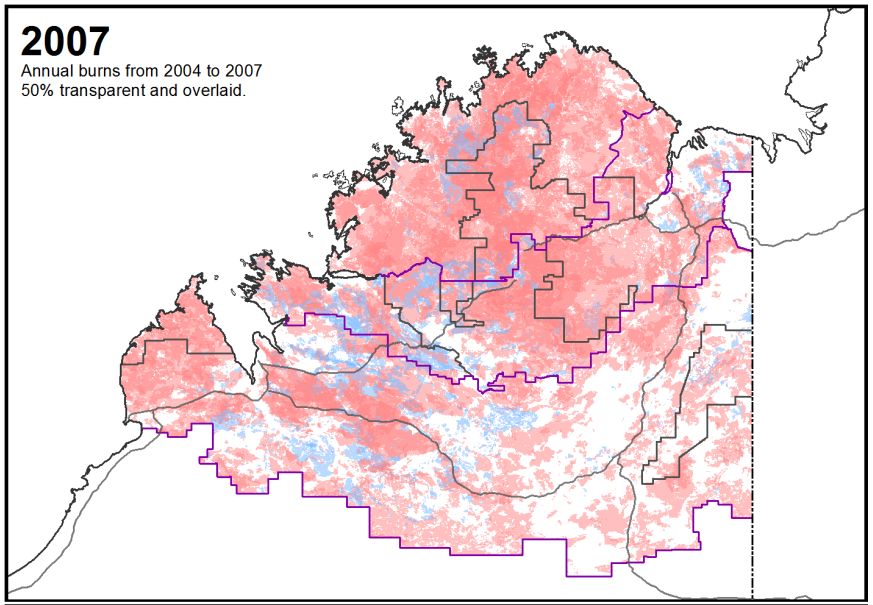
Distance between burnt and unburnt vegetation

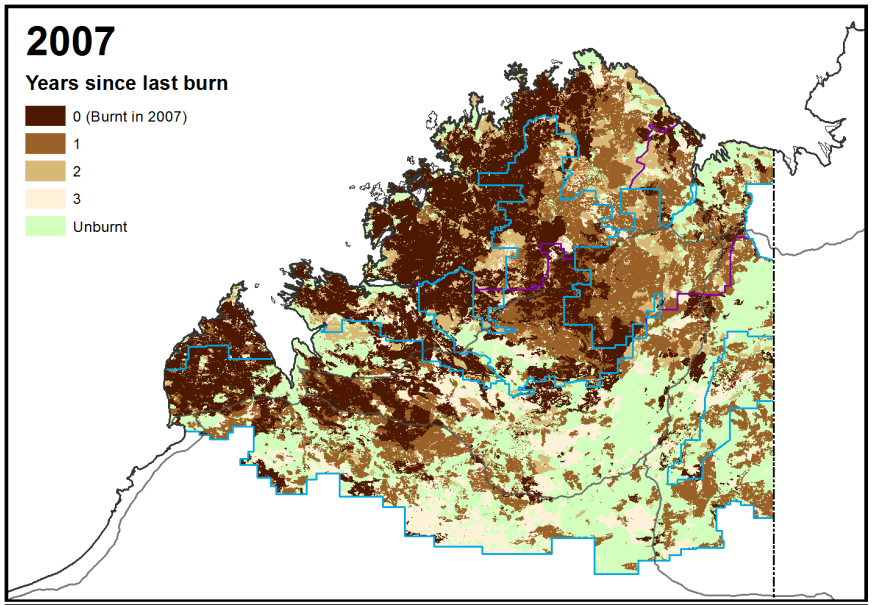


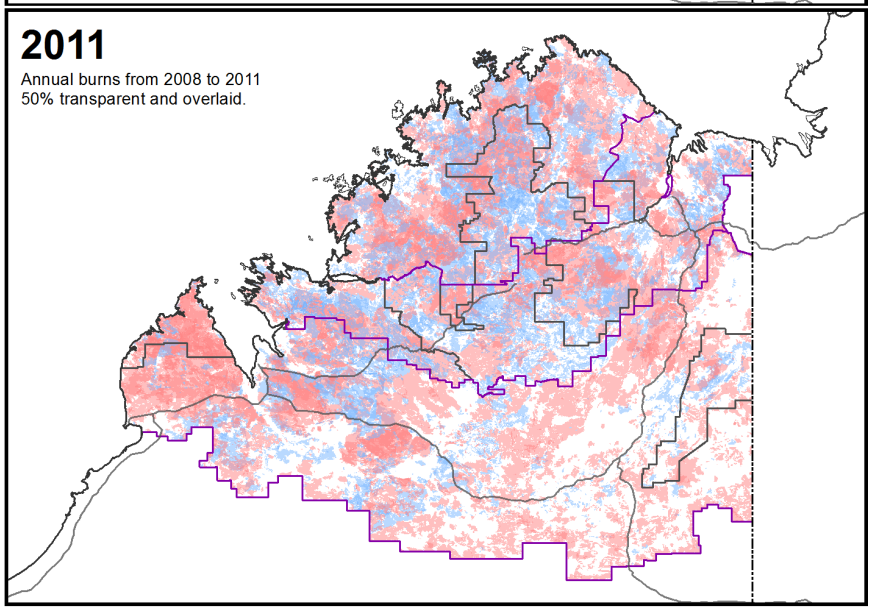
- Better management of fire has reduced the distances from burnt vegetation to unburnt vegetation – making unburnt vegetation more accessible to small mammals than before

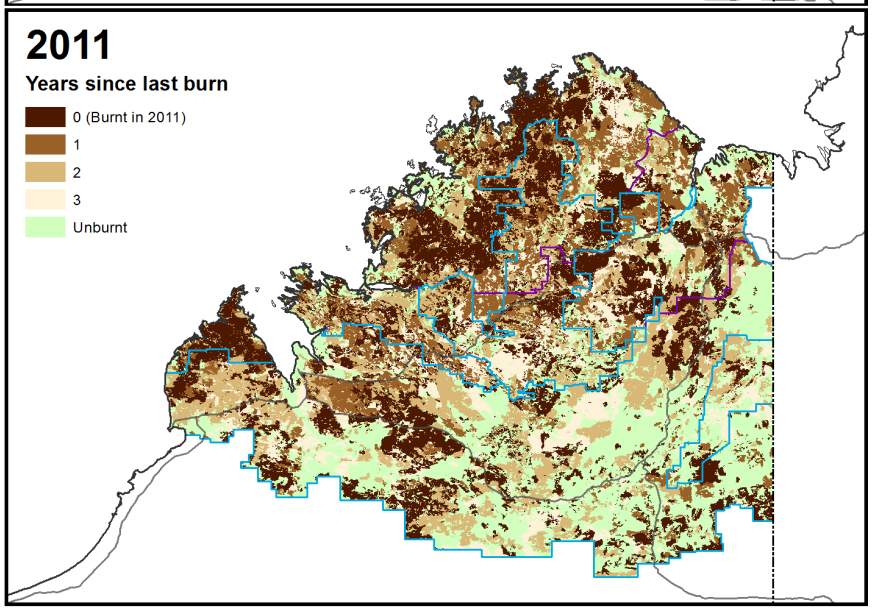
- On average:
  1. The mean distance to vegetation > 3 years of age has decreased by more than half
  2. The maximum distance to vegetation > 3 years of age has decreased by a third

Are we making a difference?









Annual Burns
Early
Late
Rainfall Zones
Management Zones

Fire History

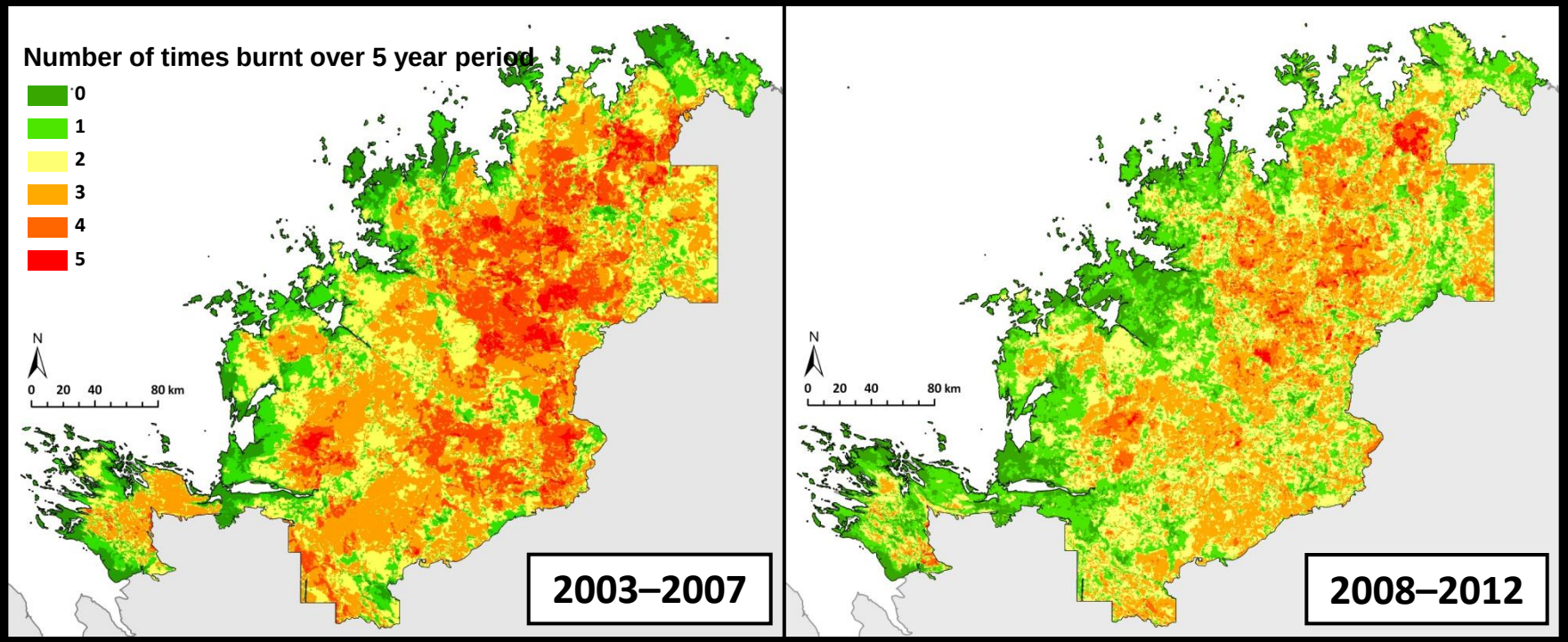
0 50 100 150 200
Kilometres

Rainfall Zones
Management Zones

Patch Age

0 50 100 150 200
Kilometres

Fire frequency



Putting all this together: What does all this tell us?

- Fires are much earlier – *better for animals and plants*
- Distances between burnt and unburnt country are getting smaller – *better for animals*
- Vegetation ages still the same
- Where country is patchy – lots of different ages of vegetation – there are lots of different animals. *Patchy fires = more animals*

Mammals are abundant (unlike places in the NT, e.g. Kakadu, Arnhem Land)

Source: Fitzsimmons et al. 2010

CSIRO PUBLISHING

Wildlife Research, 2010, 37, 116–126 www.publish.csiro.au/journals/wr

Monitoring indicates rapid and severe decline of native small mammals in Kakadu National Park, northern Australia

J. C. Z. Woinarski[A,B,E], M. Armstrong[A], K. Brennan[A], A. Fisher[A], A. D. Griffiths[A], B. Hill[A], D. J. Milne[A], C. Palmer[A], S. Ward[A], M. Watson[A,C], S. Winderlich[D] and S. Young[A]

Biological Conservation 157 (2013) 78–92

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Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

ELSEVIER

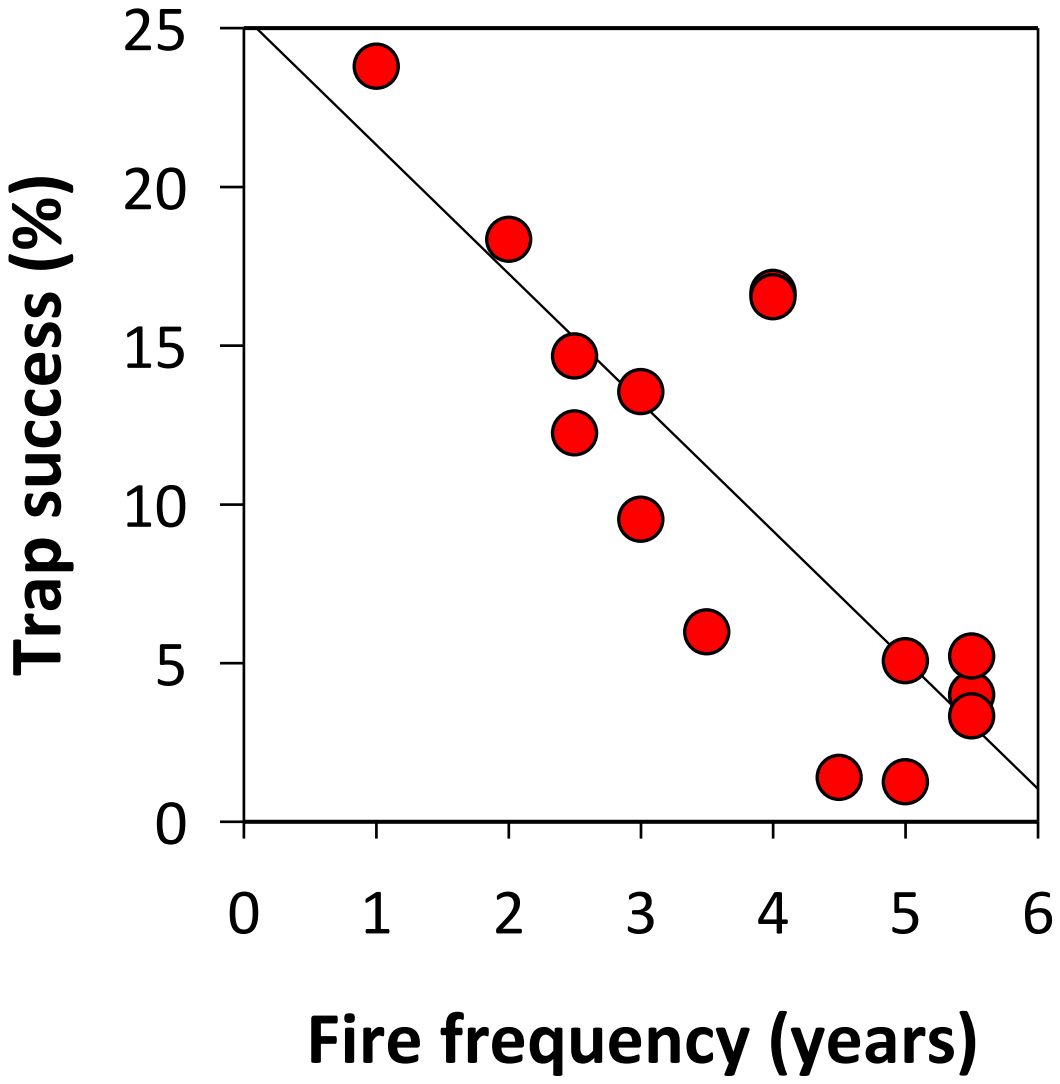
Evaluating the status of species using Indigenous knowledge: Novel evidence for major native mammal declines in northern Australia

M.R. Ziembicki[a,b,*], J.C.Z. Woinarski[a,c,1], B. Mackey[b,2]

Fire, mammals and adaptive management

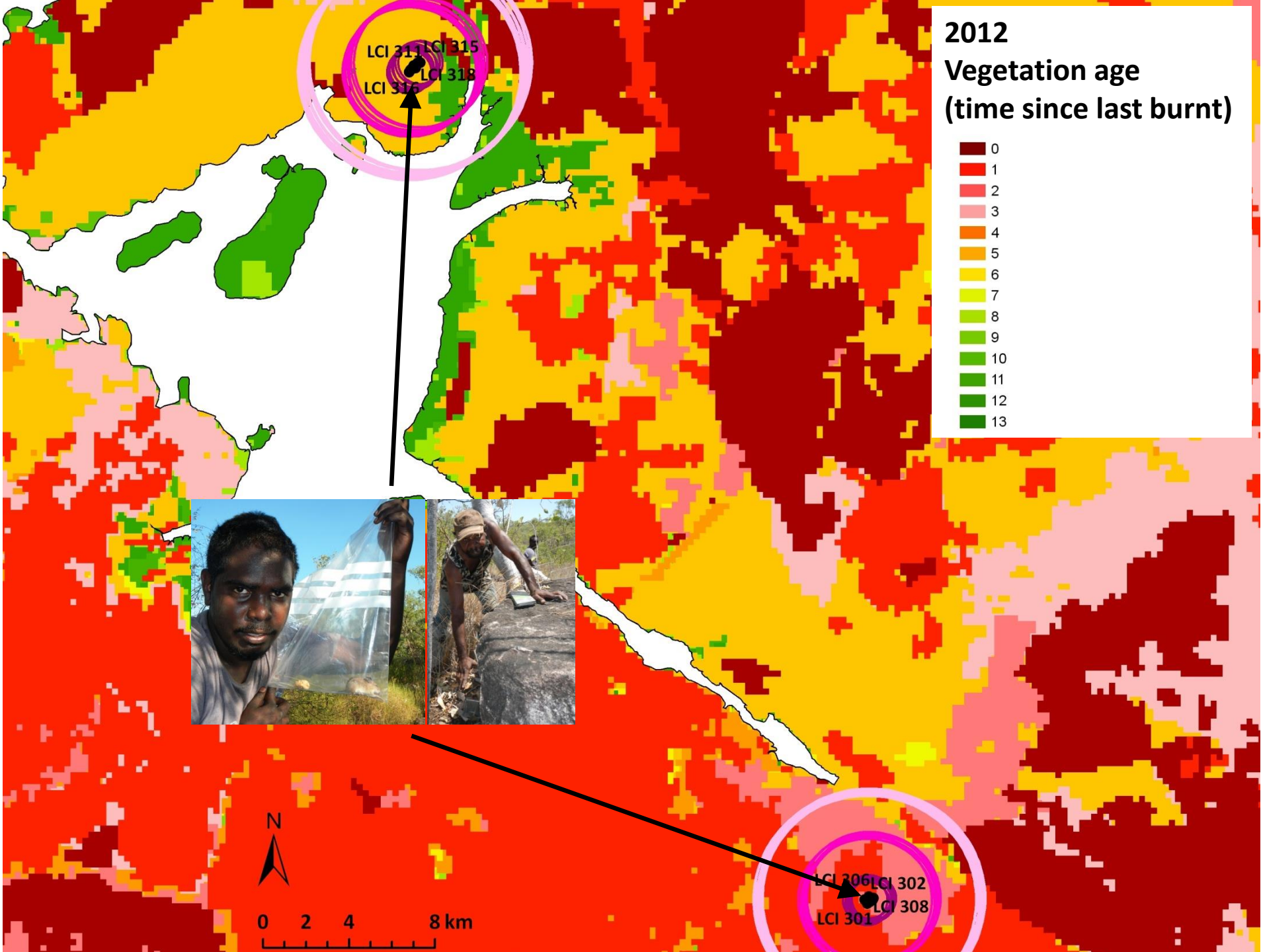
Ian Radford

Small–medium sized mammals and fire frequency (2004–2012)

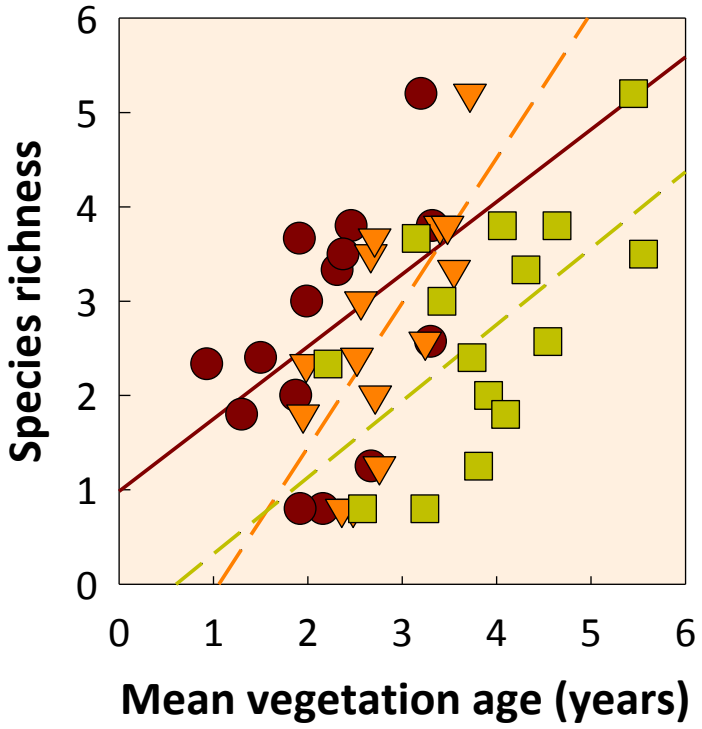


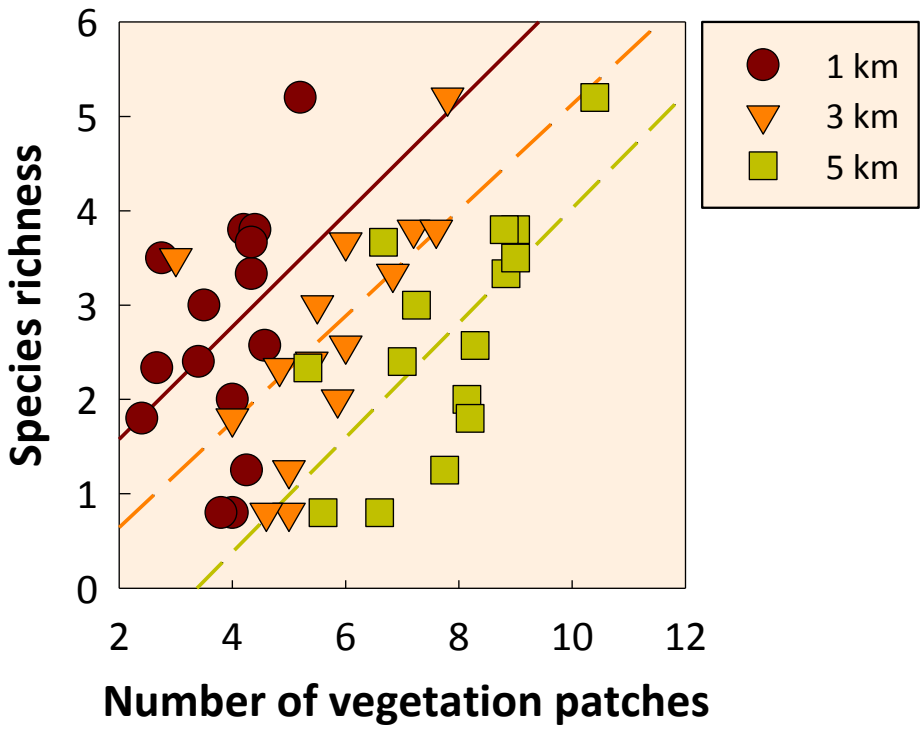
$R^2 = 0.675$; $F_{1, 13} = 26.972$; $P < 0.001$

Data pooled by geographic cluster


2012
Vegetation age
(time since last burnt)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
LCI 311
LCI 315
LCI 318
LCI 316
LCI 306
LCI 302
LCI 308
LCI 301
N
0 2 4 8 km

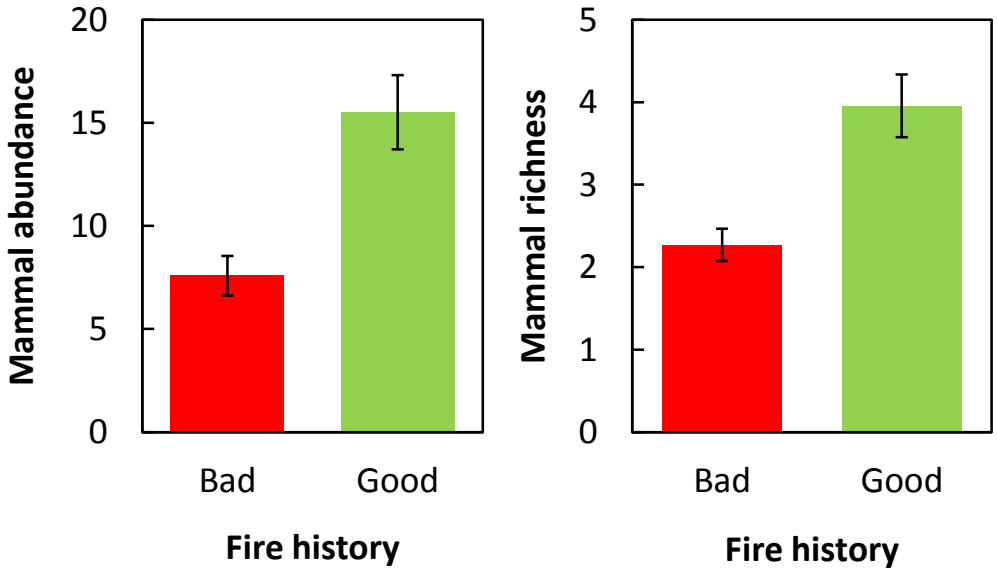
Mammals and vegetation age and patchiness





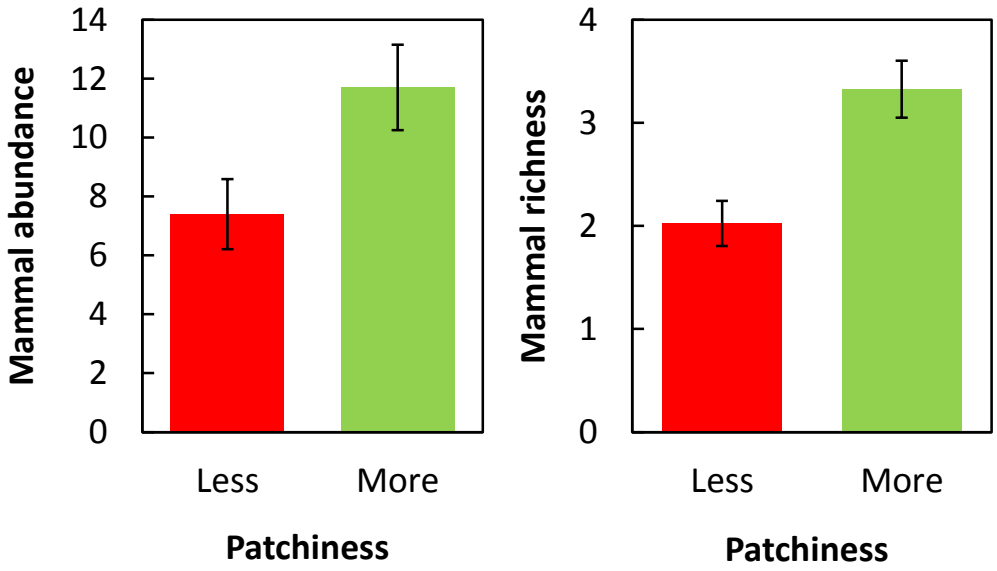
Increasing vegetation age and patchiness are good predictors of species richness

Mammals and fire frequency



Mammals do not like frequent fire

Mammals and patchy fires



Mammals like patchy landscapes

Increasing trend

Brush-Tailed Rabbit-Rat

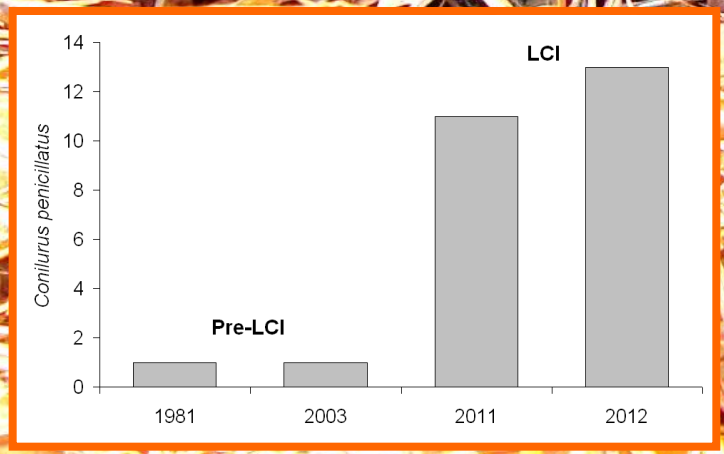
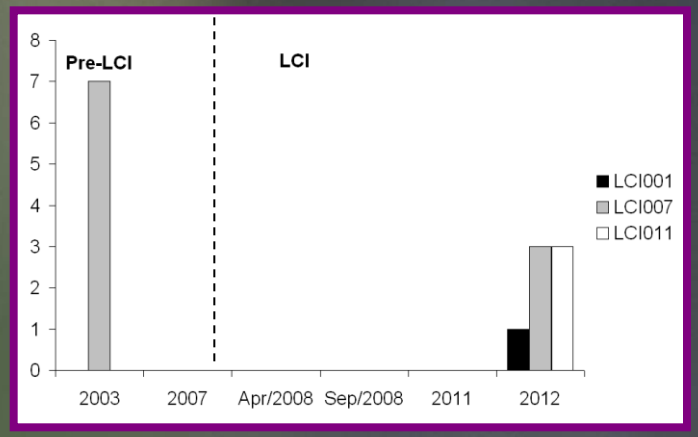


Photo by Pauline Meyer

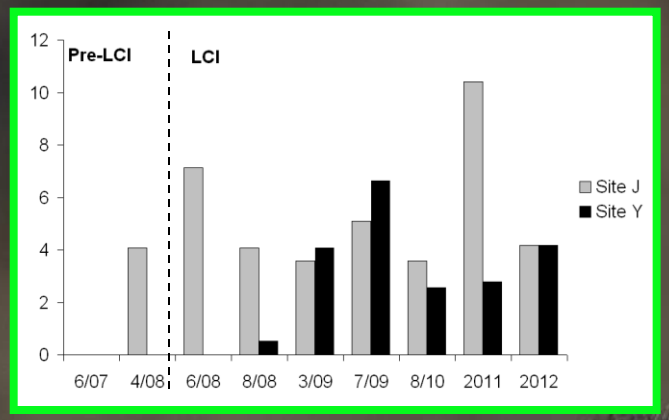
Increasing distribution



Golden-Backed Tree-Rat

Photo by David Bettini

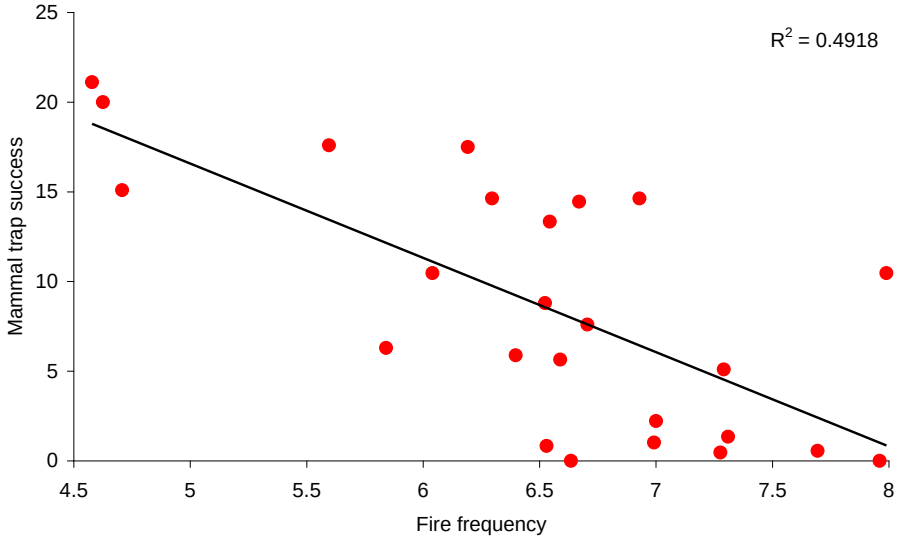
Increasing trend in some LCI areas

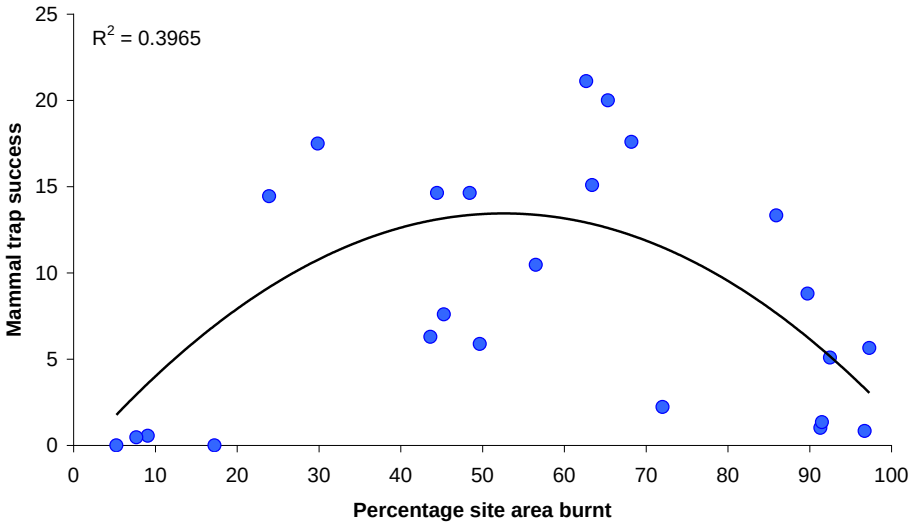


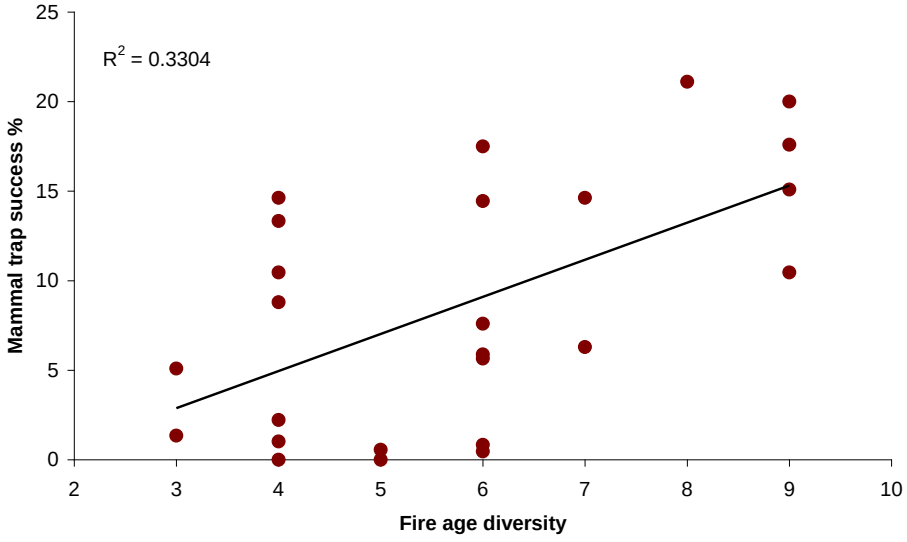
Northern Quoll

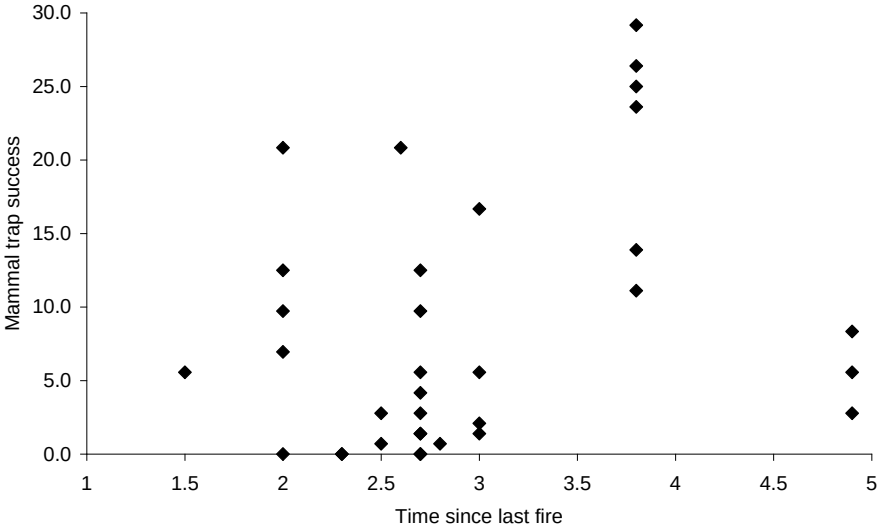
Photo by David Bettini

3 km radius


R2 = 0.4918
Mammal trap success
Fire frequency
25
20
15
10
5
0
4.5
5
5.5
6
6.5
7
7.5
8


R2 = 0.3965
Mammal trap success
Percentage site area burnt
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100


R2 = 0.3304
Mammal trap success %
Fire age diversity
25
20
15
10
5
0
2
3
4
5
6
7
8
9
10


Mammal trap success
Time since last fire
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1
1.5
2
2.5
3
3.5
4
4.5
5

Different animals and plants have different needs:

- Finches and tree rats need tree hollows for nesting
- Bandicoots need hollow logs and lots of cover on the ground
- Purple crowned fairy wrens need lots of places to hide in and nest along rivers
- Cypress pine and spinifex need lots of time to produce fruits and seed
- Finches need spinifex seeds at certain times of the year
- Many small animals can not move over large distances

What does this mean for managing fire:

- Keep fires small and cool
- Don’t burn the same place every year
- Keep fires patchy

Summary

- Robust scientific data is now supporting patch mosaics.
- Evidence that mammals are still in abundance.
- Animals are now being found in areas that haven’t previously been recorded or returning to areas of previous extent.