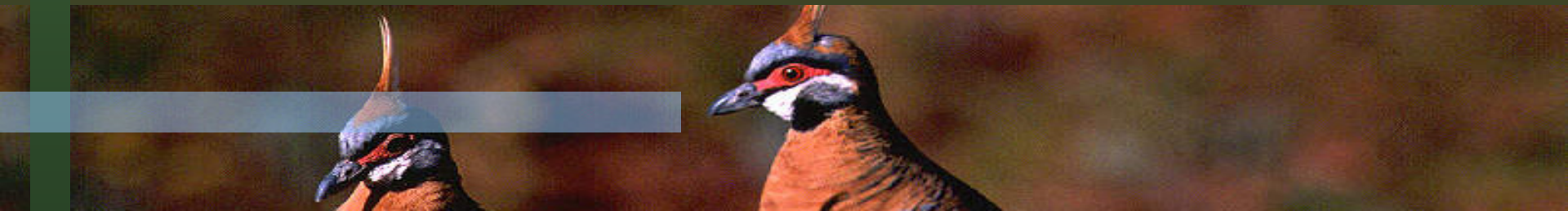
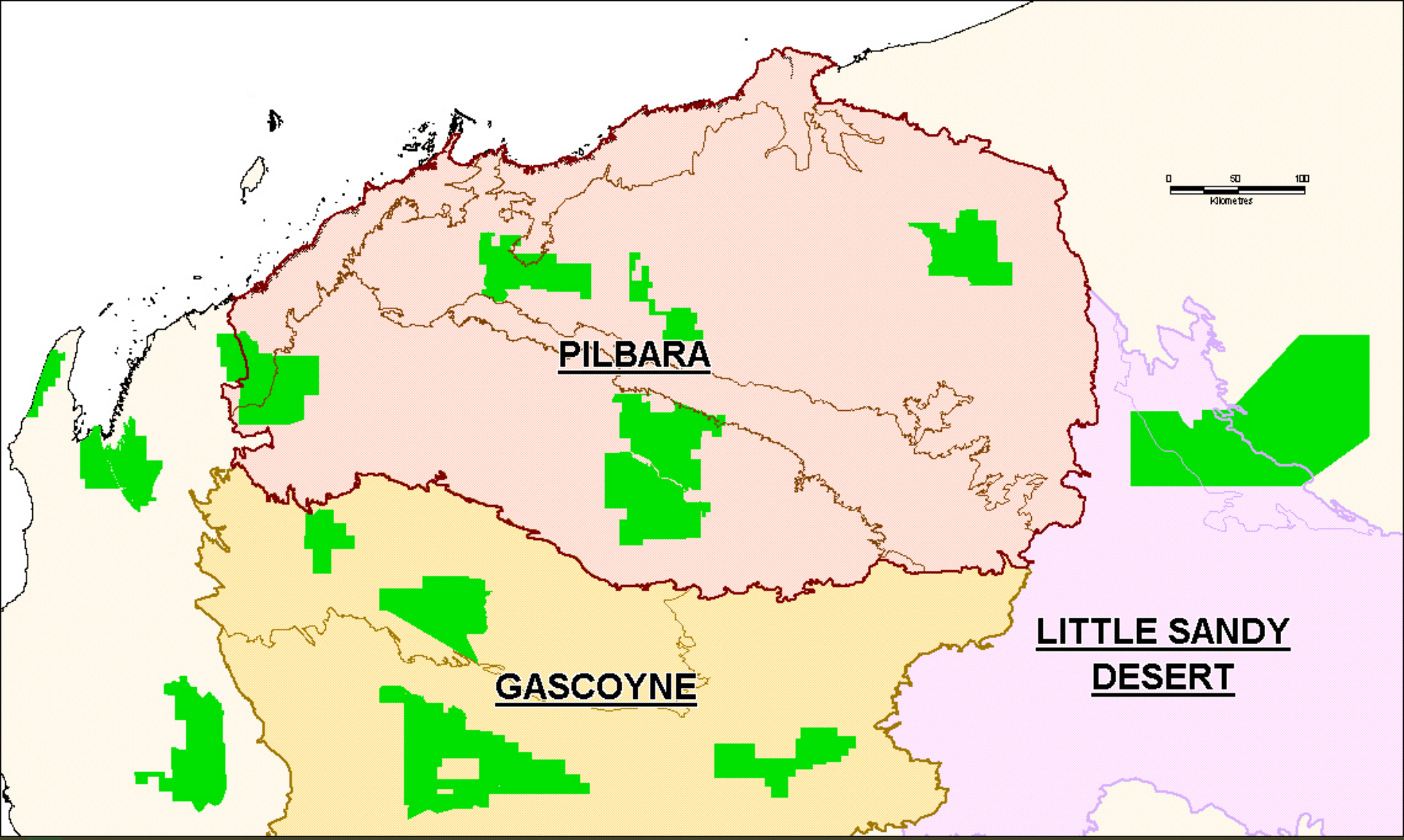
FIRE MANAGEMENT of SPINIFEX GRASSLAND

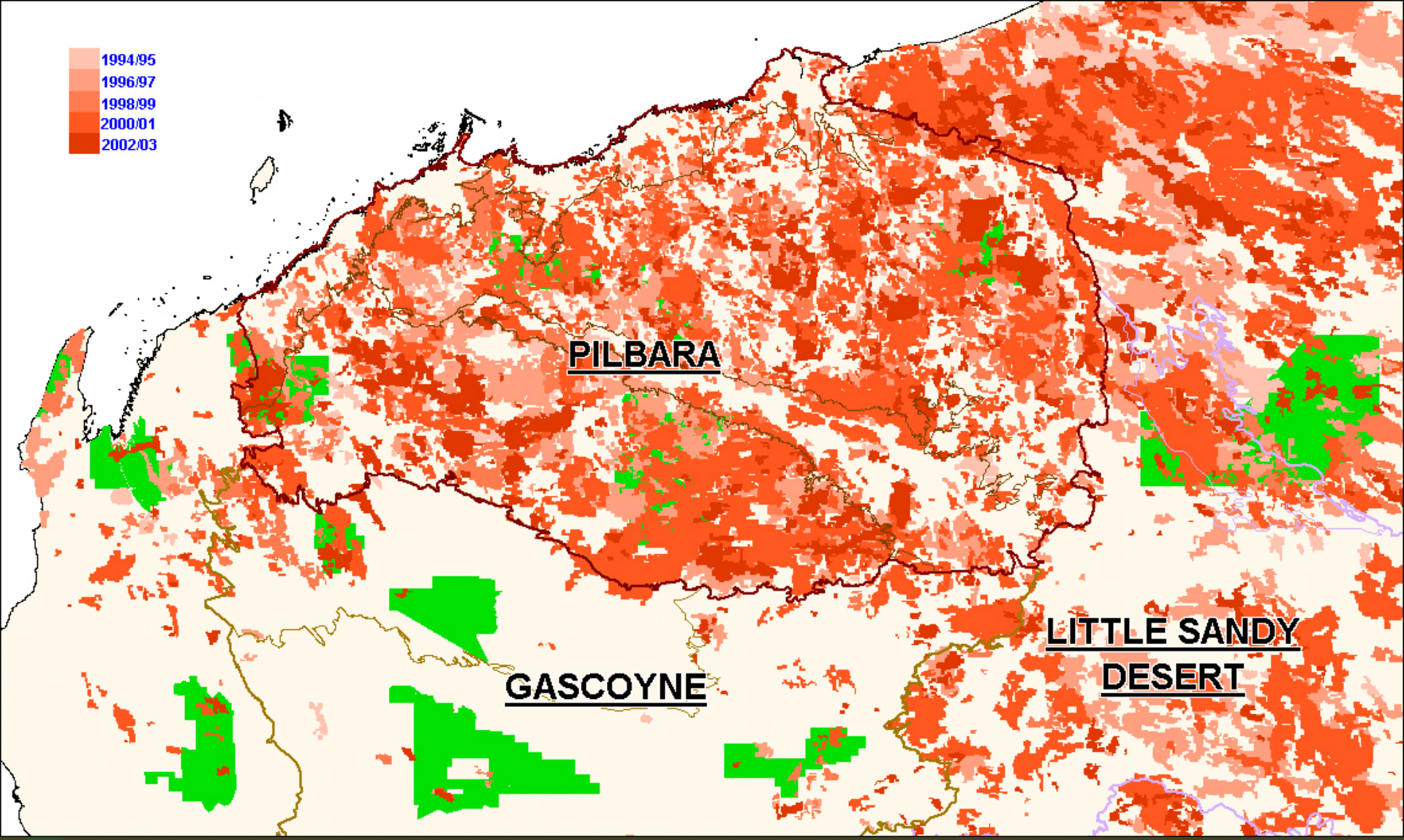
PILBARA RESEARCH PERSPECTIVES

STEPHEN VAN LEEUWEN & TONY START





IBRA Regional & sub-regional boundaries in NW Western Australia



Pilbara fire scars detected by NOAA imagery between 1994 - 2003

Research Synopsis

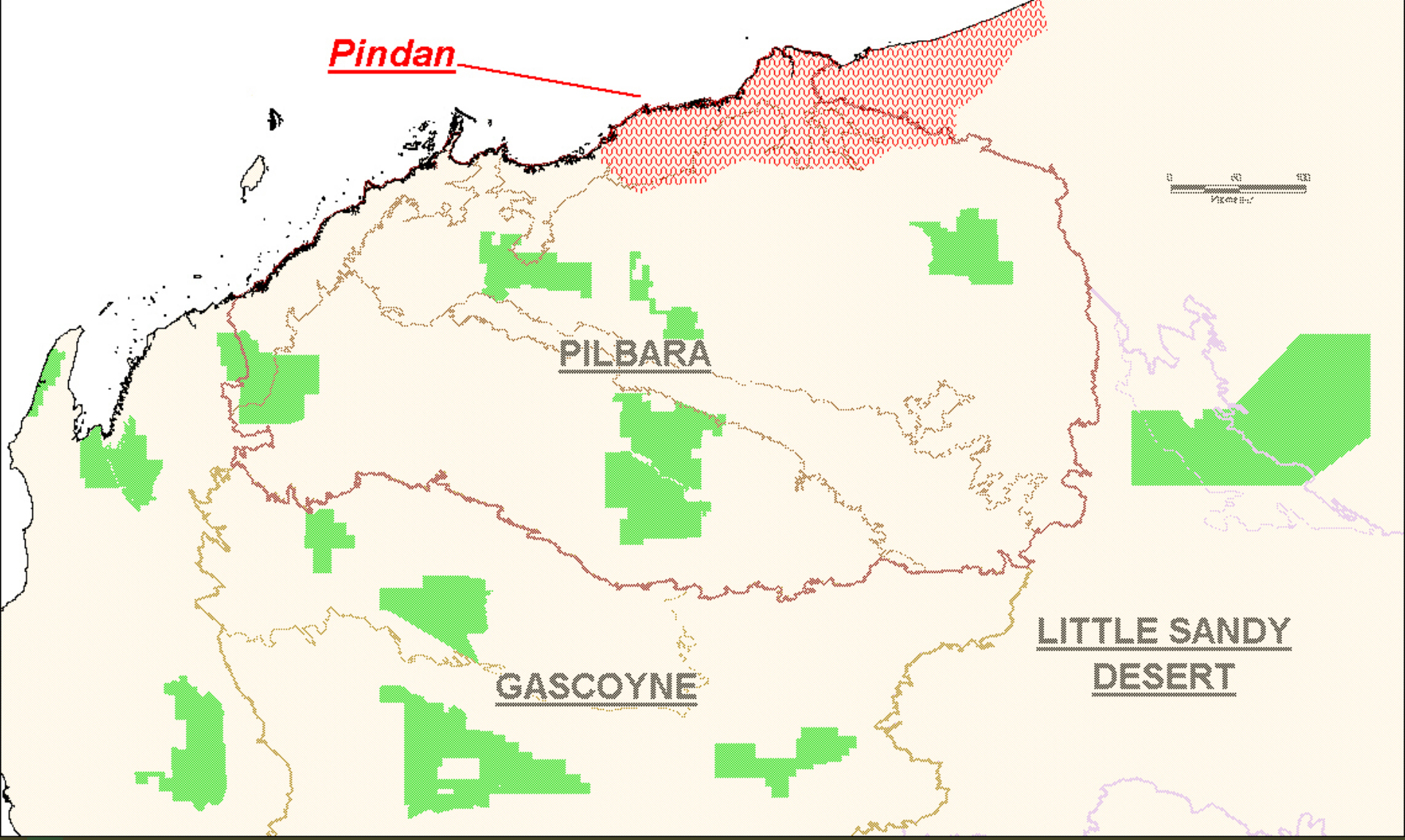
Pindan

Spinifex Hardplain

***Acacia* Woodland**

Mulga with Spinifex

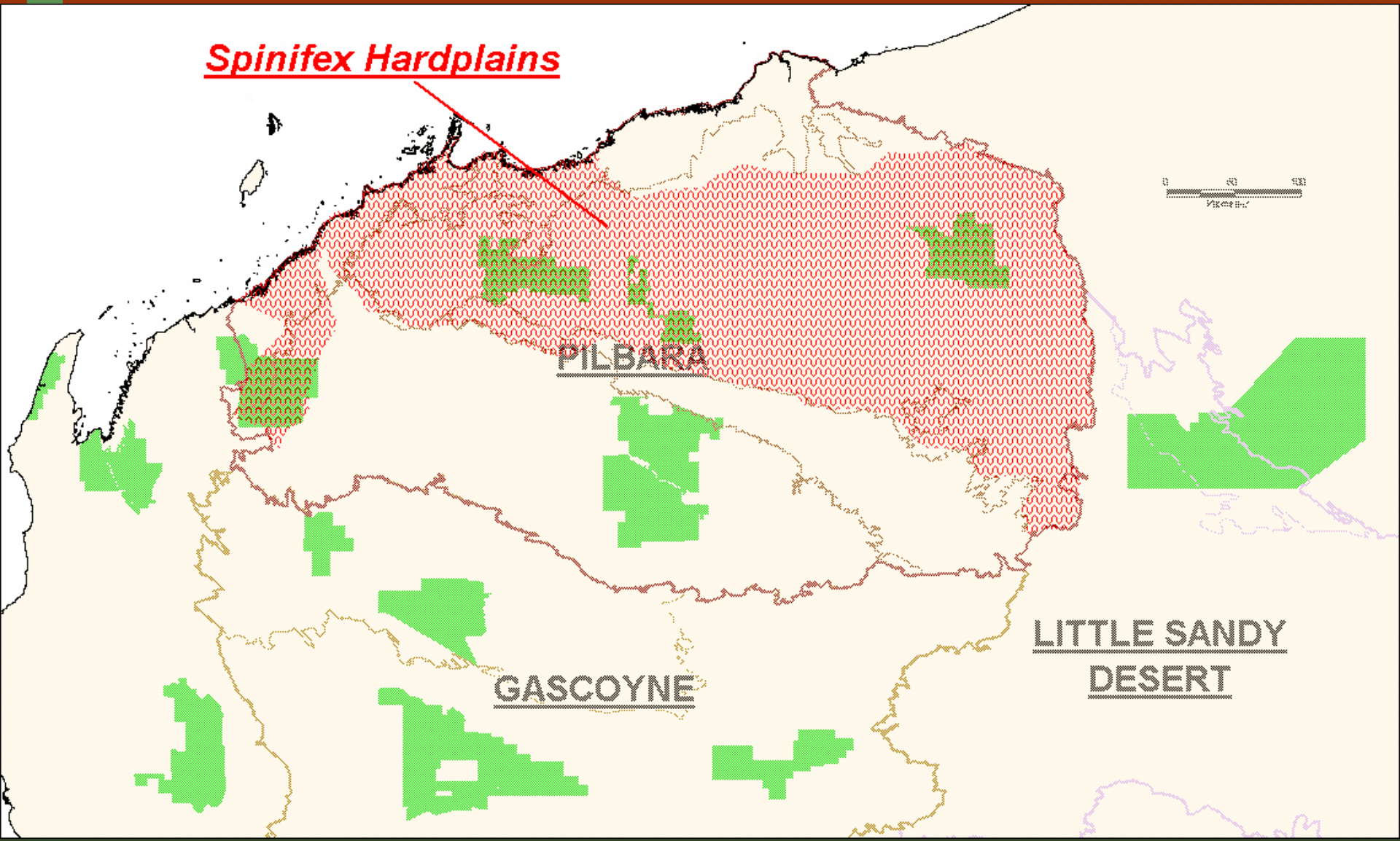
Spinifex Sandplain


Pindan
PILBARA
GASCOYNE
LITTLE SANDY
DESERT

PINDAN

- Wattles over hummock/tussock grasses.
- Frequently burnt - pastoral.
- Heavily grazed - cattle.
- Biodiversity poorly known.
- Regenerates quickly.
- Appears resilient.

- Research & management directions via Kimberley's or Tropical Savanna CRC.


Spinifex Hardplains
PILBARA
GASCOYNE
LITTLE SANDY DESERT

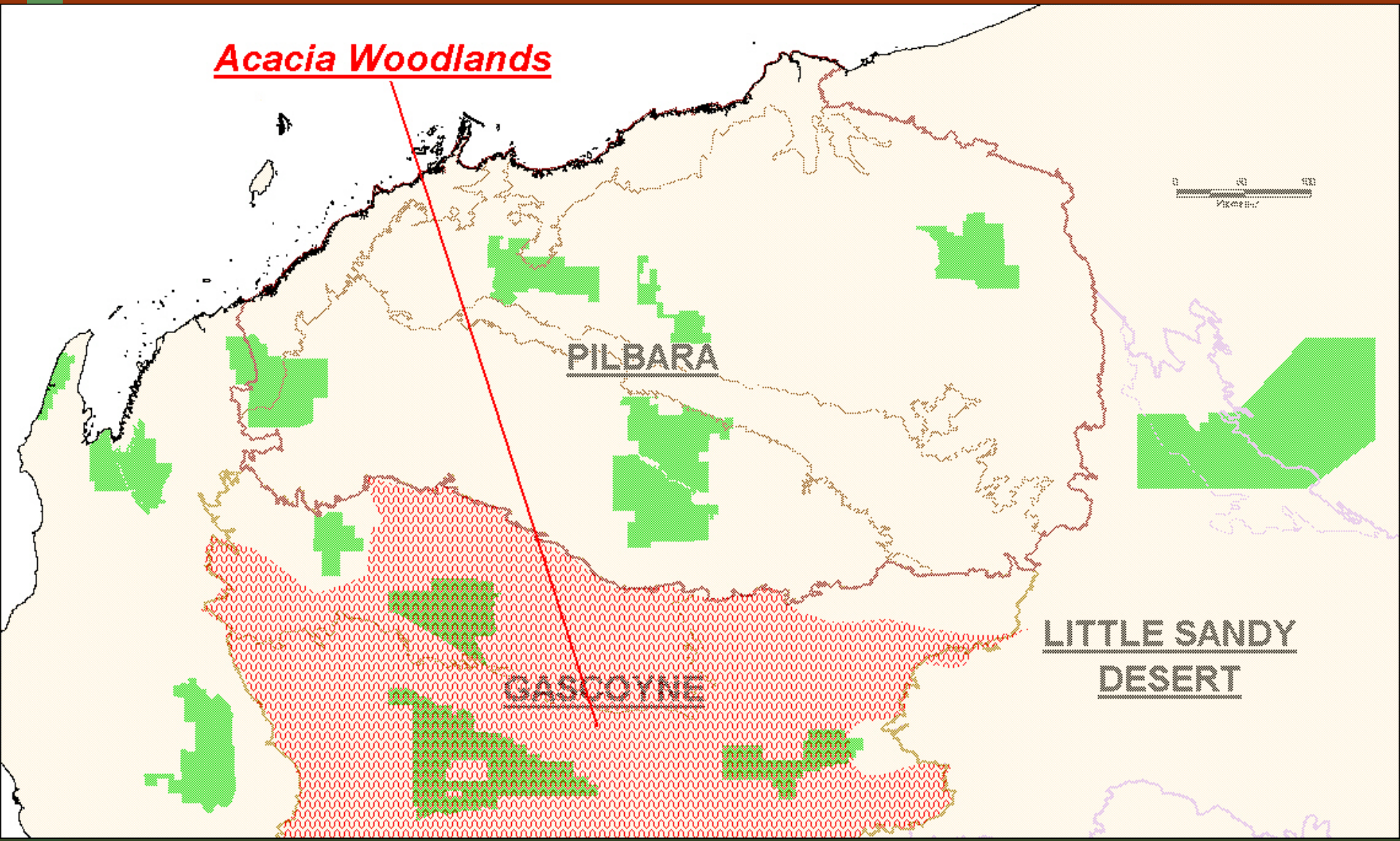
SPINIFEX HARDPLAIN

- Spinifex with emergent wattles.
- Frequently burnt.
- Local heavy grazing.
- Biodiversity poorly known.
- Highly resilient.
- Perpetual juvenile state.
- Refugial habitats common.

- Some research into fire effects on spinifex and pastoral production.

SPINIFEX HARDPLAIN

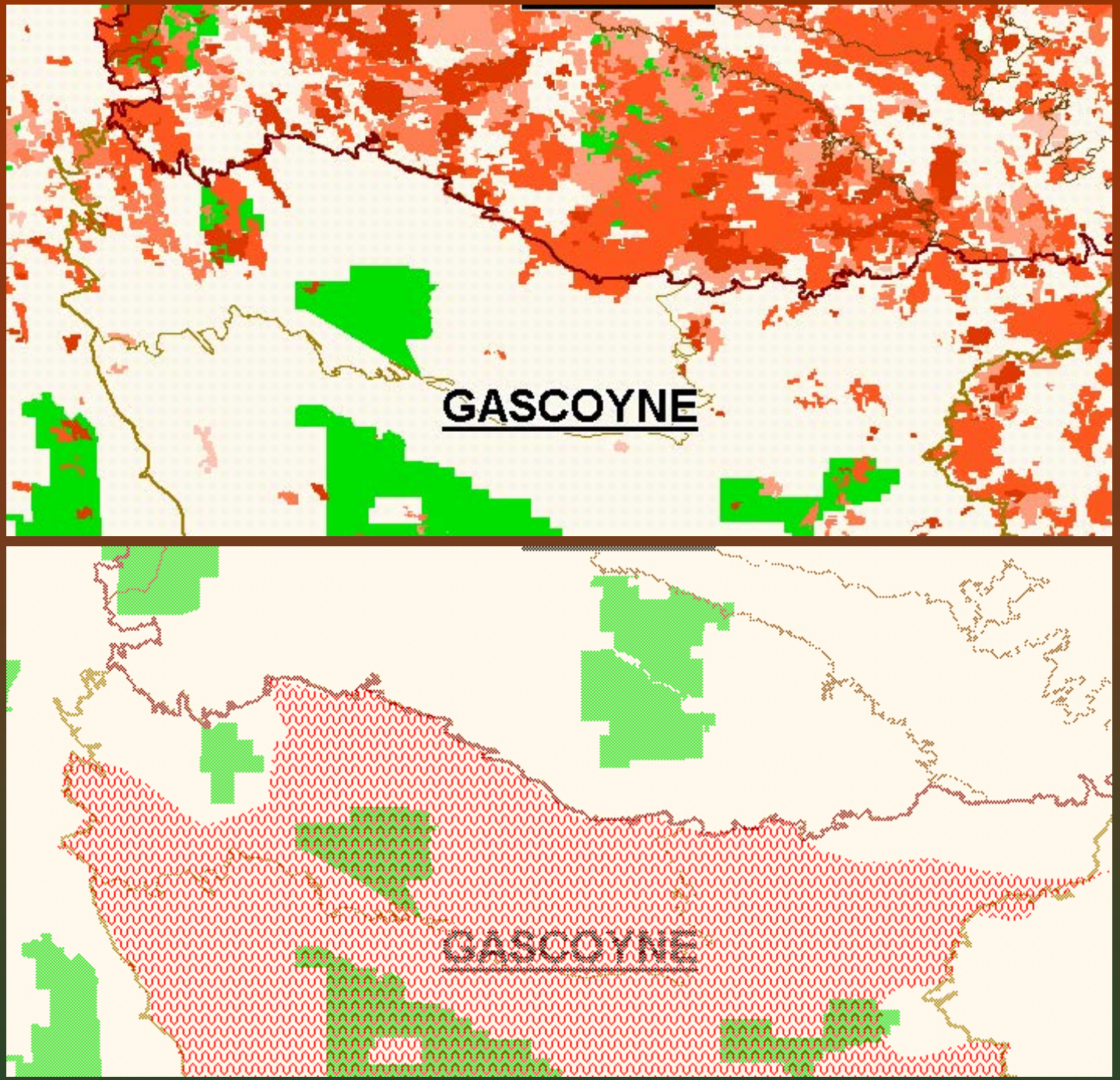
REFUGIA

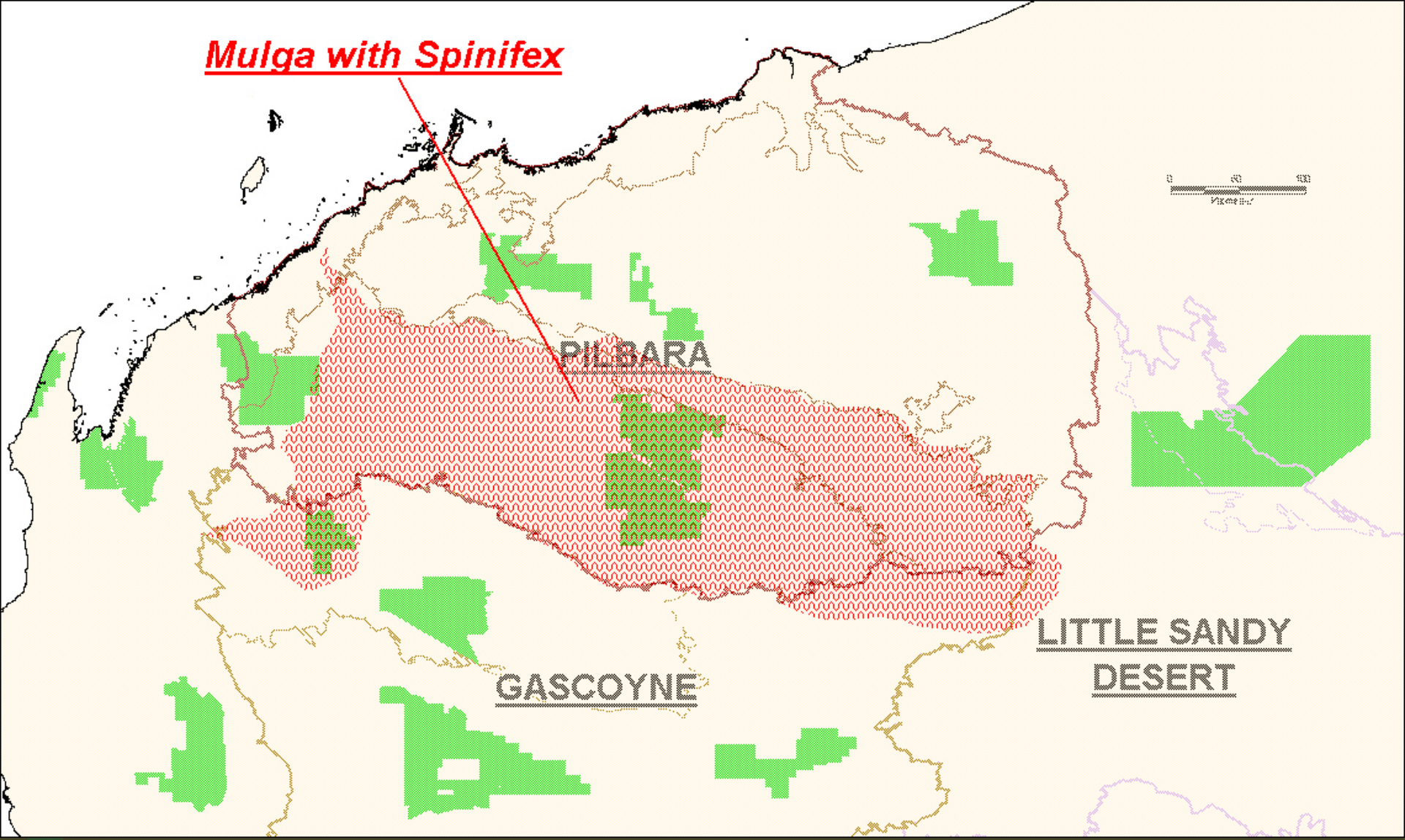

Acacia Woodlands
PILBARA
GASCOYNE
LITTLE SANDY
DESERT

Acacia Woodlands

- Woodlands (mulga) with shrub understorey.
- No groundcover - fuel layer.
- Infrequently burnt.
- Biodiversity poorly known.
- Susceptible to grazing impacts.
- Fire intolerant, very slow to regenerate.

- Pastoral impacts main threatening process.


GASCOYNE
GASCOYNE


Mulga with Spinifex
PILBARA
GASCOYNE
LITTLE SANDY
DESERT

Mulga with Spinifex

- Phytogeographic-bioclimatic transition zone.
- Woodlands/shrublands (mulga) with grassy understorey.
- Paradoxically fire intolerant over/with fire prone species.
- Sharp ecotones.
- Refugial habitats.
- Historically infrequently burnt.
- Biodiversity known, poorly appreciated & threatened.
- Susceptible to pastoral impacts.

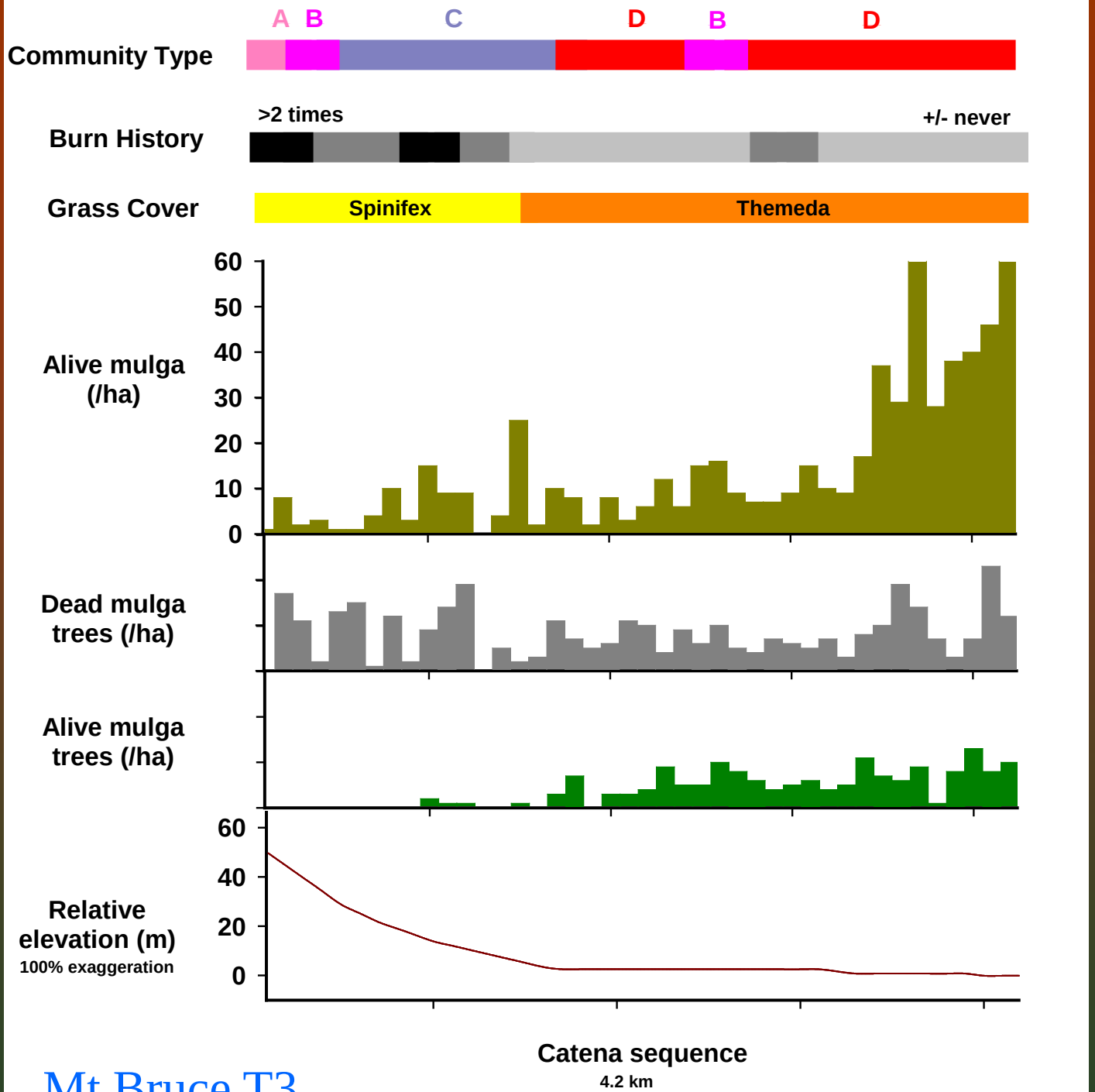
- **Key Research Outcomes** (CALM & MRC)
  - **Mulga woodlands have significant biodiversity not represented in spinifex grasslands.**
  - **Frequent fires impinge on woodlands & biodiversity.**
  - **Most vulnerable woodlands are on gentle slopes with a spinifex understorey or juxtapositioned against spinifex.**
  - **Current fire regimes impinge on biodiversity and CAR of conservation estate (>50% of mulga woodland apron around Mt Bruce now *Acacia* shrubland).**

WOODLAND → SHRUBLAND → GRASSLAND

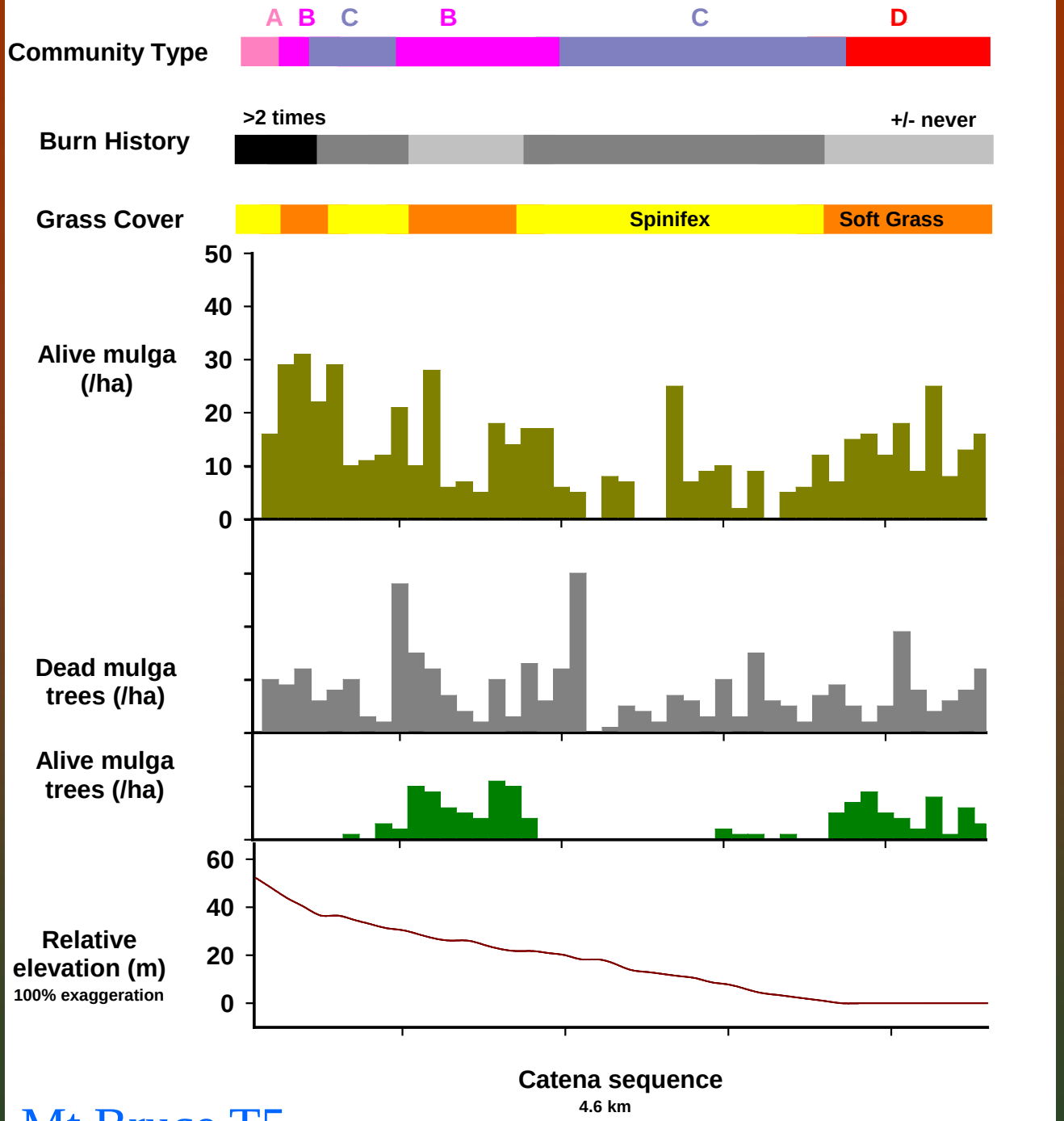
SPECIES RICH → SPECIES POOR

LOW FREQUENCY → HIGH FREQUENCY

VULNERABLE → RESILIENT


A B C D B D
Community Type
>2 times
+/- never
Burn History
Grass Cover
Spinifex
Themeda
Alive mulga (/ha)
60
50
40
30
20
10
0
Dead mulga trees (/ha)
Alive mulga trees (/ha)
Relative elevation (m)
100% exaggeration
60
40
20
0
Catena sequence
4.2 km

Mt Bruce T3


A B C B C D
Community Type
>2 times
+/- never
Burn History
Grass Cover
Spinifex
Soft Grass
50
40
30
20
10
0
Alive mulga (/ha)
Dead mulga trees (/ha)
Alive mulga trees (/ha)
60
40
20
0
Relative elevation (m)
100% exaggeration
Catena sequence
4.6 km

Mt Bruce T5

Mean numbers of mulga plants per life form categorised for woodland type and fire history

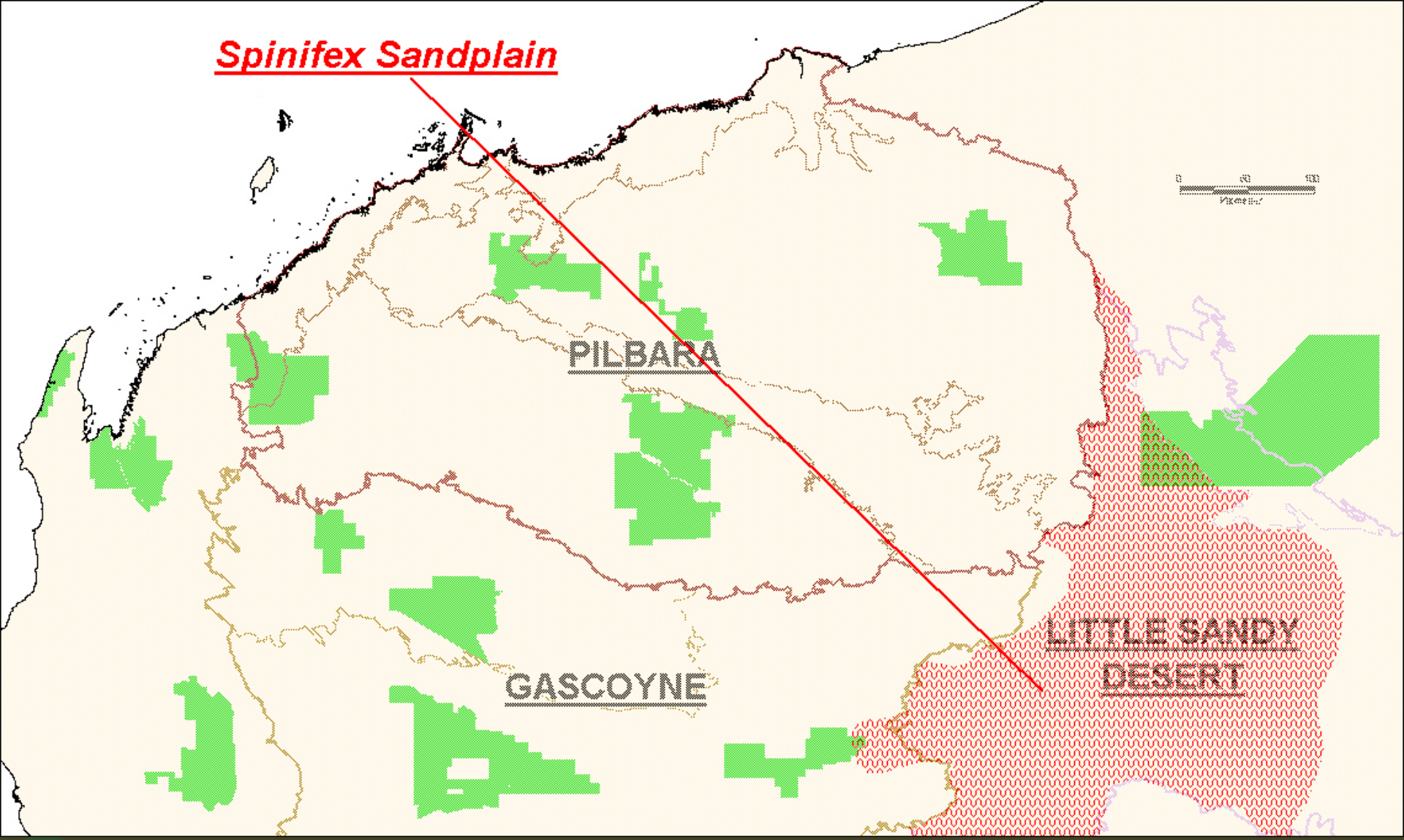
Community	Total	Trees	Regeneration
A	7.3 [a]	2.2 [a]	1.5 [a]
B	20.8 [b]	9.1 [b]	8.5 [b]
C	11.0 [a]	2.4 [a]	7.1 [b]
D	20.9 [b]	7.2 [b]	13.1 [b]

Burnt	15.7 [a]	2.5 [a]	11.1 [a]
Unburnt	15.1 [a]	8.5 [b]	4.1 [b]

Mean number of perennial plants for mulga woodland types and fire histories

Community	No. of species	Mean (± SD)	Range
A	125	17.3 ± 5.7 [a]	5 - 35
B	121	18.2 ± 5.7 [a]	7 - 37
C	115	14.1 ± 5.4 [b]	4 - 37
D	61	9.7 ± 2.5 [c]	3 - 18

Burnt	136	13.4 ± 5.2 [b]	5 - 37
Unburnt	122	16.5 ± 6.6 [a]	3 - 33


Spinifex Sandplain
PILBARA
GASCOYNE
LITTLE SANDY DESERT

SPINIFEX SANDPLAIN

- **Phytogeographic-bioclimatic transition zone.**
- **Spinifex grasslands with wattles & subshrubs – mulga islands.**
- **Fire sensitive taxa/communities in refugial habitats.**
- **Sharp ecotones.**
- **Mostly fire resilient.**
- **Biodiversity known, poorly appreciated & threatened.**
- **Feral animals & fire conspiring deleteriously on iconic taxa.**

Critical Gaps

- Vegetation map - fuel loads/density.
- Fire behaviour models for rocky undulating terrain with heterogeneous species assemblages & community cover.
- Species vital statistics & response to fire/disturbance.
- Community distributions & their resilience to fire.
- Security & CAR of fire refugia as biodiversity repositories.
- Interaction between threatening processes, in particular fire-ferals-weeds.