

FIRE AND FOREST FLORA

An overview

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Plant distribution and species assemblages depend on:

- ▶ Climate
- ▶ Landform & Soils
- ▶ Fire

Fire directly effects plant growth, survival and reproduction.

- ▶ kills and regenerates
- ▶ consumes live and dead vegetation
- ▶ changes soil moisture, nutrients & light
- ▶ stimulates reproduction
- ▶ prepares a seed bed and environment for initial growth
- ▶ many plants depend on fire
- ▶ many structures/habitats are fire dependent
- ▶ plants/habitats can be diminished by fire or lack of fire

Effects of fire will depend on the fire regime,
or the cumulative effects of:

- ▶ fire frequency
- ▶ season of occurrence
- ▶ intensity

Observed effects depend on when the observations
are made with respect to the fire regime

Traits/responses for persisting in a fire-prone environment

Post-fire Regeneration Strategies - jarrah forests

- Ephemerals 5-10%
- Obligate seeders
 - Seed stored on plant 5-10%
 - Seed stored in soil 20-25%
 - No seed on site ?
- Resprouters
 - Fleshy below ground 25-30%
 - Lignotuber/rootstock 25-30%
 - Epicormic buds 3-5%
 - Apical buds 3-5%

Resprouters vs Seeders

Vegetation /Location	Ratio Resprouters : Seeders	Authority
Two People's Bay NR	92 : 8	Hopkins
Blackwood Plateau Jarrah	71 : 29	Burrows
Kwongan	73 : 27	Van der Moezel
Unicup Plain Jarrah	74 : 26	Burrows
Kwongan	66 : 34	Bell
Ravensthorpe Range	58 : 42	Bennett
Fitzgerald River NP	49 : 51	Hamell
Karri-Solai forest	43 : 57	Burrows
Dryandra Forest	63 : 37	Burrows
Stirling Range	33 : 67	McCaw

Post-fire Flowering Response

- ▶ Fire-stimulated flowering is common
- ▶ Juvenile period is important for setting minimum fire intervals
- ▶ Plants with long juvenile periods are either fire sensitive or fire resilient
- ▶ FIREBASE : vegetation fire response database

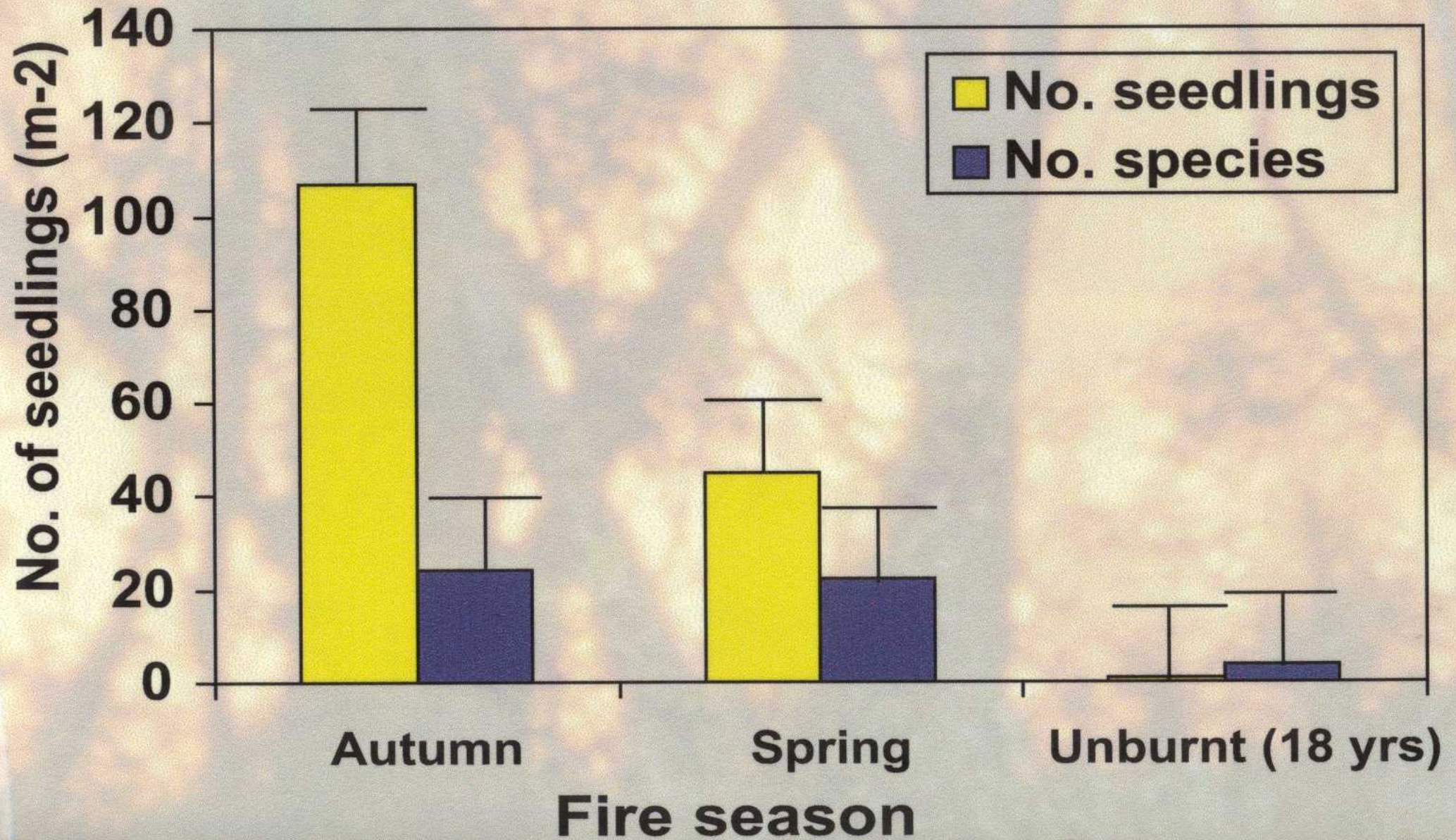
Time to first flowering after fire

- ▶ Jarrah upland, high rainfall (>900 mm) 3 yrs
- ▶ Jarrah upland, low rainfall (750 mm) 4 yrs
- ▶ Jarrah valley floor, riparian 6 yrs
- ▶ Wandoo forest upland 5 yrs
- ▶ Karri/tingle midslope/upland 3 yrs
- ▶ Karri /tingle riparian 6 yrs

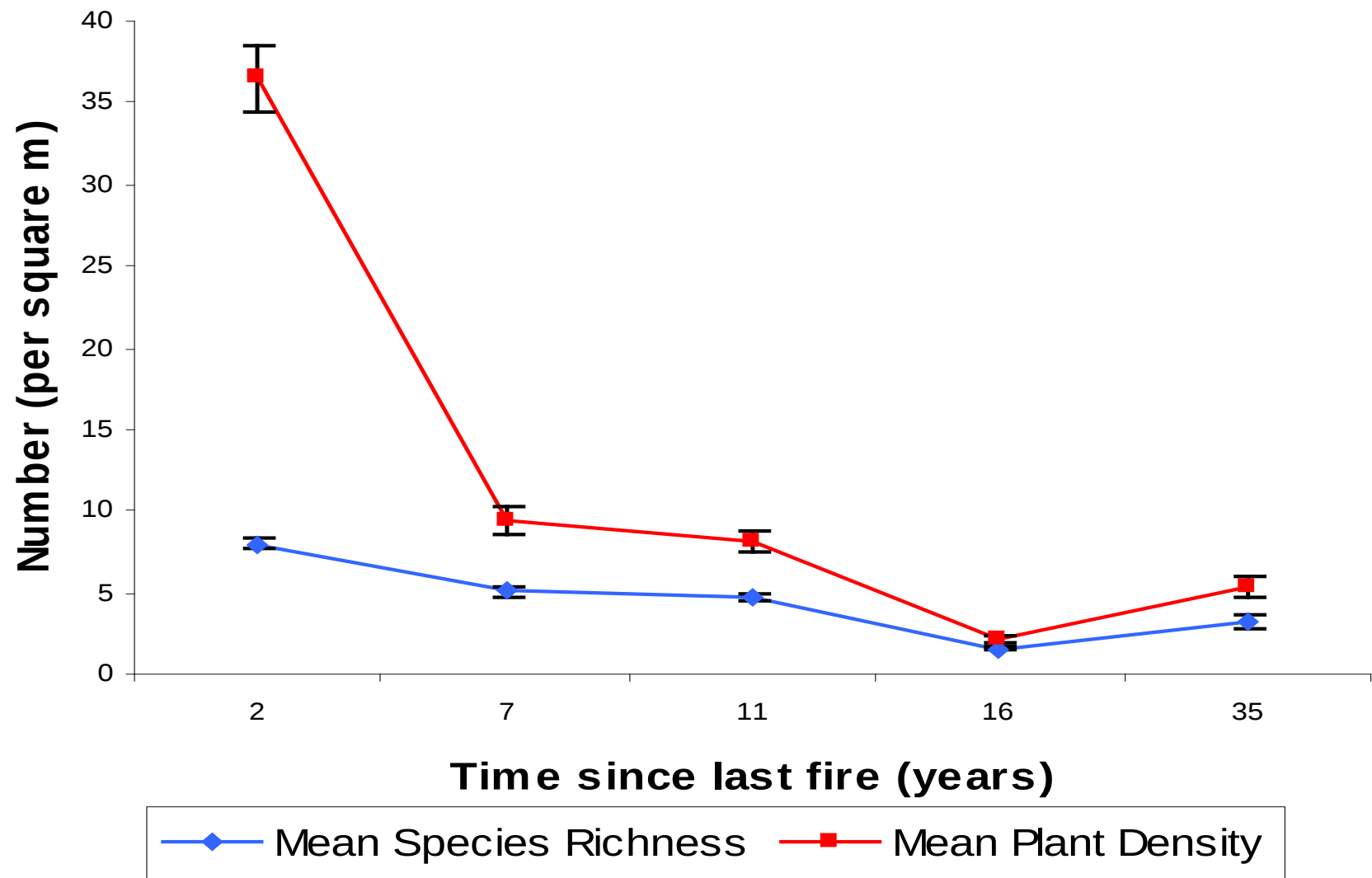
Examples of fire sensitive species with relatively long juvenile periods:

Agonis juniperina, *Acacia pentadenia*,
Lambertia rariflora, *Hakea oleifolia*, *H.*
lasianthoides, *Melaleuca viminea*. *M. ringens*,
Banksia seminuda, *B. verticilata*, *Dryandra*
sessilis

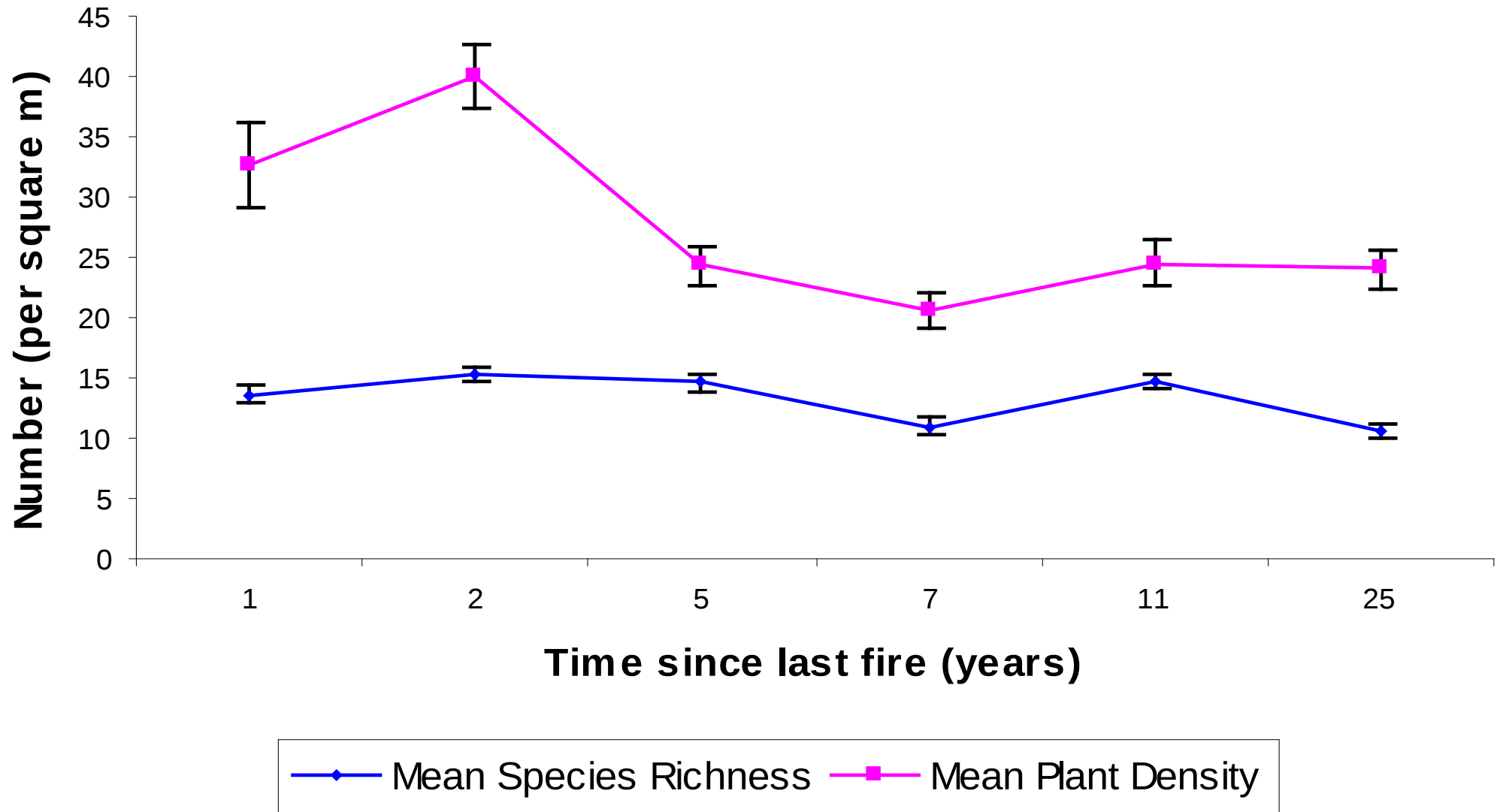
Density and diversity of seedlings one year after spring and Autumn fire



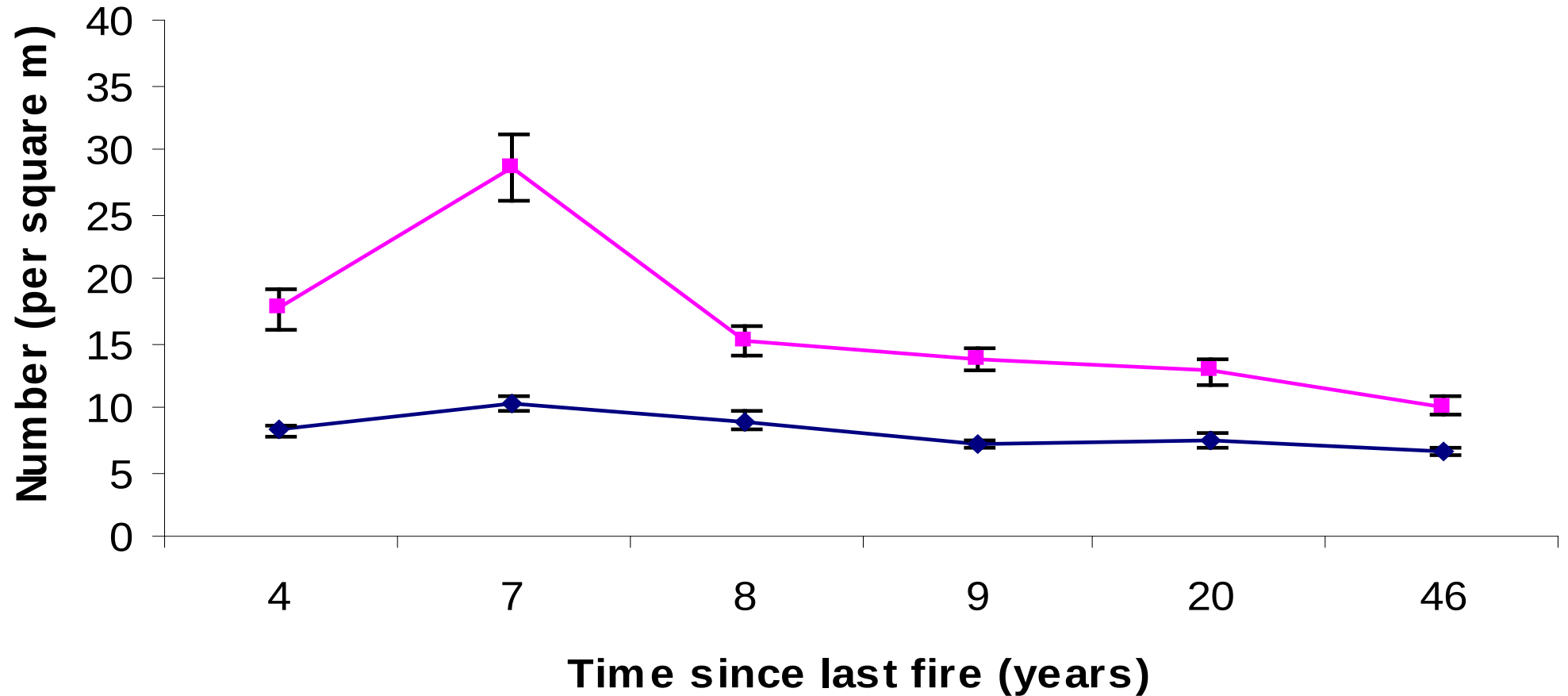
Fire Response - Karri Forest Strickland forest



Fire Response - Jarrah Forest McCorkill forest



Fire Response - Jarrah Forest (Yackelup forest)



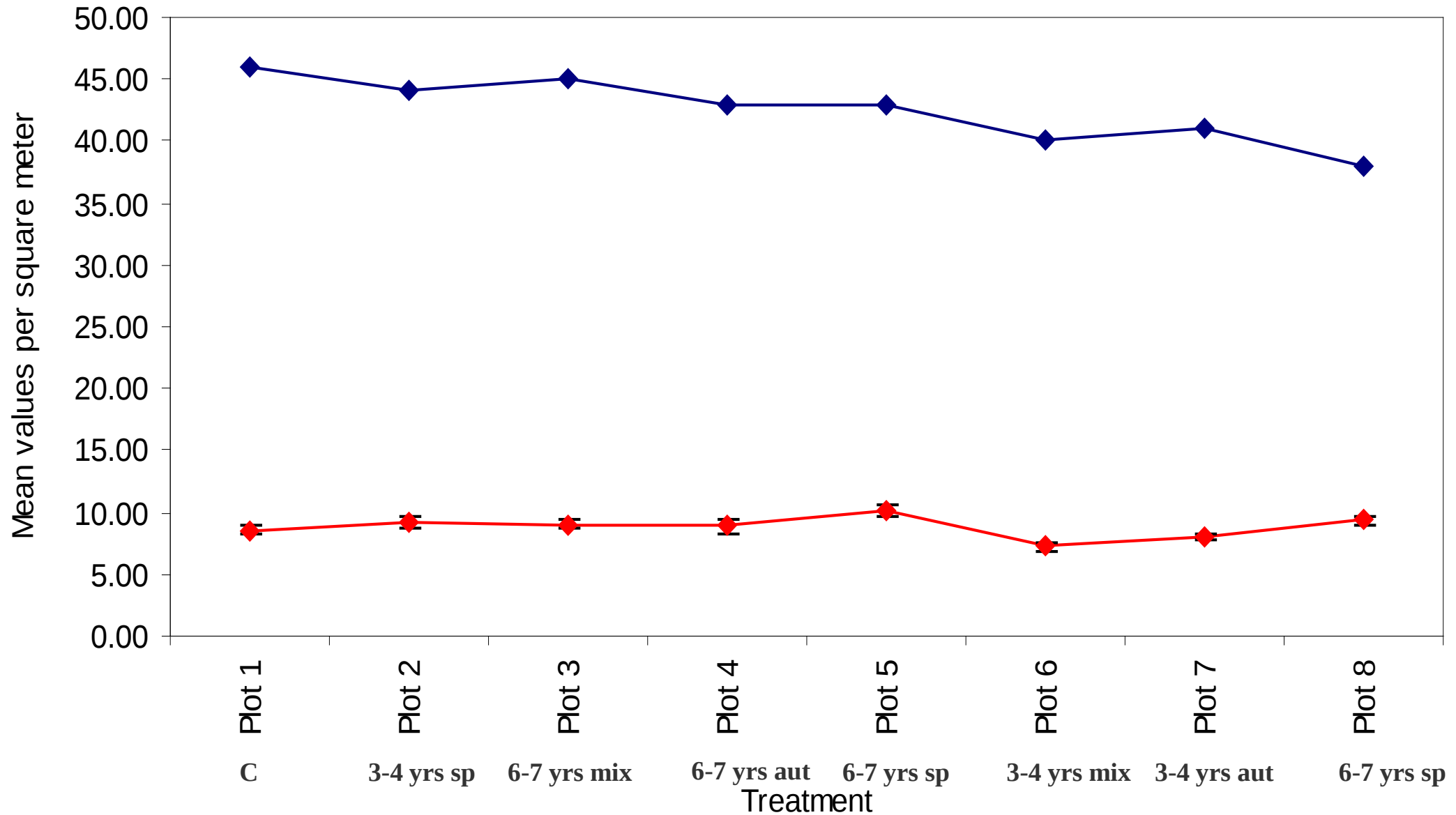
—◆— Mean Species Richness —■— Mean Plant Density

Boundary Rd Fire Ecology Monitoring Site
1970-2001

Plot1 (Control)	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
1951 1985 WF	1951 1970sp 1973sp 1977sp 1981sp 1985WF 1989sp 1994sp	1951 1971su 1978au 1985WF 1990au 1996sp	1951 1971su 1978au 1985WF 1990au 1996sp	1951 1977sp 1985WF	1951 1971su 1974su 1977sp 1982au	1951 1971su 1974au 1978au 1982au 1986au 1990au 1994au	1951 1970sp 1976sp 1982sp 1988sp 1994sp

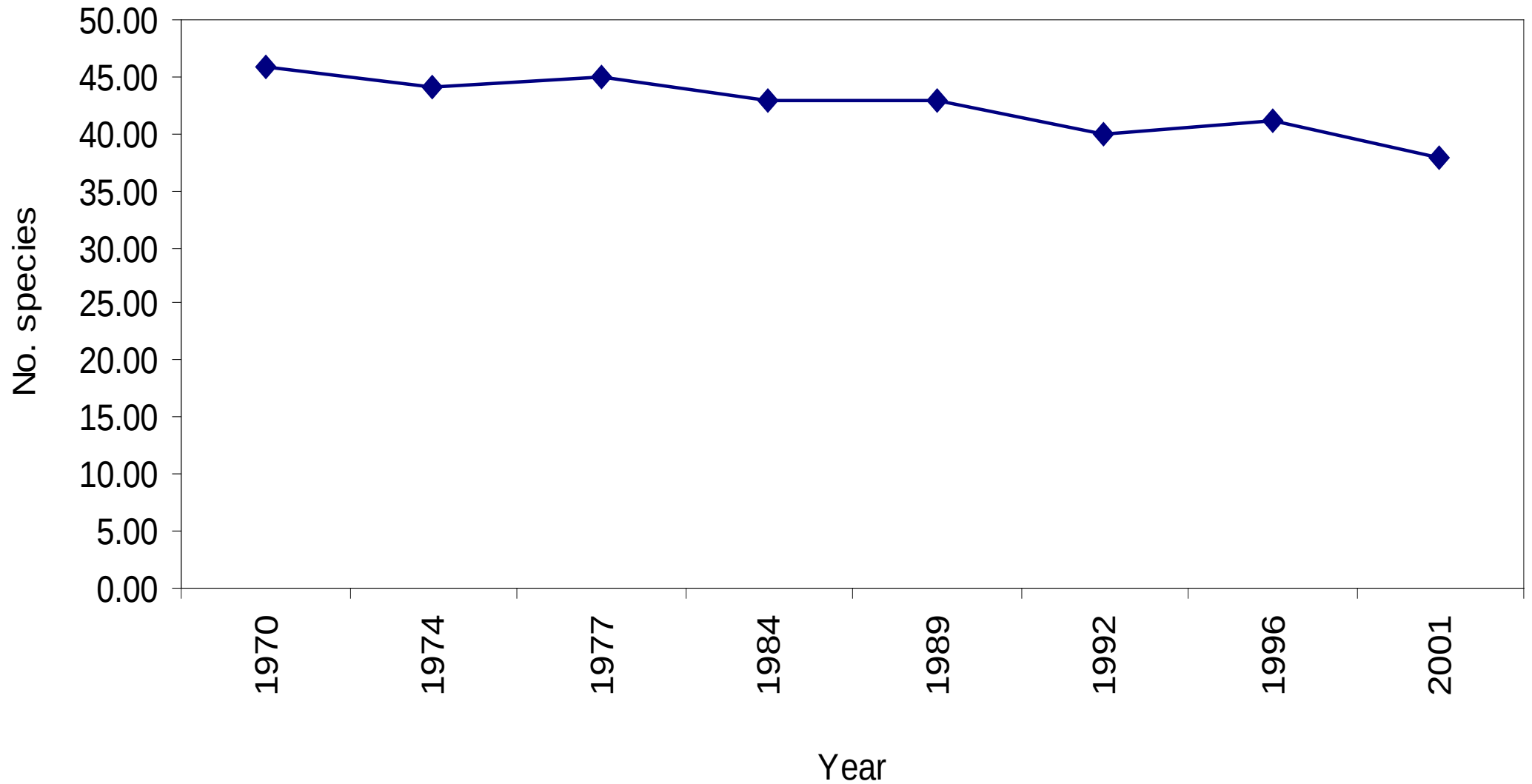
Boundary Road Fire Monitoring Site

- no of species
- no of plant

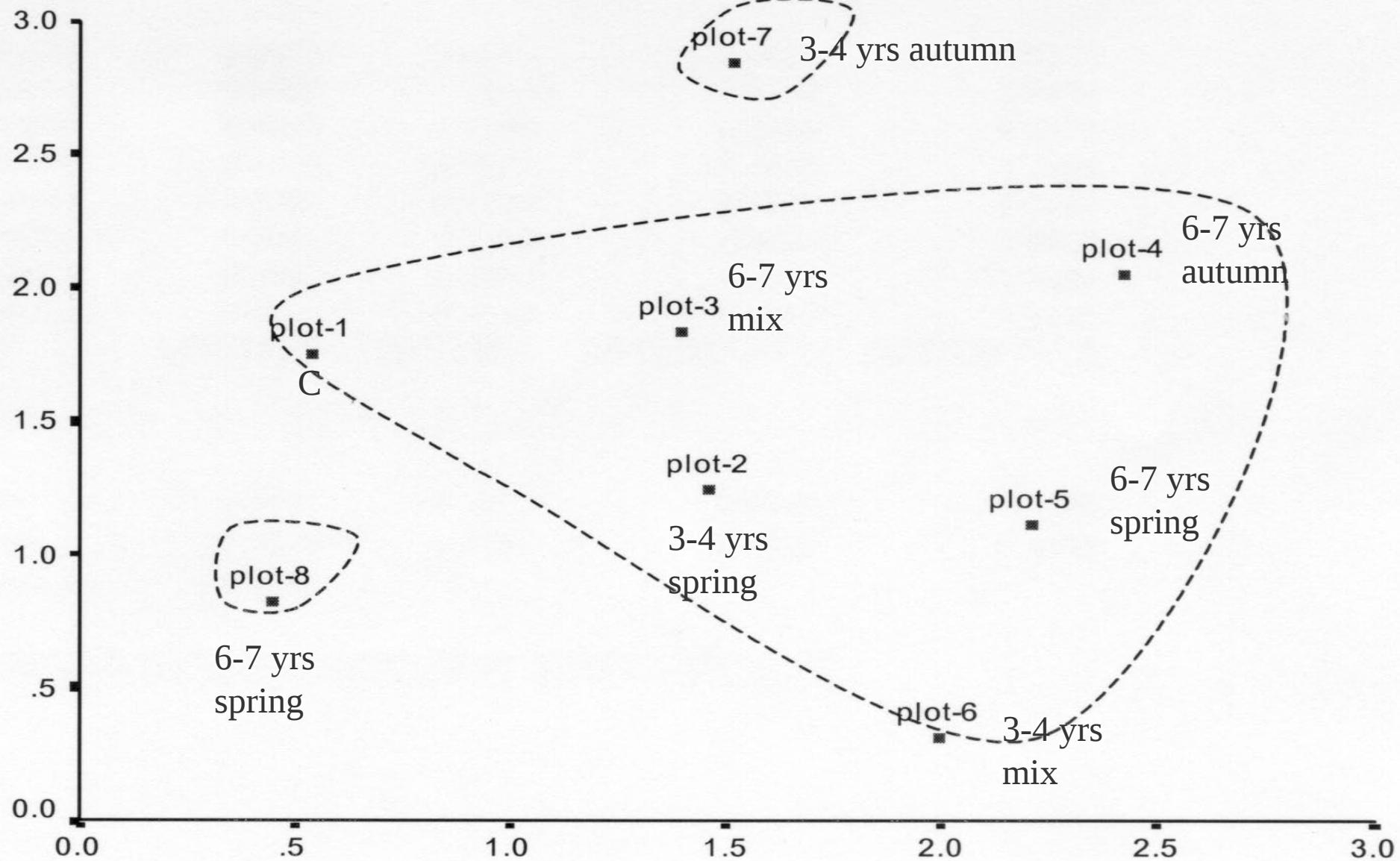


Boundary Road

3-4 yrs autumn



Species Composition for Boundary Road Survey





Conclusions

- ▶ Fire survival traits (resprouters, seeders)
- ▶ Reproductive traits cued to fire (seed release, flowering, seedbed)
- ▶ Seedling regeneration. promoted by fire
- ▶ Seedling regeneration & survival enhanced by summer/aut. fire
- ▶ Longest juvenile period 3-6 yrs sets minimum fire interval
- ▶ Granite rocks, riparian zones, valley floors, wetlands, swamps - prefer longer intervals between fire
- ▶ Fire sensitive & rare taxa in least fire prone habitats
- ▶ Species abundance & richness $> 3-5$ yrs after fire
- ▶ Sustained frequent (3-4 yrs) fires may reduce richness?