# After the fire

## Managing weeds in post-fire recovery and restoration

Biodiversity and Conservation Science

BOTANIC GARDENS & PARKS AUTHORITY

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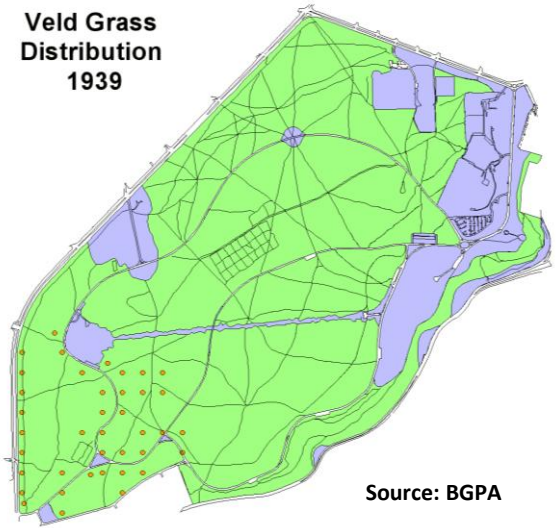
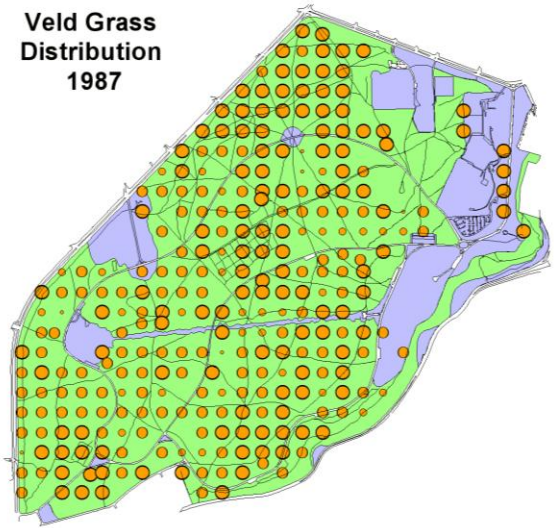
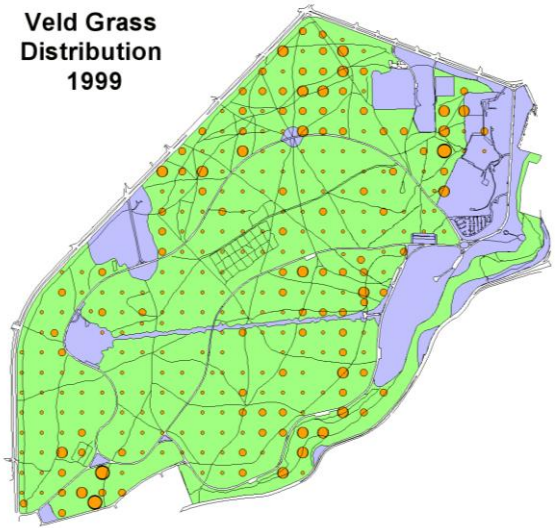
# Urban bushland threats

- **Fragmentation**
- *Altered fire regimes*
- *Weed invasion*
- Pests and diseases
- Pollination networks
- Dispersal

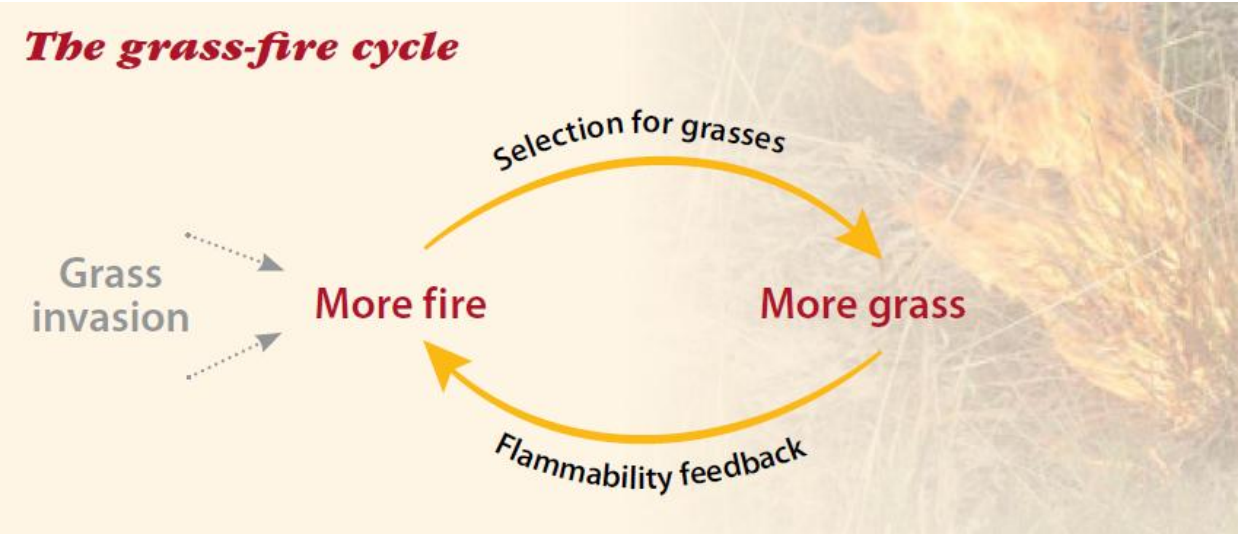

# Invasive weeds—Kings Park



# Weed invasion-flammability feedback




Miller and Miller, Landscope Spring 2020


Perth Children's Hospital
Kings Park bushland
BGPA

# BGPA fire ecology research

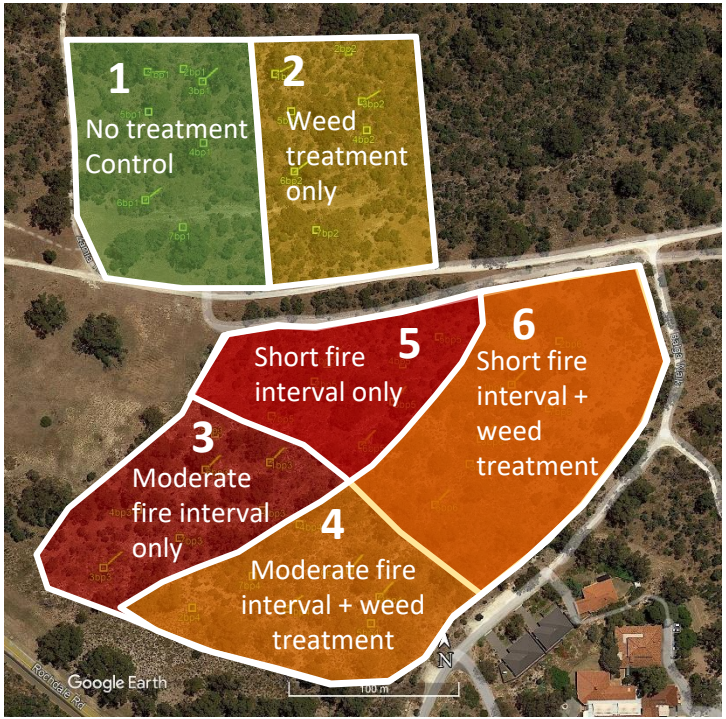
**2009** 40 ha bushfires Kings Park, Jan-Feb

**2010** *External Review of BGPA Fire Management and Response Plan*

**2011** *Comprehensive Bushfire Risk Analysis*

**2014** Fire ecology research project commenced


# Experimental design – Bold Park example




1. How effective is **weed control** in reducing weed fuel loads?
2. How does **fire** affect weeds, fuel loads, and native plant communities?
3. Does weed management improve **fuel reduction** and **native plant regeneration** after fire?
4. Does **fire interval** affect weed invasion or fire + weed management synergies?

# **Fire** is important for native plants but can also promote weeds

| | Burnt | Unburnt |
|---|---|---|
| **Herbicide** | Weeds ↓ 72%<br>**Native ↑ 14%** | Weeds ↓ 51%<br>Native ↓ 11% |
| **No herbicide** | **Weeds ↑ 36%**<br>**Native ↓ 17%** | Weeds ↑ 3%<br>Native ↓ 9% |

Increase in weeds greatest in areas with low native vegetation density

# **Herbicide** can control weeds, especially after fire

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# **Combining fire + weed control** improves outcomes for native plants and weed reduction compared to weed control alone

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**Fuel load reduction**

Fire + herbicide **70-77%** Fire only **30-70%** Herbicide only **10-22%**

# 6 months postfire

## Fire WITH weed control

## Fire WITHOUT weed control

# 7 years postfire

## Fire WITH weed control

## Fire WITHOUT weed control

# BGPA post-fire restoration

- **Weed control**
  - 342 introduced weed species
  - 40 highly invasive species
  - Veldt Grass control: 50 ha per year
- **Seed collection**
  - 50+ species each year
  - Uncommon and rare
  - Post-fire flowering species
  - Improved quality postfire



# Case studies: October 2023 fires

- Series of **fires < 1 week apart** in both parks
  - 7 ha Kings Park
  - 7.5 ha Bold Park
- Huge difference in post-fire recovery
  - Legacy weed effects
  - Native soil seed bank

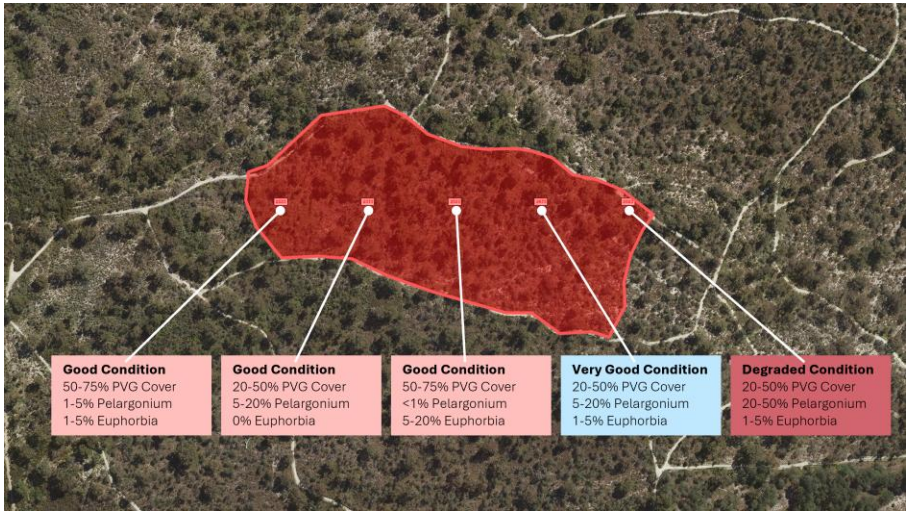

# Similar fire, different outcomes

## Bold Park

- **Degraded – Very good condition**
- 20-75% veldt grass cover (also euphorbia, pelargonium)
- Estimated cost weed control for **5+ years: >$120k**

## Kings Park

- **Very good – Excellent condition**
- < 5% veldt grass cover (some freesia)
- Estimated cost weed control for **5 years: $65k**




# **Bold Park** October 2023 fire


Pre-fire: 14 September 2014


Post-fire: 24 July 2024

# **Kings Park** October 2023 fire


Pre-fire: 25 September 2018


Post-fire: 14 October 2024

# Key learnings

- **Fire** is important for native plants but can also promote weeds
- **Herbicide** can control weeds
- **Combining fire + weed control** improves outcomes for native plants and weed reduction compared to weed control alone

# Next challenges

- Effective duration of weed management after fire
- Veldt grass soil seed bank longevity
- Herbicide resistance

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Kings Park research burn May 2022

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