Rangelands Restoration

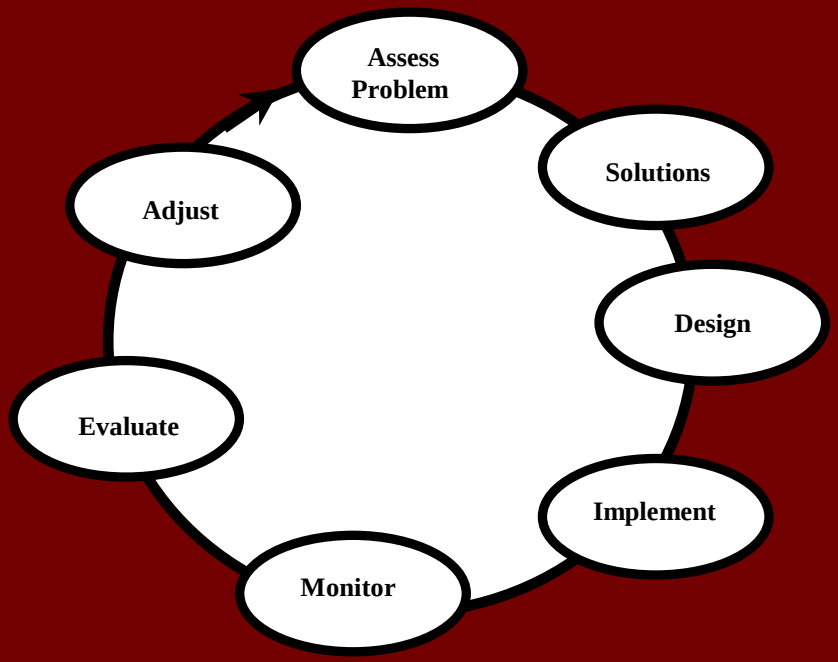
Adaptive Management in Action

Goldfields Region, Science Division & Nature Conservation Division working together

Department of Environment and Conservation

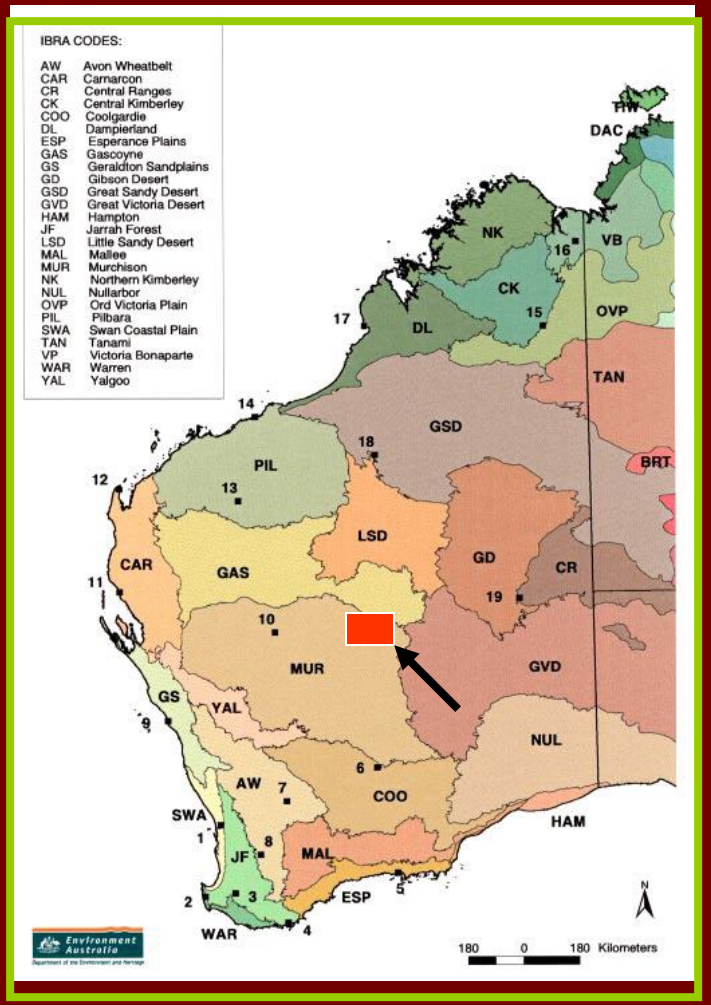
An Adaptive Management Cycle

1. Assess the problem and define the objectives
2. Devise hypotheses, possible solutions and strategies
3. Design, or plan the project
4. Implement the plan
5. Monitor the response of a) assets/values b) threats and c) relevant processes
6. Evaluate and analyse outcomes
7. Adjust management; redefine possible solutions



Rangelands Restoration: An Adaptive Management Case Study

- Lorna Glen – Earaheedy complex (~580,000 ha)
- Gascoyne & Murchison IBRAs
- Project Team: Goldfields Region, SD, NCD,
- Regular planning meetings chaired by Goldfields Regional Leader



The Problem

- Mammal extinctions in the semi-arid and arid zone:
  - 11 extinct, 6 are extinct on the mainland and are found only on off-shore islands and 16 are now severely restricted in their range.
- Rangelands ecosystem degradation
  - Over-grazing
  - Soil damage
  - Ferals & weeds
  - Altered fire regimes

Project Objectives

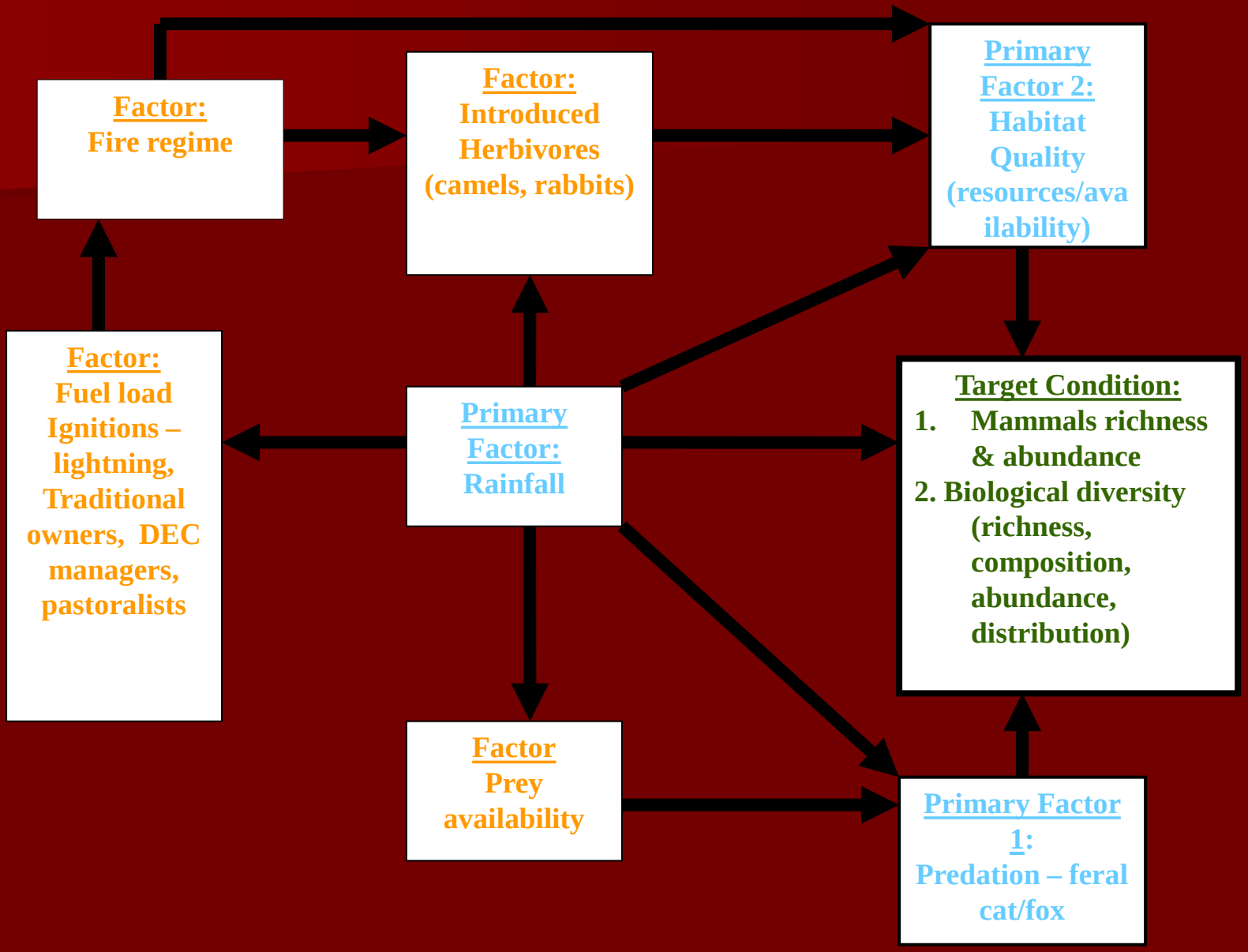
- Re-establish sustainable populations of 11 medium size (Critical Weight Range - CWR) arid zone mammal species
  - species conservation objectives
  - restore ecosystem processes
- Halt further declines: conserve extant biodiversity (no species losses at the landscape scale)
  - Whole-of-ecosystem management approach-

Devising solutions

Working Hypotheses:

- Predation by introduced predators is the primary cause of medium size mammal decline in the arid zone

- Degradation of habitat quality due to altered fire regime and over grazing


Factor:
Fire regime
Factor:
Introduced Herbivores (camels, rabbits)
Primary Factor 2:
Habitat Quality (resources/availability)
Factor:
Fuel load
Ignitions – lightning, Traditional owners, DEC managers, pastoralists
Primary Factor:
Rainfall
Target Condition:
1. Mammals richness & abundance
2. Biological diversity (richness, composition, abundance, distribution)
Factor
Prey availability
Primary Factor 1:
Predation – feral cat/fox

Management Actions

- **Close artificial waters, upgrade boundary fences**
- **Control introduced herbivores**
- **Control introduced predators**
- **Implement ecologically appropriate fire regimes**
- **Reintroduce native mammals**
- **Monitor**
  - reintroduced fauna
  - introduced predators and herbivores
  - biodiversity and ecosystem health.

Risks and uncertainties

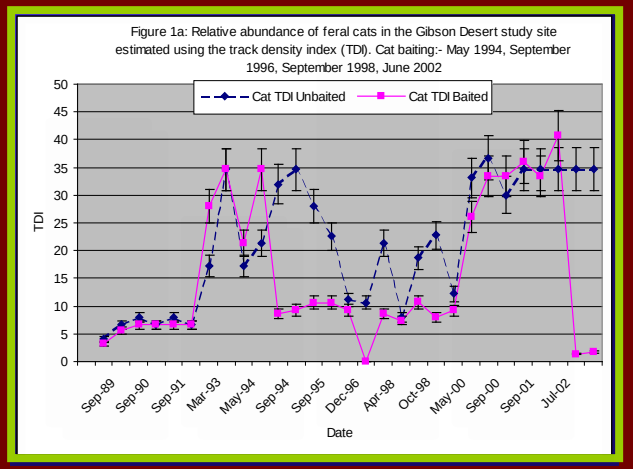
- Populations of reintroduced fauna fail to establish because Primary Factors 1 & 2 cannot be managed adequately
- Ecosystem productivity/habitat quality has been irreversibly altered/degraded
- The fundamental hypothesis for recent mammal declines and extinctions is flawed
- Lack of ongoing support

Monitoring Management effectiveness

- To check that project objectives are being met
- To determine whether the hypotheses, or assumptions, upon which management actions are based, are valid
- Advancing understanding
- Quantitative reporting on conservation outcomes and management effectiveness

Monitoring and Evaluation

- What? How? Why?
- Vital step in Adaptive Management
- Measure appropriate processes threats, values
- Indicators? Focal/keystone species?
- Analyse data:
  - right hypothesis?
  - any surprises?
  - objectives met?
- Document and write-up



Monitoring – key questions

- Have the introduced predator & herbivore control actions met the program objectives? If not, why not?
- Have mammals been successfully established according to the success criteria stipulated in the Translocation Plan? If not, why not?
- Has fire management met the objectives? If not, why not?
- Has the combination of introduced predator and herbivore control, fauna reintroductions and fire management maintained or improved ecosystem condition, where ecosystem condition refers to:
  - native species richness and composition (surrogates/indicators),
  - diversity of seral stages and vegetation structures (links with fire management above),
  - soil physical and nutrient status relevant to an accepted baseline.

Monitoring

- Satellite image analysis: fire pattern, vegetation cover
- Reintroduced fauna – radio tracking, trapping
- Introduced predators - track counts, sand pads
- Introduced (large) herbivores - aerial survey
- Permanent sampling grids for terrestrial vertebrates (pit traps) and vegetation/habitat (quadrats & line transects)
- Soil nutrients
- Inverts?

Progress

- Aerial baiting & trapping has reduced fox and feral cat density
- A fire management plan has been prepared and is being implemented
- Introduced herbivores have been removed/reduced
- 2 mammal species have been reintroduced
- A network of biodiversity monitoring sites has been established (more to do)
- Boundary fences being upgraded
- MoU with traditional owners
- Research projects (students) underway