Forestcheck

MONITORING BIODIVERSITY IN SOUTH-WEST FORESTS

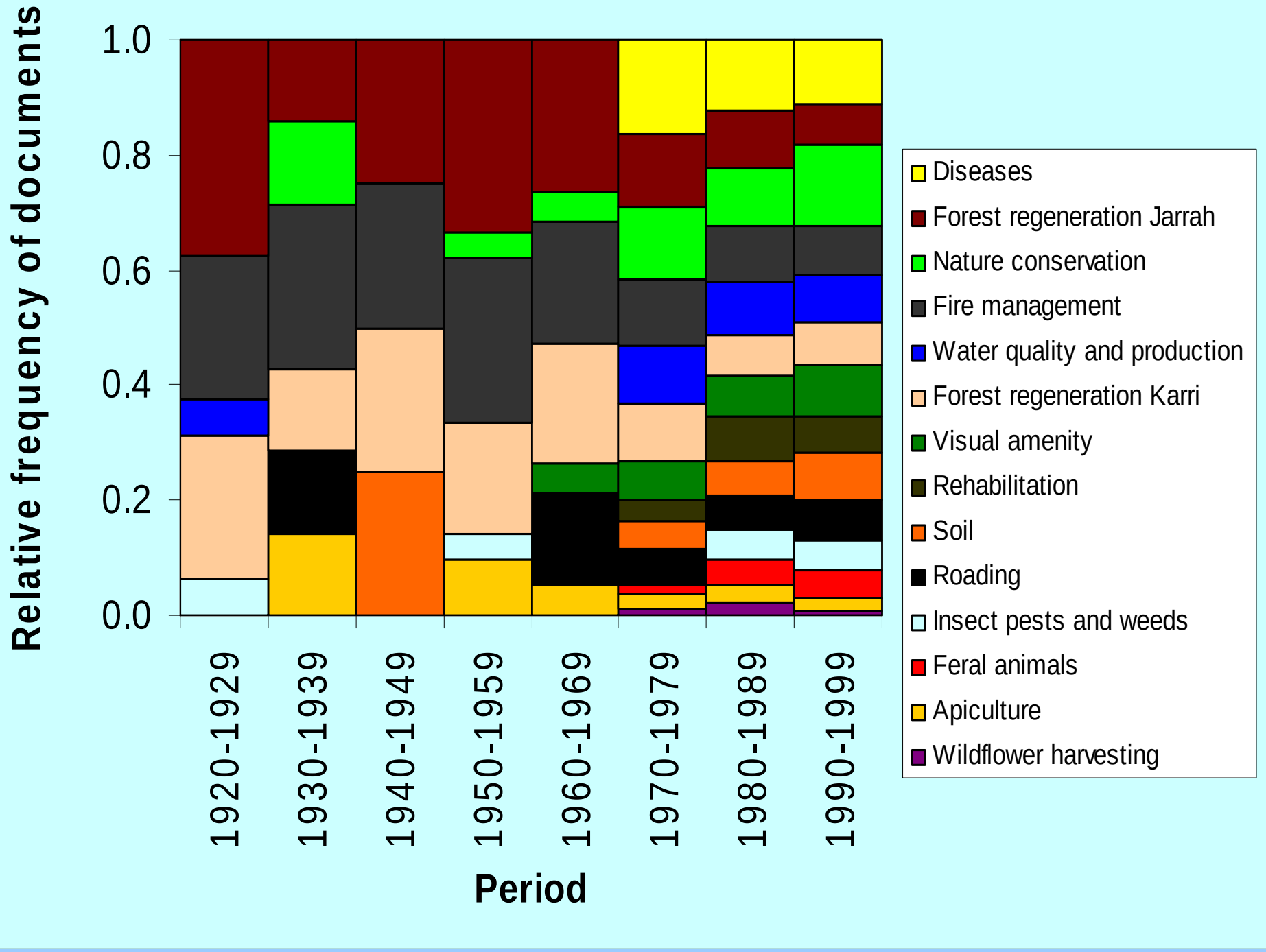
What is Forestcheck ?

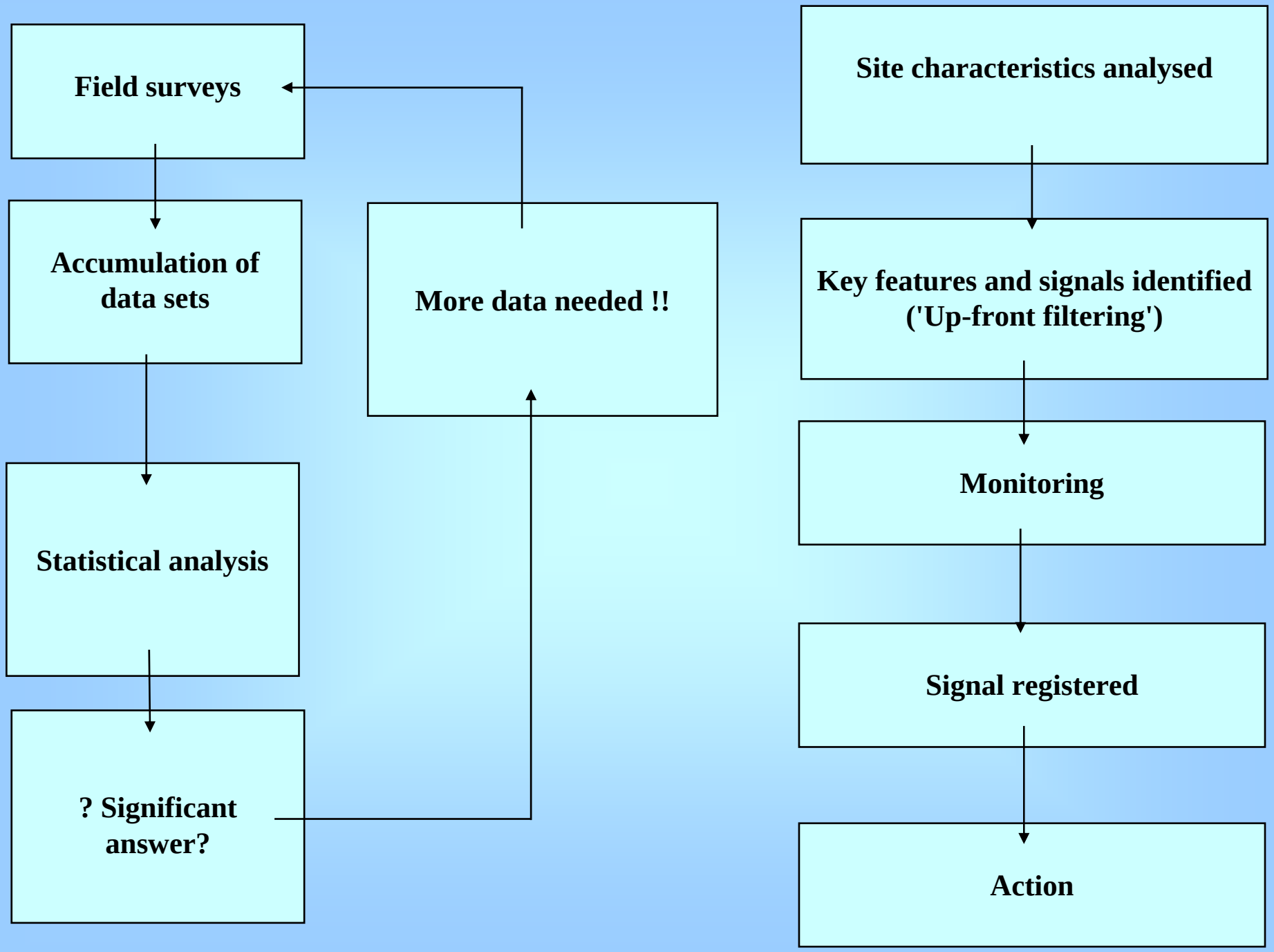
A framework to quantify, record, interpret & report on the status of key forest organisms, ecological communities & processes in response to forest management & natural variation.

AUDIT	checks extent and quality of processes/procedures
COMPLIANCE	adherence to prescriptions, policies & codes of practice
RESEARCH	gathering of scientific knowledge & information, often involving hypothesis testing, yielding better management
MONITORING	were management objectives achieved?

Forest management in WA has comprised a mix of adaptive and directed management:

- strong in strategic planning, audit and compliance
- based strongly on scientific research
- weak on monitoring of outcomes


Relative frequency of documents
1.0
0.8
0.6
0.4
0.2
0.0
1920-1929
1930-1939
1940-1949
1950-1959
1960-1969
1970-1979
1980-1989
1990-1999
Period
Diseases
Forest regeneration Jarrah
Nature conservation
Fire management
Water quality and production
Forest regeneration Karri
Visual amenity
Rehabilitation
Soil
Roading
Insect pests and weeds
Feral animals
Apiculture
Wildflower harvesting


Field surveys
Accumulation of data sets
Statistical analysis
? Significant answer?
More data needed !!
Site characteristics analysed
Key features and signals identified ('Up-front filtering')
Monitoring
Signal registered
Action

Initiation of forest monitoring in WA (mostly by scientists)

- 1916 - growth plots for trees established
- 1972 - forest mammals at Perup
- 1972 - fire impacts on plants
- 1982 - birds in karri forest
- 1995 - Forest red-tailed black cockatoo
- 1999 - FORESTCHECK concept planning begun

Why Forestcheck ?

- Monitoring is an important element of ESFM
  - adaptive management
- Ministerial Conditions 1992
- Forest Management Plan 1994
- Montreal Process - C&I of ESFM
- RFA
- Community expectations

Broad goals of ESFM (Biodiversity)

- At the broad forest ecosystem level, no species becomes extinct, or falls to irretrievably low levels, as a result of management activities
- Species assemblages at the coupe level recover in time (before the next logging event)
- Water quality is maintained within acceptable (potable) limits
- The physical condition of the soil is protected

Development of concept plan: internal stakeholder involvement

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- March 1999 - Science Management Council endorsement of draft Integrated Forest Monitoring System concept plan
- April 1999 - CALM workshop (9 CALMScience, 9 other CALM)

Development of concept plan: external expert stakeholder involvement

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- October 1999 - workshop (22 external experts, 9 CALM scientists)
- November 1999 - document revised for further peer review
- March 2000 - workshop (10 external experts, 16 CALM scientists) to finalize protocols

Corporate buy-in

- May 2000 - Concept plan approved by CALM's Corporate Executive
- Implementation stalled by insufficient resources & major legislative changes (2 new appointments required: Co-ordinator and Technical Support Officer)

Implementation

- June 2001 - CALMScience workshop at Manjimup
  - compiled an operations manual of standardized sampling methods & set up workable databases based on the Kingston experience
  - decided on 3 sites to be monitored in November 2001
  - confirmed membership of teams

FORESTCHECK

WE CANNOT:

- Measure everything, everywhere, all of the time

WE CAN:

- Measure some things, somewhere, some of the time

Sampling design

- Forest ecosystem (initially), vegetation complexes (ultimately)
- Logging disturbance: gap release, shelterwood (initially); fire history (ultimately)
- Time since logging (1990 onwards)
- Each site sampled in spring and autumn

Each FORESTCHECK site will consist of several disturbance types in close proximity:

- One gap release coupe
- One shelterwood coupe
- One internal reference area (coupe buffer)
- One external reference area

Components sampled

- Plants & cryptogams
- Invertebrates
- Macrofungi
- Birds
- Mammals (incl. fox & cat), reptiles & frogs
- Ecosystem processes

Interpreting Data

- Statistical power
- Presence/absence
- Recovery pathways
- Trend analysis (Bayesian statistics)

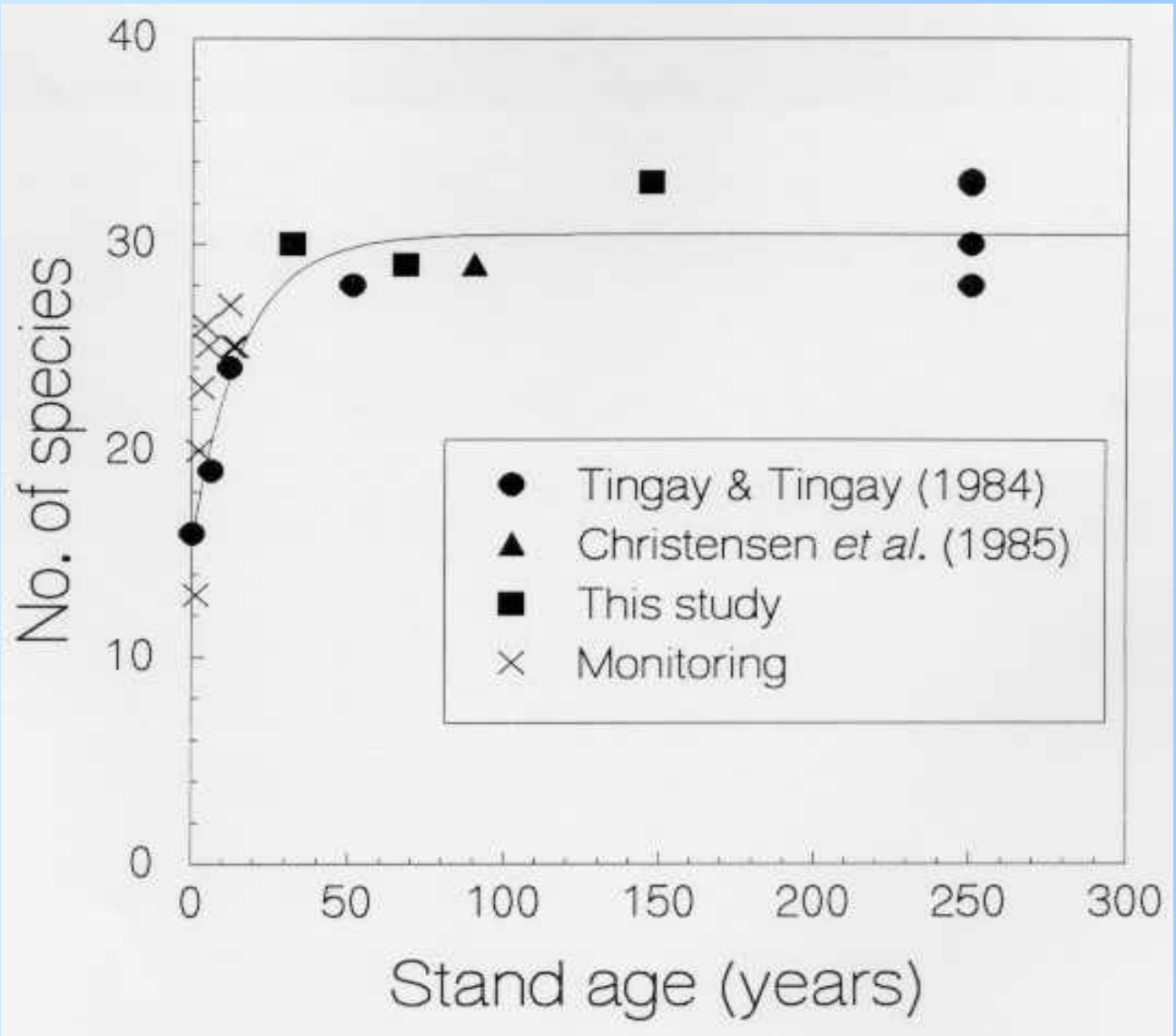
Some examples of possible analyses

Ordination of assemblage (species composition) data using non-metric multiple dimensional scaling (based on abundance data)

Trajectory graphs

These show the extent and rate that species and attributes return to levels comparable to reference sites

It should be possible to add standard errors of the means as data accrue


40
30
20
10
0
No. of species
0
50
100
150
200
250
300
Stand age (years)
Tingay & Tingay (1984)
Christensen *et al.* (1985)
This study
Monitoring

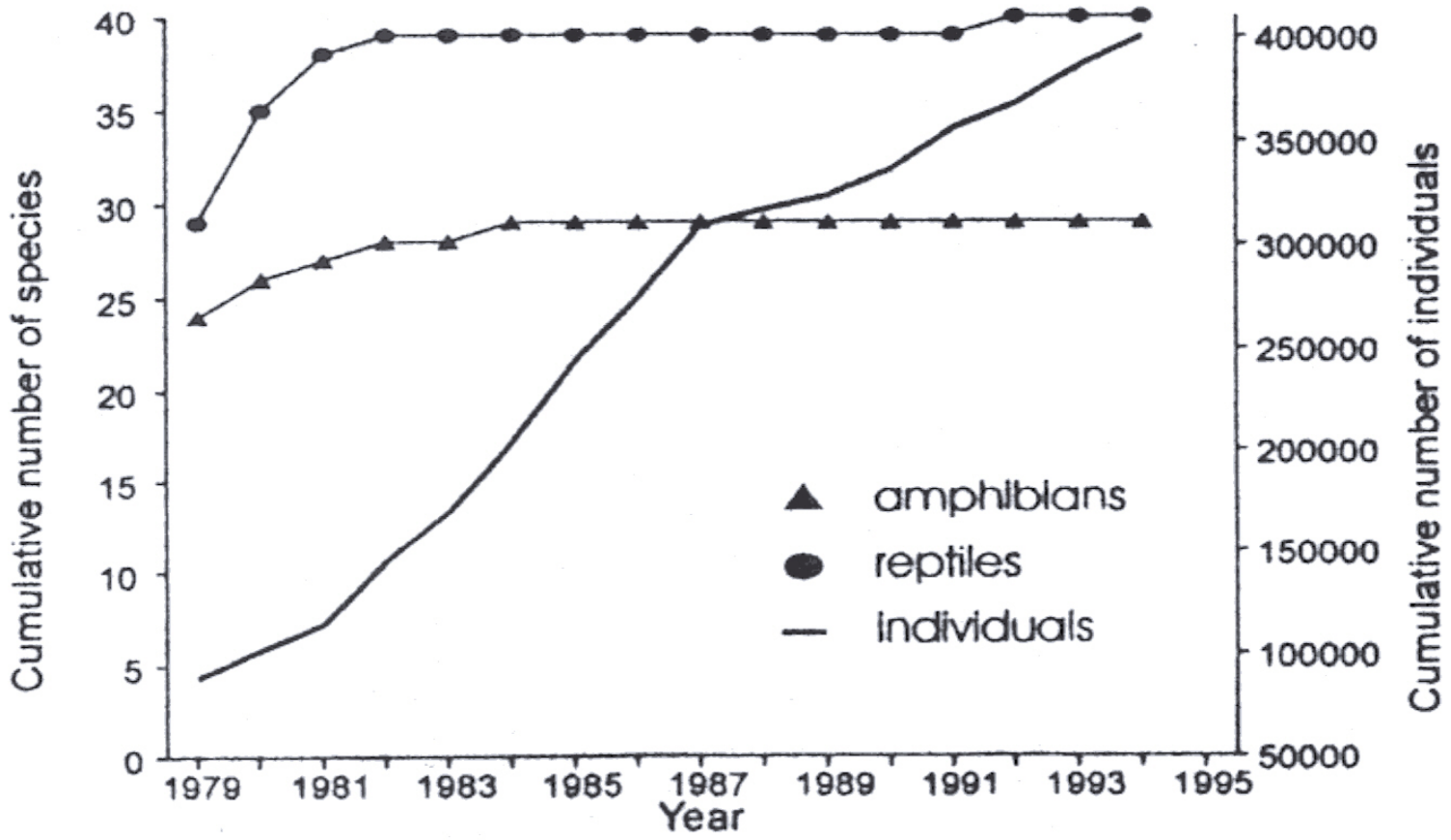
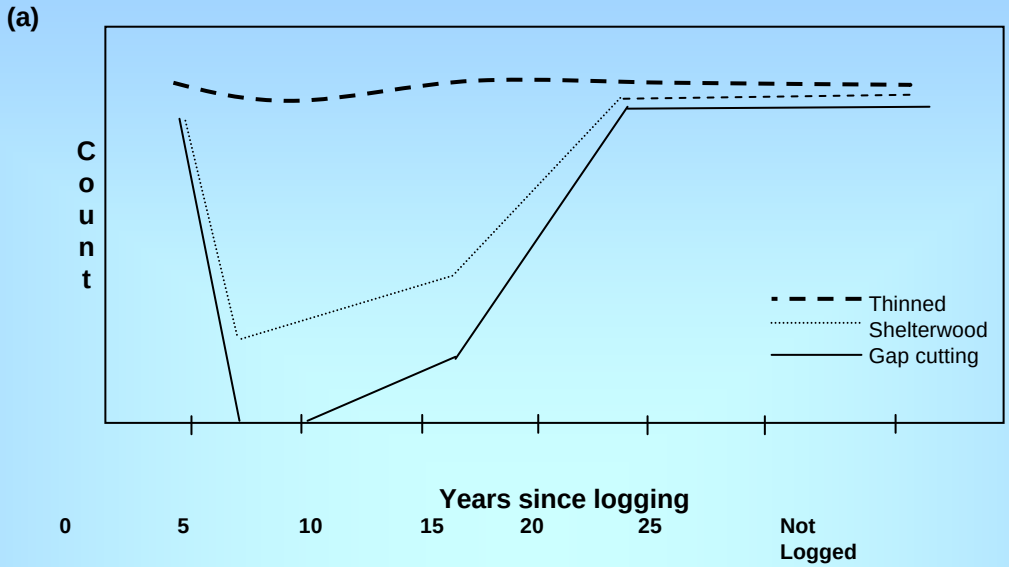
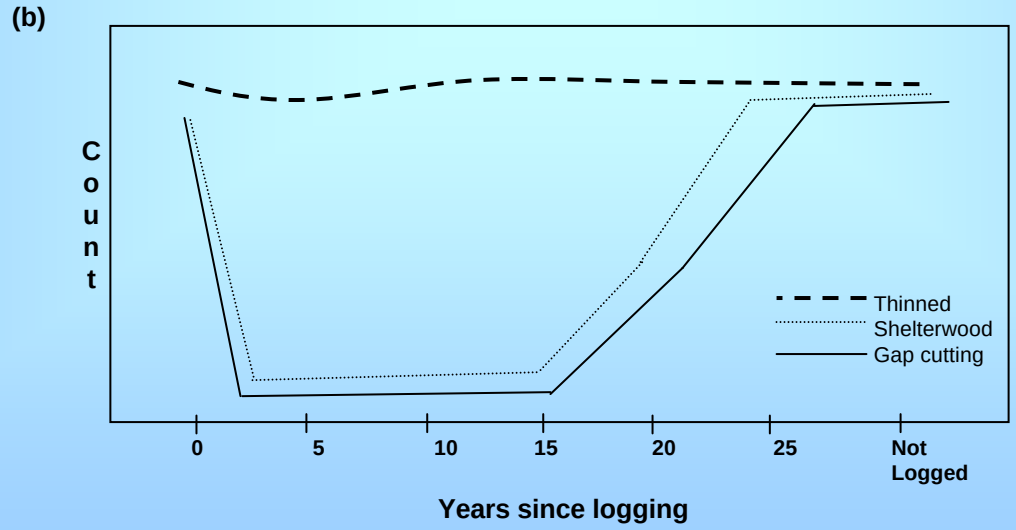


Figure 4. Annual increases in cumulative numbers of species and individual reptiles and amphibians captured at Rainbow Bay. Rainbow Bay is a temporary freshwater wetland habitat (geologically defined as a Carolina bay) and has been completely encircled with a drift fence and pitfall traps since 1978 (18 years).

Results expected





Profile diagrams

- These show the proportion of treatment sites at which species have been recorded.
- When the species are sorted in order of their frequency of occurrence in reference sites, it is straightforward to determine which species have recovered in disturbed sites

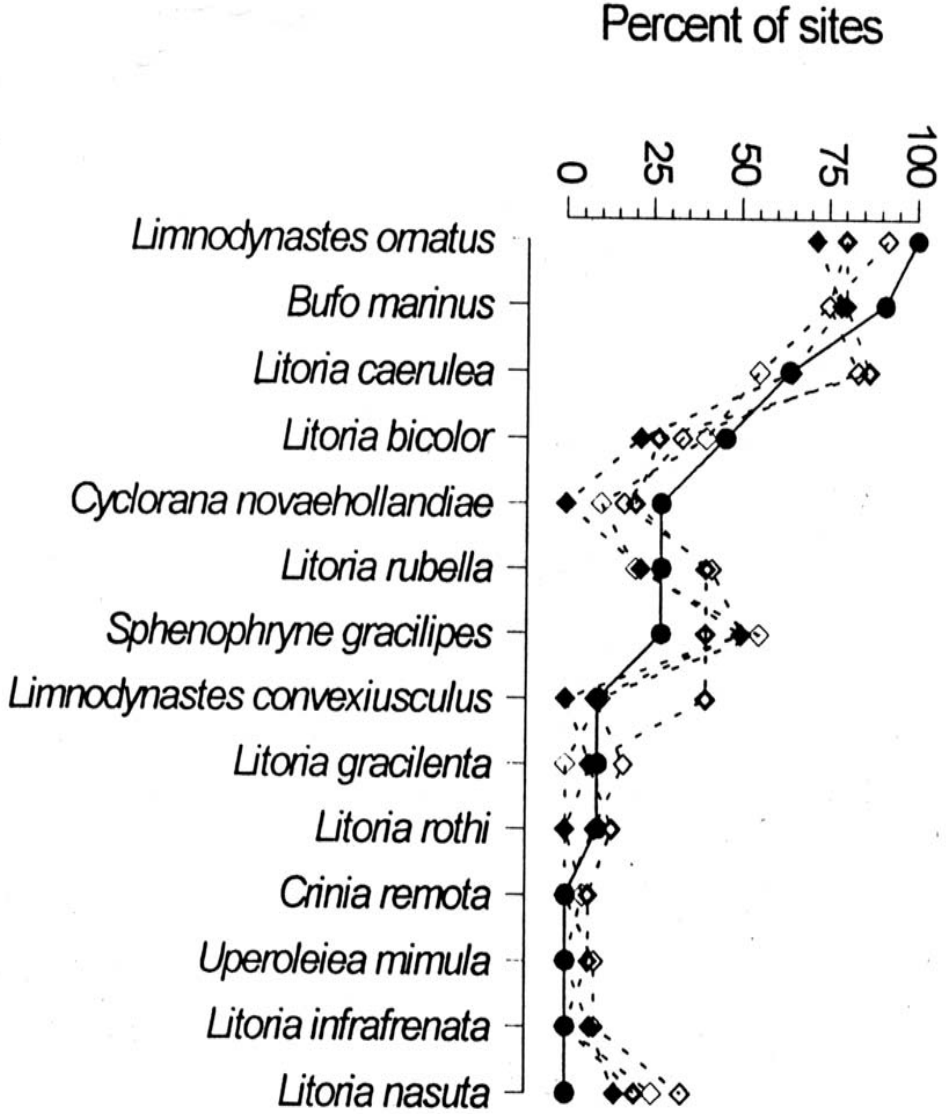


Figure 1 Profiles of percent of sites of five habitat types at Weipa, Queensland, Australia at which frogs of 14 species occurred. Species sorted in order of frequency of occurrence in native woodland. Dots and solid lines indicate native woodland habitat (13 sites). Diamonds and dashed lines indicate sites revegetated following strip mining. Density of diamonds reflects age of revegetation; from least to most dense this is: age ≤ 7 years, 7 years $<$ age $\leq$ 10.5 years, 10.5 years $<$ age $\leq$ 16 years, age $>$ 16 years. There were 15 revegetation sites in each age group in the survey.

Proposed community involvement

- Use of volunteers to help collect data
- Roadshow presentations of data collected in graphical format
- Public access to databases (transparency)
- Website access to ongoing results

Next steps?

- Aquatic invertebrate fauna
- Fire (prescribed and wild)
- Karri forest?
- Elsewhere in WA?