The value of scientific data

confessions of an applied environmental scientist

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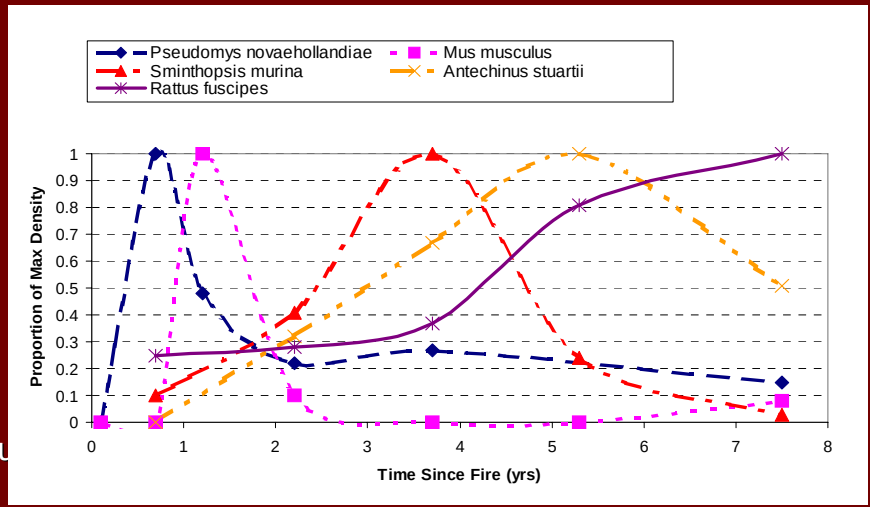
Becoming a scientist; destiny or serendipity?

From fighter pilot

to fire ecologist?

Science & Scientists

- Identify the problem and define the research question(s)
- Do background research
- Formulate a hypothesis
- Test hypothesis by experimentation
- Collect data
- Analyze data and draw conclusions
- Communicate findings



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Role of science in conservation & land management

- Science **informs** policy, planning and decision making
- Science **underpins** conservation and land management actions
  - Engenders political & community confidence
  - Agency credibility

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Data acquisition

Knowledge from data gathered via;

- Experimental research
- Survey
- Monitoring
- Adaptive management
- The global science network

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Life as an applied scientist: experimental design and implementation

- Identify the variables to be measured
- Determine procedures for measuring/collecting data
- Establish experimental sites
- Implement treatments, collect data
- Enter and check data
- Analyse & interpret data
- Present data
- Publish & communicate findings
- Determine implications of findings and transfer knowledge (tech transfer, knowledge uptake)
- Move on to next research program

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Something missing? The Confession

- What happens to the data?
  - A small subset are published
  - Most stagnate in personal filing cabinets, computers, notebooks, field sheets, etc
  - Sometimes thrown out!

Why bother with post-research data management?

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Bushfire Management

Fire Management Objectives

- Protect life, property and ecosystem services from wildfires
- Protect biodiversity & ecosystem health
- Reduce greenhouse gas emissions

Fire Management Strategies

- Planned (prescribed) burning
- Fire detection
- Fire suppression

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Research to underpin bushfire management

- Fire behaviour
- Fire ecology and impacts
  - Forests
  - Hummock grasslands

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Fire Behaviour Research

- Objective: To model the behaviour of bushfires in order to:
  - Forecast fire danger
  - Predict fire behaviour

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Field-based (empirical) approach

- Identify and measure variables thought to influence fire behaviour
  - Fuel
  - Weather
  - Topography
- Measure fire behaviour variables
  - Flame rates of spread
  - Flame dimensions
  - Fire intensity (killing power)
  - Fire perimeter & area growth
- Model relationships

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Data collection (field work)

- ~250 experimental and wildfires over 15 years
  - Establish experimental plots
  - ~3,000 sample points
  - ~10 attributes at each point
  - Conduct exp. burns
  - 10 person years of field work
  - Field work cost ~ $3M

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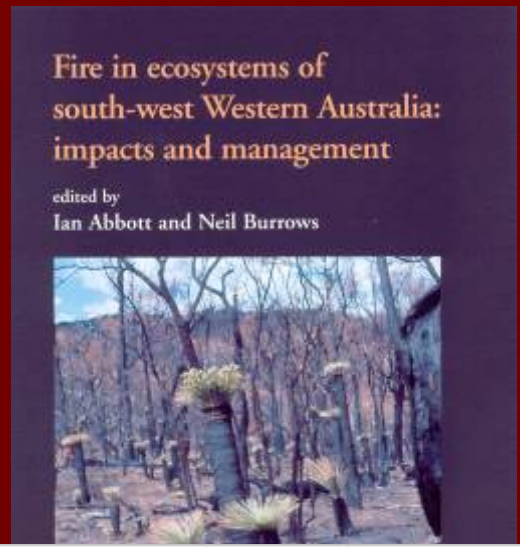
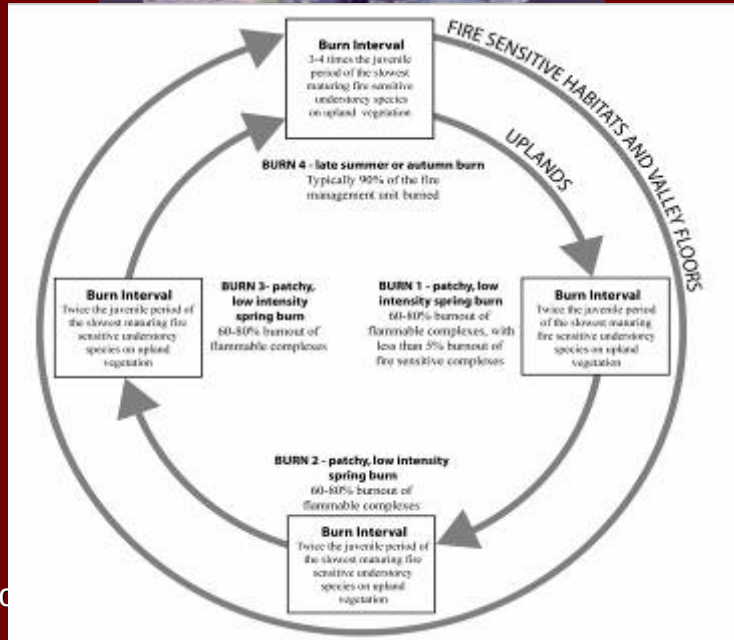
Managing the data (office work)

- Clean-up and entry
- Analysis
- Write-up
- Converting data into knowledge: Communication & tech transfer
  - 35 person years
  - Cost ~3.5M





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Science Division of the WA Department of Environment & Conservation (DEC)

- ~130 science projects
- 174 staff
- Annual expenditure ~$20M
- Generating 10^x pieces of data each year

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LEICA


TRAP SUPPORT
KIT #1


WILD M8


HOPPER

The $ cost of collecting and working with data - DEC Science Division

- Annual research budget ~$20M or ~$200M per decade.
- Data cost component of this is ~ $150M per decade.

DATA ARE VERY VALUABLE!

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Importance of good data management

- Data have high $ value
- Data = knowledge = power & influence!
- Protect data from loss or misuse
- Responsibility & accountability - usually a 3rd party has paid for data
- Tradable

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Importance of good data management

- Value add, re-analyse (e.g., climate change, new techniques)
- Shared
- Avoids duplication
- Some data are irreplaceable (unique)

WE NEED A DATA MANAGEMENT PLAN

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Data management: some attributes

- Database structure
  - Logical directories or files
  - Named
  - Easy to access
  - Relationships with other databases
- Data warehouse
  - Secure
  - Accessible (input and extract)
  - Maintain integrity of data
- Data mobility
  - Easy to move/transfer
  - Hardware/software compatibility
  - Data mining
- Database administration
  - Dedicated resources
  - Corporate systems

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Conclusions

- We live in a world dependent on knowledge and information for "sustainable development"
- Data are valuable at many levels
- Need (and legal obligation) for institutions to develop systems & infrastructure to preserve, protect and facilitate access to data
- Good data management = we work more efficiently and effectively as an individual and as an agency

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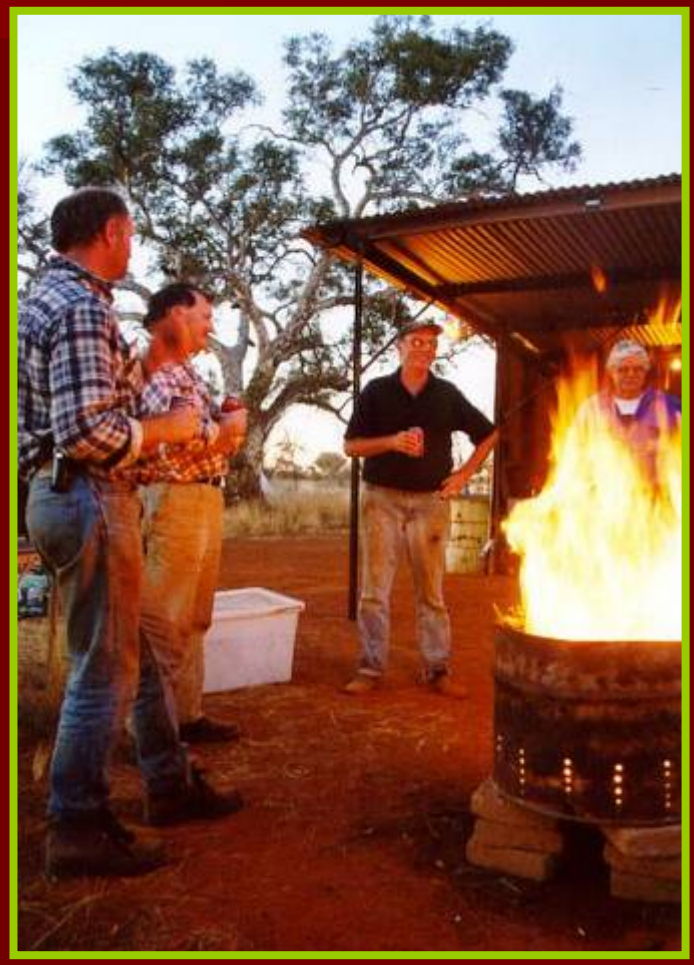
Thank You
(Blood, Sweat……. and Beers!)



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