



Science Division

“Discovering the nature of WA”

Science Division Mission:

To provide up-to-date and scientifically sound information to uphold effective conservation and land management in Western Australia

Broad Strategies

- ❖ Alignment
- ❖ Consultation, collaboration & partnerships
- ❖ Priority setting
- ❖ Secure resources
- ❖ Outcome-based teams
- ❖ Global watch
- ❖ Communicate, promote, market

Setting Priorities

- ❖ Internal workshops
- ❖ External processes
- ❖ SPAs Output programs
- ❖ Strategic/Scenario planning

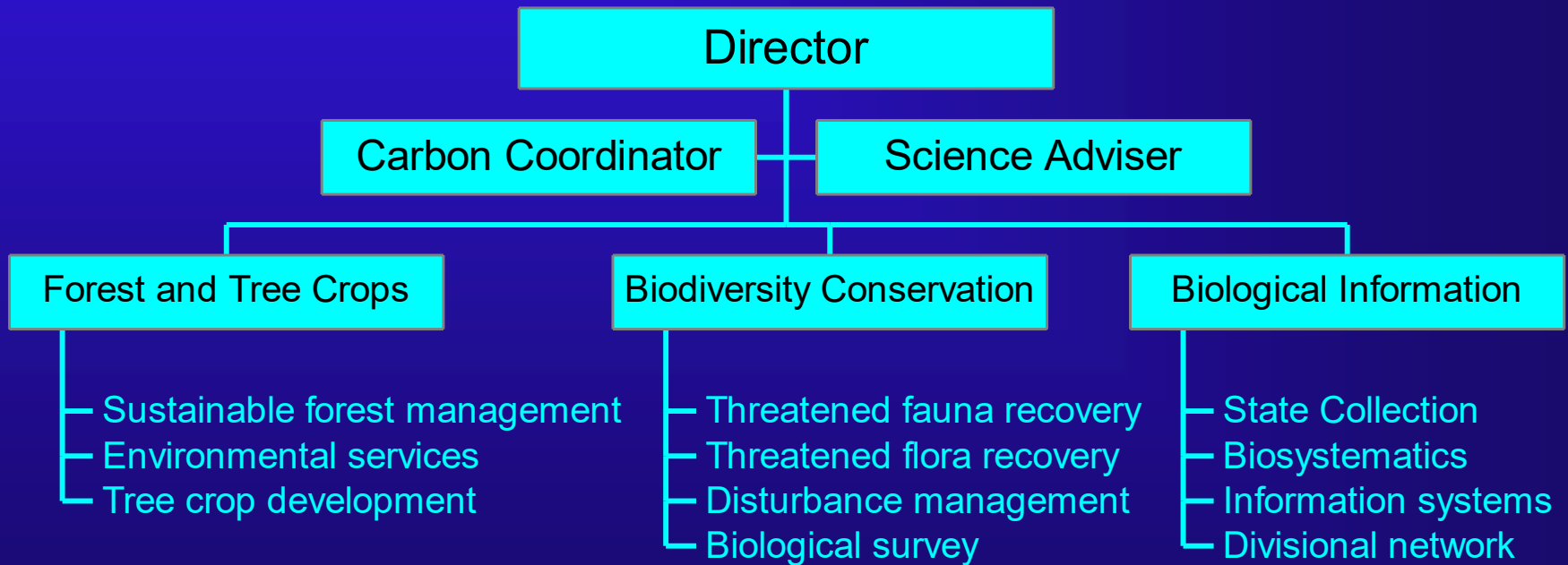
Planning Processes

- ❖ Strategic Plan (2-5 yrs)
- ❖ Operations Plan
- ❖ Science Project Plans
 - ❖ Increasing detail
- ❖ Annual Business Plan

Resources Summary

- ❖ 124 CF funded FTEs
- ❖ 25 externally funded FTEs
- ❖ Staff at 4 metropolitan centres and 10 regional centres
- ❖ \$10 million CF budget
- ❖ \$3 million external

Service Delivery Structure Science Division



Forest and Tree Crops Group

To provide the scientific basis for ecologically sustainable forest management systems, and for the cost-effective establishment and management of plantations for commercial and environmental purposes.

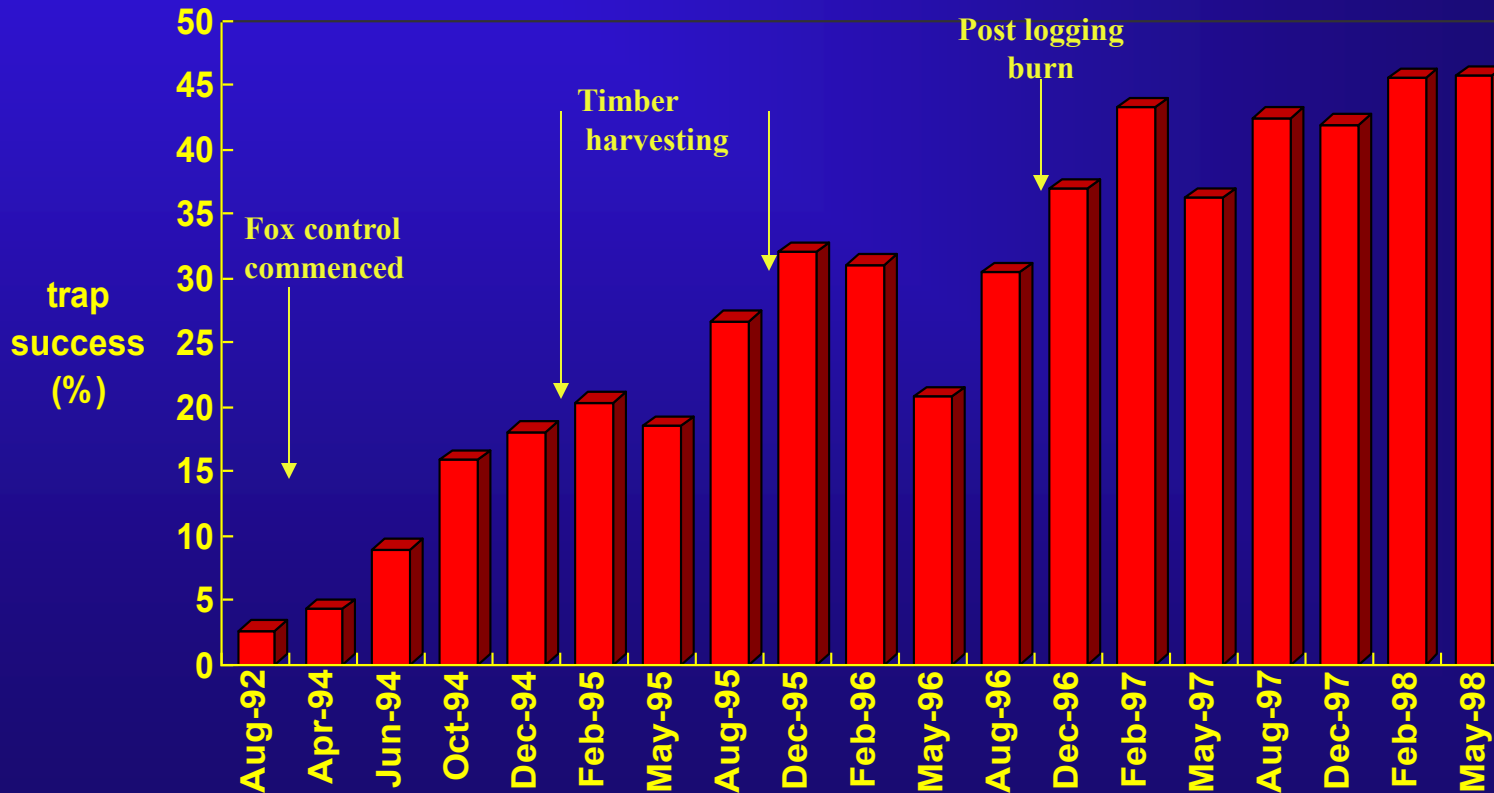
- ❖ Sustainable Forest Management
- ❖ Environmental Services
- ❖ Tree Crop Development

Sustainable Forest Management

- ❖ Kingston Study
- ❖ Forest Check
- ❖ Fire management
- ❖ Sandalwood
- ❖ Dieback monitoring



Trap success for Woylies in the Kingston forest



Environmental Services

- ❖ Genetic resources
- ❖ Tree crop management
- ❖ Tropical plantations

Woody perennials for
reversing salinity



Tree Crop Development

- ❖ Oil mallees
- ❖ SEARCH Project
- ❖ Extension services

Biological Information Group

To maintain and extend the State resource centre for taxonomic, conservation and economic information on the flora (and fauna ?).

- ❖ The State flora collection
- ❖ Bio-systematics of WA flora
- ❖ Biodiversity information systems

The State Flora Collection

- ❖ The WA Herbarium, plus Regional Herbaria.
- ❖ Collections of identified and curated material total 500 000 specimens of vascular plants, mosses and their allies, lichens, fungi and marine and fresh water algae.

Biodiversity Information Systems

- ❖ Corporate databases to communicate the results of botanical science to a wide range of users involved in conservation.
 - ❖ authoritative names database
 - ❖ descriptions for 13000 species
 - ❖ botanical library
 - ❖ spatial data from labels
 - ❖ plant images
 - ❖ biological attributes

Biodiversity Information Systems

- ❖ Australia's Virtual Herbarium Network
- ❖ WIN – Weed Information Network
- ❖ FloraBase – a Statewide plant information system integrating a range of databases into an easily accessible website

Australia's Virtual Herbarium



- ❖ On-line botanical information resource accessible via the web
- ❖ Immediate access to data associated with scientific plant specimens in each Australian Herbarium
- ❖ Six million specimen records, eventually displaying geographic distribution enhanced by images, descriptive text and identification tools
- ❖ Collaborative project of the State, Commonwealth and Territory herbaria
- ❖ Developed under the auspices of the Council of Heads of Australian Herbaria (CHAH), representing the major Australian collections

Australia's Virtual Herbarium

- ❖ AVH is accessed via the website
- ❖ A gateway at each Herbarium links to other Herbaria.
- ❖ WA Herbarium is a participating institution
- ❖ AVH will go online by December 23rd, 2001

The screenshot displays the 'Australia's Virtual Herbarium' web interface. The main window shows a map of Australia with a search for 'Acacia aneura'. The interface includes a search bar, a list of layers, and a table of records by state. A 'Point Data Query Data' window is open, showing a detailed map of the selected point and associated data.

Australia's Virtual Herbarium
Search for *Acacia aneura*

Layers:
 Acacia aneura
 Terrain
 States
 Ibra regions
 NSW Highways
 NSW Lakes
 NSW Rivers
 Lat/Long Grid
 NSW Subdivisions

Canberra	621
New South Wales	431
Queensland	306
South Australia	535
Victoria	229
Western Australia	596
2718 records mapped	

Point Data Query Data

Selected: [Map of Australia with a red box around the selected point]
Reference: [Map of Australia with a red dot at the selected point]

Species

Lat	Long	Date
32.45333333333333	151.15000000000000	1998-01-01
32.45333333333333	151.15000000000000	1998-01-01
32.45333333333333	151.15000000000000	1998-01-01

Associated Data in the Ibra regions layer

Region Code	Region Name
020	Central District

Associated Data in the states layer

State Code	State Name
NSW	New South Wales

Weed Information Network (WIN)

❖ Partnership (NHT-funded) between government and community, to combat the growing weed problem in WA through:

- ❖ a network of trained collectors
- ❖ a weed identification service
- ❖ comprehensive on-line weed identification system
- ❖ improved curation of the WA Herbarium's weed collection
- ❖ weed-incursion early-warning system
- ❖ builds on and extends the Regional Herbarium Network



Weed Information Network (WIN)

❖ Achievements to date

- ❖ WIN manual published – ‘How to Collect and Record Weeds’
- ❖ Extensive training and use of volunteers to describe and identify weeds
- ❖ Country workshops for training regional herbarium volunteers
- ❖ Weed descriptions coded in DELTA database for interactive key (17% species completed)

Biodiversity Conservation Group

To provide a scientific basis for the protection and enhancement of the State's biological diversity, and for the establishment of a CAR reserve system.

- ❖ Fauna Recovery and Conservation
- ❖ Flora Recovery and Conservation
- ❖ Disturbance Ecology
- ❖ Biological Survey and Reserve System

Fauna Recovery and Conservation

❖ threatened species management

- ecology, distribution, translocations and monitoring (e.g. Pilbara Olive Python, Mala, SBM)
- island fauna, monitoring (e.g. Barrow Is)
- marine turtle conservation



Fauna Recovery and Conservation (cont)

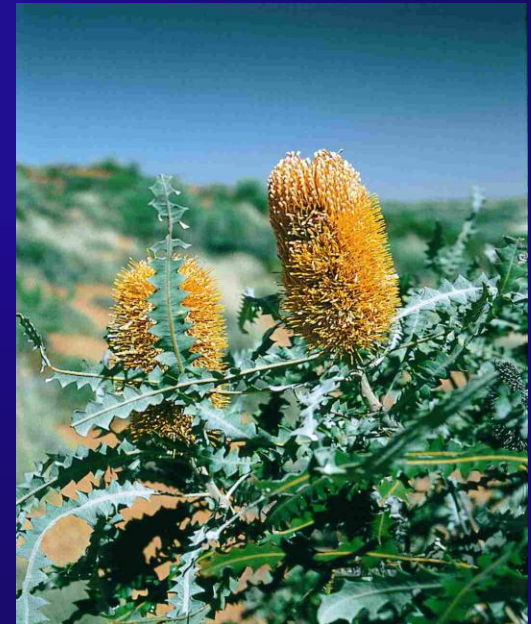
❖ Introduced animal control

- feral cat
- fox
- black rat
- house mouse



Flora Recovery and Conservation

- ❖ Ecology and genetics
- ❖ Reintroductions and threatening processes
- ❖ Survey and monitoring
- ❖ Germ plasm storage



Genetic and ecological viability of plant populations in remnant vegetation



1. Determine genetic and ecological factors that affect the viability of plant populations in remnant vegetation (Dongalocking, NSW, Qld).
2. Develop management guidelines for remnants
3. Develop landscape design principles that will maximise the probability of population persistence

Experimental translocations of Critically Endangered plant species

1. Translocation techniques for a range of site conditions
2. Protocols for assessing and predicting translocation success
3. Translocation database





OFFICIAL

Millenium Seedbank Project

1. Benefit Sharing Agreement with Royal Botanic Gardens Kew
2. DCLM Threatened Flora Seed Centre to collect 1,000 Priority Flora species over 10 years
3. Seed to be processed / stored in TFSC duplicate collections to be housed at Millenium Seed Bank, UK.
4. Total funding over 10 years
\$ 1.18 M. TFSC to receive \approx \$850,000

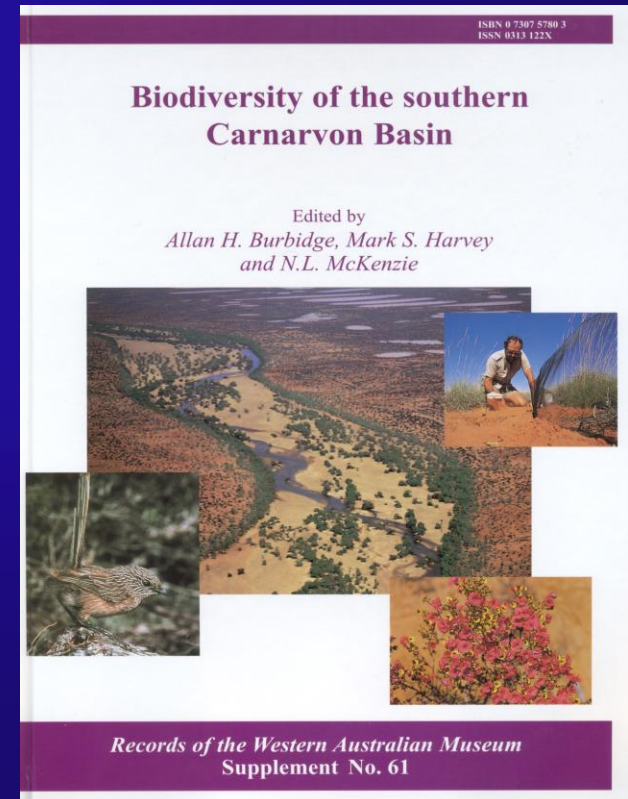
Disturbance Ecology

- ❖ rangelands management
- ❖ impacts of fire
 - ❖ Fire / mulga study
 - ❖ Mine track rehab study
 - ❖ Gibson Desert
- ❖ modifying processes
 - ❖ Ord River study
- ❖ aquatic ecosystems
 - ❖ monitoring river health
 - ❖ salinity monitoring



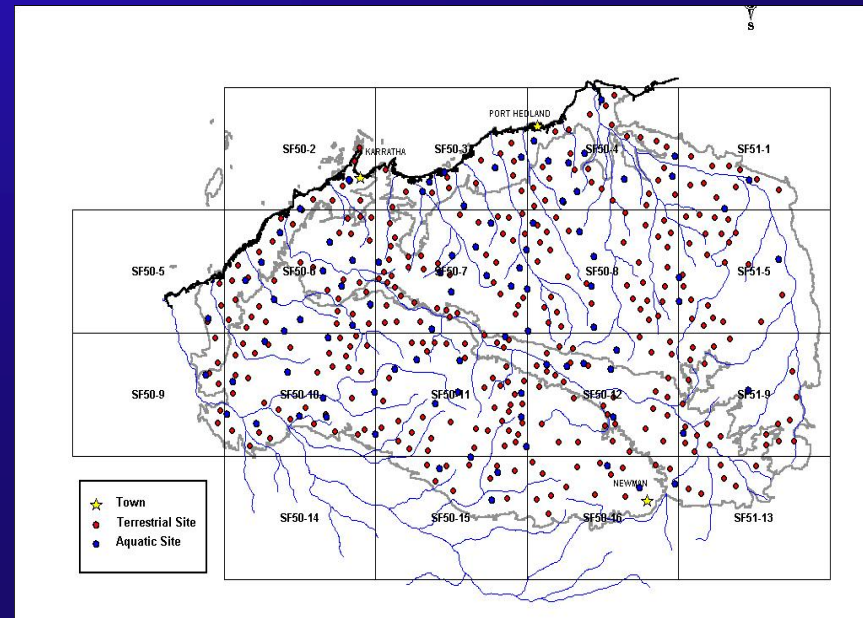
Biological Survey and Reserve System

- ❖ CAR Reserve system – Regional surveys
 - ❖ Pilbara biological survey
 - ❖ Rangelands acquisition program
- ❖ Site specific surveys
 - ❖ Pilbara and Kimberley islands
 - ❖ Little Sandy Desert, Barlee Range, Burrup etc.
 - ❖ Tussock grasslands, hilltops etc.
- ❖ National Biodiversity Audit



Pilbara Regional Survey

- ❖ Under representation of reserve system.
- ❖ Resource developments, pastoral and tourism industries.
- ❖ Northern and desert biota, endemics.
- ❖ Regional context:
 - 300 terrestrial sites
 - 50 sub-fossil sites
 - 90 aquatic sites
 - 360 stygofauna sites



What are Stygofauna ?

- ❖ Stygofauna live in groundwater. Most are crustaceans but include beetles, mites, worms and fish as well.
- ❖ About 130 species recorded in WA so far. Probably several thousand occur and they are a major component of WA biodiversity.
- ❖ Many of the crustaceans appear to be ancient species with a pre-Gondwanan history.

- ❖ Bathynellid



Stygofauna distribution

- ❖ Main habitats are underground karst caves, calcrete deposits and alluvial beds associated with drainage systems but occur in all aquifers.
- ❖ Best studied areas are Cape Range, Pilbara and Yilgarn.
- ❖ Occur in saline and fresh water.

❖ Amphipod



Stygofauna conservation issues

- ❖ Stygofauna threatened by de-watering for mining below watertable and by water abstraction for domestic and industrial supply.
- ❖ May also be threatened by changes in water quality.
- ❖ EPA has assessed mining proposals for impact on stygofauna and several stygofaunal communities have been listed as threatened by WATSCU.
- ❖ No formal reservation system exists for stygofauna other than terrestrial reserve system.

- ❖ Copepod



Stygofauna survey

- ❖ Little is known about stygofaunal distribution and ecology in WA.
- ❖ Management and conservation of this significant source of biodiversity is major challenge – mining industry.
- ❖ To provide a framework for stygofauna conservation Science Division has commenced a regional survey of stygofauna in the Pilbara.

❖ Ostracod



Science Division

Future Directions

- ❖ Knowledge Management Systems – Nature Bank
- ❖ Biological Survey
- ❖ Threatened Species & Communities
- ❖ Landscape Ecology & Reconstruction
- ❖ Natural Resource Management
- ❖ Monitoring
- ❖ Partnerships & Collaborations

naturebank

A Western Australian Conservation Information System

- ❖ Better knowledge management.
- ❖ Assemble physical, biological and ecological data into central databases which are readily accessible to users.
- ❖ Develop predictive models about species distributions, ecological processes, impacts etc.
- ❖ Draft concept plan available
- ❖ Intend to establish 3 positions (Data Manager, GIS Research Scientist, Biological Modeller)