Science Division

"Discovering the nature of WA"

Corporate Executive Briefing

25 June 2007

Neil Burrows

Department of Environment and Conservation

Government of Western Australia

The 6th MASS SPECIES EXTINCTION IS UNDERWAY ON EARTH


BBC NEWS

Front Page
World
UK
UK Politics
Business
Sci/Tech
Health
Education
Entertainment
Talking Point
In Depth
AudioVideo

Tuesday, 21 May, 2002, 13:48 GMT 14:48 UK

Quarter of mammals 'face extinction'

Siberian tigers may vanish within three decades

By Corinne Podger
BBC science correspondent

Almost a quarter of the world's mammals face extinction within 30 years, according to a United Nations report on the state of the global environment.


CNN.com/SCI-TECH

THE GREEN CENTURY

TIME

Scientists agree world faces mass extinction

August 23, 2002 Posted: 11:43 AM EDT (1543 GMT)

By Gary Strieker
CNN

(CNN) -- The complex web of life on Earth, what scientists call "biodiversity," is in serious trouble.

Organ Pipe Cactus National


CNN.com/SCIENCE & SPACE

Home Page
World
U.S.
Weather
Business
Sports
Politics
Law
Technology
Science & Space
Health
Entertainment
Travel
Education
Special Reports

NEXT@CNN

» AIRS: Saturdays 3 p.m. ET / Sundays 5 p.m. ET

Study: Only 10 percent of big ocean fish remain

By Marsha Walton
CNN
Wednesday, May 14, 2003 Posted: 10:28 PM EDT (0229 GMT)

(CNN) -- A new global study concludes that 90 percent of all large fishes have disappeared from the world's oceans in the past half century, the


BBC NEWS UK EDITION

News Front Page
World
UK
England
Northern Ireland
Scotland
Wales
Business
Politics
Health
Education
Sci/Nature
Technology
Entertainment
Have Your Say
Magazine

Last Updated: Thursday, 18 September, 2003, 12:04 GMT 13:04 UK

E-mail this to a friend
Printable version

Lions 'close to extinction'

Lion populations have fallen by almost 90% in the past 20 years, leaving the animal close to extinction in Africa, a wildlife expert has warned.

There are now only 23,000 left, compared to an estimated 200,000 two decades ago,

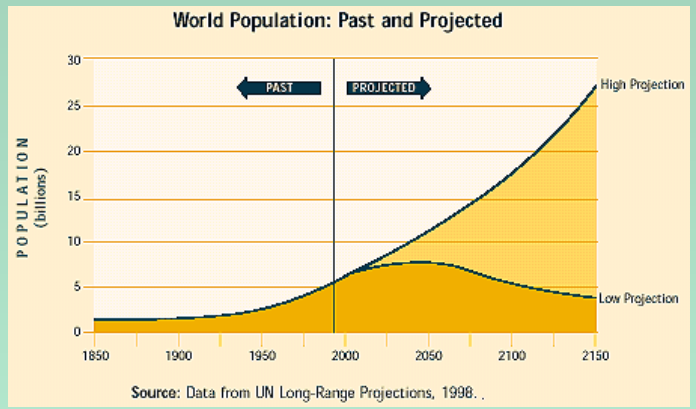
Live with them or lose them

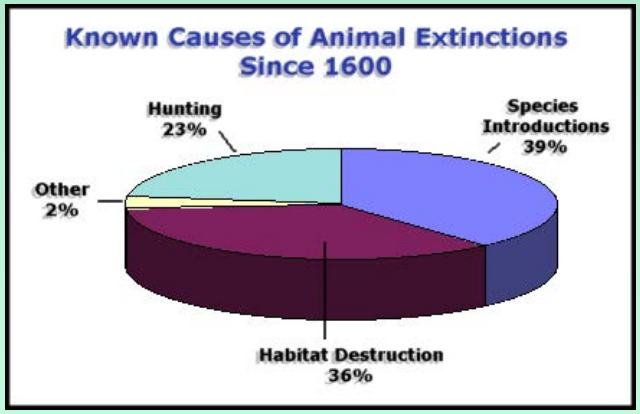
SEE ALSO:
'Wildlife watchers stay away from Kenya
22 Sep 98 | Africa
'Kenyan lions killed in revenge attacks
23 Jun 03 | Africa
'Malawi's killer lion shot dead
24 Feb 03 | Africa

RELATED INTERNET LINKS:

- First mass extinction (c. 440 mybp)
- Second mass extinction (c. 370 mybp)
- Third mass extinction (c. 245 mybp)
- Fourth mass extinction (c. 210 mybp)
- Fifth mass extinction (c. 65 mybp)
- **Sixth mass extinction commenced 10k ybp – first biotic, rather than physical, cause.**

- Human population 30 times the sustainable population, altering global biophysical processes
- 70% of Earth's habitable terrestrial surface is disturbed by agriculture, natural resource use or construction (Hannah *et al.* 1994)
- Humans use around 45% of terrestrial net primary productivity
- 80% of forests that once covered the planet have been cleared, modified or degraded (Bryant *et al.* 1997)
- >60% of major fisheries are over-exploited (FAO 2006)
- 20% percent of the world's coral reefs are effectively destroyed (Wilkinson 2004).



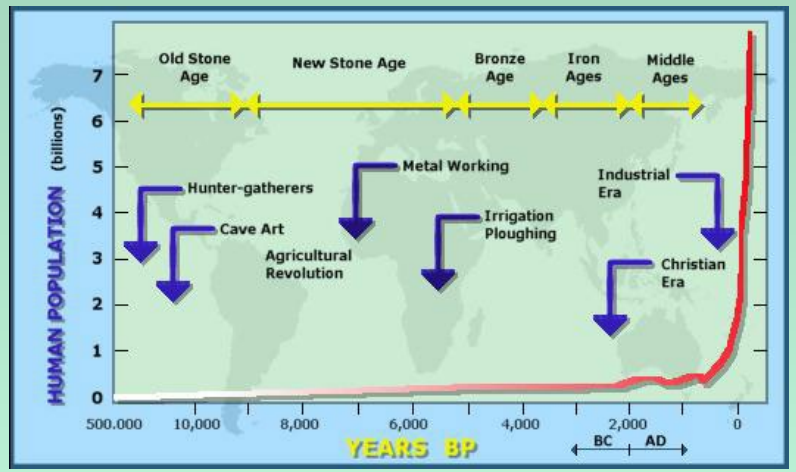


Source: World Conservation Monitoring Centre, "Global Biodiversity" Chapman & Hall, London, 1992.

Biodiversity Conservation Global Situation

- Species extinction rate over the last 100 years is between 100 and 1000 times faster than the background rate of species extinction (Pimm *et al.* 1995)

- Earth is currently losing in the order of 30,000 species per year (Wilson 1993)



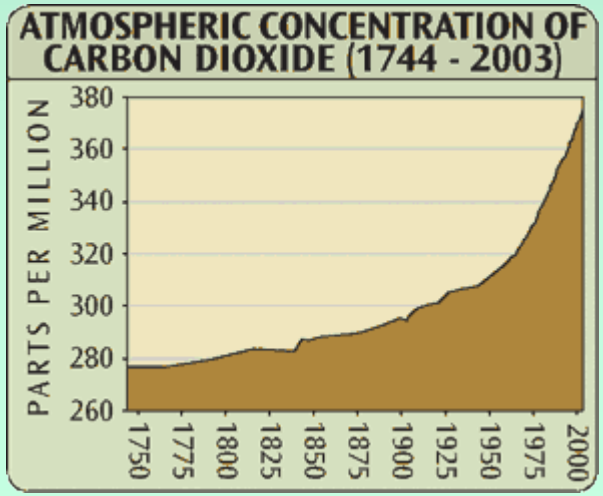
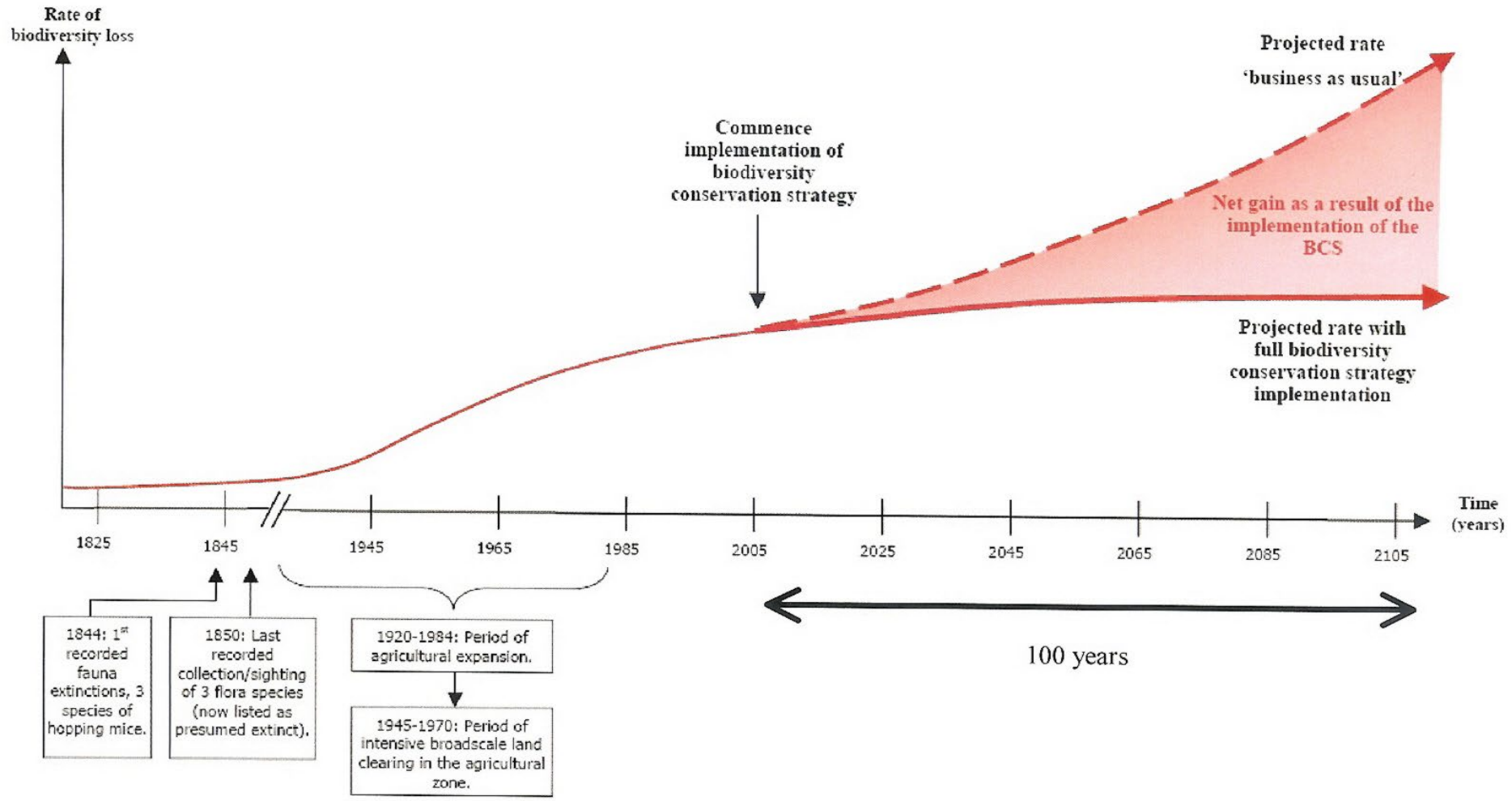


Figure 4: A conceptual representation of past and projected rate of biodiversity loss in WA, and expected impact of implementing the State biodiversity conservation strategy. Source: Keith Claymore pers comm.



The Role of Science

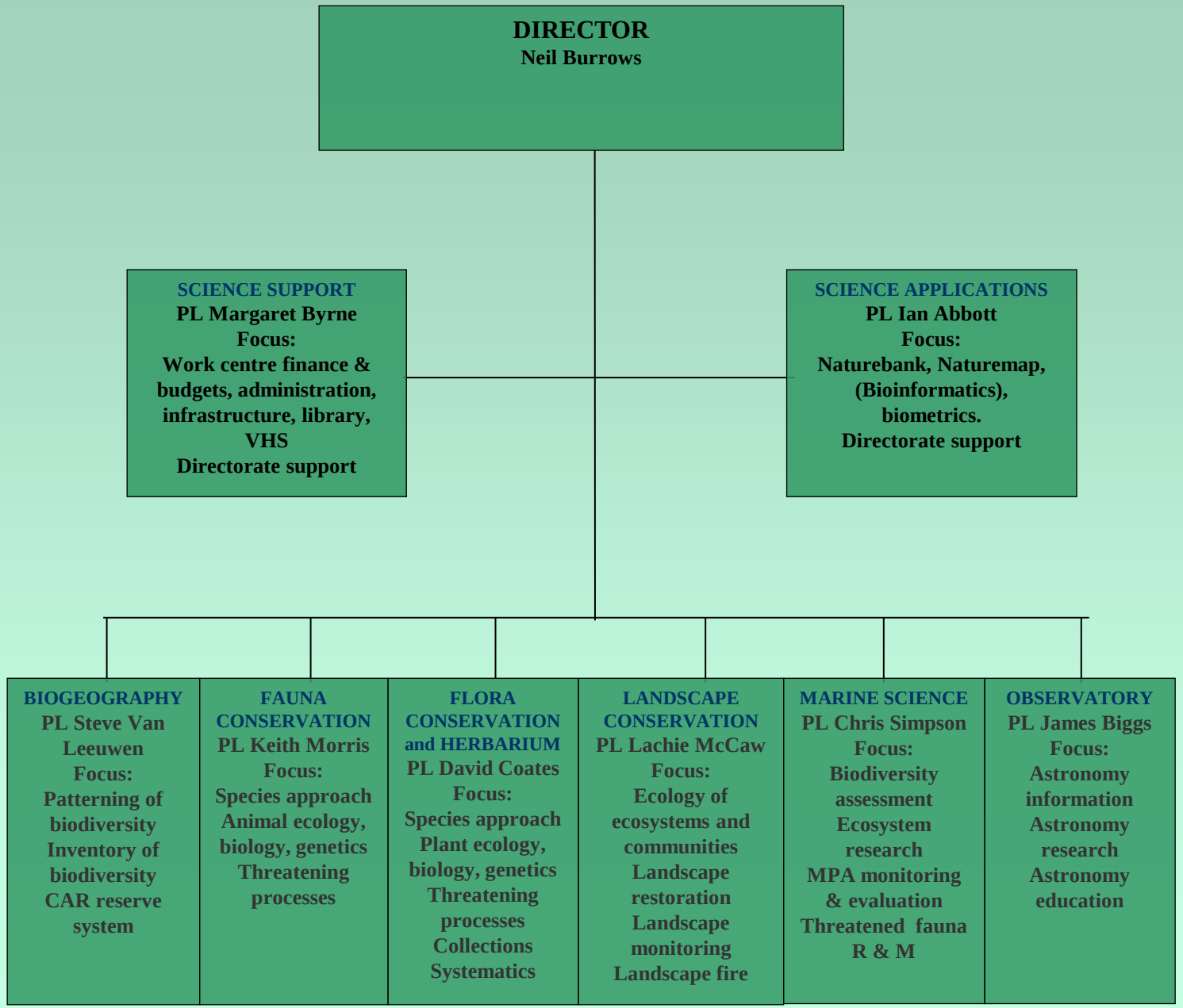
"Although science can help ensure that decisions are made with the best available information, ultimately the future of biodiversity will be determined by society".

Science Division Services

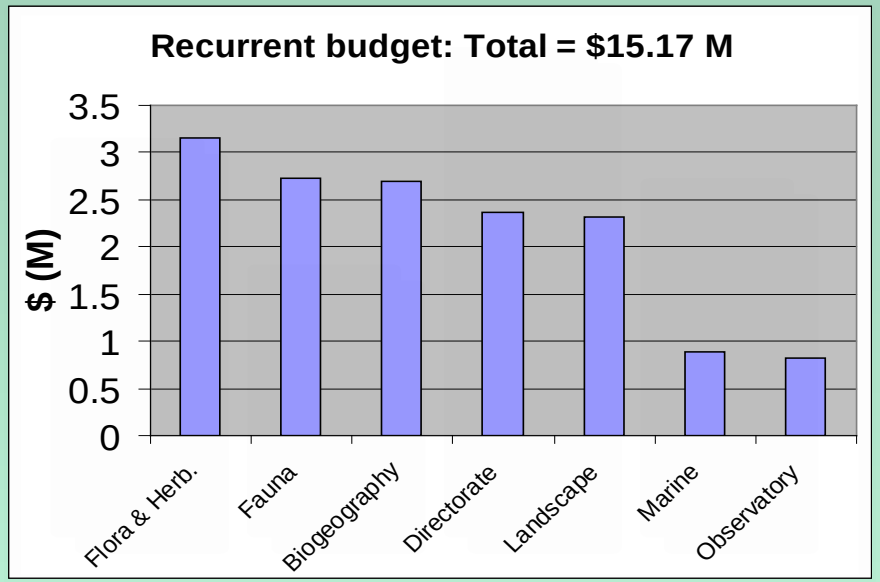
- Knowledge:
  - Acquire Knowledge to uphold effective conservation of biodiversity and sustainable natural resource management in WA
  - Provide Advice and technical support to guide policy and planning
  - Transfer Knowledge to improve management actions & outcomes
  - Communicate Knowledge internally and externally

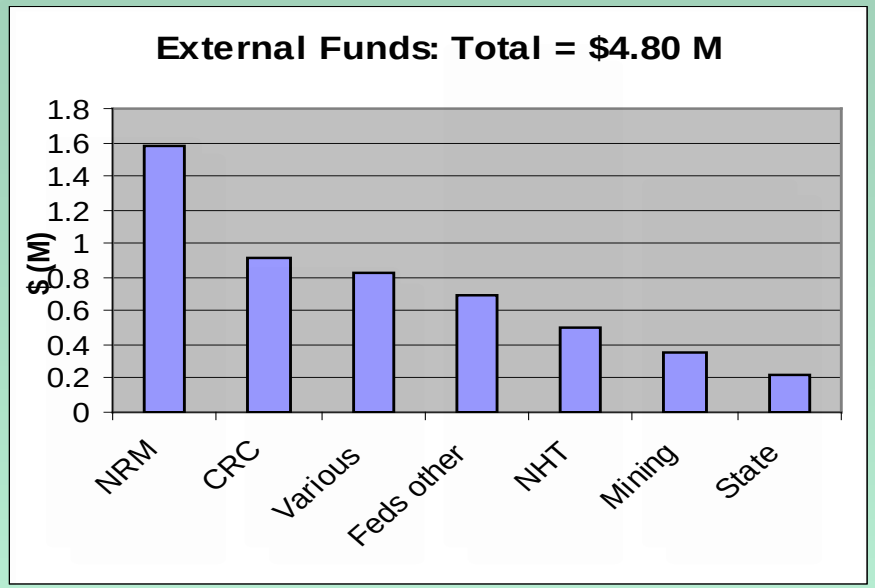
- Research, survey, monitoring, global science network, adaptive management

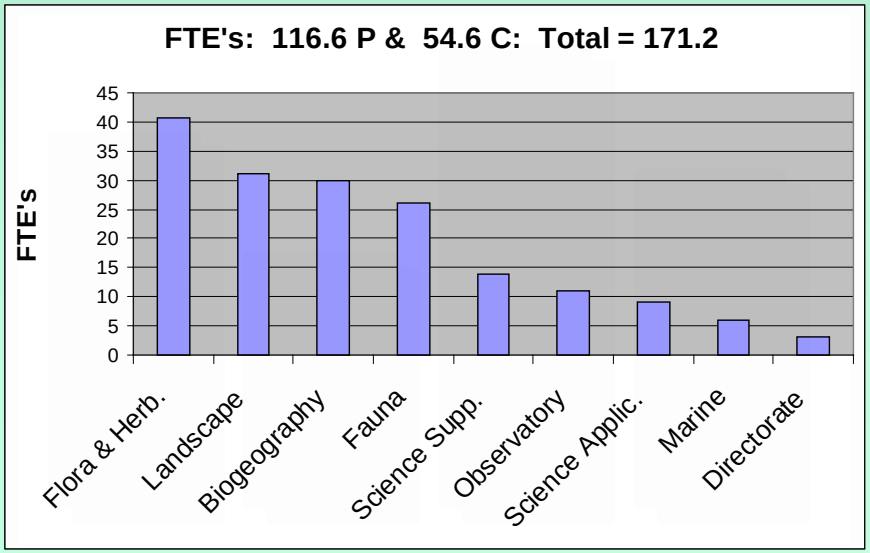
- Other: Library,VHS, Biometrics, Herbarium, Information Systems (e.g., *FLORABASE, NATUREMAP*), Labs (incl. DNA), Education, Training


DIRECTOR
Neil Burrows
SCIENCE SUPPORT
PL Margaret Byrne
Focus:
Work centre finance & budgets, administration, infrastructure, library, VHS
Directorate support
SCIENCE APPLICATIONS
PL Ian Abbott
Focus:
Naturebank, Naturemap, (Bioinformatics), biometrics.
Directorate support
BIOGEOGRAPHY
PL Steve Van Leeuwen
Focus:
Patterning of biodiversity
Inventory of biodiversity
CAR reserve system
FAUNA CONSERVATION
PL Keith Morris
Focus:
Species approach
Animal ecology, biology, genetics
Threatening processes
FLORA CONSERVATION and HERBARIUM
PL David Coates
Focus:
Species approach
Plant ecology, biology, genetics
Threatening processes
Collections
Systematics
LANDSCAPE CONSERVATION
PL Lachie McCaw
Focus:
Ecology of ecosystems and communities
Landscape restoration
Landscape monitoring
Landscape fire
MARINE SCIENCE
PL Chris Simpson
Focus:
Biodiversity assessment
Ecosystem research
MPA monitoring & evaluation
Threatened fauna
R & M
OBSERVATORY
PL James Biggs
Focus:
Astronomy information
Astronomy research
Astronomy education

Staff and Budget Summary







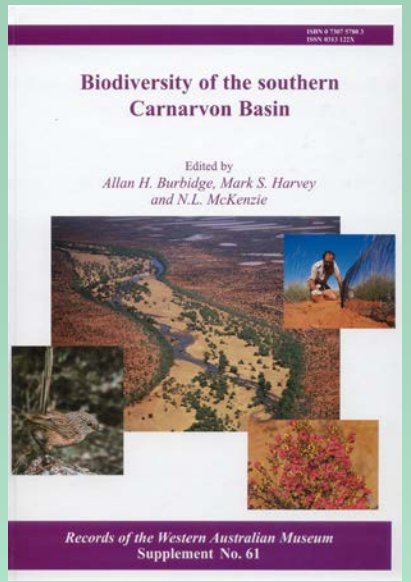
Research Centres

Albany, Bickley, Busselton, Dwellingup, Herbarium, Kensington, Kununurra, Manjimup, Woodvale

Significant Partnerships

- 62 Students (mostly PhD)
- 96 (56%) research projects with other agencies.

Priorities
Biogeography



- Complete Pilbara regional biological survey
- Commence Kimberley islands biological survey
- Complete banded ironstone formations floristic survey (& other sub-regional surveys)
- Develop a 10 year strategic plan for regional scale Biological Survey

Priorities
Fauna Conservation

- Prepare & assist with implementation of recovery plans
- Western Shield:
  - Unfinished business WS Mk 1: Woylie & other mammal declines in SW, meso-predator release
  - Expansion into semi-arid and arid zones (predator control, fauna reintroductions)
- Feral animals - survey, impact assessment & control measures camels, pigs, goats
- Gilbert's Potoroo: Establish second mainland population; Survey for additional wild populations; Cross-fostering; Larger captive breeding compound
- Cane toad monitoring/response

Priorities
Flora Conservation

- Ongoing identification & survey of threatened taxa
- Ongoing research into ecology & biology of threatened taxa, threatening processes (weeds, disease, changed fire, salinity), recovery actions
- Molecular genetic analysis and re-assessment of taxonomic and conservation status of critically endangered flora.
- Fire and weeds in fragmented landscapes
- Threatened Seed Centre - Millennium Seed Bank Project
- *Phytophthora* risk, susceptibility, efficacy of Phosphate

Priorities Herbarium

- New herbarium building
- Expansion of taxonomic effort
- Expansion of fungi specimens & information
- Increase plant ID capacity
- Incorporation of marine algal specimens ex universities & CSIRO
- Ongoing development of information systems including FloraBase
- Policies on Charging, Vouchering, ID, Accessions

Priorities
Landscape Conservation

- Fire ecology & management incl. ecosystem responses, GG emissions:
  - north Kimberley, coastal heathlands, goldfields woodlands, hummock grasslands
- Develop and expand resource condition monitoring
- Climate change monitoring - 'at risk' species and ecosystems
- Maintain wetlands monitoring
- Develop a proposal for integrated forest health monitoring

Priorities Landscape Conservation

- Complete pre-treatment measurement for stream buffer study
- Review the effects of timber harvesting on groundwater and stream-flow in the jarrah forest (IRZ study)
- Commence 'targeted' biological survey of SW forests.
- Complete study into seed collection zones for rehabilitation species
- Implement an updated forest fire danger and behaviour prediction system based on findings from Project Vesta
- Continue with long term forest monitoring programs (FORESTCHECK, Fire Regimes, Mammals, Birds)

Priorities
Marine Science

- Marine Science Strategy & Business Plan
- Statewide marine resource condition monitoring and evaluation system
- Coral reef recovery studies - Ningaloo MP & Barrow Island Marine Management Area
- Biodiversity inventory & mapping – Montebello & Barrow Islands, Rowley Shoals
- Monitoring coral-eating snail – *Drupella*, Ningaloo MP

Science Applications

Future Directions

- Avon Catchment baselining project
- Develop information management systems to improve access to data, especially biological survey data
- Develop and maintain a meta-database
- Continue the development of Florabase & *NatureMap*

Priorities General

- Strategic research plan for next 10 years
- Biodiversity Assessment 2008 – WA (NLWRA)
- Regional adaptive management projects
- Assist with improving the design criteria for a CAR reserve system
- Assist with the development and implementation of Regional fire management plans
- Develop and undertake ecosystem/native vegetation mapping at 1:100,000 for the entire State.
- Assist with the development and implementation of Regional risk assessment protocols for pest animals, weeds and P.c.

Challenges

- Maintain/grow permanent staff expertise to meet future challenges – budget and recruiting issues
- 'Brain drain' as skilled and experienced staff leave the workforce or are attracted to better opportunities
- Maintaining a science presence in remote areas
- Grow partnerships and alternative sources of revenue
- Improve communication/uptake/impact
- Improve the accommodation situation

Thank You

Science Division

"Discovering the nature of WA"

Future Directions

Environmental Management Division Meeting

5 April 2007

Neil Burrows

Department of Environment and Conservation

Government of Western Australia

Role of Conservation Science in DEC

- Knowledge and understanding of biodiversity and ecosystem processes is essential to underpin good policy, planning, implementation and monitoring
- Science ***informs:***
  - policy, planning and decision making
  - society

Vision

Our science conserving biodiversity

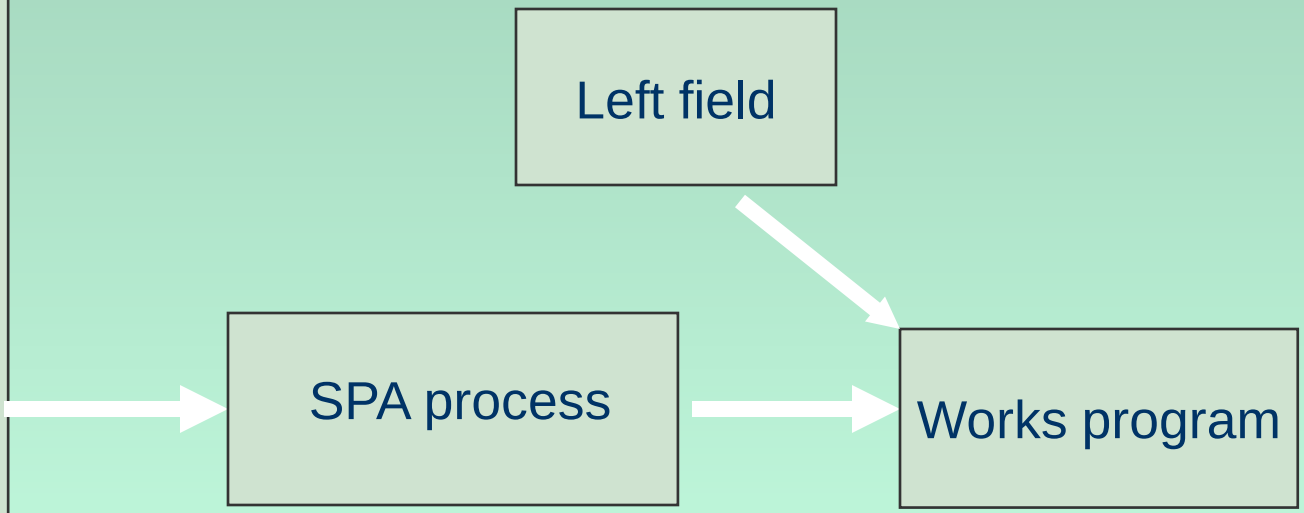
Mission

To provide up-to-date and scientifically sound information to uphold effective conservation of biodiversity and sustainable natural resource management in Western Australia

Research Priority Drivers

Influences

- Policy & Politics
- Plans/strategies
- Reviews
- Risk management
- Scientists
- Regions
- Community
- Historical
- Funding
- Skills/Resources



Key Strategic Goals

- Understand the composition of, and patterning in, terrestrial and marine biodiversity
- Understand the threats to biodiversity and develop evidenced-based management options to ameliorate threats

Key Strategic Goals

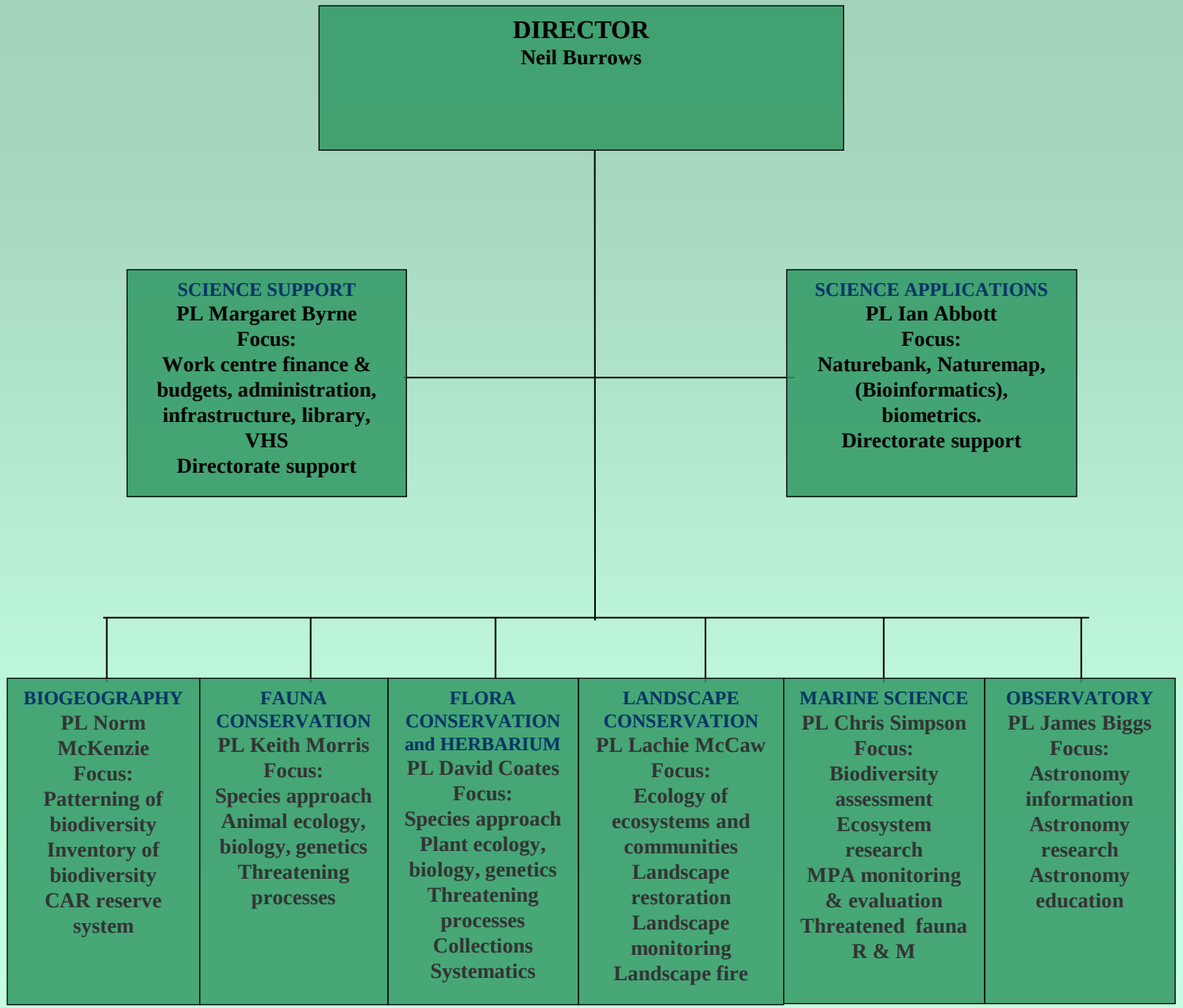
- Monitor and evaluate the condition and trends of species, populations and communities in terrestrial and marine ecosystems
- Provide scientific concepts and tools for best practice management of biodiversity as an integral part of natural resource management

Key Strategic Goals

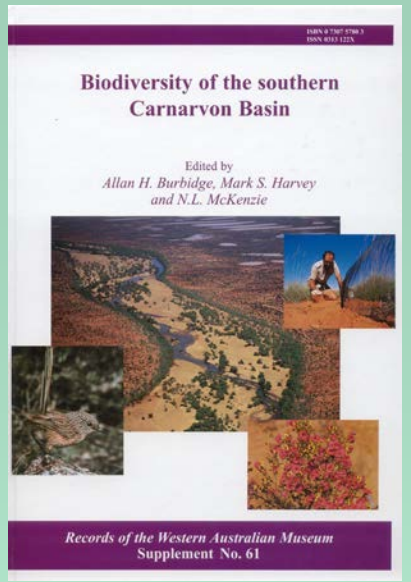
- Promote and facilitate the uptake of research findings and communicate the contribution of science to biodiversity conservation and sustainable NRM
- Improve knowledge of how people respond to, and interact with, the natural environment including protected areas

Knowledge Acquisition Strategies

- Research
- Survey
- Monitoring
- Adaptive management
- Learn from others (science information exchange)
- Partnerships


DIRECTOR
Neil Burrows
SCIENCE SUPPORT
PL Margaret Byrne
Focus:
Work centre finance & budgets, administration, infrastructure, library, VHS
Directorate support
SCIENCE APPLICATIONS
PL Ian Abbott
Focus:
Naturebank, Naturemap, (Bioinformatics), biometrics.
Directorate support
BIOGEOGRAPHY
PL Norm McKenzie
Focus:
Patterning of biodiversity
Inventory of biodiversity
CAR reserve system
FAUNA CONSERVATION
PL Keith Morris
Focus:
Species approach
Animal ecology, biology, genetics
Threatening processes
FLORA CONSERVATION and HERBARIUM
PL David Coates
Focus:
Species approach
Plant ecology, biology, genetics
Threatening processes
Collections
Systematics
LANDSCAPE CONSERVATION
PL Lachie McCaw
Focus:
Ecology of ecosystems and communities
Landscape restoration
Landscape monitoring
Landscape fire
MARINE SCIENCE
PL Chris Simpson
Focus:
Biodiversity assessment
Ecosystem research
MPA monitoring & evaluation
Threatened fauna
R & M
OBSERVATORY
PL James Biggs
Focus:
Astronomy information
Astronomy research
Astronomy education

Future Directions
Biogeography



- Complete Pilbara IBRA biological survey
- Commence Kimberley Islands biological survey
- Continue banded ironstone ranges floristic survey (& other sub-regional surveys)
- Commence SW Forests biological survey (FMP)
- Develop a 10 year strategic plan for regional scale Biological Survey

Future Directions
Fauna Conservation

- Prepare & implement recovery plans
- Western Shield:
  - Unfinished business WS Mk 1: Woylie decline, meso-predator release?
  - Expansion into semi-arid and arid zones (predator control, fauna reintroductions)

- Impact assessment feral animals esp; camels, pigs, goats
- Gilbert's Potoroo: Establish second mainland population; Survey for additional wild populations; Cross-fostering; Larger captive breeding compound
- Cane toad monitoring/response

Future Directions Flora Conservation

- Ongoing identification & survey of threatened taxa
- Ongoing research into ecology & biology of threatened taxa, threatening processes (weeds, disease, changed fire, salinity), recovery actions
- Molecular genetic analysis and re-assessment of taxonomic and conservation status of critically endangered flora.
- Fire and weeds in fragmented landscapes
- Threatened Seed Centre - Millennium Seed Bank Project
- *Phytophthora* risk, efficacy of Phosphate

Future Directions Herbarium

- New herbarium building
- Expansion of taxonomic effort
- Expansion of fungi specimens & information
- Increase plant ID capacity
- Incorporation of marine algal specimens ex universities & CSIRO
- Ongoing development of information systems including FloraBase
- Policies on Charging, Vouchering, ID, Accessions

Future Directions
NCD
Landscape Conservation

- North Kimberley fire ecology & management
- Fire ecology research including carbon fluxes; coastal heathlands, eucalypt woodlands, hummock grasslands
- Develop and expand resource condition monitoring program
- Climate change monitoring - montane, mesic south-west ecosystems
- Maintain wetlands monitoring
- Landscape restoration ecology – wheatbelt, rangelands

Future Directions
Marine Science

- Marine Science Strategy
- Statewide marine resource condition monitoring and evaluation system
- Coral reef recovery studies - Ningaloo MP & Barrow Island Marine Management Area
- Biodiversity inventory & mapping – Montebello & Barrow Islands, Rowley Shoals
- Monitoring coral-eating snail – *Drupella*, Ningaloo MP

Science Applications

Future Directions

- Develop corporate information management systems to improve access to biological data
- Develop and maintain a meta-database
- Continue the development of *Florabase* & *NatureMap*

Cross-Cutting Themes Future Directions

- Strategic research plan for next 10 years
- Assist in the development and implementation of terrestrial resource condition monitoring
- With Regional Services and Nature Conservation Divisions, develop at least one large-scale active adaptive management project in each Region
- Model likely impacts of climate change on potentially vulnerable species and communities in SW WA
- Explore management adaptations to climate change for biodiversity conservation

Future Directions

- Assist with improving the design criteria for a CAR reserve system
- Assist with the development of Regional fire management plans
- Develop and undertake ecosystem/native vegetation mapping at 1:100,000 for the entire State.
- Assist with the design and implementation of invasive species surveys (camels, goats, pigs)

Future Directions

- Assist with the development of risk assessment protocols for weeds and P.c.

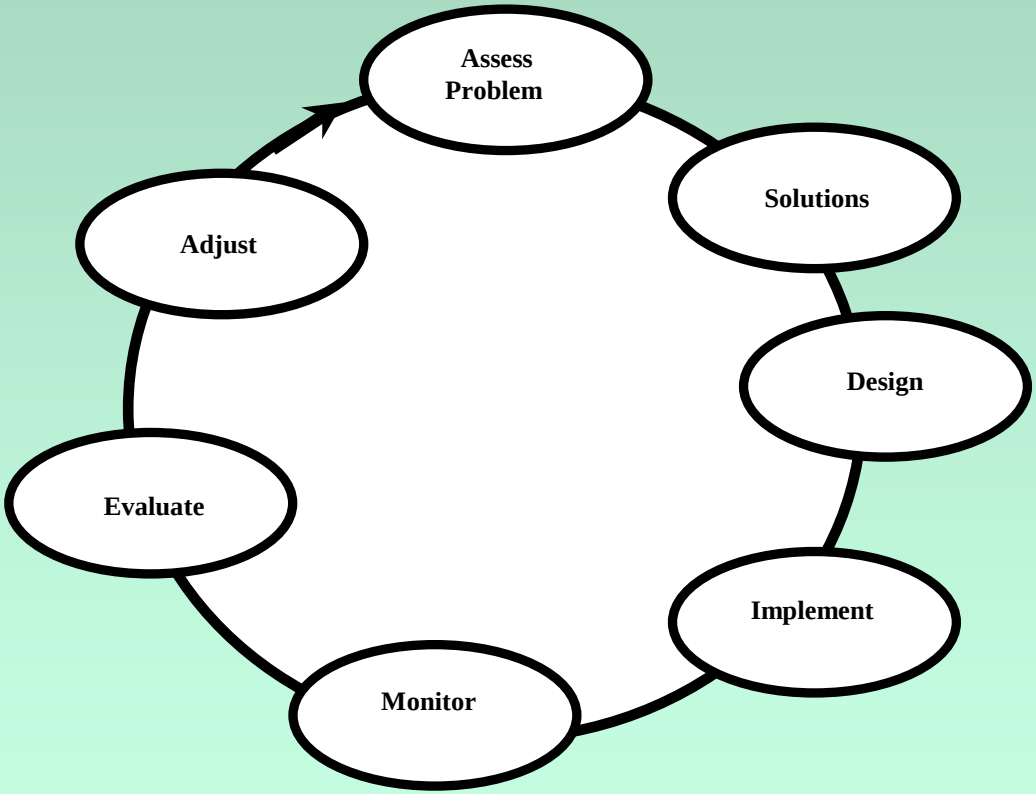
Adaptive Management

Adaptive management incorporates ***existing knowledge*** *into* ***conservation action****. Specifically, it is the* ***integration*** *of design, management, and* ***monitoring*** *to systematically* ***test assumptions*** *in order to* ***adapt, learn*** *and deliver conservation outcomes*

Integrated Adaptive Management

- It also a mechanism for *integrating* the Department's resources to implement programs that deliver on-ground *conservation outcomes* and *advance knowledge*
- E.g, Adaptive management project teams comprised of staff from Science, Nature Conservation and Regional Services Divisions

Integrated Adaptive Management



Example of Integrated Adaptive Management

- Goldfields Region:
  - Rangelands Reconstruction: 600,000 ha Lorna Glen – Earaheedy complex
  - Objective: Arid zone fauna reconstruction
    - Introduced predator and herbivore control
    - A patch-burn strategy
    - Mammal translocations
    - Monitoring
- Goldfields Region, Science, Nature Conservation

Thank You

Science Division

"Discovering the nature of WA"

Future Directions

Nature Conservation Division Meeting

8 December 2006

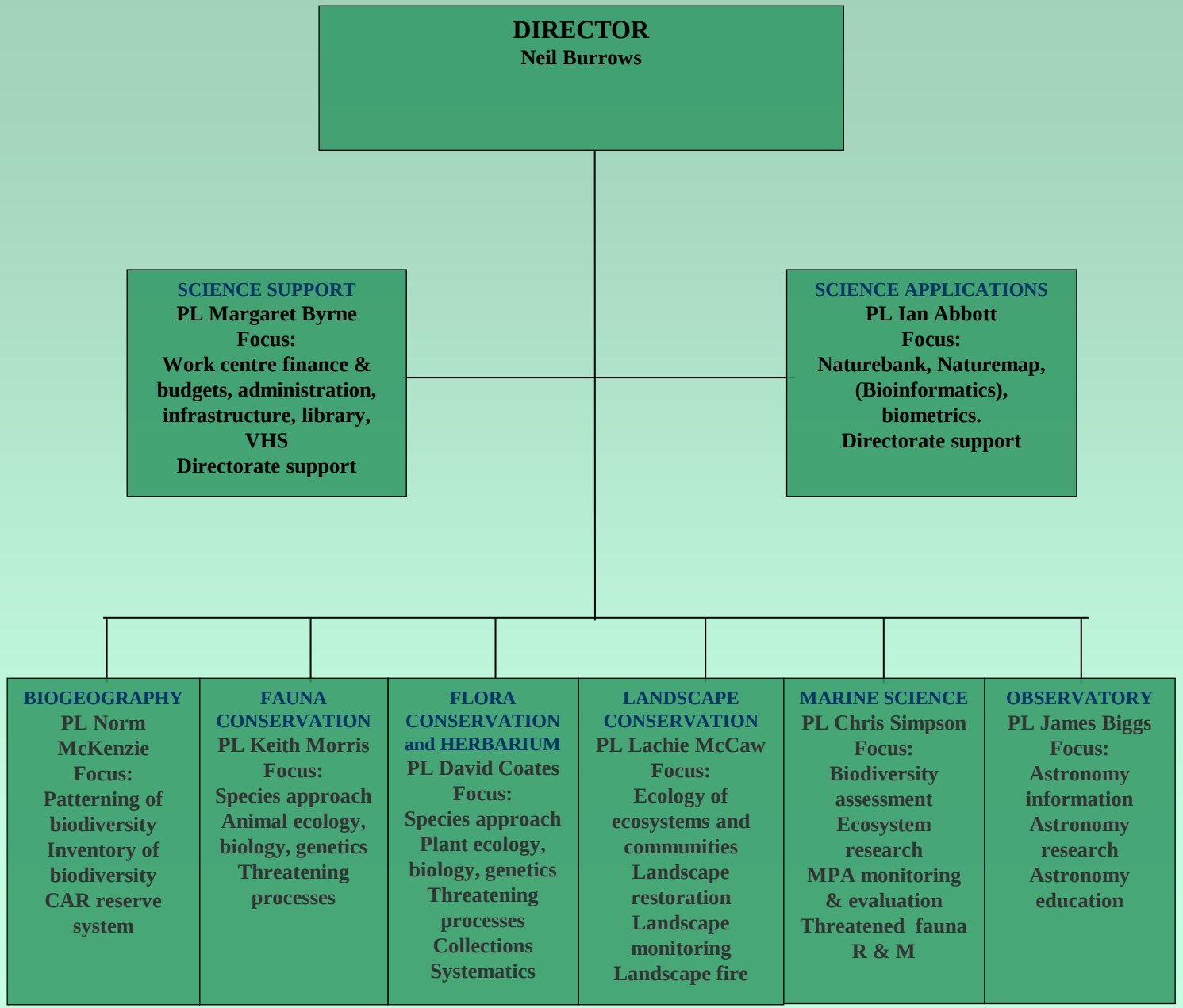
Neil Burrows

Department of Environment and Conservation

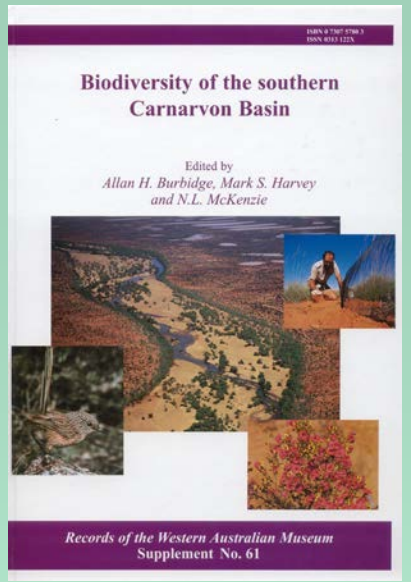
Government of Western Australia

Role of Conservation Science in DEC

- Knowledge and understanding of biodiversity and ecosystem processes is essential to underpin good policy, planning, implementation and monitoring
- Science ***informs:***
  - policy, planning and decision making
  - society


DIRECTOR
Neil Burrows
SCIENCE SUPPORT
PL Margaret Byrne
Focus:
Work centre finance & budgets, administration, infrastructure, library, VHS
Directorate support
SCIENCE APPLICATIONS
PL Ian Abbott
Focus:
Naturebank, Naturemap, (Bioinformatics), biometrics.
Directorate support
BIOGEOGRAPHY
PL Norm McKenzie
Focus:
Patterning of biodiversity
Inventory of biodiversity
CAR reserve system
FAUNA CONSERVATION
PL Keith Morris
Focus:
Species approach
Animal ecology, biology, genetics
Threatening processes
FLORA CONSERVATION and HERBARIUM
PL David Coates
Focus:
Species approach
Plant ecology, biology, genetics
Threatening processes
Collections
Systematics
LANDSCAPE CONSERVATION
PL Lachie McCaw
Focus:
Ecology of ecosystems and communities
Landscape restoration
Landscape monitoring
Landscape fire
MARINE SCIENCE
PL Chris Simpson
Focus:
Biodiversity assessment
Ecosystem research
MPA monitoring & evaluation
Threatened fauna
R & M
OBSERVATORY
PL James Biggs
Focus:
Astronomy information
Astronomy research
Astronomy education

Future Directions
Biogeography



- Complete Pilbara IBRA biological survey
- Commence Kimberley Islands biological survey
- Continue banded ironstone ranges floristic survey (& other sub-regional surveys)
- Commence SW Forests biological survey (FMP)
- Develop a 10 year strategic plan for regional scale Biological Survey

Future Directions
Fauna Conservation

- Prepare & implement recovery plans
- Western Shield:
  - Unfinished business WS Mk 1: Woylie decline, meso-predator release?
  - Expansion into semi-arid and arid zones (predator control, fauna reintroductions)
- Impact assessment feral animals esp; camels, pigs, goats
- Gilbert's Potoroo: Establish second mainland population; Survey for additional wild populations; Cross-fostering; Larger captive breeding compound
- Cane toad monitoring/response

Future Directions
Flora Conservation

- Ongoing identification & survey of threatened taxa
- Ongoing research into ecology & biology of threatened taxa, threatening processes (weeds, disease, changed fire, salinity), recovery actions
- Molecular genetic analysis and re-assessment of taxonomic and conservation status of critically endangered flora.
- Fire and weeds in fragmented landscapes
- Threatened Seed Centre - Millennium Seed Bank Project
- *Phytophthora* risk, efficacy of Phosphate

Future Directions Herbarium

- New herbarium building
- Expansion of taxonomic effort
- Expansion of fungi specimens & information
- Increase plant ID capacity
- Incorporation of marine algal specimens ex universities & CSIRO
- Ongoing development of information systems including FloraBase
- Policies on Charging, Vouchering, ID, Accessions

Future Directions NCD Landscape Conservation

- North Kimberley fire ecology & management
- Fire ecology research including carbon fluxes; coastal heathlands, eucalypt woodlands, hummock grasslands
- Develop and expand resource condition monitoring program
- Climate change monitoring - montane, mesic south-west ecosystems
- Maintain wetlands monitoring
- Landscape restoration ecology – wheatbelt, rangelands

Future Directions
Marine Science

- Marine Science Strategy
- Statewide marine resource condition monitoring and evaluation system
- Coral reef recovery studies - Ningaloo MP & Barrow Island Marine Management Area
- Biodiversity inventory & mapping – Montebello & Barrow Islands, Rowley Shoals
- Monitoring coral-eating snail – *Drupella*, Ningaloo MP

Science Applications

Future Directions

- Develop information management systems to improve access to data
- Develop and maintain a meta-database
- Continue the development of *NatureMap*

Science General Future Directions

- Strategic research plan for next 5-10 years
- Assist in the development and implementation of terrestrial resource condition monitoring
- With Regional Services and Nature Conservation Divisions, develop at least one large-scale active adaptive management project in each Region
- Model likely impacts of climate change on potentially vulnerable species and communities in SW WA
- Explore management adaptations to climate change for biodiversity conservation

Future Directions

- Assist with improving the design criteria for a CAR reserve system
- Assist with the development of Regional fire management plans
- Develop and undertake ecosystem/native vegetation mapping at 1:100,000 for the entire State.
- Assist with the design and implementation of invasive species surveys (camels, goats, pigs)

Future Directions

- Assist with the development of risk assessment protocols for weeds and P.c.

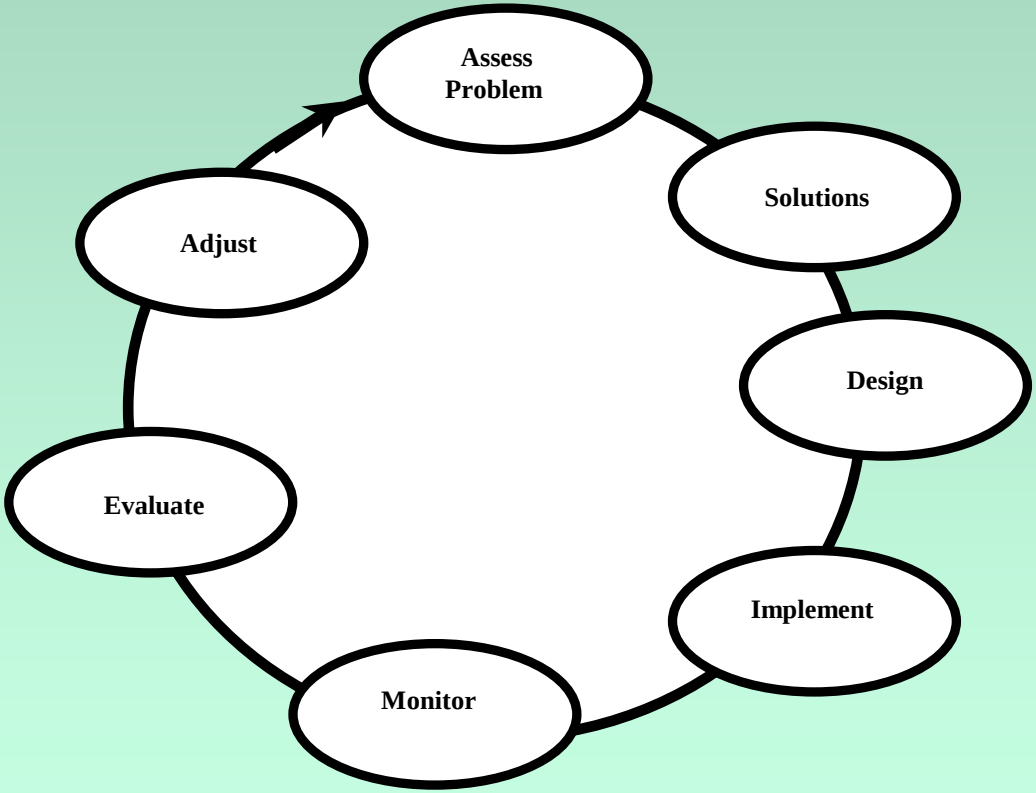
Adaptive Management

Adaptive management incorporates ***existing knowledge*** *into* ***conservation action****. Specifically, it is the* ***integration*** *of design, management, and* ***monitoring*** *to systematically* ***test assumptions*** *in order to* ***adapt, learn*** *and deliver conservation outcomes*

Integrated Adaptive Management

- It also a mechanism for *integrating* the Department's resources to implement programs that deliver on-ground *conservation outcomes* and *advance knowledge*
- E.g, Adaptive management project teams comprised of staff from Science, Nature Conservation and Regional Services Divisions

Integrated Adaptive Management



Example of Integrated Adaptive Management

- Goldfields Region:
  - Rangelands Reconstruction: 600,000 ha Lorna Glen – Earaheedy complex
  - Objective: Arid zone fauna reconstruction
    - Introduced predator and herbivore control
    - A patch-burn strategy
    - Mammal translocations
    - Monitoring
- Goldfields Region, Science, Nature Conservation

Thank You

Science Division

Discovering the nature of WA

FUTURE DIRECTIONS

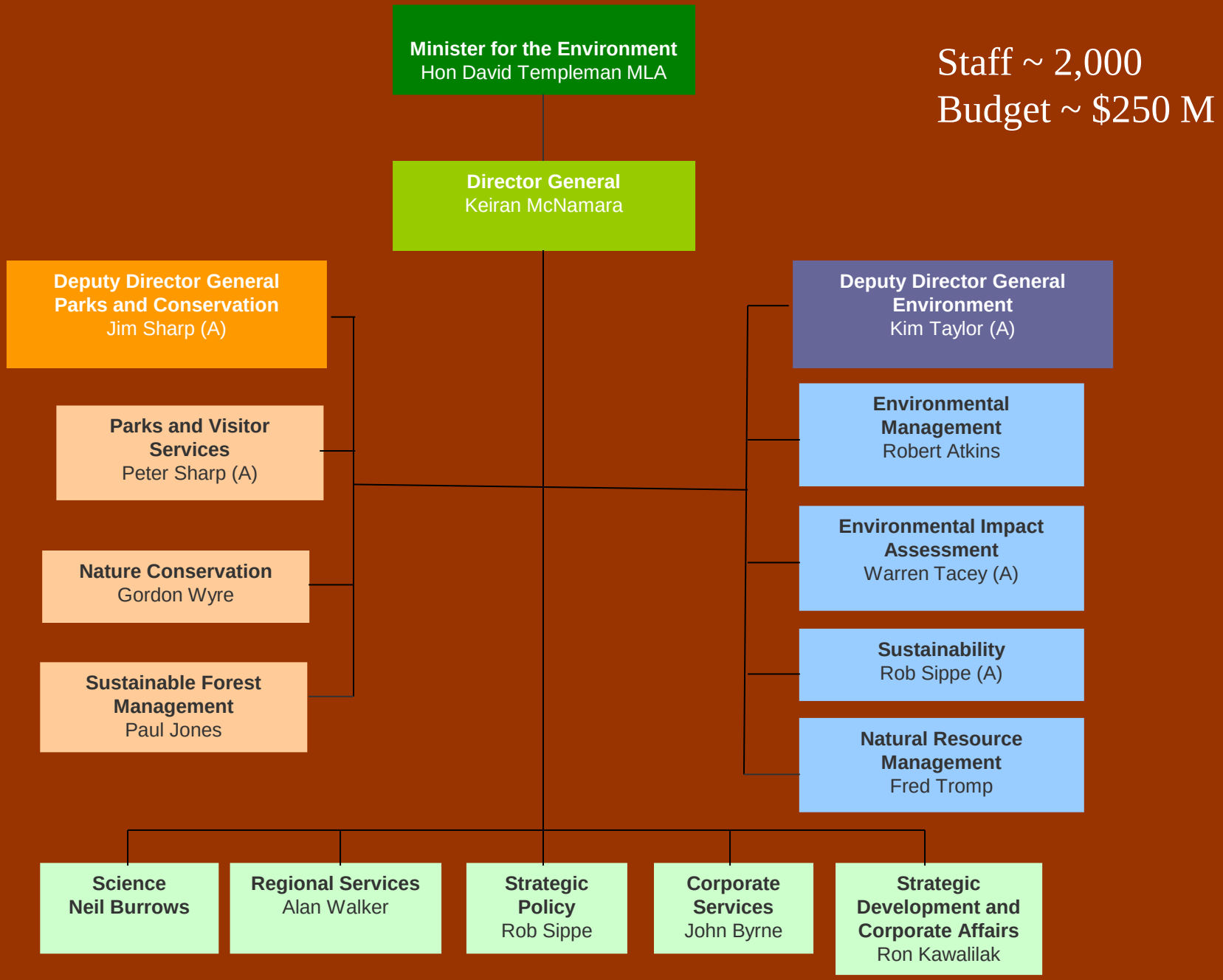
Department of Environment and Conservation

Government of Western Australia

The Department of Environment and Conservation (DEC)

- Protecting the environment
- Conserving biodiversity
- Creating sustainable community benefits
- Maintaining community involvement and support
- Promoting sustainable industry
- Improving the way we do business

Department of Environment and Conservation



Science Division

DIRECTORATE
Neil Burrows

Staff ~ 150

Budget ~ $15 M

SCIENCE SUPPORT
PL Margaret Byrne
Focus:
Work centre finance & budgets, administration, infrastructure, library, VHS
Directorate support

SCIENCE APPLICATIONS
PL Ian Abbott
Focus:
Bioinformatics, biometrics.
Directorate support

BIOGEOGRAPHY
PL Norm McKenzie
Focus:
Patterning of biodiversity
Inventory of biodiversity
CAR reserve system

FAUNA CONSERVATION
PL Keith Morris
Focus:
Species approach
Animal ecology, biology, genetics
Threatening processes

FLORA CONSERVATION and HERBARIUM
PL David Coates
Focus:
Species approach
Plant ecology, biology, genetics
Threatening processes
Collections
Systematics

LANDSCAPE CONSERVATION
PL Lachie McCaw
Focus:
Ecology of ecosystems and communities
Landscape restoration
Landscape monitoring
Landscape fire

MARINE SCIENCE
PL Chris Simpson
Focus:
Biodiversity assessment
Ecosystem research
MPA monitoring & evaluation
Threatened fauna
R & M

OBSERVATORY
PL James Biggs
Focus:
Astronomy information
Astronomy research
Astronomy education

Our Goals

G1: Understand the composition of, and patterning in, terrestrial and marine biodiversity

G2: Understand the threats to biodiversity and develop evidence-based management options to ameliorate threats

G3: Monitor and evaluate the condition and trends of species, populations and communities in terrestrial and marine ecosystems

G4: Provide scientific concepts and tools for best practice management

G5: Understand how people respond to, and interact with, the natural environment

G6: Promote and facilitate the uptake of research findings and communicate the contribution of science

Supporting Strategies

S1: Build integrated, trans-disciplinary teams to address key complex biodiversity issues

S2: Maintain and improve the quality and relevance of scientific output incorporating best practice methodology, reporting, publishing and communication

S3: Expand research capability by building strategic partnerships

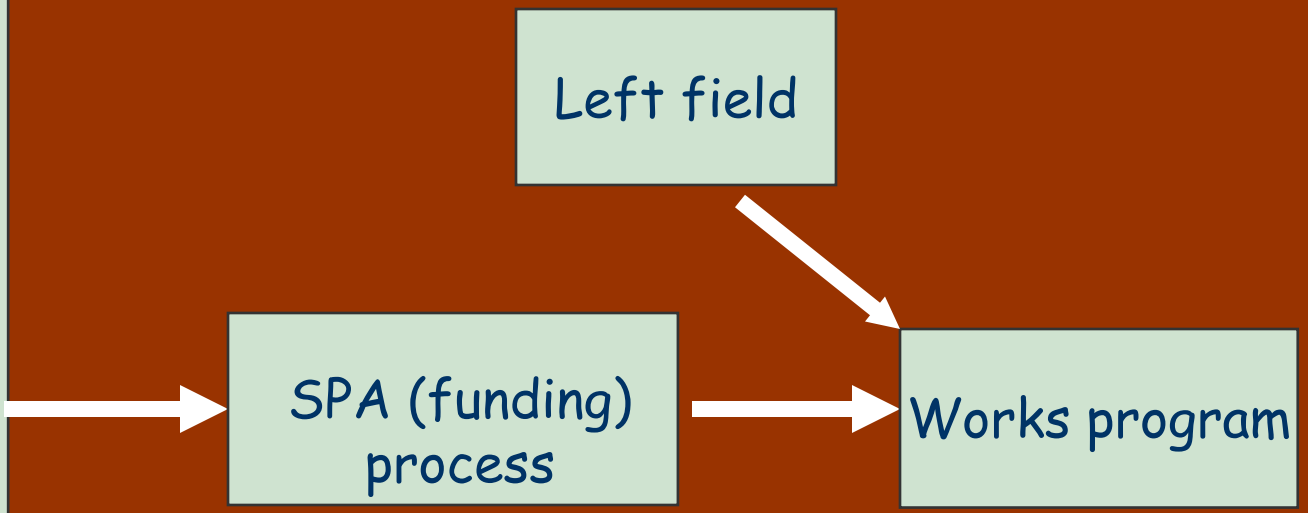
S4: Improve management and integration of corporate data and information

S5: Recruit and retain versatile, skilled, experienced and motivated staff

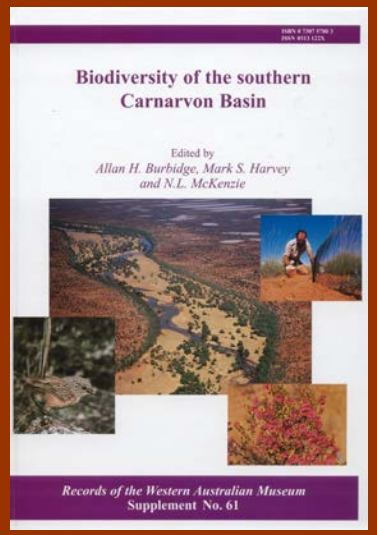
Research Priority Drivers

Forces

- Policy & Politics
- Plans/strategies
- Reviews
- Risk management
- Scientists
- Regions
- Community
- Historical
- Funding
- Skills/Resources



Future Directions
Biogeography



- Complete Pilbara biological survey
- Complete banded ironstone formations floristic survey (& other sub-regional surveys)
- Commence Kimberley islands biological survey
- Commence SW Forests biological survey (FMP)
- Develop a 10 year strategic plan for regional scale Biological Survey
- Develop a Biological Survey Information System (BioSIS)

Future Directions
Fauna Conservation

- Western Shield:
  - Mammal declines -SW, meso-predator release?
  - Expansion into semi-arid and arid zones (predator control, fauna reintroductions)
- Gilbert's Potoroo
- Threatened Fauna recovery plans
- Feral animal impact and control: camels, pigs, goats
- Cane toad impacts, monitoring, management options
- DNA Library (threatened taxa)
- Fauna monitoring programs

Future Directions
Flora Conservation

- Resolve the conservation status of threatened and priority list taxa
- Ongoing research into ecology & biology of threatened taxa, threatening processes (weeds, disease, changed fire, salinity) & development of recovery actions
- Molecular genetics:
  - Re-assessment of taxonomic and conservation status of critically endangered flora.
  - Survey
- Fire and weeds in fragmented landscapes
- Threatened Seed Centre - Millennium Seed Bank Project
- *Phytophthora* risk, efficacy of Phosphate

Future Directions
Herbarium

- New State Herbarium building
- Expansion of taxonomic effort
- Expansion of fungi specimens & information
- Increase plant ID capacity
- Incorporation of marine algal specimens ex universities & CSIRO
- Ongoing development of information systems including FloraBase

Future Directions
Landscape Conservation

- North Kimberley fire ecology & management including greenhouse gas emissions
- Fire ecology & management – other ecosystems ; forests, coastal heathlands, eucalypt woodlands, hummock grasslands
- Monitoring:
  - Resource condition
  - Forests
  - Climate change
  - Wetlands
  - Riparian zones
- Landscape restoration ecology – wheatbelt, Swan Coastal Plain, rangelands

Future Directions
Landscape Conservation

- Soil conservation – timber harvesting
- Timber harvesting & groundwater and stream-flow in the jarrah forest IRZ
- Water extraction Yaragadee
- Revegetation Gnangarra mound
- Stream buffers
- FORESTCHECK & forest health monitoring

Future Directions
Marine Science

- Marine Science Strategy & Ops plan
- Statewide marine resource condition monitoring and evaluation system
- Coral reef recovery studies - Ningaloo MP & Barrow Island Marine Management Area
- Biodiversity inventory & mapping – Montebello & Barrow Islands, Rowley Shoals
- Monitoring coral-eating snail – *Drupella*, Ningaloo MP

Future Directions
Science Applications

- Avon Catchment baselining
- Information management systems to improve access to data
- Develop and maintain a meta-database
- Continue the development of *NatureMap*
- Develop a Biological Survey Information System (BioSIS)

Future Directions
Social Science

- Visitor usage and impacts
- Indicators – sustainable tourism
- Community attitudes & perceptions
- Community engagement models, including Traditional Owners

Future Directions

Cross Program activities

- New Building – Biodiversity Conservation Science Centre Stage 1@ Kensington (inc. new State Herbarium)
- Strategic research plan for next 5-10 years
- Terrestrial resource condition monitoring protocols
- Climate change:
  - Modelling response
  - Monitoring impacts
  - Management adaptation (e.g. reserve system design)
- Active adaptive management

- Design criteria CAR reserve system
- Regional fire management plans
- Vegetation/ecosystem map at 1:100,000 for the entire State.
- Invasive species (plants, animals) risk assessment and surveys
- *Phytophthora* – risk assessment model

Partnerships

- DEC Science Partner Liaison Officers University of Western Australia:
  - Dr David Coates
  - Keith Morris
  - Dr Chris Simpson
- Formal meetings twice yearly
  - Partnership opportunities
  - Student opportunities
  - Joint seminars
  - Timing – ARC grants?

Thank You

Science Division

"Discovering the nature of WA"

CALM Wildlife Officer's Conference

9 August 2005

Department of Conservation and Land Management

Government of Western Australia

Key Role of Science

- Science ***informs*** policy, planning and decision making
- Knowledge and understanding of biodiversity and ecosystem processes is essential to underpin good policy, planning, implementation and monitoring
- Policy and planning drives implementation (works programs)
- This, in turn, brings about effective science-based conservation and land management and, community and political confidence in CALM

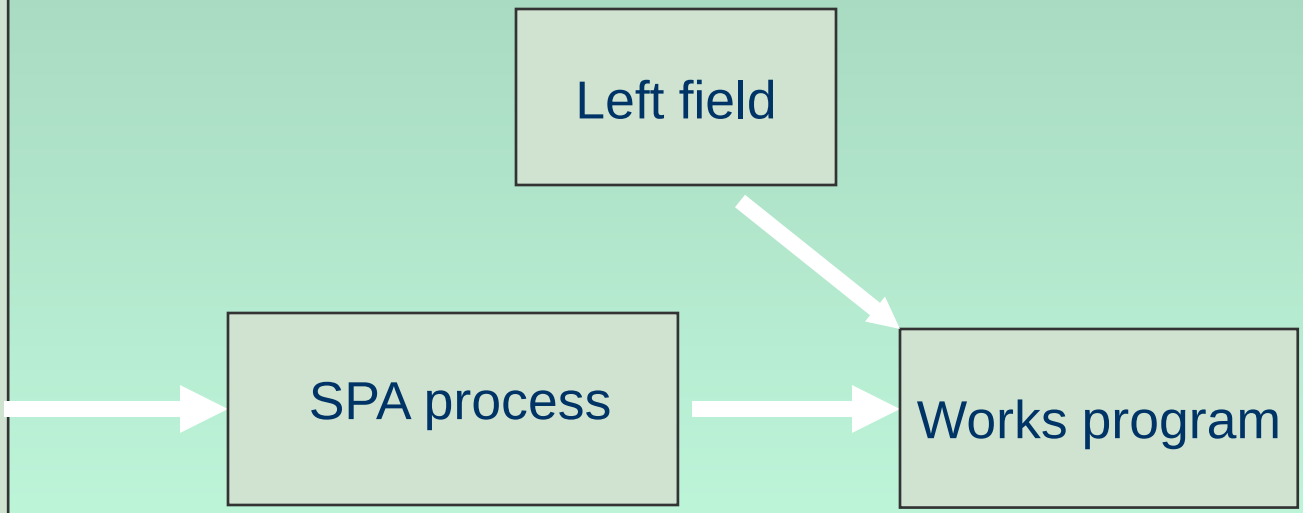
Our Focus

- Provide up-to-date and scientifically sound information to uphold effective conservation of biodiversity and sustainable natural resource management in Western Australia.
- Provide excellence in science and technology based on internationally recognised best practice.
- Operate research centres that foster, promote and reward creativity and innovation

Research Priority Drivers

Influences

- Policy & Politics
- Plans/strategies
- Reviews
- Risk management
- Scientists
- Regions
- Community
- Historical
- Funding
- Skills/Resources



Science Division Structure

Science Support
Margaret Byrne (Pilbara)
Work centre finance & budgets, administration, infrastructure, library. Vegetation Health Service. Directorate support.

Director
Neil Burrows (Goldfields)

Science Applications
Ian Abbott (Swan)
Naturebank, Naturemap, (Bioinformatics), biometrics. Facilitate integration, partnerships and science uptake. Directorate support

Biogeography
Norm McKenzie (Kimberley)
Patterning of biodiversity. Inventory of biodiversity. CAR reserve system

Fauna Conservation
Keith Morris (South West)
Species approach. Animal ecology, biology, genetics. Threatening processes.

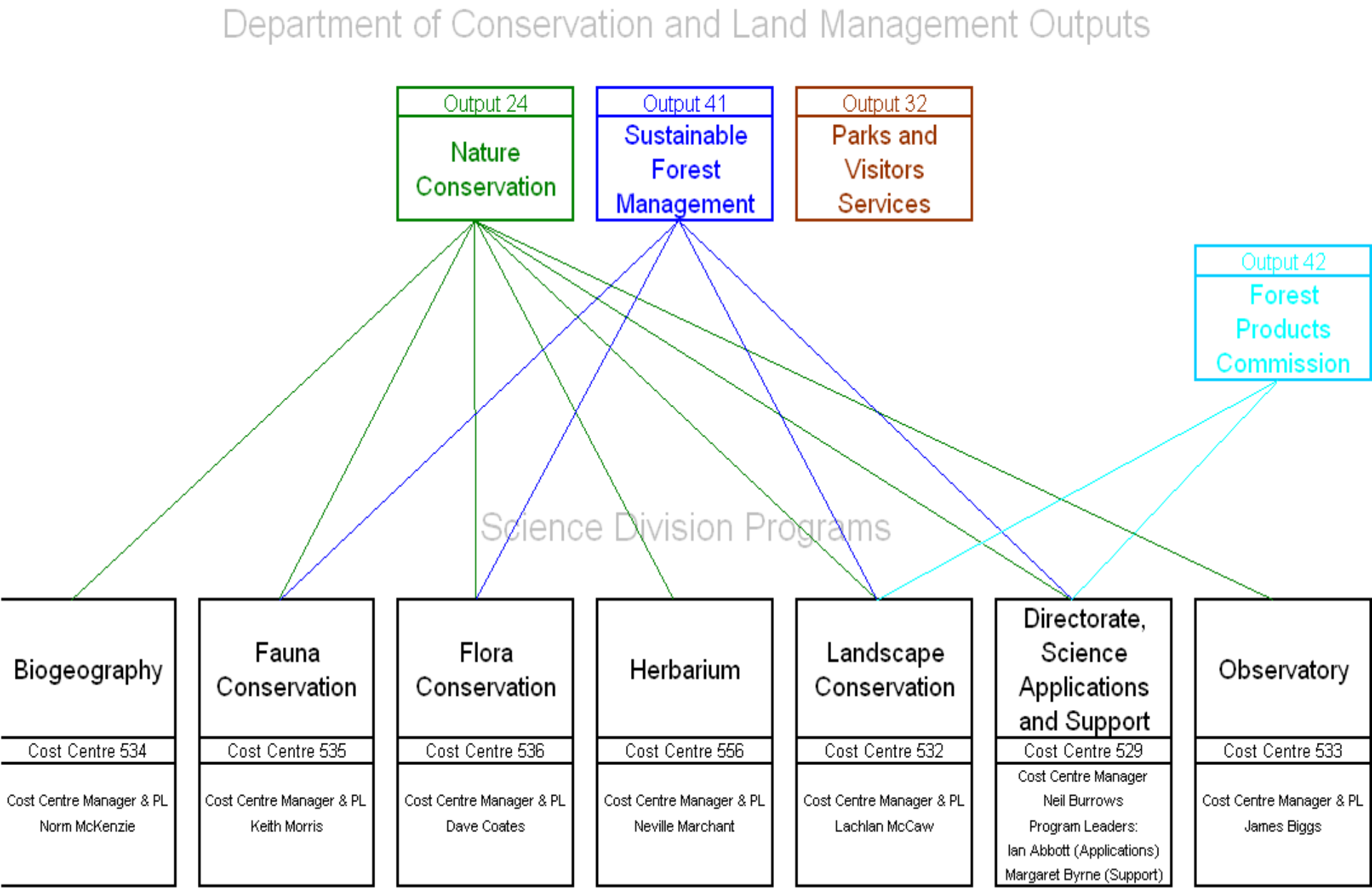
Flora Conservation
David Coates (Wheatbelt, Warren)
Species approach. Plant ecology, biology, genetics. Threatening processes.

Herbarium
Neville Marchant (Midwest)
Collections. Systematics

Landscape Conservation
Lachie McCaw (South Coast)
Ecology of ecosystems and communities. Landscape restoration. Landscape monitoring. Landscape fire.

Observatory
James Biggs
Astronomy information. Astronomy research. Astronomy education

Science Division Financial Structure and Funding Relationship

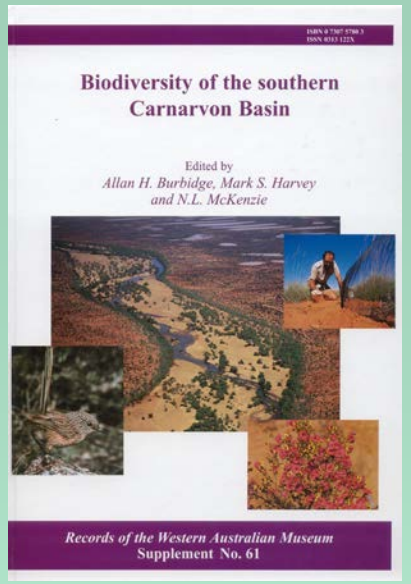


16th February 2005

Biogeography
Highlights 2004/05

- Biological Survey of the Wheatbelt (SAP) published, information disseminated – workshops, presentations, CD.
- National Biodiversity Audit published, WA subregional synopsis published.
- Pilbara Biological Survey: $550k from NHT, sites scored.
- Subregional surveys e.g., Mandora, Swan Coastal Plain, Goldfields Ranges, Warren Region, Darling Scarp, Barlee Ranges NR, Hamersley Range, Pilbara tussock grasslands, Little Sandy Desert, Burrup Peninsula, Yanchep National Park, Cape Arid National Park

Biogeography
Future Directions



- Complete Pilbara biological survey
- Kimberley Islands biological survey
- Banded ironstone ranges flora survey
- Forests biological survey
- Biodiversity Audit mk2
- Numerous sub-regional and local area surveys

Fauna Conservation
Highlights 2004/05

- Successful feral cat bating trials in the arid zone (Lorna Glen, GDNR)
- Completed Probait registration trials
- Rapid survey of forest quokkas, fire management guidelines prepared and implemented
- Successful Dibbler translocations at Peniup & SRNP; IRP prepared.
- Completed survey of medium size mammals in Kimberley – declines in lower rainfall areas.
- Bilby and Boodie translocations - Dryandra
- Gilbert's Potoroo Recovery Plan finalised. Initial cross-fostering trials unsuccessful. Trial translocation to Bald Isd.
- Draft revised Numbat Recovery Plan

Fauna Conservation
Future Directions

- Ongoing assessment/identification of threatened taxa
- Preparation & implementation of recovery plans
- Western Shield 1: Unfinished business
- Expansion of Western Shield into semi-arid and arid zones
- Impact assessment & control feral animals esp.camels, pigs, goats
- Sea turtle research & management
- Threatened fauna translocations
- Gilbert's Potoroo: 2nd translocation to Bald Isd. Survey additional wild populations, predator control,cross-fostering.
- Cane toad monitoring/response

Flora Conservation
Highlights 2004/05

- Ongoing assessment of conservation status of threatened taxa
- 21 threatened taxa translocations
- Completed molecular genetic studies on 6 threatened taxa
- Phase 1 of the Millennium Seed Bank Project completed
- Remnant size and isolation critical factors in the viability of plant populations
- Development of WATTLE - computer-based Acacia id system
- 40% of the south-west flora is susceptible to *Phytophthora cinnamomi.*
- Integrated strategies for control of Pc impacts- phospite
- Development of a methodology to categorise threatened flora (DRF) into 8 functional groups for conservation actions.

Flora Conservation
Future Directions

- Ongoing assessment/identification of threatened taxa
- Ongoing research into ecology & biology of threatened taxa, threatening processes (weeds, disease, changed fire, salinity), recovery actions
- Molecular genetic analysis and re-assessment of taxonomic and conservation status of critically endangered flora.
- Population viability analysis (PVA) of Critically Endangered species.
- Population viability of species in fragmented landscapes
- Threatened Seed Centre - Millennium Seed Bank Project
- Weed/fire interactions in remnants
- *Phytophthora* risk, efficacy of Phosphate

Herbarium
Highlights 2004/05

- A collaborative project with Marine Branch, Universities and CSIRO is capturing details of 25 000 WA marine plant collections
- FloraBase 2, has an average of 27,065 successful requests per day. 825,485 were received in December 2004.
- The on-line WA Flora now delivers detailed descriptions of many WA weed taxa and provides the results of taxonomic studies of blackberries
- A mycological taxonomist working on the fungi project is recording fungal diversity in Perth urban bushland.

Herbarium
Future Directions

- Total holding of 1.2M vascular plants
- Expansion of Fungi specimens & information
- Incorporation of Algal specimens ex universities & CSIRO
- Repatriation of type specimens – Europe
- Expansion Regional Herbaria Project (NHT)
- Ongoing participation AVH Project
- Expansion of taxonomy effort
- Expansion weed information network

Landscape Conservation
Program Highlights 2004/05 NCD

- Reported on 2 decades of salinity and depth monitoring in south-west wetlands
- Commenced project to assess weed risk in revegetation systems
- Implemented Bushfire CRC and mosaic burning studies for biodiversity conservation in proposed Walpole Wilderness Area
- Fire management workshops; hummock grasslands and Kimberley savanna

Landscape Conservation
Program Highlights 2004/05 SFM

- Provided scientific input to design and monitoring of trials to minimise soil damage during timber harvesting (FMP Action 20.1.1)
- Re-activated Kingston Study 5 year monitoring (FMP Action 9.2.1)
- Initiated stream buffer study (FMP Action 33.1)
- Completed installation and assessment 3rd round FORESTCHECK monitoring program (FMP Actions 9.2.2 and 9.2.3)

Landscape Conservation
Future Directions NCD

- North Kimberley fire ecology & management
- Coastal heathlands fire ecology and management
- Hummock grasslands fire ecology & management
- Expansion of biodiversity monitoring program
- Landscape restoration ecology – wheatbelt, rangelands
- Climate change monitoring - montane, mesic south-west ecosystems

GM rangelands desertification: A conservation disaster?

Landscape Conservation Future Directions SFM

Forest Management Plan 2004-2013

- FORESTCHECK biodiversity monitoring
- Integrated forest health monitoring
- Effects of timber harvesting on groundwater and stream-flow in the jarrah forest (IRZ study)
- Ecologically appropriate fire regimes
- Domestic firewood production
  - Weeds and pest control
  - Dieback
  - Soil and water
  - Greenhouse –climate change
  - Silviculture

Science Applications

Highlights 2005/05:

- Established Program
- Co-location of *Naturebank* staff to IMB
- Maps of plant species endemism and richness published

Future Directions

- Model for best practice biodiversity information management systems
- NatureMap commenced
- Database corporatization progressed
- Models of impact of climate change on selected species and ecosystems

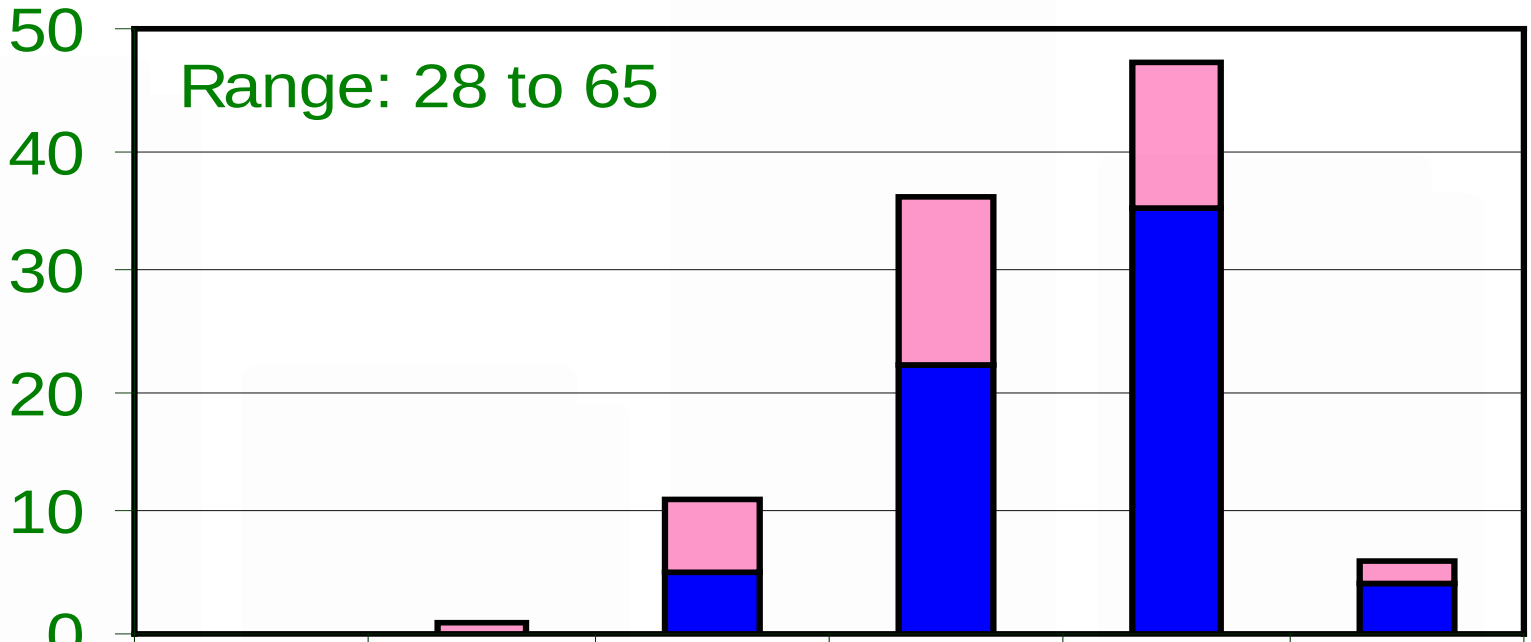
Future Directions Whole-of-Division

- Move to ‘Adaptive Experimental Management' (a creative, evidence-based approach – including monitoring as integral to, not incidental to, management)
- WA Biodiversity Conservation Science Centre incorporating a new herbarium (co-location, integration, partnerships)

Future Directions
Whole-of-Division

- State biodiversity research strategy
- Corporate biodiversity information management systems - one-stop-shop, biophysical info warehouse, readily accessible
- Climate change (modelling, monitoring, adapting)
- Succession plan

Science Division Staff Age Demographic



	Under 21	20 - 29	30 - 39	40 - 49	50 - 59	60 +
Female	0	1	6	14	12	2
Male	0	0	5	22	35	4

Parks & Visitor Services

- Nil funding to SD from PVS
- Biol Survey Parks
- Anthropologist
- Area-based management plans
- Interpretive material
- Social scientist to manage research - environment impacts on visitors
- Sustainable Parks; research on visitor impacts on environment

Thank You