



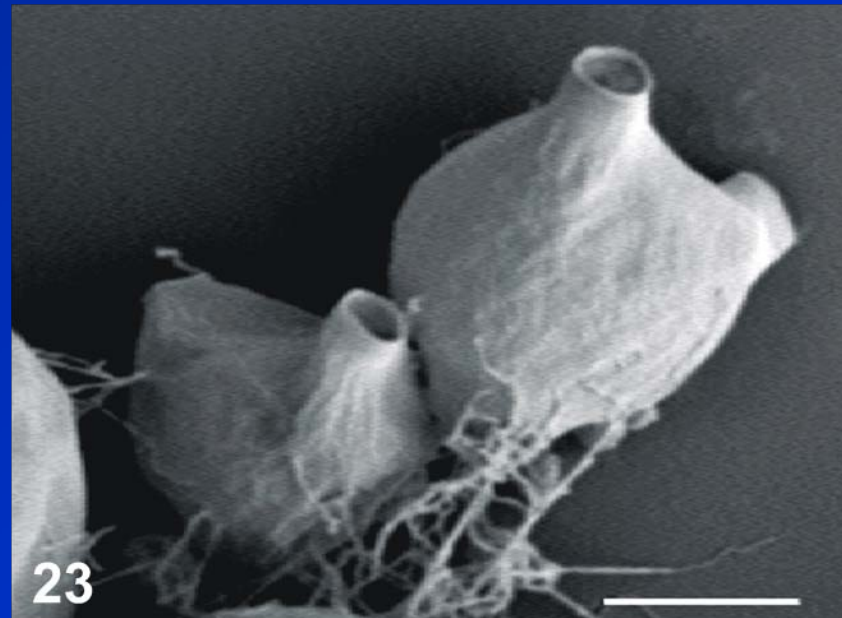
Managing wildlife diseases in Australia

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Overview

- History
- Importance
- Examples of management
- System and policy
- Opportunities



History of the discipline

- Wildlife Disease Association formed in 1951

- Australasian Section in 1975



- Mostly documenting diseases with some management of important ones like tuberculosis in deer (driven by game industry)

Don't worry be happy

- Widespread attitude right up until the 1980s in mainstream fields.
- Wildlife disease absent from zoology, veterinary and medical textbooks and courses until 1990s.

Exceptions

- Brucellosis and tuberculosis eradication from northern Australian feral buffalo and cattle populations
- Management of myxomatosis to control rabbit populations



Why should we worry?

- Wildlife are origin of human (zoonotic) and domestic animal diseases
Eg: Ebola, SARS, AI, TB, Rabies
- EIDs of human health originating from wildlife have increased with time related to human population growth, density and wildlife diversity (Jones et al 2008)

Why should we worry?

- Wildlife health may be an indicator of environmental health
Eg: Esperance lead poisoning in birds
- Wildlife health may affect biodiversity
Eg: Chytridiomycosis, Rinderpest, Avian Malaria



But what can we do about it?



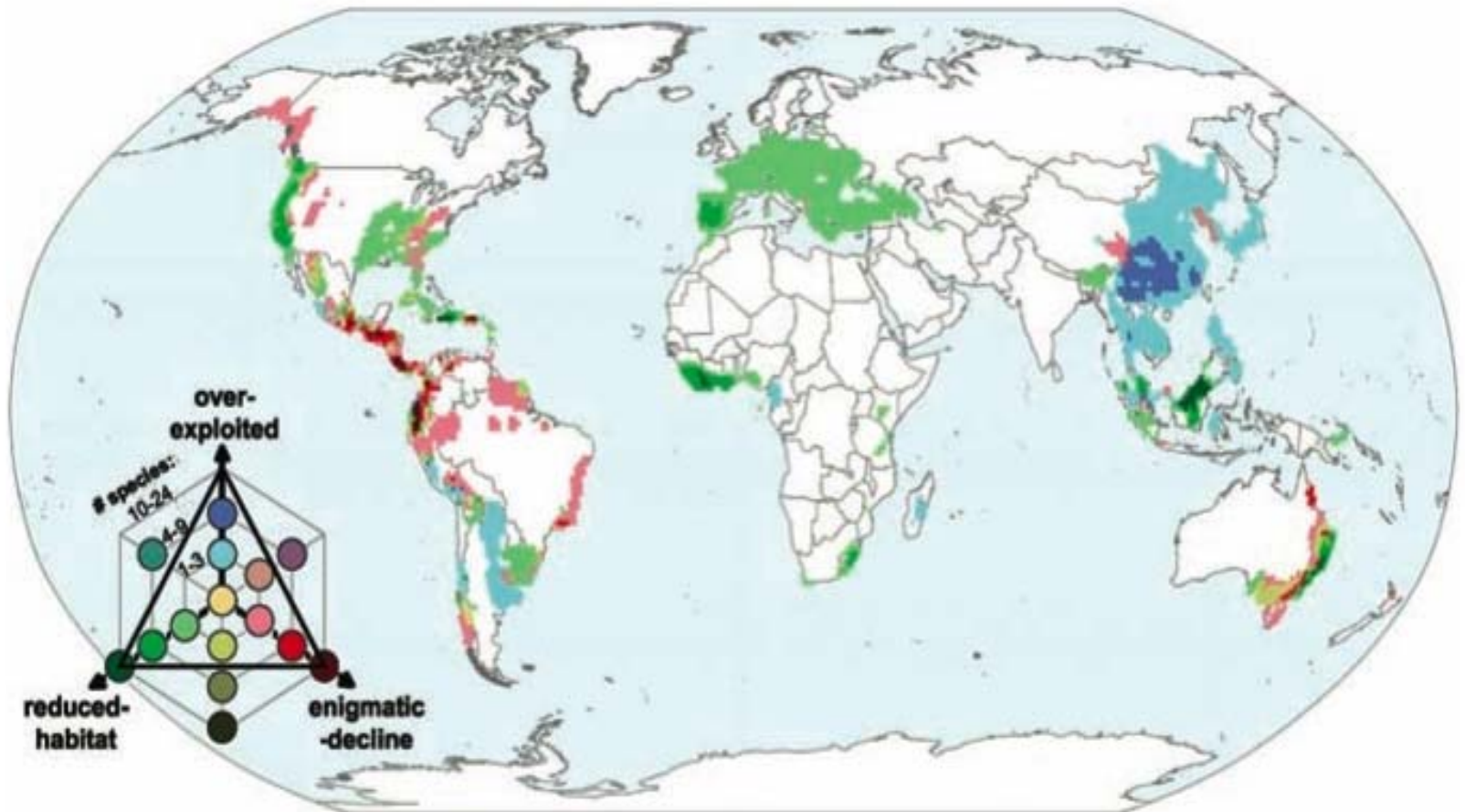
Wildlife diseases affecting biodiversity



- Worldwide amphibian declines (435 species rapidly declining, 122 possibly extinct since 1980)
- Many due to over-exploitation and habitat loss
- Enigmatic declines (n=207)
 - Protected, high altitude streams in neotropics

(Stuart et al *Nature* 2004)

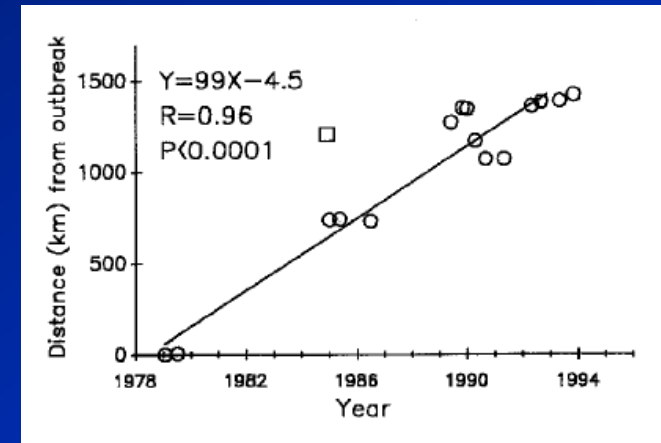
Declining Frog Populations



(Stuart et al *Nature* 2004)

Analysis of frog declines in Queensland suggested the introduction of a waterborne disease of adult frogs

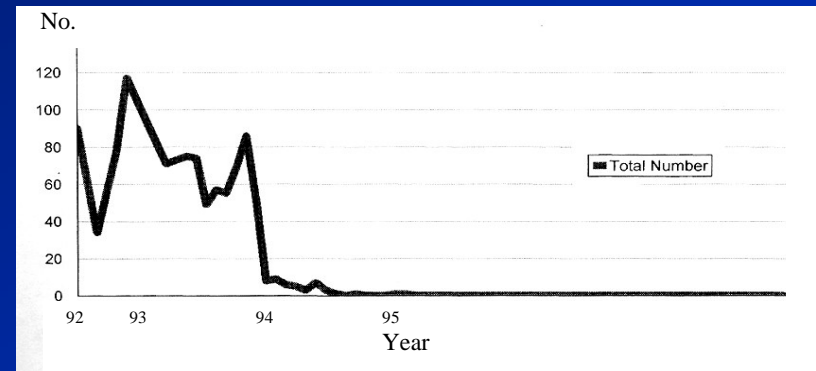
- Declines were asynchronous
-south to north spread
- Stream-dwelling frogs declined
- Tadpoles remained after adults disappeared
- No environmental problems detected
- Sudden declines since 1979
- Mass die-off detected in rainforest in 1993



(Laurence et al *CB* 1996)

Factors which suggested the introduction of *Batrachochytrium dendrobatidis* (Bd)

- *Bd* found on dying frogs during mass die-off at Big Tableland in 1993 and Panama 1997
- 55% sick frogs in Australia have severe chytridiomycosis
- Experimentally produce up to 100% mortality in adults but not tadpoles
- Waterborne pathogen
- First record in 1978 from SE Qld (n=110<1978)



(Berger et al *PNAS* 1998, *AVJ* 2004)

Impact of Bd in Australia

- Nine species extinct
- At least four have management preventing extinction
- At least ten have reduced population size and distribution and are more vulnerable to extinction

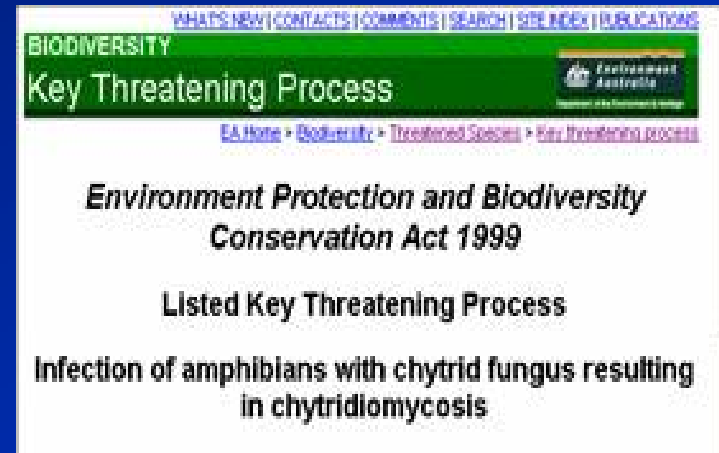


Chronology of Management

- Chytridiomycosis identified as a cause of amphibian declines in 1997
- Key paper (Berger et al.) published in 1998
- “Getting the Jump on Amphibian Diseases Conference” recommended nominating Bd as a Key Threatening Process (KTP) – August 2000

Australian Government Policy:

Protect biodiversity



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BIODIVERSITY
Key Threatening Process

[EA Home](#) • [Biodiversity](#) • [Threatened Species](#) • [Key threatening processes](#)

*Environment Protection and Biodiversity
Conservation Act 1999*

Listed Key Threatening Process

**Infection of amphibians with chytrid fungus resulting
in chytridiomycosis**

- Key Threatening Process (KTP)
 - Threat Abatement Plan (TAP)

Chronology (cont.)

- Nominated as a KTP – Dec 2000
- Accepted as a KTP requiring a Threat Abatement Plan (TAP) – July 2002
- Dept of Environment & Heritage (DEH) tender for consultant to write TAP – Mar 2003
- Input at meeting of key stakeholders – Jul 2003

Chronology (cont.)

- Rewritten & iterations with TAP Reference Committee
- Draft TAP released for public comment for 3 mths (concluded 1 Dec 2003)
- TAP revised
- Publication of final TAP Feb 2006!



Can Bd be eradicated from Australia?

- **NO!**

Objectives of TAP

- **Objective 1:** To prevent the spread of Bd into areas where it may impact amphibian species.
- **Objective 2:** To promote the recovery of amphibian species threatened by Bd.
- **Objective 3:** To improve the management of infection with the amphibian chytrid through appropriate research and monitoring programs.
- **Objective 4:** To inform Australian Government, State and Territory management agencies, researchers and other academics, landholders, relevant industries and the public about the Threat Abatement Plan's actions and their outcomes.
- **Objective 5:** To effectively coordinate management activities

Novel wildlife diseases spilling over into humans and domestic animals

Novel viruses from Australian/SE Asian bats

- 1994 –Hendra virus
- 1996 – Australian bat lyssavirus
- 1997 – Menangle virus
- 1999 – Nipah virus
- 2003 – SARS like virus?



Australian bat lyssavirus!

- Index case 1996 (Fraser et al 1996)
- Predicted (St George 1989)
- First case 1995 (Skerratt et al 1998)
- Two deaths from ABL – Rockhampton (1996) and Mackay (1998)



Wildlife diseases affecting economic and human health biosecurity

- Significant research and surveillance in feral animals and some wild animals and vectors to improve surveillance and risk analysis



GMO's as biological control agents in wildlife

- Myxomatosis and RHD have been effective in controlling rabbits
- Develop novel pathogens as BCA's
eg. *Parastrongyloides* in Brush-tailed possums
- Mostly aim to provide immunocontraception

Human and Animal Health Budgets in Australia versus Wildlife Health

- \$78.6 billion 2003-2004 for health
- Several billion for domestic animal health ?
- Several million for wildlife health ?

Law of diminishing returns! Could we improve human and domestic animal health more by investing in wildlife health?

Wildlife Health Management

- Methods
- System and policy



Methods: Preventative and Reactive

- Biosecurity
- Respond to emerging and emergency wildlife disease
 - Surveillance
 - Emergency response
 - Control including research with adaptive management

Current system and policy: Biosecurity

- Border security
- Farm biosecurity in intensive industries
- Australia has a relatively good system and policy

Current system and policy: Surveillance

- National Animal Health Surveillance System
- Northern Australia Quarantine Strategy targets specific wildlife diseases of economic and human health significance
- Australian Wildlife Health Network – cross disciplinary
- Australian Registry of Wildlife Pathology
- Australian Biosecurity Cooperative Research Centre
- Wildlife Care Groups
- Veterinary clinics and diagnostic labs (CSIRO AAHL)

Current system and policy: Surveillance

- Australia has a relatively poor system
 - Not coordinated
 - Not resourced and lacking capacity
 - No centre of expertise

Need to learn from systems in North America and Europe.

Current system and policy: Emergency Response

- AusVetPlan

Narrow focus compared with other
systems



Current system and policy: Control

- Mostly at human or domestic animal level by improving biosecurity
- Chytridiomycosis
- Sarcoptic mange

Poorly resourced and lacking capacity compared with overseas – rabies, CWD, TB, chytridiomycosis, canine distemper, sarcoptic mange

Who is responsible and pays?

- Veterinary field is at the top as it investigates wildlife diseases of zoonotic and biodiversity as well as economic importance
- Human health is showing some interest in zoonotic diseases of wildlife
- Environmental agencies are addressing some important wildlife diseases affecting biodiversity. No accountability and few industries to cost share

Issues with management

- Spatially and temporally fluid populations
- Population numbers large and difficult to estimate
- Diagnostic tests unavailable and invalid
- Lack of human capacity
- Lack of knowledge of systems and policies

Future Needs

- Integration of health data across disciplines? Rather expertise and resources
- Surveillance, emergency response and control coordinated and resourced
- Education in management and research
- Benchmarking and innovation for systems and policy