Environment Australia

Department of the Environment and Heritage

Hamdallah Zedan
Executive Secretary
Convention on Biological Diversity
World Trade Centre
393 St Jacques Street, Office 300
MONTREAL
QUEBEC CANADA H2Y 1N9

Australian Thematic Report on Alien Species, Case Study and comments on Principles

Dear Executive Secretary

In response to decision V/8 - Alien species that threaten ecosystems, habitats or species adopted by the Conference of the Parties (COPV) to the Convention on Biological Diveristy (CBD), please find attached:

- Australia's comments on 'Interim Guiding Principles' for Alien Species from CBD Parties (Attachment A).
- A case study on the Black Stripe Mussel outbreak (Attachment B).
- Australia's thematic report to the CBD on Alien Species, pursuant to decision V/19 on national reporting (Attachment C).

Should you have any queries please do not hesitate to contact Gareth Rees on ph: 612 6274 1476 or email gareth.rees@ea.gov.au.

Yours sincerely

Max Kitchell
First Assistant Secretary
Natural Heritage Division
10 October 2000

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Attachment A

September 2000

Comments from Australia on Alien Species Principles

Australia strongly supports the interim guiding principles proposed by the Executive Secretary. However, Australia has a number of suggested amendments and comments.

General

Use of the word "principle": We recall from discussion at SBSTTA5 that the word principle has been interpreted differently by different countries. In this context, we understand that the principles are, in effect, agreed objectives or aims providing guidance to parties. However, other countries might interpret the principles as forming binding obligations. To avoid any confusion we propose amending the document by deleting the words 'guiding principles' or 'principle' and replacing it with the word 'guideline(s)'.

Comments on Specific Principles/Guidelines

1. Precautionary Approach

- Australia supports referencing of the precautionary principle. However, we believe it is important to ensure that any reference be precise. Therefore we suggest that the following reference be made in the title of the first principle or guidelines: "Precautionary Approach contained in the Rio Declaration Principle 15". This reference should be repeated in the first sentence.

- The second and third sentences should be deleted as this is implicit in the approach stated by the Rio Declaration Principle 15 and would apply to all other principles or guidelines.

10. Intentional Introduction

- The invasiveness of species already present in a country will generally be increased where further introductions spread the species to new locations and/or make the gene pool more diverse. It is therefore important to prevent further imports or to restrict imports to locations where species already occur and to genetic varieties that are already present. The importance of establishing measures to restrict the gene pool of alien invasive species and to avoid or reduce new loci of introduction should be recognised in the 'Introduction of Species' guiding principle 10 'Intentional Introduction'. Suggested text, for inclusion where appropriate, is:

  > Importations of alien species already present in a country should be restricted to locations where the species occurs and to genetic varieties that are already present in these locations.

- Add "and any existing international rights and obligations." to the last sentence of principle 10. It is important to remind countries that this guidance is in addition to any obligations they might incur as parties to other agreements.

12. Mitigation of Impacts

- The risk that an already established species will become a pest is greater than that of newly arrived species. International data suggest that perhaps one in ten naturalised species will become a pest, whereas the general level of risk from newly introduced species may be one in one thousand. Naturalised species are defined as species that have established self-maintaining wild populations. The relatively high threat to natural or semi-natural ecosystems posed by some naturalised species should be recognised in the 'Mitigation of Impacts' guiding principle12. Add the following sentence to end of principle 12:

  Surveillance and risk assessment of naturalised species should be undertaken, and control measures implemented for those species where a specific risk is identified.

<u>New guidelines</u>

Australia is of the view that the following guidelines should be included in the document.

User Pays Guideline:
Under the user pays concept domestic users benefiting from the import of an alien species could be asked to meet some of the cost of risk assessment and any specified import measures. Suggested text is:

> "Consideration should given to arrangement such that the domestic users who will benefit from the introduction of an alien species pays for risk assessment and any management measures specified. Consideration of cost recovery would need to be balanced against public benefits and the likelihood that high risk assessment and management costs could significantly increase illegal imports."

Polluter pays Guideline:
The polluter pays concept would seek assistance from the domestic user of an alien species to meet the costs associated with clean up and biodiversity restoration where the user has failed to comply with the regulatory environment and address the risks associated with the use of the species. Suggested text is:

> "The polluter pays guideline should be applied to the domestic use of alien species. The user should bear costs of clean up and biodiversity restoration where it is established that they failed to comply with the regulatory environment, and/or failed to take management measure specified."

The user pays guideline should be inserted under section C as bis12 and the polluter pays guideline should be inserted under section D as bis16. While these are important issues to consider they are provided as possible mechanisms to ensure robust domestic regimes and are not intended to introduce concepts of liability.

<u>Ongoing development of Alien Species</u>

We note paragraph 15 of decision V/8. In this context we would also urge that Executive Secretary include in the dialogue the World Trade Organisation and the International Plant Protection Convention. We consider these organisations to be amongst the "other relevant organisations" referred to in paragraph 15 of V/8.

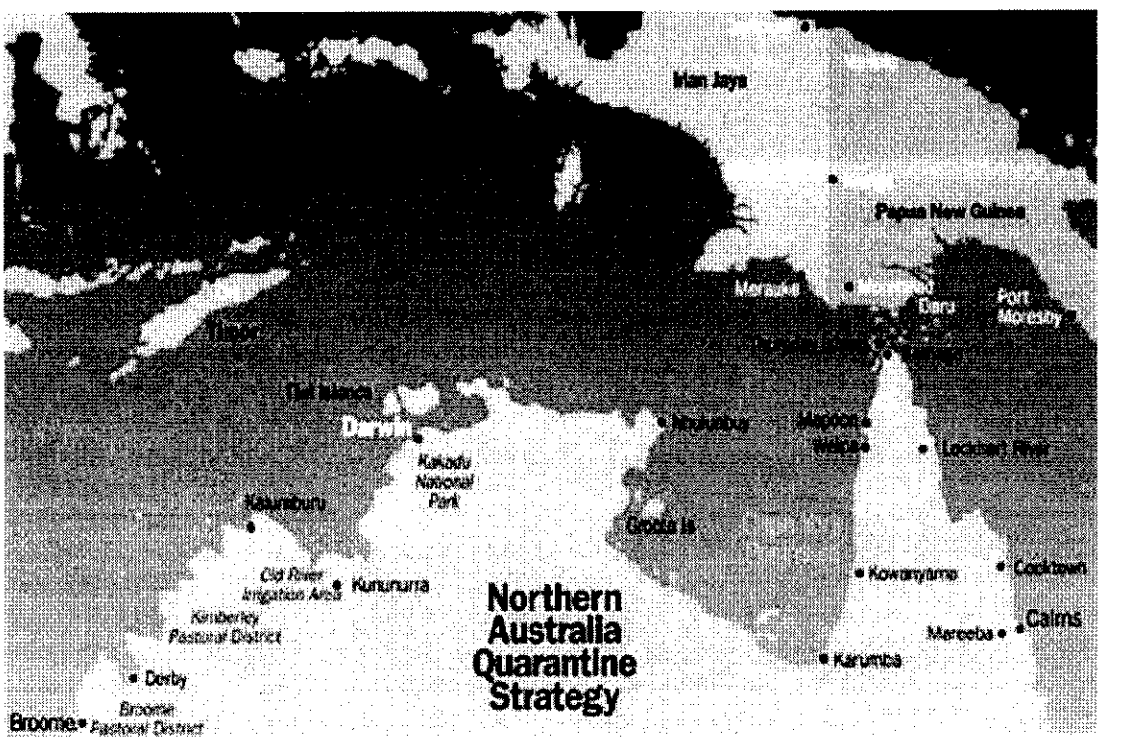
Attachment B

Case Study on the Black Striped Mussel

1. Description of the problem

(a) Location of the case-study

The Black Striped Mussel was identified at three sites in Darwin Harbour in Australia's Northern Territory (12 DEG 27 MINS South, 130 DEG 50 MIN East). These comprised two marinas and one mooring basin.



Location of Darwin in relations to Australia's Northern Neighbour Countries.

(b) History

The Black Striped Mussel is a native of tropical and sub tropical western Atlantic waters extending from Colombia to the Gulf of Mexico.
On 27 March 1999, divers from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) detected significant populations of the Black Striped Mussel in a Darwin Harbour marina, at a density of 10,000 mussels per square metre. Further light infestations were found in a second marina and in the mooring basin during the next five days.
At the time of the discovery 223 vessels were within the marinas and mooring basin, and another 197 had left and put to sea since September 1998 when surveys of Darwin Harbour biota had not found Black Striped Mussels.

(c) Description of the alien species concerned ecology of the invasion(s) (type of and potential or actual impacts on biological diversity and ecosystem(s) invaded or threatened, and stakeholders involved)

The Black Striped Mussel is a *Mytilopsis* or *Congeria* species, most likely *Mytilopsis sallei*. The bivalve can form dense monocultural mats that exclude most other species and lead to substantial reductions in biodiversity at infected sites, as well as massive fouling of wharves, seawater systems and marine farms. Prior to the invasion of Darwin marinas the bivalve had colonised a number of countries in the Asia-Pacific region, such as Singapore, Hong Kong, Japan and Taiwan, although not always in pest proportions. It is recognised as as a significant fouling pest in India.

According to the available literature the Black Striped Mussel is about 1-2 cm long with a soft shell and can reach maturity within one month of settlement. It can reproduce in water as cool as 18 degrees Celsius and can survive in water to 10 degrees Celsius. Each mussel can produce 50,000 offspring.

The most likely vector for the spread of Black Striped Mussels is vessel hull fouling. The fouling of aquaculture equipment and marine debris are other possible vectors. The vector for the Darwin invasion is not known, however there is sufficient circumstantial evidence to suggest a visiting international yacht introduced the species to the marina.

(d) Assessment and monitoring activities conducted and methods applied, including difficulties encountered (e.g. uncertainties due to missing taxonomic knowledge)

A comprehensive survey of all structures and navigational aids within Darwin harbour, including buoys, wharves, marinas, oil rigs, barge landings and nearby Darwin Harbour shorelines was conducted to establish the extent of the contamination. The port of Gove Harbour was also extensively surveyed. These surveys confirmed that the outbreak was limited to the three sites originally identified within the closed waters of Darwin Harbour marinas.

2. Options considered to address the problem

(a) Description of the decision-making process (stakeholders involved, consultation processes used, etc.)

Following confirmation of the mussel being a serious marine pest, a high level management committee was established in the Northern Territory (NT). The Taskforce headed by the Assistant Commissioner of Police was led by the NT Department of Primary Industry and Fisheries (DPIF) and included relevant senior officials from the NT Government.

National government agencies led by Agriculture Fisheries and Forestry - Australia (AFFA) established a national working group on 6 April 1999 to coordinate national action to prevent the spread of the mussel to other States. Other agencies involved included Environment Australia (EA), CSIRO CRIMP, the Australian Fisheries Management Authority (AFMA), the Australian Quarantine and Inspection Service (AQIS), the Australian Maritime Safety Authority (AMSA), the Australian Customs

Service (ACS), the Australian Government Solicitor (AGS) and the Department of Defence (Navy).

A scientific sub-committee comprising representatives from CSIRO CRIMP, the Northern Territory University, andDPIF developed national protocols to detect and treat the Black Striped Mussel at sites and on vectors considered to be at risk, from Fremantle on Australia's west coast to Sydney on the east coast.

(b) Type of measures (research and monitoring; training of specialists; prevention, early detection, eradication, control/containment measures, habitat and/or natural community restoration; legal provisions; public education and awareness)

There was essentially an information vacuum relating to the control of Black Striped Mussels, as maritime industries and the scientific community had little experience of situations where eradication of a mussel infestation was feasible. The Black Striped Mussel outbreak was therefore treated in an epidemiological manner along the lines of infectious diseases.
Amendments to Northern Territory *Fisheries Act* were effected to complement the Commonwealth *Quarantine Act* to enable the control the of movement vessels, water and any item in contact with contaminated waters.
In the absence of contingency funds allocated for marine pest outbreaks, Cabinet also approved the unqualified expenditure of funds necessary to effectively address the response actions.

(c) Options selected, time-frame and reasons for selecting the options

Within three weeks of the discovery of the invasion, four treatments (chlorine, copper sulphate, chlorine dioxide, detergent) were trialed and two (chlorine and copper sulphate) successfully implemented.

Actions undertaken involved over 300 personnel, and included the tracking and treatment of vessels that had left infected sites, the treatment of three sites and almost three hundred vessels in the Darwin area and the initiation of a public awareness program to meet local and national needs.

(d) Institutions responsible for decisions and actions

Covered under 2(a) above.

3. **Implementation of measures, including assessment of effectiveness**

(a) Ways and means set in place for implementation

Between 31 March and 19 April 1999, treatments were applied to eradicate the Black Striped Mussel. These included the addition of chlorine (sodium hypochlorite) and copper sulphate to the marina waters. Both treatments killed mussels but the copper sulphate proved more effective. Subsequent monitoring suggested that the treatments had been successful. On 23 April 1999, with the mussel completely eradicated from

these areas, the marinas and mooring basin were re-opened for normal use. Procedures were established for further monitoring and sampling to detect new infestations. No further infestations have been detected to date.

(b) Achievements (specify whether the action was fully successful, partially successful, or unsuccessful), including any adverse effects of the actions taken on the conservation and sustainable use of biodiversity

The eventual elimination of the Black Striped Mussel from the infected areas was to become one of the few successful aquatic pest eradication exercises ever to be undertaken world wide.
The preservation of the biodiversity of Territory waters, and subsequently Australian coast lines, required the short-term sacrifice of the artificial marina ecosystems. The marina ecosystems have fully recovered.

(c) Costs of action

The Northern Territory Government expended in excess of $A2.2 million on operational resources, excluding personnel costs, in controlling the Black Striped Mussel infestation. Almost $A1m was reimbursed by the National Government.

4. **Lessons learned from the operation and other conclusions**

(a) Further measures needed, including transboundary, regional and multilateral cooperation

The management of the outbreak highlighted the need for increased preparedness to handle marine pests. A National Taskforce on the Prevention and Management of Marine Pest Incursions was established in August 1999. Participants at a workshop conducted to assist the Taskforce found that, while the local response actions taken after the confirmed detection of the pest were quick and effective, there was a delay in raising the alarm about the outbreak. The two most effective methods for the detection of an introduced marine pest were: 1. an extensive monitoring and surveillance program, and 2. through enhanced public awareness to stimulate voluntary reporting.

The scientific team charged with finding a solution to controlling the outbreak was very effective in developing treatment options for the contaminated marinas.

Discussions highlighted the need for strong political commitment to the issues of marine pest impacts and the need to obtain this commitment from the various jurisdictions in order to obtain a secure funding base for incursion management actions. It was acknowledged that systematic risk management was an essential approach to maximising the effectiveness of preventing and responding to marine pest outbreaks. An existing national approach to dealing with exotic animal diseases was endorsed as the model within which to develop the required national, jurisdictional and local level emergency response and control plans for marine pest outbreaks. Essential elements to consider in monitoring and evaluation actions were identified as pro-active research, early warning pre-incursion monitoring and evaluation of past case studies and monitoring procedures.

(b) Replicability for other regions, ecosystems or groups of organisms

The lessons of the Black Striped Mussel invasion were incorporated into the work of the National Taskforce and its report which was presented to Government Ministers at the end of 1999.

(c) Information compilation and dissemination needed

[Clarification needed on what is required here]

Reference

The Effectiveness of Australia's Response to the Black Striped Mussel Incursion in Darwin, Australia: a report of the Marine Pest Incursion Management Workshop – 27-28 August 1999, Environment Australia, 2000 (forthcoming).

Attachment D

Australia's thematic report on Alien Species

National Focal Point

Max Kitchell
First Assistant Secretary
Natural Heritage Division
Environment Australia
ph: 612 6274 2345
fax: 612 6274 2228
max.kitchell@ea.gov.au

GPO Box 787
CANBERRA ACT 2601

Contact office for national report:

Gareth Rees
Assistant Director
Biodiversity Convention and Strategy Section
Environment Australia
ph: 612 6274 1476
fax: 612 6274 2723
gareth.rees@ea.gov.au

Summary of process by which this report was prepared

This report has been prepared in consultation with relevant Commonwealth government agencies. In addition:

1. Australia has developed and implemented a *National Strategy for the Conservation of Australia's Biological Diversity*. Australia is currently reviewing that strategy. As part of that process the strategy objective on alien species has been widely discussed. Much of the information provide in this report was gathered through the review process.

2. Australia has recently introduced the *Environment Protection and Biodiversity Conservation Act 1999*. This became the primary Commonwealth legislation for protecting the environment in July 2000. It replaced a number of existing pieces of legislation relating to invasive species management. In developing this legislation much of the information provided below was also gathered.

Questions

Article 8h Alien Species

1. High

2. Good

3. c)

4. b) and c) also see under further comments

5. b)

6. d)

Decision IV/1 Report and recommendations of the third meeting of SBSTTA

7. c)

8. c)

Case Studies

9. a) no, however we have provided a case study ~~is~~ in relation to the Black Striped Mussel outbreak in Darwin in March 1999. (see attached)

10. c) more than 2

Transboundary Issues

11. c) with respect to the Black Striped Mussel: prior to the Darwin incursion the Mussel had colonised a number of countries in the Asia-Pacific region, such as Singapore, Hong Kong, Japan and Taiwan, although not always in pest proportions. We also understand that it was known as a significant fouling pest in India.

12. c) Australia is very active in the development of an international treaty or other international instrument which will address the problem of harmful aquatic organisms transported in ships' ballast water, some of which have the potential to become invasive. This international instrument is being developed over the next few years through the International Maritime Organisation.

Further Comments

Introduction

Australia is actively combating the threats posed by alien species, both internationally and domestically. Australia's unique and varied biological diversity can be easily threatened by the introduction of alien species. In addition native species which are introduced outside of their original habitat can also pose threats. In general Australia identifies such species (whether from outside or inside Australia) as 'invasive species'.

The management of invasive species in Australia is primarily the responsibility of individual landowners or land managers. Local and State Governments have a range

of legislation and regulatory mechanisms covering invasive species management but these are primarily focussed on managing species that threaten economic production rather than environmental values. The Commonwealth approach to invasive species management is based on a 'partnership approach' by industry, government and the wider community to achieve the objectives of invasive species management. A risk assessment, risk management and risk communication approach is being adopted to obtain a clearer definition of the problems caused by invasive species, with management efforts focusing on managing the problems resulting from an invasive species rather than on the species itself.

In relation to question 4(b), alien species management is also addressed in the Wetlands Policy of the Commonwealth Government of Australia; the National Strategy for the Conservation of Australia's Biological Diversity (see below) and the State of the Environment Report.

In relation to question 4 (c) Australia has instituted the following specific alien species strategies and/or programs:

- Australia has a National Weeds Program to reduce the detrimental impact of nationally significant weeds on the sustainability of Australia's productive capacity and natural ecosystems.
- Australia produced a National Weeds Strategy in 1997 to provide a strategic approach to weed problems of national significance.
- Australia has a National Feral Animal Control Program to ensure effective management of the impact of feral animals on the natural environment and on primary production.
- Australia has an Introduced Marine Pests Program to support actions that will lead to the control and local eradication of introduced marine pest species. Australia is also moving to set up a comprehensive national system for prevention and management of marine pests. This will include strengthening existing capacities and adding new capacities in: prevention systems operating at pre-border, borders and post border levels; emergency response to new incursions; ongoing control of introduced marine pests already in Australia; monitoring to assist in risk assessment, detection of incursions and control programs; research ; community preparedness and education and training.

Australia has also instituted a range of specific actions at both Commonwealth and State levels of government.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* is the primary Commonwealth legislation for protecting the environment. It replaced a number of existing pieces of legislation relating to invasive species management. The *Act* provides for the preparation of binding threat abatement plans for key threatening processes (which could include invasive species) and includes Section 301A Provision for Regulations for the Control of Non-native Species. The regulations may *inter alia* regulate or prohibit bringing into the Australian jurisdiction species that do, may or would be likely to threaten biodiversity. The regulations may also regulate the trade in such species:

- between Australia and another country.
- between two States.

- between two Territories.
- between a State and a Territory.
- by a constitutional corporation.

Natural Heritage Trust

The Natural Heritage Trust is a $1.5 billion funding mechanism established by the Commonwealth Government in 1997 to conserve, repair and replenish Australia's natural capital. Three programs within the Natural Heritage Trust are directly targeted at addressing invasive species; the National Weeds Strategy, the National Feral Animal Control Program, and the Coasts and Clean Seas Introduced Marine Pests Program.

The Trust also provided funds to support research and development towards a decision support system to enable the risks of translocating marine pests in individual ships' ballast water loads to be better assessed. This is planned to become operational in July 2001.

The National Weeds Program aims to reduce the detrimental impact of nationally significant weeds on the sustainability of Australia's productive capacity and natural ecosystems. The objectives of the Program are to:

- develop integrated strategic approaches to reduce the impact of weeds of national significance.
- prevent the introduction of new pest plants through revised quarantine assessment procedures.
- assess the potential of existing pest plants to become weeds of national significance.

Further information on the National Weeds Program is available on the world wide web at: http://www.nht.gov.au/programs/weeds.html.

The National Weeds Strategy was developed in 1997 to provide a strategic approach to weed problems of national significance. It was developed in consultation with the States and Territories by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Forestry Ministers. In particular, the Strategy addresses:

- weed problems which threaten the profitability or sustainability of Australia's principal primary industries.
- weed problems which threaten conservation areas or environmental resources of national significance.
- weed problems where remedial action may be required across several States and Territories.
- weed problems which constitute major threatens to Australia's biodiversity.

The National Weeds Strategy is available on the world wide web at: http://www.dpie.gov.au/dpie/armcanz/pubsinfo/nws/nws.html.

The National Feral Animal Control Program is a Natural Heritage Trust Program that aims to:

- develop integrated, strategic approaches to the management of the impacts of nationally significant feral animals.
- implement threat abatement plans under the *Endangered Species Protection Act 1992* for those species listed as contributing to key threatening processes.
- develop best practice guidelines for the control of the impacts of nationally significant feral animals.

Further information on the National Feral Animal Control Program is available on the world wide web at: http://www.nht.gov.au/programs/ferals.html.

The Introduced Marine Pests Program supports action that will lead to the control and local eradication of introduced marine pest species. The Program provides advice and funds to help combat marine pest outbreaks. In doing so, it complements the barrier controls set in place by the Australian Quarantine and Inspection Service under the Australian Ballast Water Management Strategy. Further information on the Introduced Marine Pests Program is available on the world wide web at: http://www.environment.gov.au/marine/frameset/new/fs_new_main.html.

Cooperative research centres

Cooperative Research Centres (CRCs) are joint industry/government/university research organisations. There are two CRCs directly relevant to invasive species management.

The CRC for Biological Control of Pest Animals aims to achieve significant and continuing benefit to Australia by reducing the devastating environmental and economic impact of introduced pest animals. This will be accomplished by developing novel fertility control agents which are cost-effective and environmentally friendly, will reduce the impact of the pest to acceptable levels, will be more humane and will retain their effectiveness over time.

The CRC for Weed Management Systems is committed to develop multidisciplinary approaches, using herbicides, biological control and vegetation management to produce integrated weed management programs for temperate ecosystems in Australia.

The Commonwealth Scientific and Industrial Research Organisation – Centre for Research on Introduced Marine Pests (CSIRO-CRIMP) is another relevant research organisation. The CSIRO-CRIMP was established in 1994. Its objectives are to:

- develop and promote the application of techniques for earlier detection, more accurate prediction of impacts, and effective assessment of risks and costs associated with marine pest species introduced into Australian waters.
- to develop new methods or improve existing measures to control the introduction and spread, and minimise the impacts of exotic marine pest species.

CSIRO-CRIMP draws on a diverse range of research skills within CSIRO Marine Research and CSIRO as a whole, and provides a core group to facilitate co-operative research involving the shipping, mariculture and fishing industries, and the Australian and international scientific community. More information on CSIRO CRIMP is available at http://www.ml.csiro

Examples of State and Territory Government control of invasive species

In the Northern Territory, all potential introductions of alien and inter-State species of animal are subject to strict regulation. The NT Government responded immediately and successfully to the black-striped mussel incursion in Darwin.

A Weed Strategy for South Australia was prepared by the Natural Resources Council in 1998 to complement the National Weeds Strategy and provides a framework for achieving an integrated approach to weed management and identifies responsibilities. Operation Bounceback in the Flinders Ranges is implementing goat, rabbit, fox, cat and weed control over large areas, and includes National Parks and private lands. There has been an increase in recruitment and survival of the threatened Yellow-footed Rock Wallaby in these areas.

Foxes have been effectively controlled over 3.5 million hectares in south-western Western Australia under Western Shield, leading to recovery of native fauna including the removal of three mammal species (the woylie, quenda and tammar) from the threatened fauna list. Research on effective feral cat control is well advanced. High priority is also given to conserving native flora and ecological communities threatened by phytophthora cinnamoni dieback. A draft State Weed Plan has been prepared for public comment, and legislation is in place regulating the keeping, import and control of invasive plants and animals.

The NSW Biodiversity Strategy identifies the need to improve cooperative approaches to weed and pest management as a priority action. Building on the NSW Weeds Strategy, the threat abatement planning process and the ongoing work of the NSW Pest Animal Council, the NSW Government has provided additional funding for key weed and pest control programs to implement this priority action ($1.1million over three years). An example of a project that is partially funded through the NSW Biodiversity Strategy is the strategic management of Bitou bush on coastal ecosystems, which includes developing a state-wide Bitou bush strategy. Preparation of threat abatement plans for invasive species listed as threatening processes under the *Threatened Species Conservation Act 1995*, will ensure management of these species is targeted at minimising impacts on biodiversity.

A Vertebrate Pest Strategy has been developed at the NSW and National levels. Funding for NSW in 1997/98 through Commonwealth and State funding for pest animal management was $11.4 million and includes a component under NHT (the National Feral Animal Control Program.

NSW Agriculture in association with Rural Land Protection Boards (RPLBs) has produced density distribution maps for a range of pest animals (such as foxes, rabbits). To date two series of densities maps have been produced ~ 1993 and 1998, it is also aimed to produce these maps in the future. With assistance from NSW Agriculture, all RLPBs have produced pest animal management plans. These aim to increase efficiency of pest animal management control measures by conducting these on group basis.

The NSW Weeds Strategy has been developed to identify and address significant new and existing weed incursions, through the preparation and implementation of management plans to control priority or noxious weeds.

Examples of Commonwealth protected area invasive species issues

Some examples of invasive species issues in Commonwealth protected areas are:

- crazy ants on Christmas Island.
- cane toads approaching Kakadu National Park.
- feral buffalo in Kakadu National Park.
- rabbits in Uluru – Kata Juta National Park.
- coastal weeds in the Booderie National Park.

A Draft Weed Management Strategy has been developed for the Kakadu National Park. The key elements for the Strategy are:

- prevention.
- identifying ecosystems prone to invasion.
- surveillance and early intervention.
- minimising an area's susceptibility to invasion.
- managing existing weeds.
- researching existing and potential weed problems.
- undertaking regular reviews.

The plan identifies *Salvinia molesta* (salvinia) and *Mimosa pigra* (giant sensitive plant)as the major priority weeds for control in the Kakadu National Park.

National Strategy for Conservation of Australia's Biological Diversity

Australia has developed and implemented a national strategy for the conservation of our biodiversity. One objective is to:

> *Control the introduction and spread of alien species and genetically modified organisms and manage the deliberate spread of native species outside their historically natural range.*

Australia is currently reviewing implementation of the Strategy but preliminary findings with regard alien species are:

The *Environmental Indicators for National State of the Environment Reporting: biodiversity* states that exotic and alien organisms outside cultivation or captivity are a major pressure on biological diversity. The report goes on to state that "the number of such organisms outside cultivation and captivity is reasonably well known for vertebrates, higher plants and some invertebrates, but knowledge is poor for most other organisms except the more obvious problem organisms such as *Phytophthora cinnamomi* in south-western Australia".

The management of invasive species within Australia is primarily the responsibility of individual landowners or land managers. Local and State Governments have a range of legislation and regulatory mechanisms covering invasive species management but these are primarily focused on managing species that threaten economic production rather than environmental values. The Commonwealth also has a wide range of activity on alien species. There has been considerable activity on terrestrial and marine invasive species in all jurisdictions with a number of success stories. Despite this, invasive species continue to pose a major threat to biodiversity.