Report on the Economic and Social Contribution of the Zoological Industry in Australia

Prepared for the
Australasian Regional
Association
of Zoological Parks
and Aquaria

Aegis Consulting
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Contents

List of tables

This report was commissioned by the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) to assist it to determine the economic and social value that wildlife parks, zoos and aquariums contribute to Australia. The consultants have assessed five main possible values of zoological organisations (zoos). These are:

- Economic value, measured in terms of contributions to Gross Domestic Product, employment and tourism (production value).
- Value for consumers, measured via visitor survey results, the revenue and financial support provided to zoos and consumer surplus (recreational value).
- Value of contribution to conservation, measured by the nature and results of in-situ and ex-situ programs and research.
- Value of contribution to education, measured by the nature and results of school, tertiary and visitor education programs and their links to raising conservation awareness and motivating behaviour change.
- Value of contribution to bio-security, measured by the role zoos play in protecting Australia's biodiversity and environment and primary production industries.

The consultant's assessment of these values is based on:

- Their formal survey of all 107 zoos in Australia, to which 20 organisations (representing 24 zoos) responded.
- Visits they made to 18 zoos (6 of whom did not respond to the survey).
- Consultations with the majority of the more than 35 conservation and 20 education experts that they contacted to test the value of zoos.
- Literature and data reviews, including information from the Australian Bureau of Statistics.

The 30 zoos participating in the report represent the vast majority of conservation, education, research and other social and economic contributions by the zoo sector.

The zoos responding to the survey and visited by the consultants reflected a wide cross section of large, medium, small, government, private, not for profit, urban and regional zoos in each State and Territory of Australia.

Overall, in preparing this report, the consultants gathered data and information from a total of 30 zoos (28 per cent of all 107 zoos) of which 22 are ARAZPA members (56 per cent of institutional members) and 8 are non members.

Economic Value of Zoos

Based on the consultant's survey, the total estimated production by zoos is worth about **$424 million per annum**. This consists of annual operating expenditure of about $358 million and capital expenditure of about $66 million.

Zoos **employ about 5300 people**, including 3700 full-time employees and 1600 part-time employees.

International visitors to zoos may create an estimated net benefit to the Australian economy of about $58 million per annum in addition to their payments for admissions to zoos. Allowing for a multiplier of up to 2.0, this could convert to a total value of about **$116 million per annum.**

Value for Consumers

In 2005-06, nearly 36 per cent of the population over 15 years of age visited a zoo at least once. More Australians visits zoos each year than any other form of cultural entertainment, apart from movies (65 per cent). Zoos have maintained this rate of visitation for over ten years.

It is significant that zoos maintain the second highest level of annual visitation compared to other cultural activities, such as libraries, museums and art galleries, even though zoo visits come at a cost and general admission to libraries, museums and art galleries is generally free. This is a strong indicator of the value that consumers attribute to zoos.

There are an estimated 15.4 million visits to zoos per annum, which include about 3.3 million visits by international tourists and 12.1 million visits by Australian residents.

Overall the private sector, including visitors, contributes three-quarters of the revenue of zoos. This is an indication of the minimum level of benefits to consumers. The price of admission is one source of this private revenue. The median price of admission to ARAZPA member zoos is about $24 per adult and $12 per child.

Consumer surveys indicate that the benefits to consumers are typically greater than their payments for admissions. Many consumers have consumer surpluses. However, the consultants do not have data on the possible magnitudes for such surpluses.

State governments contribute about a quarter of the revenue of zoos. On a per capita basis their contribution is only $2.92 across Australia or $4 per visitor. Between 2006 and 2008 the Commonwealth government allocated only $1.1 million to three zoos (two of which are State government owned zoos). These contributions are very low compared to government subsidies provided to other less popular cultural activities, such as libraries, museums and art galleries.

Analysis of general surveys conducted by zoos show a particularly high level of consumer satisfaction with zoo education. These surveys suggest that learning about the animals themselves has overtaken the pure novelty or entertainment value of zoos as one of the principal reasons why people visit. Recent independent studies confirm this and demonstrate that 76 per cent of international tourists are interested or very interested in experiencing (mainly iconic) native wildlife and of these more than half preferred to visit either a zoo or wildlife park, rather than take a tour in the wild.

The value that consumers place on zoos is also represented by the:

- Number of people who belong to Zoo Friends Associations (more than 167 000) and the median price they are willing to pay for Zoo Friends membership (about $80 per person for ARAZPA member zoos).
- Number of people who volunteer at zoos (2300).
- Number of corporate sponsors of zoos (198).
- Amount of non-corporate donations to zoos (about $10 million in 2007-08).

Value of Conservation Activities

There are many perspectives on what conservation means, but in reality zoos play a role in delivering ex situ and in situ conservation for both biological diversity and conserving wild populations of animals in their natural habitats.

The significant value that the international community places on conservation is reflected by the commitment of the vast majority of nations in the world to key international treaties regulating the conservation of biological diversity and import and export of endangered species, as well as the widespread membership of the World Conservation Union (IUCN).

The significant value that the Australian community places on conservation is reflected by the Australian Government's ratification of these international treaties and the range of Commonwealth and State regulation concerning threatened species and habitat protection.

There are a myriad of views about how to measure the contribution of zoos to conservation. Some consider that zoos either make no contribution or that it cannot be measured. The vast majority of parties consulted during the preparation of this report (including most NGOs) consider that zoos make valuable and unique contributions to both ex situ and in situ conservation.

The general value to Australian society of zoos in situ and ex situ native species conservation is particularly significant because according to the Australian Government, 93 per cent of frogs, 89 per cent of reptiles, 85 per cent of flowering plants, 82 per cent of mammals, and 45 percent of land birds that occur in Australia are unique in the world. Thus any effort to conserve native species is arguably valuable, regardless of the number species or animals within a species that are saved.

One of the clearest methods developed to assess the contribution of zoos to conservation suggests that conservation projects undertaken by zoos should be measured according to the (1) importance of the project to conserving wild species or their habitats, (2) the scale of the project and (3) the impact of the project. The difficulty with this is the long timeframes projects need to make a discernable difference.

This approach is also project based and not suitable for the kind of national assessment undertaken in this report. Accordingly the consultants have assessed the contributions of zoos against the specific criteria relating to ex situ and in situ conservation that the *Convention on Biological Diversity* (CBD) requires ratifying parties to undertake. Australia is a party to the CBD.

Judged against these criteria and based on the survey data:

- Zoos deliver 4 of the 5 CBD criteria for ex situ conservation.
- Zoos deliver 4 of the 13 CBD criteria for in situ conservation.
- 24 zoos hold about 3900 species of native and exotic vertebrates and invertebrates. Of these 173 are Australian native species and 197 are exotic species included on the IUCN Red List of endangered species. These are not net figures as many of these zoos hold the same species under joint breeding programs.
- Some larger highly resourced zoos undertake their own conservation and scientific research, but many SME and large zoos fund external research. Between 2006 and 2008, 10 SME and large organisations provided over $2M in research funding to universities and other research institutions.
- 16 zoos participate in specific in situ conservation programs. Spending on in situ programs occurs through general capital expenditure (such as animal facilities to support breeding programs for reintroduction); distribution of public donations collected at animal displays in support of campaigns about threatened species and donations from Zoo Friends Associations.
- In 2007/08 these 16 zoos implemented 75 in situ programs to conserve 48 native endangered species. Eighty one (81) per cent of these programs are recovery and re-introduction programs and 19 per cent are habitat species management programs.
- In 2007/08 12 zoos contributed 37 in situ programs for the conservation of 20 exotic species. Of these 35 programs are habitat and species management programs and 2 are recovery and reintroduction programs. These 12 zoos also contributed to 5 international programs for the creation of sanctuaries in the wild. Almost all of these programs are undertaken in conjunction with an NGO.
- The international programs to which these 12 zoos contributed occurred in 15 countries, 14 of which are developing.
- 15 zoos provide wildlife rehabilitation programs for native species and treat over 14 000 animals each year. The cost of these programs is absorbed in the general operating expenditure of zoos. Nevertheless, given the volume of animals treated government agencies and/or NGOs would require significant expert personnel and financial resources to substitute this function.

In making these assessments the consultants have not attempted to rank species that are subject to conservation programs according to their worth to eco systems, as this is beyond the scope of this report. However it is generally acknowledged that some species are more important to eco systems than others.

Value of Education Activities

Zoos provide a range of conservation education programs for school and tertiary students, visitors and the general public. All of the 18 zoos (except one) visited by the consultants during the preparation of this report demonstrate a very strong commitment to student and visitor education through all facets of zoo operations ranging from signage to mobile zoos and community based programs.

Zoos meet all the standards of conservation education programs set by the European Association of Zoos and Aquaria (EAZA).

In 2007-08 19 zoos provided formal education to about 613 000 students nationally. In many states zoo education programs are either integrated with or reflect state education curriculum.

Education experts consider that zoos are a unique place for:

- Children to learn about environmental issues because they can see and feel animals and this sensory experience is essential to the way children learn;
- Field and zoo biologists to study. Biologists are essential for animal husbandry, animal welfare and connecting environment sustainability with issues of development and economic growth; and
- Veterinary science students to learn about animal care and wildlife medicine.

Only 4 zoos seek to evaluate their education programs as part of their visitor surveys or in other ways in relation to school education. The survey conducted by one of these zoos indicates that 83 per cent of visitors discovered new things they didn't know about before visiting the zoo.

Overall, education program evaluation is not highly developed amongst zoos globally. But Australian zoos are investing in new research to understand how education programs can and should change visitor behaviour to support conservation over the long term.

Nevertheless during their visits to zoos, the consultants observed that zoos make strong attempts through animal exhibits and signage and other material about threatened species and habitats to stimulate emotional responses in visitors and suitable reactions in support of conservation. The report has identified some case studies that seem to illustrate that zoo education can stimulate longer lasting behaviour change for conservation.

Value of Bio-security Activities

Zoos play an important role in bio security because most diseases over the last 30 years are zoonotic or occur first in wildlife. Bio security management tends to be undertaken by large zoos, universities, NGOs and government agencies working in collaboration because smaller zoos do not have the resources to fund such work. Wildlife disease surveillance is coordinated nationally through the Australian Wildlife Health Network (AWHN), in which many zoos participate.

A review of Australia's bio security regime in October 2008 found that the AWHN performs an invaluable role in monitoring disease in feral and native wildlife, but requires more personnel and resources to work at an optimal level. Zoos, collaborate with other organisations to maintain the Australian Registry of Wildlife Health (the Registry) which undertakes diagnostic work, disease investigation, disease surveillance, research, and education.

1.1 Purpose and Scope of this Report

The Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) is the peak body representing zoos, wildlife parks and aquariums (zoos) in Australia and New Zealand. It has commissioned this report to assist it determine the economic and social value that zoos contribute to Australia. The paper does not examine the value of zoos in New Zealand.

In consultation with the consultants preparing this report, a decision was made at an early stage to separate the Australian and New Zealand studies because public policy decision makers in Australia and New Zealand would only be interested in the economic and social value of activities in their respective countries.

The main purpose for which ARAZPA has sought this report is to determine whether the economic and social value of the zoological industry to Australia:

- Affirms the contribution that zoos seek to make to Australian society.
- Confirms the specific species conservation and conservation education roles that zoos seek to play.
- Underpins the relationships between zoos and NGOs, particularly those involved in in-situ conservation activities.
- Assists the Australian and State governments deliver their commitments to conservation, environment protection and climate change reduction policies.
- Supports calls for Australian and State government funding for conservation, environmental protection and climate change projects conducted by both government and privately owned zoos.

To achieve this level of analysis the consultants have undertaken a rigorous process which is detailed in section 2 – Methodology.

This scope of this report is consistent with the definition of zoos provided by the Australian Bureau of Statistics (ABS). The ABS defines zoos as units engaged in the active management, breeding, preservation, study and exhibition of zoological parks, wildlife parks that are actively managed, aquaria, aviaries and reptile parks. The ABS does not include units engaged in operating fauna reserves or parks where fauna is protected but it remains in its natural environment.

1.2 Role of ARAZPA

As the peak industry body, ARAZPA fulfills two main roles. It:

- Develops Australasian Species Management Plans (ASMP) for the hosting and breeding of animals in captivity; and
- Develops industry policy and responses to government policy and advocates industry issues with the Commonwealth and State governments and other stakeholders.

Commonwealth and State government regulation governing the operations of zoos includes legislation covering animal welfare, the import and export of species, the conservation of threatened species, the control of alien species, and biological diversity.

Zoos that are members of ARAZPA have agreed to be subject to ASMP, accreditation and other policies and protocols developed and applied by ARAZPA. The Board of ARAZPA consists of representatives elected from the institutional members of ARAZPA.

Zoos that are not members of ARAZPA are not subject to ASMP and other ARAZPA protocols. Consultations with ARAZPA and non ARAZPA organisations during the preparation of this report indicate that smaller privately owned zoos are often concerned that being subject to ASMP will limit their competitiveness and revenue options because their capacity to offer new animal exhibits will be controlled by ARAZPA.

However some smaller zoos, such as Symbio Wildlife Park in NSW[1], have chosen to join ARAZPA because it has given them an opportunity to participate in an ASMP (in their case the Sumatran Tiger program) which helps them deliver conservation outcomes while boosting the public appeal and therefore revenue of their organisation.

Within the zoos that are not members of ARAZPA, it is common for the owners of those organisations and/or key conservation personnel to be individual members of ARAZPA. Thus while some organisations choose not to be subject to the policies and protocols that ARAZPA sets, there is a broad agreement amongst the zoological industry about the role that a peak body like ARAZPA can play in representing the broad interests of wildlife parks, zoos and aquariums.

There are 107 certified zoos in Australia[2]. These include:

- Small private and local government owned wildlife parks, zoos and aquariums.
- Wildlife parks, sanctuaries, and zoos owned by the National Trust and co-operatives.
- Large zoos and aquariums owned by public companies.
- State government owned zoos and wildlife parks.

Of the 107 zoos, 39 are members of ARAZPA and 68 are not members. Of the non members, 20 belong to the ARAZPA affiliated organisation called Australasian Regional Association of Zoological Parks and Aquaria of Queensland (ARAZPAQ). For the purposes of this report these 20 members of ARAZPQ are treated as non members of ARAZPA.

The table below describes the number of zoos in Australia by state and territory and also by the number that are ARAZPA members and non members.

Other contributors to the zoological industry include academia, government research facilities, government regulators and non-government organisations (NGOs).

Table 1.1 Zoological Organisations in Australia[3]

Institution	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
ARAZPA	2	9	4	10	4	1	7	2	39
Other	1	10	0	25[a]	4	13	2	13	68
Total	3	19	4	35	8	14	8	15	107

(a) Includes 20 ARAZPAQ members

[1] Consultations with Symbio Wildlife Park

[2] Information provided Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA)

[3] Ibid

2.1 Identifying the Economic and Social Values to Examine

Before commencing the project the consultants completed a scoping study to identify the kinds of economic and social values they should examine. This included a literature review and consultations with zoological, economic and scientific experts. Based on this study the consultants determined that they should examine the following primary values of zoos:

- Economic value, measured in terms of contributions to Gross Domestic Product, employment and tourism (production value).
- Value for consumers, measured via visitor survey results, the revenue and financial support provided to zoos and consumer surplus (recreational value).
- Value of contribution to conservation, measured by the nature and results of in-situ and ex-situ programs and research.
- Value of contribution to education, measured by the nature and results of school, tertiary and visitor education programs and their links to raising conservation awareness and motivating behaviour change.
- Value of contribution to bio-security, measured by the role zoos play in protecting Australia's biodiversity and environment and primary production industries.

Zoos vary considerably in size and in the services that they provide. As a result, a few large zoos have the capacity and do provide all of the economic and social benefits identified above. Others, especially smaller organisations, are largely recreational.

Much of the literature reviewed by the consultants considers the prime public benefits of zoos as wildlife conservation followed by education. Education can be considered to be an input to conservation activities as well as a stand-alone objective.

Bio security contributions are considered to be smaller.

Research by zoos can be an input into these other contributions as well as a distinct and separate contribution. However, most research that takes place in zoos is applied and its value depends on how it assists other objectives.

2.2 Measuring the Identified Economic and Social Values

2.2.1 Economic (Production) Values

The direct economic impact of a zoo, or a collection of zoos, can be measured in two main ways:

- As gross output. Gross output is essentially the gross expenditure of zoos including purchases from other sectors; or
- As value added. Value added is labour costs plus profits (if any). It excludes purchases from other sectors.

The indirect economic impact of a zoo can also be measured in various ways.

One approach is to estimate the multiplier effects from institutional expenditure. However, care must be taken in interpreting this result and especially with the assumption that expenditure is an economic benefit. This later assumption implies that people employed by zoos have no alternative source of employment. It also assumes that spending government funds is a benefit even though the funds could have been used elsewhere. Also, real multiplier effects are usually low especially in a full employed economy.

A second approach is to estimate the value of an increase in international tourist expenditure in an economy as a result of zoo parks. Local expenditure on zoos is generally regarded as a transfer from some other sector. However, international tourist expenditure must itself be serviced, which typically involves an outlay of resources. Servicing tourists may also displace other output. Thus the net increase in local incomes due to increased international tourist expenditure is usually quite low.

In general the value of the output or services of an institution is the value that consumers and other members of society attach to the output or services. However, the estimated economic output of institution provides an important economic perspective.

This report examines the direct gross output of zoos in Australia and makes conservative estimates of the value to the economy of induced international tourist expenditure.

This involved collecting data on zoo expenditure and employment, and estimating incremental tourism expenditure less costs of supply, and any business multipliers. Most of the data was obtained via a survey of zoos (the survey). The sample values from the survey are factored up to estimate the total value of production in Australia[1].

[1] Applied Economics and Aegis Consulting (2005) did such a study of the economic production value of Taronga and Western Plains Zoos. See also Economics Research Group Cincinnati (1997) and Washington Economics Group (2003)

2.2.2 Consumer Values

Expenditure by visitors and contributions by zoo friends is a good indicator of the minimum value of these services to visitors and friends. However, this expenditure may understate benefits if prices are low and there are consumer surpluses (consumer valuations exceed prices) or when there is free riding (people do not contribute but hope to gain from the contributions of other).

Ideally some form of evaluation technique would be employed to determine real user values, for example contingent valuation and travel cost methods. However this kind of primary research is not possible in this study because of the budget and timeframe.

Accordingly, this study focuses on visitor numbers and revenues and other data on supporter groups and contributions collected from zoos. This is supplemented with some Australian market research data undertaken by zoos and universities.

2.2.3 Contributions to Conservation

In terms of valuation, several issues need to be considered such as:

- The value society places on saved species.
- Whether zoos breeding programs for endangered species are successful.
- Whether the species in breeding programs are significant for their ecosystems.
- The success of reintroduction programs.

Identifying expenditure on conservation is a starting point. It provides a guide to value, especially if it can be shown to be cost-effective compared with in-situ conservation. But expenditure on conservation may not equal value. The value depends on the value of the conserved species.

To estimate the value of conservation activity it is necessary to estimate whether a zoo has reduced extinction probabilities, secured populations and increased them in the wild, and how does that cost compare to in situ conservation or with the possible public valuation of the species. This is a significant research exercise. There is no general answer or number. Claims to conservation are examined on their merit in this report.

To achieve this, the consultants asked zoos to identify the contributions that they make to conservation of species or habitats and asked for supporting experts, institutions and data. The questions used by the consultants were framed using the schema proposed by the World Association of Zoos and Aquariums, notably the suggestions for identifying contributions to conservation of wild populations, contributions to science and research in conservation, and suggestions for methods for managing small populations[2].

[2] World Association of Zoos &Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, chapters 2-4

To confirm the effectiveness and value of conservation projects undertaken by zoos, the consultants discussed the value of these projects with government agencies, academic experts and national and international NGOs, including those that participate in programs with zoos.

2.2.4 Contributions to Education

Education is a valuable role for zoos. While vicarious enjoyment, such as television documentaries on wildlife, is important and can show some aspects of wildlife that zoos cannot show, some characteristics of animals cannot be experienced vicariously – e.g. the size of animals, the feel of their skins etc.

As with conservation there are conflicting views about the role of zoos in education. For many people, visiting zoos is the primary way of exposure to wildlife and can often be the first point of contact with nature[3]. Undoubtedly zoos have a very wide audience for education and can extend this through the internet.

However, others argue that there is little evidence of educational benefits because other educational methods are available[4]. More recently, a large survey of zoo visitors found that people leaving a zoo had little if any more knowledge about conservation than did people entering the zoo[5].

To assess the value of education programs the consultants asked zoos to identify the contributions that they make to education in Australia along with nominations of supporting experts, institutions and data. This could be formal or informal education. It could also include staff contributions to knowledge of animal life or behaviour. The questions draw on the specific suggestions by the World Association of Zoos and Aquariums[6]. Where the zoos made claims for educational services, supporting evidence was sought.

[3] Ibid Chapter 5

[4] Jamieson, D, 'Against Zoos', in P Singer (ed.) 'In Defence of Animals', Basil Blackwell, 1985, pp108-117

[5] Balmford, A. Leader-Williams, N, Mace, G Manica, A, Walter, O, West, C, and Zimmermann, A. 'Message received? Quantifying the impact of informal conservation education on adults visiting U.K. zoos' in Zoos in the 21st Century, Cambridge University Press, 2007, pp120-136

[6] World Association of Zoos and Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, chapter 5

2.2.5 Contributions to Bio Security

Work on bio security tends to be focused on significant national issues and done in large organisations rather than in small ones. For example the Australian Wildlife Health Network hosted by Taronga Zoo and funded by the Commonwealth is working on bird flu issues and the Australian poultry industry has a turnover of $240 billion.

However it is difficult to tease out components that zoos provide to bio security and hard to quantify both contributions to bio security and the value of bio security which is a kind of insurance value.

There is also an offsetting concern about the bio security values. As was seen with equine flu, any activity involving imports of animals may increase the likelihood of exotic introductions, and in intensive zoo-like conditions, diseases may spread if introduced. Further, animals in such conditions are more likely to be intensively treated with drugs because of their environment and less resistant to pests/diseases in the wild if reintroduced.

The consultants asked zoos to identify the contributions that they have made and are likely to make to bio security in Australia along with nominations of supporting data. Again such claims were tested by reference to other experts.

2.3 Formal Survey of Zoos

The consultants prepared a comprehensive survey document (the survey) which asked a series of questions to obtain data and information about the five main economic and social values discussed above. The survey document was distributed by ARAZPA to all of the 107 zoos in Australia.

In the survey, zoos were asked to:

- Supply basic data on visitors, expenditures, sources of income etc;
- Identify all possible benefits and types of claims that can be made under the five classes of benefits shown above;
- Provide any evidence to support such claims; and
- Identify experts and/or institutions that can support such claims.

The consultants received survey responses from 20 organisations (the respondents) representing 24 zoos[7]. The respondents represented a wide cross section of large, small/medium, government, private, not for profit, metropolitan and regional zoos. Each State and Territory was represented in the responses.

[7] Three of these organisations, Taronga Conservation Society, Zoos Victoria and Zoological Society of South Australia included data in their survey responses from a total of 4 additional institutions under their control. TCS represents Taronga Zoo and Western Plains Zoo, ZV represents Melbourne Zoo, Werribee Zoo and Healseville Sanctuary, and ZSSA represents Adelaide Zoo and Monarto Zoo.

Of the respondents:

- 16 are ARAZPA members, and 4 are not.
- 5 are subject to State government ownership, 13 are privately owned and 2 are under the control of a trust.
- 9 represent zoos in regional areas, 3 represent zoos in metro and regional areas and 8 represent zoos in metropolitan areas.
- 17 provided detailed data on operating and capital expenditure, revenue and employment that could be used to assess gross domestic product.
- Most provided information about conservation and education, including case studies that assisted the consultants assess conservation and education values.
- A minority provided information about consumer surveys and bio security.

Based on the information received from the respondents, 11 can be classified as small/medium enterprises (SMEs) and 9 can be considered to be large enterprises. To make this distinction the consultants have assumed that an SME is an organisation with less than 199 employees and/or annual revenue in 2007/08 of less than $6 million[8].

A large random survey of users of zoo services including research of consumers of zoo services was not feasible given the budget and timeframe for the report. An extensive survey of institutions that are associated in one way or another with zoos was also considered impractical because of the difficulty of eliciting informed and representative views from institutions as distinct from the views of particular officers of the institutions. In discussions with various informed parties it was evident that individuals often held strong views about zoos that did not necessarily or fully represent the views of the institutions they worked for.

However, the report has been able to draw on results of pre-existing independent market research of consumer attitudes and responses conducted for zoos and as part of academic research undertaken by universities.

[8] The Australian Government defines SMEs as those enterprises with less than 199 employees. The consultants have used the revenue figure of $6M as a second indictor to confirm these classifications.

Table 2.1 Respondents to Formal Survey

Location	Area	Govt	Private	Trust	ARAZPA member	Definition
New South Wales	Regional		Australian Reptile Park		yes	SME
	Regional		Pet Porpoise Pool		yes	SME
	Metro		Sydney Aquarium and Wildlife World		yes	Large
	Metro/ Regional	Taronga[9] Conservation Society			yes	Large
Northern Territory	Regional	Alice Springs Desert Park			yes	SME
	Metro	Territory Wildlife Park			yes	SME
Queensland	Metro		Alma Park Zoo		yes	SME
	Regional		Australia Zoo		yes	Large
	Regional		Cairns Tropical Zoo		yes	SME
	Metro			Currumbin Sanctuary	yes	Large
	Metro		Dreamworld		yes	Large
	Regional		Rainforest Habitat		no	SME
	Metro		Seaworld		yes	Large
South Australia	Metro/ Regional			Zoological Society of South Australia[10]	yes	Large
Tasmania	Regional		Trowunna Wildlife Park		yes	SME
Victoria	Metro/ Regional	Zoos Victoria[11]			yes	Large
Western Australia	Regional		Armadale Reptile Centre		no	SME
	Metro		Caversham Wildlife Park		no	SME
	Metro	Perth Zoo			yes	Large
	Regional		Rainbow Jungle		no	SME
Total		**6**	**12**	**2**		

[9] Representing Taronga Zoo and Western Plains Zoo

[10] Representing Adelaide Zoo and Monarto Zoo

[11] Representing Melbourne Zoo, Werribee Zoo and Healseville Sanctuary

2.4 Consultants Visits to Zoos

Low responses are a potential problem for this kind of study especially when the population group is small. To avoid the low response problem, collect a rich set of information, and gain first-hand knowledge about the operation and programs of zoos, the consultants conducted face-to-face interviews with as many zoos as possible within the set budget.

The consultants visited 18 zoos across Australia. To assist the robustness of their analysis, the consultants selected a cross section of large, small, government, private, not for profit, metropolitan and regional zoos in the mainland States and Territories. Of the zoos visited:

- 13 are ARAZPA members and 5 are not.
- 5 are State government owned, 11 are privately owned and 2 are under the control of a trust.
- 7 are in regional areas and 11 are in metropolitan areas.
- 12 also submitted a response to the formal survey and 6 did not.

Thus, in addition to the data received from the 20 respondents to the formal survey (representing 24 zoos), the consultants' visits gathered information from another 6 zoos. Of these 6 zoos, 2 are ARAZPA members, and 4 are non members.

Accordingly, in preparing this report, the consultants gathered data and information from a total of 30 zoos (28 per cent of all 107 zoos) of which 22 are ARAZPA members (56 per cent of institutional members) and 8 are non members.

Table 2.2 Zoos Visited by the Project Consultants

Location	Area	Govt	Private	Trust	ARAZPA member	Survey Respondent
New South Wales	Metro		Featherdale Wildlife Park		no	no
	Metro		Sydney Aquarium and Wildlife World		yes	yes
	Regional		Symbio Wildlife Park		yes	no
	Metro	Taronga Zoo			yes	yes
Northern Territory	Regional	Alice Springs Desert Park			yes	yes
Queensland	Regional		Australia Zoo		yes	yes
	Regional		Cairns Tropical Zoo		yes	yes
	Metro			Currumbin Sanctuary	yes	yes
	Metro		Dreamworld		yes	yes
	Regional		Hartley's Ck Crocodile Farm		no	no
	Regional		Kuranda Koala Gardens		no	no
	Metro		Seaworld		yes	yes
South Australia	Metro			Adelaide Zoo	yes	yes
	Metro	Cleland Wildlife Park			yes	no
Victoria	Metro		Melbourne Aquarium		no	no
	Metro	Melbourne Zoo			yes	yes
Western Australia	Metro		Caversham Wildlife Park		no	yes
		Perth Zoo			yes	yes
Total		**5**	**11**	**2**		

2.5 Consultations with Independent Experts

A critical part of the methodology applied in preparing this report was consultation with independent experts in relation to the contribution that zoos make to conservation and education.

The consultants considered that this step was important to test the responses of zoos to the survey document, as well as the data and information gathered by the consultants during their visits to zoos.

Independent experts in conservation and education were identified in two ways:

- The survey document sent to zoos asked them to identify experts; and
- The consultants identified experts.

Through this dual process over 35 conservation experts and 20 education experts were identified. During the preparation of this report the consultants interviewed the majority of these experts.

These experts included government officials in agencies responsible for environment, conservation, primary industries, education, and economic analysis, national and international NGOs and individuals involved in in-situ conservation and conservation education programs, and academics involved in conservation and education research and teaching programs. Some of the experts consulted included:

Conservation

- Academics at James Cook University
- Academics at Griffith University
- Academics at Macquarie University
- Academics at Monash University
- Academics at Queensland University
- Australian Koala Foundation
- Cheetah Outreach
- Flora & Fauna International
- Free the Bears Foundation
- NSW Government, Department of Environment and Climate Change
- QLD Government, Department of Primary Industries
- Save the Bilby Fund
- Stop the Toad Foundation
- Tenkile Conservation Alliance
- WA Government, Department of Environment and Conservation

Education

- Academics at Flinders University
- Academics at Sydney University
- Academics at Murdoch University
- Australian Association of Environmental Education
- Northern Territory Government, Department of Education
- NSW Government, Department of Education
- NSW TAFE
- WA Government, Department of Education

2.6 Literature Review and Other Data Collection

To supplement the collection of information through the survey, visits to organisations and consultations with independent experts, the consultants reviewed other literature regarding the zoological industry including:

- Australian Bureau of Statistics data
- Government discussion papers and reports
- The World Zoo and Aquarium Conservation Strategy
- Texts and reference material about zoos

Data on zoos can be obtained either from existing source or new ones. The main existing source of data in Australia is the Australian Bureau of Statistics (ABS). Some data on zoo expenditure and visitors can be found in various ABS publications including most notably ABS (2008, Cat. No.4172.0)[12].

However, the ABS has relatively limited data on zoo parks and aquaria. The ABS ran a special Zoos, Parks and Gardens Industry survey in 1996-97 and provided the results in ABS (1998, Cat. No.8690). The ABS has not conducted a specialist survey of this sector since then.

[12] ABS, 2008, *"Arts and Culture in Australia: A Statistical Overview"*

Key Findings

Based on the consultant's survey, the total estimated production by zoos is worth about **$424 million per annum**. This consists of annual operating expenditure of about $358 million and capital expenditure of about $66 million.

Zoos **employ about 5300 people**, including 3700 full-time employees and 1600 part-time employees.

International visitors to zoos may create an estimated net benefit to the Australian economy of about $58 million per annum in addition to their payments for admissions to zoos. Allowing for a multiplier of up to 2.0, this could convert to a total value of about **$116 million**.

3.1 Contribution to Gross Domestic Product

3.1.1 ABS Data on Zoos

The ABS records output and expenditure by zoos as part of Cultural and Recreational Services (Division P) of the Australian National Accounts. Cultural and Recreational Services are one of 18 major economic sectors in the National Accounts[1].

However, the Cultural and Recreational Services sector itself contains 23 distinct cultural occupations as well as several sporting and other recreational activities. Zoos and botanic gardens constitute one of the cultural occupations. Therefore data on zoos has to be obtained mostly from specialist ABS publications dealing with cultural occupations and this data is quite limited and out-of date.

In any case there are wide variations in ABS data on zoos, which makes it problematic to rely on the data to determine with certainty the production value that zoos represent to the national economy. Accordingly the consultants have relied to a greater degree on the results of their survey of zoos.

ABS (2008, Cat. No. 4172.0) provides a breakdown of the outputs of the major cultural occupations, including zoos and botanic gardens.[2] As shown in Table 3.1, the gross output of zoo and botanical garden operations in 2001-02 in Australia was $920 million. However, no breakdown is readily available for the separate contributions within this group.

Despite consultations with the ABS it is not clear what sample of zoos it used to estimate overall production value. Accordingly, the consultants have included Table 3.1 for background purposes only, and have not relied on the ABS data to determine the actual production value of zoos. This is particularly because the sampling of zoos undertaken by the consultants is reasonably comprehensive.

The latest year for which ABS has reported detailed data on expenditure on zoos is 1996-97. The ABS reports[4] that *"while recent data are available on people's attendance and work involvement in areas of environmental heritage, little exists on the economic activity of the organisations which operate and maintain nature, zoological and botanic parks and reserves"*. ABS confirmed in correspondence with the consultants that it has no more recent data on expenditure.

[1] For a full description see Australian Bureau of Statistics, 2006, *Australian and New Zealand Standard Industrial Classification*, Cat. No.1292.0. However, this publication is already out-of date as there were then 19 major industrial Divisions rather than the present 18, and zoological institutions were then part of Arts and Recreational Services (Division R).

[2] ABS, 2008, *Arts and Culture in Australia: A Statistical Overview,* Cat. No.4172

Table 3.2 shows the breakdown of the expenditure data for 1996-07. This indicates gross output as measured by expenditure as $127 million in 1996-97. Even allowing for changes in prices, this figure seems low compared with recent figures as described below. Expenditure on labour, inclusive of on-costs, was slightly under half of all expenses.

Again the consultants have included this table for background purposes only and do not place any reliance on it. This is because of the age of the data, uncertainties about sample size and the fact that the consultant's comprehensive survey of major zoos indicated much higher expenditure.

Table 3.1 Gross Output of Zoos, Libraries, Museums and the Arts in 2001-02 ($m)[3]

Product group	$m	%
Creative arts services	1095	19.3
Library, museum and art gallery services	1061	18.7
Music and theatre productions	478	8.4
Other services to the arts	288	5.1
Performing arts venue operation	1103	19.5
Recreational parks and garden operations	614	10.8
Sound recording studio operations	106	1.9
Zoological and botanical garden operations	920	16.2
Total	**5665**	**100.0**

Table 3.2 Expenditure Breakdown in Zoos in 1996-97[5]

	$m	%
Labour costs		
Wages and salaries	52.7	41.5
Contributions to superannuation	3.4	2.7
Workers compensation costs	1.7	1.3
Total	**57.8**	**45.5**
Selected expenses		
Advertising and marketing	5.6	4.4
Repair and maintenance	5.1	4.0
Other expenses	23.9	18.9
Total selected expenses	34.6	27.3
Other costs		
Purchases of goods and materials	19.8	15.6
Depreciation and amortisation	9.9	7.8
Interest expenses	3.5	2.8
Insurance premiums	1.2	1.0
Total other costs	**34.5**	**27.2**
Total all expenses	**126.9**	**100.0**

[3] ABS, 2008, Cat. No.4172.0
[4] ABS, 2008 Cat. No. 4172.0, p55
[5] ABS, 1998, Cat No. 8699.0

3.1.2 Survey Data Collected by the Consultants

As reported in Chapter 2, 20 organisations representing 24 zoos responded to the survey. The consultants asked zoos to provide data on their expenditure in 2007-08 and 2006-07.

However, of the 20 respondents:

- 17 provided data on their expenditure for 2007-08 of which 13 are ARAZPA members (representing 17 zoos) and 4 are non members.
- 16 provided data on their expenditure for 2006-07 of which 13 are ARAZPA members and 3 are non members.

The total expenditure recorded in the survey was $227 million in 2007-08 and $208 million in 2006-07. The additional non-ARAZPA member zoo in 2007-08 accounted for about $1.8 million. Even allowing for this and for some 3 per cent inflation, there was a real increase in zoo expenditure in 2007-08.

Of the total reported expenditure in 2007-08, the:

- 13 ARAZPA members accounted for $223.6 million.
- 4 non-ARAZPA members accounted for $3.6 million.

In these records, labour with on-costs accounted for slightly over half of all expenses. The other major items were trading costs of sales, depreciation, marketing and maintenance.

Table 3.3 Expenditure of Surveyed Zoos in 2006-07 and 2007-08[6]

	2006-07 $m	2006-07 %	2007-08 $m	2007-08 %
Operating expenses				
Salaries and wages	86,629,690	41.6	94,434,504	41.5
Superannuation	6,877,572	3.3	10,292,196	4.5
Payroll tax	4,456,846	2.1	5,707,444	2.5
Other labour on-costs	8,003,151	3.8	7,871,780	3.5
Trading cost of sales	21,576,073	10.4	23,484,458	10.3
Marketing expenses	11,553,273	5.5	12,730,318	5.6
Depreciation	24,292,102	11.7	22,382,847	9.8
Insurance	2,220,934	1.1	2,269,409	1.0
Maintenance	11,622,314	5.6	12,448,110	5.5
Finance costs	5,182,213	2.5	0.44,393,779	1.9
Specified conservation programs	853,000	0.4	3.43,527,000	1.6
Specified research programs	711,384	0.3	2.2140,000	0.1
Donations to other conservation/research	454,909	0.2	661,929	0.3
Other expenses	23,833,500	11.4	26,914,500	11.8
Total operating expenses	**208,266,961**	**100.0**	**227,258,274**	**100.0**
Of which 17 ARAZPA zoo parks			**223,644,612**	
Of which 4 non-ARAZPA zoo parks			**3,613,662**	
Total capital expenditure	**45,001,144**		**39,270,000**	

(a) 16 zoos in 2006-07; 17 zoos in 2007-08. The additional zoo in 2007-08 accounted for $1.77 million.

[6] Aegis Consulting and Applied Economics Survey 2009

To estimate total zoo expenditure, these survey figures need to be grossed up to allow for all 39 ARAZPA zoos and for the 68 non-ARAZPA zoos.

To estimate the gross output of the ARAZPA zoos the consultants drew on data from ARAZPA that indicates that the 13 ARAZPA members (representing 17 zoos) that responded to the survey question about expenditure account for close to 75 per cent of all operating expenditure by the 39 organisations that are ARAZPA members.[7] This implies that, to obtain an estimate of total operating expenditure in 2007-08, the reported survey expenditure figures need to be factored up by 33 per cent[8].

Accordingly the estimated total operating expenditure of ARAZPA members in 2007-08 was $297 million.

There is little data for the non-ARAZPA zoos. The expenditure of the 4 reporting zoos in 2007-08 varied from $0.13 million to $1.77 million and averaged $0.9 million. The consultants held meetings with 3 other non-ARAZPA zoos and judged that they had expenditure similar to the largest non-ARAZPA zoo that responded to the survey. On the other hand, many non-ARAZPA zoos are even smaller operations and would likely have expenditure of less than $0.5 million. For this study, an average non-ARAZPA expenditure of $0.9 million is allowed.

This gives a total output of $61 million in 2007-08 for the 68 non-ARAZPA members.

Based on this assessment, total operating expenditure by all zoos in 2007-08 was about $358 million.

In addition, the survey respondents reported total capital expenditure of $84.3 million over the two years, 2006-07 and 2007-08, for an average of $42.1 million per year. Grossing this amount up to a population figure by the same factor as for operating costs (i.e. by 1.57 = $358 million / $227 million) gives an average of $66 million capital expenditure per annum for the industry in these two years[9].

Therefore total operating and capital expenditure for the industry is currently about $424 million per annum.

3.2 Contribution to Employment

3.2.1 ABS Data

There are widely varying data on employment in zoos. Drawing on the 2006 Household Census, ABS reports that employment in zoos and botanical gardens in August 2006 was 2571 persons including 596 in cultural occupations and 1975 in other occupations[10].

Of the paid employees, 45 per cent were involved quite directly with animals as curatorial/maintenance, education or specialist research staff. The rest were involved in management, administration, retail sales and other work. These figures relate to a person's main job in the week before the Census night.

On the other hand ABS reports in the same publication that employment in zoos totalled 8100 in the 12 months to April 2007[11]. This figure included 5800 persons with a main job in zoos and 2300 other persons with secondary work in zoos (see Table 3.4 opposite).

In addition, another 5000 persons are reported to have some unpaid involvement in zoos[12]. These estimates are derived from a sample of households and ABS has advised the consultant that they are likely to be less accurate than the household census data.

Table 3.4 describes these ABS findings.

[7] ARAZPA supplied the consultants with estimated operating costs for its member institutions, presumably supplied by the member organisations. In some instances these estimates were lower than the costs provided to the consultant in the survey. However, we assume that they indicate realistic relativities between ARAZPA institutions.
[8] The uplift factor of 33% is calculated by dividing 25 by 75
[9] Note that this is a different factor because it includes a much larger uplift factor for the non-ARAZPA zoos and ARAZPA zoos
[10] ABS, 2008, Cat. No.4172.0, Table 5.2
[11] ABS, Cat. No.4172.0, Table 5.5
[12] ABS, 2008, Cat. No.4172.0

Table 3.4 Paid Employment in Selected Cultural Occupations in 2006-07 ('000)[13]

Occupation	No: main job	No: other job	Total	%
Botanic gardens	6.8	2.6	9.4	11.5
Heritage organisations	4.1	5.7	9.8	11.7
Libraries and archives	29.3	6.6	35.9	42.9
Museums	8.4	1.4	9.8	11.7
National parks and reserves	8.4	4.9	13.3	15.9
Public art galleries	10.3	4.6	14.9	17.8
Zoos and aquaria	5.8	2.3	8.1	9.6
Total heritage	**60.3**	**23.4**	**83.7**	

3.2.2 Survey Data Collected by the Consultants

A total of 18 organisations (representing 22 zoos) responded to the survey question about employment. They reported that they employed a total of 3112 persons. Of these approximately 70 per cent were full-time employees and 30 per cent were part-time[14]. Nearly all of these employees are employed at the 18 zoos operated by ARAZPA members and only 88 are employed at the 4 non-member zoos.

To estimate total employment, the survey results are again factored up in a similar way to the expenditure statistics. However, in this case ARAZPA data shows that the ARAZPA organisations which responded to the survey account for 80 per cent of the total expenditure by ARAZPA members. Therefore the sample employment number is factored by 25 per cent[15] to obtain a population figure of 3780 employees in ARAZPA zoos.

Allowing an average of 22 persons in non-ARAZPA zoos, the consultants calculate that there are about 1496 employees in the 68 zoos which are not ARAZPA members.

Using round numbers these estimates suggest that zoos employ a total of about 5300 people. This includes 3700 full-time employees and 1600 part-time employees. These estimates sit well between the two very diverse ABS estimates (totalling 2571 and 8100 total employees respectively).

3.3 Contribution to Tourism

Sixteen organisations (representing 20 zoos) responded to the survey question on their number of international visitors in 2006-07 and 2007-08. In total they reported that they had 1.69 million overseas visitors in both 2006-07 and 2007-08.

This total included 1.56 million international tourists visiting 17 zoos operated by organisations which are members of ARAZPA and 0.13 million visiting 3 non-AZAZPA members.

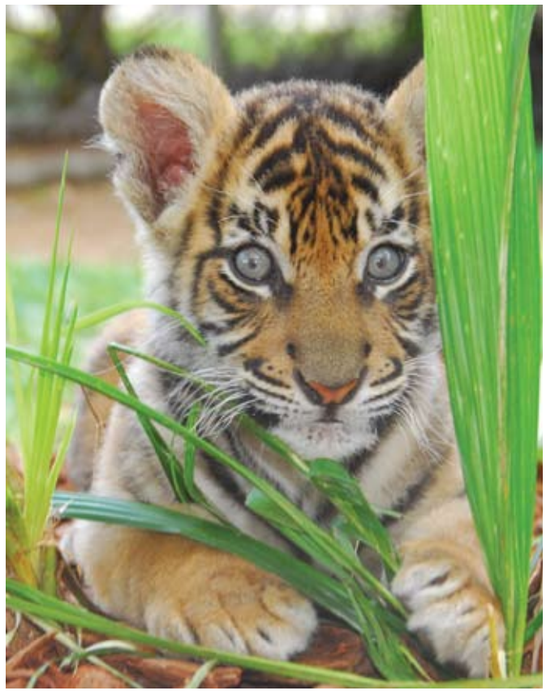
To estimate total overseas visitors, the survey results are factored up by drawing on total visitor numbers for ARAZPA zoos which have been supplied to the consultants by ARAZPA. Accordingly, international tourist visits to ARAZPA zoos has been factored up by 1.50. Based on this, international tourists make an estimated 2.3 million visits a year to these zoos.

The average for non-ARAZPA member zoos is strongly influenced by the figures for one zoo. Assuming that visitors are proportional to employment at zoos, international visitors at non-ARAZPA zoos would be 40 per cent of those at ARAZPA zoos. This would imply 0.94 million international visitors to the 68 zoos that are not members of ARAZPA.

These estimates suggest that international tourists make about 3.3 million visits to Australian zoos in a year. Of course, some visitors may visit more than one zoo.

Average tourism expenditure per overseas visitor was $4840 in 2006-07[16]. Given an average stay of 7.5 days, average expenditure would be $725 per day. However, this includes air travel and other fixed costs of the visit.

[13] Ibid
[14] These percentages are based on 16 responses. Two large private institutions did not provide a breakdown between full and part-time employees
[15] The factor of 25% is calculated by dividing 20 by 80
[16] ABS, 2008, Tourism Satellite Account, ABS cat, no. 5249.0



In the absence of relevant data, for the purpose of estimating gross tourist-induced expenditure, this report makes the following assumptions.

- Half the international visitors to zoos stay an extra half day in Australia (the other half exchange a zoo experience for other experiences);
- The international visitors spend an extra $100 per half day (in addition to zoo admission, which is counted as a revenue benefit below);
- The cost of servicing each extra dollar of international expenditure is 65 cents. Therefore, there is a surplus of 35 cents per dollar of induced expenditure[17].

The first round net economic benefit of the extra zoo visitors would therefore be:

(3.3 million visitors × 0.5) × $100 × 0.35

= $58 million per annum.

This first round of benefits may lead to additional benefits as the first-round surplus income is re-spent. The size of income multipliers depends on leakages taxes, savings and imports (directly or indirectly).

If 50 per cent of income leaks into these areas, the multiplier is 2.0. In this case the total net benefit from extra international expenditure would be about $116 million. The actual numbers, and particularly the leakage into imports, depends a lot on the spare capacity of the economy at any point in time. The multiplier is unlikely to be greater than 2.0.

[17] This figure is consistent with estimates of tourism benefits given in Applied Economics (2007) study of the tourism benefits of the Formula 1 Grand Prix

Key Findings

In 2005-06, nearly 36 per cent of the population over 15 years of age visited a zoo at least once. More Australians visits zoos each year than any other form of cultural entertainment, apart from movies (65 per cent). Zoos have maintained this rate of visitation for over ten years.

There are an estimated 15.4 million visits to zoos per annum, which include about 3.3 million visits by international tourists and 12.1 million visits by Australian residents.

Overall the private sector, including visitors, contributes three-quarters of the revenue of zoos. This is an indication of the minimum level of benefits to consumers. The price of admission is one source of this private revenue. The median price of admission to ARAZPA member zoos is about $24 per adult and $12 per child.

It is significant that zoos maintain the second highest level of annual visitation compared to other cultural activities, such as libraries, museums and art galleries, even though zoo visits come at a cost and general admission to libraries, museums and art galleries is generally free. This is a strong indicator of the value that consumers attribute to zoos.

Consumer surveys indicate that the benefits to consumers are typically greater than their payments for admissions. Many consumers have consumer surpluses. However, the consultants do not have data on the possible magnitudes for such surpluses.

State governments contribute about a quarter of the revenue of zoos. On a per capita basis their contribution is only $2.92 across Australia or $4 per visitor. Between 2006 and 2008 the Commonwealth government allocated only $1.1 million to three zoos (two of which are State government owned zoos). These contributions are very low compared to government subsidies provided to other less popular cultural activities, such as libraries, museums and art galleries.

Analysis of general surveys conducted by zoos show a particularly high level of consumer satisfaction with zoo education. These surveys suggest that learning about the animals themselves has overtaken the pure novelty or entertainment value of zoos as one of the principal reasons why people visit. Recent independent studies confirm this and demonstrate that 76 per cent of international tourists are interested or very interested in experiencing (mainly iconic) native wildlife and of these more than half preferred to visit either a zoo or wildlife park, rather than take a tour in the wild.

The value that consumers place on zoos is also represented by the:

- Number of people who belong to Zoo Friends Associations (more than 167 000) and the median price they are willing to pay for Zoo Friends membership (about $80 per person for ARAZPA member zoos).
- Number of people who volunteer at zoos (2300).
- Number of corporate sponsors of zoos (198).
- Amount of non-corporate donations to zoos (about $10 million in 2007-08).

This Chapter discusses the ways in which zoos are valued by the community. This can include the price visitors are willing to pay, the educational benefits they consider zoos provide, the number of zoo friends and zoo volunteers and a range of other indicators.

4.1 Consumer Profile

4.1.1 ABS Data

As shown in Table 4.1, more Australians visit zoos than any other major cultural activity (except for movies). The ABS found from a multi-purpose household survey that, in 2005-06, nearly 36 per cent of the population over 15 years of age visited a zoo at least once.

Zoos have maintained this high rate of visitation for over ten years. The attendance rate for zoos of 35.6 per cent in 2005/06 was virtually the same as the rate of 35.3 per cent ten years earlier in 1995[1].

Table 4.1 Australians Over 15 Attending Cultural Venues and Events in 2005-06[2]

	No of people attending ('000)	Attendance rate No. as % of population over 15
Movies	10,431	65.2
Zoological parks and aquariums	5,700	35.6
Libraries: local, state and national	5,455	34.1
Botanical gardens	5,391	33.7
Popular musical concerts	4,036	25.2
Art galleries	3,630	22.7
Museums	3,611	22.6
Theatre performances	2,732	17.0
Musicals and operas	2,613	16.3
Classical music concerts	1,508	9.4

Nearly half of all visits to zoos in 2005-06 were single visits and the other half were the same people visiting more than once. Taking these multiple visits into account there were an estimated 8.56 million visits by Australians over 15 years of age to zoos in 2005-06. Of this, an estimated 3.43 million visits were made to zoos, 2.28 million to wildlife parks and 2.85 million to aquariums and maritime parks[3].

Attendance rates are spread well over age groups (see Table 4.2).

Table 4.2 Attendance Rate: No as % of Population by Age Group[4]

Age	15-17	18-24	25-34	35-44	45-54	55-64	65-74	75+	Total
%	42.0	35.4	46.5	48.0	32.0	31.0	22.7	11.0	35.6

[1] T ABS, 2008, Cat. No. 4172.0
[2] Ibid
[3] Ibid
[4] Ibid

4.1.2 Consultants Survey Data

The 19 organisations (representing 23 zoos) responding to the survey questions about visitor numbers reported 7.7 million total admissions in 2007-08. This included 7.3 million admissions to the 15 ARAZPA organisations that responded to the survey. Note that these figures, and all those in this section, include admissions by persons aged 15 years or less and by overseas tourists.

To estimate total admission, the ARAZPA survey numbers are factored up 1.50[5], giving a total of 11 million visits to ARAZPA zoos. Allowing that visits to non-ARAZPA zoos are 40 per cent of those to ARAZPA zoos, there were an estimated 4.4 million visits to the 68 non ARAZPA zoos (an average of 65,000 visits per zoo).

These estimates imply a total of 15.4 million visits to zoos per annum. This estimate includes international visitors and children below the age of 15, who are not included in the ABS visitor figures gathered in 2005-06.

[5] See the description of why this factor is used in section 3.3

4.2 Consumer Satisfaction

There are various views on why consumers may be satisfied with zoos enough to visit them in large numbers.

On one hand, zoos would claim that people visit zoos because they offer a serious education and conservation role. Alternatively some suggest that the high visitation rate for zoos may be a result of art galleries and museums being viewed by consumers as 'high-brow', while zoos are perceived as entertaining and family friendly[6].

It is reasonable to assume that zoos do offer entertaining recreation for visitors. Zoo consumer survey data shows groups of four or less, with children under 15 years of age make up a large proportion of zoo visitors. At the same however, zoo consumer surveys also suggest that learning about the animals themselves has overtaken the pure novelty or entertainment value of zoos as one of the principal reasons why people visit[7].

The notion that consumers consider zoos to represent more than just entertainment value, such as a day out, is reflected to some degree by the fact that consumers choose to pay a median price of about $24 per adult and $12 per child to visit a zoo in preference to a (usually) free general visit to other 'cultural activities' such as libraries, art galleries and museums[8].

While consumer surveys are not carried out by all zoos, there are some noticeable trends in consumer surveys that were received by the consultants from participating zoos[9].

- Visitors were generally very satisfied with the overall zoo experience (>90%).
- A significant majority of zoo visitors feel the zoo represents very good or quite good value for money (>80%).
- Most visitors are satisfied or very satisfied with the conditions in which the animals live.
- Lower satisfaction scores were registered for non-animal aspects such as food and beverage outlets, shade and rest areas, parking.

The most common reason for domestic visitors to visit the zoo is for a family outing or to show children the animals. International visitors usually visit in response to having heard about a particular zoo or to see particular, usually native, animals[10].

[6] Mullan, B. and Marvin, G, 'Zoo Culture', 2nd Ed. University of Illinois Press, 1999
[7] Consumer survey data provided by 6 zoos in response to the Aegis Consulting and Applied Economics Survey 2009
[8] The median price and other price data is based on the admission prices of the 39 ARAZPA members and respondents to the 2009 Aegis Consulting and Applied Economics Survey
[9] In response to the 2009 Aegis Consulting and Applied Economics survey, six organisations provided results of their own consumer surveys: 2 large public organisations representing 3 zoos, 2 large private zoos 1 public SME zoo and 1 private SME zoo.
[10] Ibid

A 2006 report on international visitor wildlife experiences found that 76 per cent of international tourists to Australia were interested or very interested in experiencing (mainly iconic) native wildlife and of these more than half preferred to visit either a zoo or wildlife park, rather than take a tour in the wild[11].

These figures support the contention that zoos have a demonstrable interest to international visitors and visitors are likely to allocate extra time in Australia to see native animals in a controlled environment, rather than in the wild. Prideaux and Coghlan[12] suggest that zoos can take a greater role in conservation by exposing international tourists to some of the lesser known Australian native animals.

4.2.1 Consumer Education

Education programs in Zoos, especially in relation to students, are discussed more fully in Chapter 6. However it is appropriate to briefly discuss education here in relation to its effect on consumer satisfaction.

One of the aims of modern zoos is to educate consumers about animal welfare and the need for conservation to protect endangered species. While few zoos have formal methods of measuring the success or otherwise of their consumer education role, analysis of general surveys conducted by zoos and provided to the consultants show a high level of consumer satisfaction with zoo education[13]. For example:

- Visitors see zoos as strong performers in conservation and conservation education (80%).
- Zoo visitors are more likely to donate to conservation causes than non-visitors.
- Over 80% of visitors rate the educational value of a zoo visit as high or very high.
- 75% of visitors learnt something new or increased their existing knowledge.
- The educational value to consumers has risen over time.

Zoo experts suggest that exposure to wildlife alone is not sufficient to educate of influence consumer behaviour, and that there must be an interpretative element for education to have an impact[14]. Interpretation observed by the consultants during zoo site visits and interviews was generally in the form of signage, static displays and keeper talks.

[11] Prideaux, B & Coghlan, A, 'Wildlife Tourism in TNQ, An overview of visitor preferences for wildlife experiences', James Cook University, 2006, p9

[12] Ibid

[13] In response to the 2009 Aegis Consulting and Applied Economics survey, six organisations provided results of their own consumer surveys: 2 large public organisations representing 3 zoos, 2 large private zoos 1 public SME zoo and 1 private SME zoo

[14] Tribe, Andrew. Captive Wildlife Tourism in Australia (Series: Wildlife tourism research report (Cooperative Research Centre for Sustainable Tourism) No.14) 2001

4.3 Consumer Payments to Zoos

4.3.1 ABS Data

The only detailed ABS data on zoo revenues relates to 1996-97 and is shown in Table 4.3. This shows that admission income made up nearly half of all revenues. The average admission price in that year was $8.70. Sales of goods and government funding were the other two main sources.

Table 4.3 Sources of Income for Zoos in 1996-97[15]

Sales of goods and services	$m	%
Admissions income	69.2	48.6
Sales of goods	29.0	20.4
Income from education programs	0.8	0.6
Rent, leasing and hiring income	4.7	3.3
Other operating income	4.0	2.8
Total	**107.8**	**75.7**
Other income		
Government funding	25.5	17.9
Non-government funding		
Donations and bequests	2.6	1.8
Sponsorships	3.6	2.5
Non-operating income	2.9	2.0
Total other income	**34.6**	**24.3**
Total income	**142.4**	**100.0**

4.3.2 Data Collected by the Consultants

Table 4.4 shows the total 2006-07 and 2007-08 operating revenue reported by the zoos that responded to the consultant's survey. As would be expected, total reported revenue is broadly in line with the total reported operating and capital expenditure of the 13 ARAZPA members (representing 17 zoos) and 4 non ARAZPA members responding to these questions in the survey (Table 3.3). Factoring up from the sample to the total number of zoos would produce a revenue total similar to the expenditure total of $424 million.

In the last two years, admission fees comprised nearly 40 per cent of total revenue. If total revenue was $424 million, this would imply total admission revenue of $170 million[16].

Overall the private sector, including visitors, contributes three-quarters of the revenue of zoos.

The other main revenue sources are State government grants, which account for about a quarter of all revenue, and trading and franchise revenue, which account for about a fifth of total revenue.

Table 4.4 Revenue of Surveyed Zoos in 2006-07 and 2007-08[17]

	2006-07	2006-07 %	2007-08	2007-08 %
Admission fees	103,235,790	39.6	110,351,790	39.8
Trading and franchise revenue	57,144,503	21.9	56,742,043	20.5
Corporate sponsorships	6,118,108	2.3	5,479,415	2.0
Ticket sales for events	2,926,833	1.1	2,464,666	0.9
Zoo friends / associations	2,996,000	1.2	3,347,000	1.2
Commonwealth government grants	399,819	0.2	699,000	0.3
State government grants	64,193,800	24.6	72,510,000	27.2
Research grants	4,666,400	1.8	4,692,800	1.7
Education service fees	2,605,966	1.0	3,086,166	1.1
Research service fees	418,000	0.2	520,000	0.2
Wildlife protection services	550	-	0	-
Other corporate income	16,047,600	6.2	17,122,700	6.2
Total income	**260,753,369**	**100.0**	**277,015,580**	**100.0**

[15] ABS, 1998, Cat. No. 8699.0

[16] It should be noted that total admissions data provided includes visitors who generally enter for free, such as zoo friend and admissions for zoos or parks that do not charge an entry fee.

4.4 Other Measures of Consumer Value

The admission price that people are willing to pay to visit a zoo is only one way to assess the way consumers value zoos.

This value can also be measured by non-corporate donations to zoos including bequests, sponsorship and Zoo Foundation grants. Associations such as Zoo Friends and zoo volunteers are a further measure of consumer payments.

Table 4.5 shows the value of non-corporate (consumer) donations to the zoos who responded to the consultant's survey and Table 4.6 shows the number of supporters and sponsors.

Table 4.5 Non-Corporate Donations[18]

Non-Corporate Donations	2006-07	2007-08
Animal Sponsorship	$1 702 250	$1 054 200
Animal Encounters	1 309 058	1 626 000
Bequests/Philanthropy	528 000	1 331 000
Trusts/Foundation grants	123 000	151 000
Donations	3 358 958	2 752 000
Event Sponsorship	722 000	782 000
Non-Corporate sponsorship of goods and services	450 000	208 000
Zoo Friends or similar Association grants	2 077 855	2 086 600
Total	**$10 271 121**	**$9 990 800**

Of the 20 respondents covering 24 zoos, in 2007-08:

- 12 had active animal sponsorship programs, accounting for nearly $1m.
- 10 received additional income from animal encounters not included in the entry charge.
- 9 were the beneficiaries of bequests.
- 14 zoos shared $2.7m in donations.
- 5 zoos received grants from Zoo Friends Associations.

Two large private zoos did not provide information on non-corporate donations, however, observations by the consultants during their visits to zoos suggest their revenue from Animal Encounters and donations would increase the total amount of non corporate donations significantly.

[17] Aegis Consulting and Applied Economics Survey 2009
[18] Aegis Consulting and Applied Economics Survey 2009

Table 4.6 Zoo Supporters/Sponsors 2007-08[19]

Zoo Friends Association Members	Volunteers	Corporate Sponsors
167 717	2246	198

Of the 20 respondents to the survey, 10 reported that they had a total of over 167 000 Zoo Friends. The survey data reveals that Zoo Friends associations are particularly active in the State government owned zoos, who have 162 549 Zoo Friends members. Membership of Zoo Friends associations in the public zoos has a median cost of $80 per adult per year, compared to a median adult entry fee of about $24. The extra investment by consumers to become a Zoo Friends is strong evidence of the high value consumers place on zoos.

Volunteers are spread across both public and private zoos, although predominate in larger organisations. Fourteen organisations report a total of 2246 volunteers.

Volunteers represent a significant contribution to zoos with two organisations estimating the value of volunteer hours to be worth $1.8m and $1.2m per annum each respectively[20]. Across the 2246 volunteers listed in the survey this represents up to $7.8m per annum[21].

As with volunteers, corporate sponsors are found across the range of organisations, with 9 respondents to the survey reporting a total of 198 sponsors. Corporate sponsorship appears to predominate in large State government owned, with 5 organisations reporting a total of 172 sponsors. No attempt could be made to identify the number of individual corporate sponsors represented by the 198 identified by zoos but it would seem reasonable to expect that some national companies may sponsor more than one organisation or zoo.

In some organisations sponsorship extends beyond simple advertising rights with at least one company reportedly aligning itself closely with the animal conservation issues promoted by the participating zoo. Without further research it is difficult to ascertain the benefits a company may receive by sponsoring a zoo or wildlife park, but it may be reasonable to conclude that unless there are demonstrable benefits, fewer companies would enter into sponsorship agreements with zoos.

[19] Ibid
[20] fotz.org.au and zoofriends.org.au, viewed 25 February 2009
[21] This is based on an average of $3488 per volunteer and calculated by dividing $3M by the 860 volunteers at the two zoos

4.4.1 Comparative International Examples of Consumer Value

The payments that Australian consumers are willing to make to zoos are consistent with the kinds of support zoos receive overseas.

In the United States many public zoos are financed by imposing a discrete levy on property owners as part of their overall property taxes. Schools, Police and Fire departments are financed in a similar way. Each proposed levy and any subsequent increases are voted on by property owners in conjunction with elections for county officials. Zoos and their supporters as well as opposition groups actively campaign to sway voters for or against the proposition. In effect this provides a measure of the value of the zoo to local consumers.

Three examples of zoo funding propositions are provided by Cincinnati Zoo (Hamilton County, Ohio), Detroit Zoo (Oakland County, Michigan) and Hogle Zoo and Tracey Aviary (Salt Lake City, Utah). All three zoos had propositions voted on during 2008 as the economic downturn was taking hold across the United States.

The rate of the levy is expressed as a 'millage rate' or 'mills' which is the assessment rate per $1000 of the taxable value of the property.

Cincinnati Zoo

The Cincinnati Zoo Levy was a renewal and an increase, at .46 for a five-year period (2009-2013). This would mean for a $100,000 home $9.44 per year, an increase of $1.78 over the previous levy. The Levy will raise approximately $36.3 Million for the Zoo over the course of the five year period, approximately 23% of the zoo's annual budget. The Levy funds are used solely for the care and feeding of Zoo animals, horticulture and maintenance of Zoo facilities.

The zoo proposition was voted on in March 2008 during the Presidential Primaries. The result was 58% in favour. In fact in 7 voting rounds since 1982 the zoo has only lost once: in 1997 when it asked for a large increase in the mill rate from .45 to .7; it succeeded the following year with a decrease to .42mills.

In the 2008 election, school districts won new or increased levies with an average 'yes' vote of less than 55%. One school lost its ballot for an increased levy[22].

Detroit Zoo

On August 5 2008, property owners in Detroit voted to impose a new tax on themselves for the next ten years. Set at .1mill, and costing the average tax payer $10 per year, the tax is expected to generate approximately $12 million in the first year, or half of the zoo's projected 2009 annual operating budget.

In Detroit, during the meltdown of the car industry which the city relies on, high unemployment and worsening economic conditions, almost 75% of property owners voted for the zoo levy.

In the same election, a proposal to set up a building and sinking fund for some county schools was defeated[23].

Salt Lake City

In conjunction with the November 2008 Presidential election, Salt Lake City's property owners were asked for two new taxes. One was for Tracy Aviary to authorise a $19 million bond for running expenses, upkeep and building works. The other was for $33million bond for Hogle Zoo to undertake maintenance and new building work.

The zoo's $33 million bond will translate into an extra $4.68 a year on a $200,000 home. The aviary's $19 million bond will mean a $2.05 tax increase; a total tax increase of $6.73. Tracey Avery won its tax imposition with a 'yes' vote of 67.7%; and Hogle zoo won its tax with a vote of 72.6%.[24]

That property owners in the United States would vote to impose new or increased taxes on themselves during difficult economic times implies the significant value they attribute to zoos.

4.5 Government Financial Support for Zoos

Commonwealth and State Government support for zoos is shown in Tables 4.7 to 4.9. They demonstrate the relatively low level of government support for zoos on a per capita basis.

According to the ABS, in 2006-07, the average cost of State government support for zoos was only $2.92 per capita. It was just over $5.0 per capita in the ACT and NSW[25]. Viewed in an alternative way, the State government subsidies are about $4 per visitor to a zoo.

The ABS does not record any contribution from the Commonwealth Government. However, responses to the consultant's survey indicate that the Commonwealth Government contributed about $0.4 million in 2006-07 and $0.7 million in 2007-08. This was in the form of grants to 3 of the 20 organisations that responded to the consultant's survey. Of these 3 organisations, 2 are State government owned zoos and one is a large privately owned zoo[26].

The Commonwealth may have made other grants towards a variety of wildlife programs that were not allocated to zoos expenditure, but it was not within the scope of this report to analyse this.

Table 4.7 State Government Contributions to Zoos[27]

	2004-05	2005-06	2006-07
Total ($m)	59.4	88.0	60.8
Per capita ($)	2.93	4.45	2.92

Table 4.8 Breakdown of Government Contributions in 2006-07[28]

	ACT	NSW	NT	Qld.	SA	Tas	Vic	WA	Total
Total ($m)	1.9	35.0			3.1		11.6	9.2	60.8
Per capita ($)	5.77	5.1			1.98		2.24	4.55	2.92

[22] Hamilton-co.org viewed 8 January 2009
[23] Oakgov.com viewed 8 January 2009
[24] Ci.slc.ut.us viewed 8 January 2009

[25] ABS (2008) *Cultural Funding by Government*, 2006-07 Cat No 4183.0
[26] Aegis Consulting and Applied Economics Survey 2009
[27] ABS, 2008, *Cultural Funding by Government*, Cat No. 4183.0
[28] Ibid

Table 4.9 Government Funding of (Selected) Cultural Institutions 2006-07[29]

Activity	Government funding					Cost per Capita
	Federal		State		Total	
	$m	% of funding	$m	% of funding	$m	$
Libraries & Archives	129.8	2.5	385.7	6.9	515.50	24.72
Other Museums	209.5	3.7	310.7	5.5	520.2	24.95
Art Museums	47.2	0.8	187.4	3.3	234.6	11.25
Botanic Gardens	7.3	0.1	80.6	1.5	87.9	4.22
Zoos & Aquaria	**0**	**0**	**60.8**	**1.0**	**60.8**	**2.92**

State Government support for zoos is not spread evenly across the country, generally being limited to funding for public zoos in Sydney, Melbourne, Canberra, Adelaide and Perth, ACT and Northern Territory (through Dept of Natural Resources, Environment & the Arts). In Queensland, where there is no publicly funded zoo, state government payments to zoos appear to be limited to allocations for specific projects such as crocodile relocation or targeted research.

In the responses to the consultant's survey only two grants totalling $16 800 were attributed to the Queensland government.

Table 4.9 compares government support of other cultural institutions to that provided to zoos in 2006-07.

The table shows that zoos receive a lower level of Commonwealth and State government funding compared to other cultural institutions. This is despite the fact that for the last 10 years zoos have received the second highest rate of visitation of any other cultural institution (movies being the most popular) and that unlike libraries, museums and art galleries (for which general admission is free), a zoo visit attracts a cost[30].

In addition to their contributions to GDP and net tourism benefit, zoos expenditure on animal rescue and rehabilitation and wildlife disease monitoring and response for bio security represent direct and in direct benefits for Commonwealth and State governments.

For example, in response to the consultant's survey 13 organisations (representing 15 zoos) indicated they undertook wildlife rescue and rehabilitation services under formal and informal arrangements with government and treated more than 14000 animals per year. They don't generally account for the cost of this service separately in general operating expenditure, but where they could identify it, they estimate their collective expense to be over $2.3 million per year[31]. However given veterinary, nursing and hospital costs as well as medicine and consumables it would be reasonable to assume that the total value would be many millions of dollars. Rescue and retrieval costs, especially for marine animals, would add several millions more.

The ultimate test of the value of this service is to ask whether government or NGOs could provide this care if zoos were no longer able. For any NGO or government agency to provide a similar service with the level of expertise available within a zoo setting, taking into account the geographic spread required and the high volume of use, the cost, in all likelihood, would be beyond that acceptable by the public, especially in the current economic conditions.

[29] ABS (2008) *Cultural Funding by Government*, 2006-07 Cat No 4183.0
[30] See Section 4.1
[31] See Appendix 4

Key Findings

There are many perspectives on what conservation means, but in reality zoos play a role in delivering ex situ and in situ conservation for both biological diversity and conserving wild populations of animals in their natural habitats.

The significant value that the international community places on conservation is reflected by the commitment of the vast majority of nations in the world to key international treaties regulating the conservation of biological diversity and import and export of endangered species, as well as the widespread membership of the World Conservation Union (IUCN).

The significant value that the Australian community places on conservation is reflected by the Australian Government's ratification of these international treaties and the range of Commonwealth and State regulation concerning threatened species and habitat protection.

There are a myriad of views about how to measure the contribution of zoos to conservation. Some consider that zoos either make no contribution or that it cannot be measured. The vast majority of parties consulted during the preparation of this report (including most NGOs) consider that zoos make valuable and unique contributions to both ex situ and in situ conservation.

The general value to Australian society of zoos in situ and ex situ native species conservation is particularly significant because according to the Australian Government, 93 per cent of frogs, 89 per cent of reptiles, 85 per cent of flowering plants, 82 per cent of mammals, and 45 percent of land birds that occur in Australia are unique in the world. Thus any effort to conserve native species is arguably valuable, regardless of the number species or animals within a species that are saved.

One of the clearest methods developed to assess the contribution of zoos to conservation suggests that conservation projects undertaken by zoos should be measured according to the (1) importance of the project to conserving wild species or their habitats, (2) the scale of the project and (3) the impact of the project. The difficulty with this is the long timeframes projects need to make a discernable difference.

This approach is also project based and not suitable for the kind of national assessment undertaken in this report. Accordingly the consultants have assessed the contributions of zoos against the specific criteria relating to ex situ and in situ conservation that the *Convention on Biological Diversity* (CBD) requires ratifying parties to undertake. Australia is a party to the CBD.

Judged against these criteria and based on the survey data:

- Zoos deliver 4 of the 5 CBD criteria for ex situ conservation.
- Zoos deliver 4 of the 13 CBD criteria for in situ conservation.
- 24 zoos hold about 3900 species of native and exotic vertebrates and invertebrates. Of these 173 are Australian native species and 197 are exotic species included on the IUCN Red List of endangered species. These are not net figures as many of these zoos hold the same species under joint breeding programs.
- Some larger highly resourced zoos undertake their own conservation and scientific research, but many SME and large zoos fund external research. Between 2006 and 2008, 10 SME and large organisations provided over $2M in research funding to universities and other research institutions.
- 16 zoos participate in specific in situ conservation programs. Spending on in situ programs occurs through general capital expenditure (such as animal facilities to support breeding programs for reintroduction); distribution of public donations collected at animal displays in support of campaigns about threatened species and donations from Zoo Friends Associations.
- In 2007/08 these 16 zoos implemented 75 in situ programs to conserve 48 native endangered species. Eighty one (81) per cent of these programs are recovery and re-introduction programs and 19 per cent are habitat species management programs.
- In 2007/08 12 zoos contributed 37 in situ programs for the conservation of 20 exotic species. Of these 35 programs are habitat and species management programs and 2 are recovery and reintroduction programs. These 12 zoos also contributed to 5 international programs for the creation of sanctuaries in the wild. Almost all of these programs are undertaken in conjunction with an NGO.
- The international programs to which these 12 zoos contributed occurred in 15 countries, 14 of which are developing.
- 15 zoos provide wildlife rehabilitation programs for native species and treat over 14 000 animals each year. The cost of these programs is absorbed in the general operating expenditure of zoos. Nevertheless, given the volume of animals treated government agencies and/or NGOs would require significant expert personnel and financial resources to substitute this function.

In making these assessments the consultants have not attempted to rank species that are subject to conservation programs according to their worth to eco systems, as this is beyond the scope of this report. However it is generally acknowledged that some species are more important to eco systems than others.

5.1 Defining Contributions to Conservation

To assess the contribution that zoos make to conservation it is necessary to first determine what it is meant by the term 'conservation'.

The general dictionary meaning of conservation is "preservation, especially of the natural environment"[1]. The primary international legal instrument governing conservation, the Convention on Biological Diversity 1992 (CBD), does not specifically define the word, but rather describes it in terms of in situ and ex situ activities.

The CBD defines in situ conservation to mean "the conservation of ecosystems and natural habitats, and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings in which they have developed their distinctive properties"[2]

The CBD defines ex situ conservation to mean "the conservation of components of biological diversity outside their natural habitats"[3].

As a result, the debate about the contribution that zoos make to conservation tends to be framed around the in situ and ex situ activities that organisations undertake.

From the discussions the consultants have had with zoos, NGOs and governments, it is clear that different stakeholders define conservation in varying and sometimes opposite ways.

Zoos may consider holding and breeding species in captivity to represent a conservation activity. This is because:

- A species is extinct in the wild and therefore holding a specimen or breeding it with others in captivity is an act of conserving that species for future generations (ex situ); or
  - A species is critically endangered, endangered or vulnerable and therefore holding a specimen:
  - Is an act of insurance against the species becoming extinct in the wild (ex situ);
- Supports breeding in captivity programs aimed at insuring against the species becoming extinct in the wild or the genetic diversity of the species (ex situ); or
- Supports breeding in captivity programs aimed at generating higher volumes of genetically diverse specimens for release into the wild (in situ).

For example it has been suggested to the consultants that "*while individual animal collections are often too small to be of much value to long term conservation, cooperative international and/or regional ex situ breeding programs form large viable populations that can make a difference. Furthermore, if managed correctly, there is potential to provide demographic and genetic insurance populations*"[4].

Some zoos, and most of the NGOs, government agencies and independent experts consulted during the preparation of this report share the view that not all of these activities properly represent conservation. Their common perspective is that conservation activities are chiefly those that contribute directly to protecting natural ecosystems.

For example, Zoos Victoria claims that to guide its support for and participation in conservation programs it defines conservation to be "*the securing of long term populations of species and communities in functional ecosystems and natural habitats wherever possible, taking into account the natural and socio-economic dimensions of our world*"[5].

Accordingly these zoos, NGOs and government agencies consider that while in situ conservation is an effective direct tool to secure natural habitats, ex situ activities, such as holding or breeding species for insurance purposes or genetic diversity, is simply an act of species preservation rather than conservation. This is particularly where the species being held and/or bred is extinct in the wild or the ex situ effort does not end in the conservation of the natural environment.

Broader literature confirms the need to view with skepticism any claim that all ex situ activity represents conservation. On one hand it appears logical that breeding species in captivity provides opportunities to reintroduce them into the wild to prevent natural populations from becoming extinct. However, in reality most captive breeding programs do not result in reintroductions into the wild to support viable naturally based populations. One suggested way to distinguish ex situ conservation that supports conservation of species in their natural environment from programs that do not is to declare up front the 'intent' of any captive breeding and management program.[6]

The view that conservation must be activity that secures natural environments is also supported by the World Association of Zoos and Aquariums. It defines conservation to be "*the securing of long term populations of species in natural ecosystems and habitats wherever possible*"[7].

[1] The Australian Concise Oxford Dictionary
[2] Convention on Biological Diversity 1992, Article 2
[3] Ibid

[4] Response of Zoological Society of South Australia, Aegis Consulting and Applied Economics Survey 2009
[5] Response of Zoos Victoria, Aegis Consulting and Applied Economics Survey 2009
[6] Dickie, Bonner and West, 'In situ and ex situ conservation:blurring the boundaries between zoos and the wild' Zoos in the 21st Century, Cambridge University Press, 2007, p224
[7] World Association of Zoos and Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, p9

The Association considers that as part of this definition the words natural ecosystems and habitats *"signify that no amount of worthy endeavour is of ultimate value if it doesn't translate into animals and plants surviving in the wild. In addition these wild populations must be able to develop and evolve"*[8].

This emphasis on the need for conservation activities to preserve and promote wild populations of animals and plants further supports the notion that in situ, rather than ex situ, activities are more appropriately considered 'conservation'.

Nevertheless, the value of ex situ activities as a conservation tool is recognised by the Commonwealth government's *National Strategy for the Conservation of Biological Diversity*[9]. The strategy states that:

"Although in situ conservation is the most effective means of conserving biological diversity, there are several situations in which ex situ conservation may be of great importance. Unpredictable events may threaten rare genotypes of species. Ex situ conservation provides insurance in these circumstances.

Some threatened species require cultivation of breeding in captivity to build up their numbers for reintroduction into the wild. Other genotypes or species can survive only ex situ because of the total loss or alteration of their habitat.

Some significant steps have been taken to achieve ex situ conservation of threatened species, among them the establishment of the Australian Network for Plan Conservation, and the Australasian Species Management Program, the captive breeding and propagation activities of the State and Territory conservation agencies, and the establishment and maintenance of seed and germplasm banks and microbial collections in a range of institutions" [10]

The Strategy affirms the value that the CBD and the World Conservation Union (IUCN) also attribute to the role that ex situ conservation can play. Article 9 of the CBD and the IUCN's Technical Guidelines on the Management of Ex Situ Populations for Conservation 2002, explicitly support ex situ measures where they complement in situ conservation.

Thus, in general terms, while in situ conservation appears to be widely considered to represent a more direct link to the accepted norms of protecting natural ecosystems, ex situ activities can also have an important role in delivering these outcomes. The success of either kind of conservation activity in supporting international goals for protecting natural environments and biodiversity will largely depend on their quantitative and qualitative contribution on a case by case basis.

The challenge for the zoological industry is effectively measuring this kind of success, which is often made difficult by the long time frames involved in achieving any recognisable impact on ecosystems and natural habitats.

[8] Ibid
[9] Australian Government, Department of Environment, Heritage and Arts
[10] Ibid, Objective 1.9

5.2 The Value of Conservation to Society

Regardless of whether an activity is in situ or ex situ, there is little doubt that the global society places tremendous value on the conservation of biodiversity and natural ecosystems and habitats.

For many years this value has been reflected in the World Conservation Union (IUCN), which was established in 1948 to "influence, encourage, and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable"[11]. The IUCN has over 1000 government and NGO members, as well as more than 11 000 volunteer scientists from about 160 countries, including Australia.

As part of its activities the IUCN regularly collects and updates data on existing and new species of animals and plants to assess the threats to them and guide global and national conservation program priorities. Information on species ranges from those that are extinct to those facing little risk. Threatened species include those that are extinct in the wild, critically endangered, engendered, vulnerable, and conservation dependent. The IUCN's latest research shows that 16 928 species of animals and plants (8 462 species of animals) are currently threatened[12].

[11] Information from the IUCN
[12] World Conservation Union, Red List, Table 1, 2008

At the same time the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) 1975 has three rankings for animals and plants depending on how at risk they are. Currently there are 5000 species of animals and 28 000 species of plants protected by CITES. The CITES has been ratified by over 150 nations, including Australia, and is enforced through domestic legislation that regulates through a permit or other system the import and export of species[13].

More recently, the value that conservation has for the international community has also been captured in the *Convention on Biological Diversity* 1992 (CBD). The CBD is an international treaty and the paramount legal instrument governing the conservation of biodiversity. Every nation in the world, with the exception of the United States of America, has ratified the CBD[14].

The IUCN Red List, CITES and CBD are longstanding and powerful reminders of the impact that human society can have on its environment and the responses needed to minimise this impact. Their very existence and influence on decision makers and the commitment that the international community has to them are strong illustrations of the value that global society places on the need for conservation.

Two of the indicators of the value that the Australian community attributes to the conservation of biodiversity are (1) the fact that the Australian government is a signatory to the CBD[15] and (2) the extent of regulation that the Commonwealth and State parliaments have and continue to enact to implement the CBD and promote and improve biodiversity outcomes.

[13] Australian Government, Department of Environment, Heritage and Arts. Australia ratified the convention on 27 October 1976
[14] Convention website http://www.cbd.int/countries/
[15] Australia ratified the CBD on 18 June 1993

The Commonwealth government's *National Strategy for the Conservation of Biological Diversity* is part of Australia's ratification of the CBD and is based on three principles intrinsic to the CBD. These are the need to conserve genetic diversity, species diversity and eco system diversity[16]. The Strategy confirms that the numerous benefits from preserving biological diversity include[17]:

- Providing a primary source for the fulfillment of humanity's needs and a platform for adapting to environmental, societal and economic change.
- Providing humanity with all of its food and many of its medicines and industrial products. For example, the fishing, forestry and wildflower industries rely on harvesting biological resources from the wild.
- Providing a range of ecological services such as the maintenance of hydrological cycles, climate regulation, soil production and fertility, protection from erosion, nutrient storage and cycling, and pollutant breakdown and absorption.
- Avoiding the rising cost of degrading ecological systems, which is estimated by the CSIRO to be about $1 billion annually.
- Enhancing the marketability of the commodity inherent in Australia's expertise in managing a diverse array of ecosystems ranging from arid lands to tropical rainforests and coral reefs.
- Enhancing the cultural identity of Australia and the spiritual and emotional well being of its urbanised populations.
- Increasing active and passive recreational values associated with ecosystems.

In support of its ratification of the CBD the Commonwealth Government is also a signatory to various related international treaties such as those concerned with safeguarding the habitat of migratory species, world heritage sites, wetlands, the Antarctic region and South Pacific Islands, which are particularly vulnerable to climate change[18].

In addition the Commonwealth government has enacted a range of legislation related to biodiversity, which are specifically aimed at regulating the import and export of species, protecting threatened species, and governing environmental impact assessments in a holistic way[19].

State and Territory governments also have a raft of legislation aimed at establishing and managing protected areas, preserving wilderness areas, protecting native species and managing environmental impacts of human activity.[20]

[16] Australian Government, National Strategy for the Conservation of Biological Diversity, Introduction
[17] Ibid
[18] Ibid
[19] Ibid
[20] Ibid

5.3 Overview of the Contribution of Zoos

Some commentators consider that it is virtually impossible to assess the conservation work of zoos because the definitions of conservation vary[21]. Others consider that the contribution can be measured by calculating the costs and benefits of captive breeding for the establishment of wild populations of endangered species as this will indicate the comparative cost (and therefore value) of ex situ and in situ activity[22].

Another view is that the expenditure on conservation is a guide to its value but should not be confused with actual value, and that the real value of zoos is that they are best placed to integrate the entire spectrum of conservation related work which covers captive breeding, in kind and financial support for in situ programs, laboratory and field research and education[23].

Other experts consider that the contribution of zoos to conservation depends on how successful organisations are at breeding endangered species, the importance of the species they are breeding to ecosystems from which they have been taken, the success of reintroduction programs and the comparative success of zoos and non-zoos in breeding and reintroduction programs[24].

Further still, some animal rights NGOs consider that zoos make no contribution to conservation that justifies holding species in captivity for display or breeding purposes and that captive breeding that is undertaken is normally for marketing rather than conservation reasons[25]. Other NGOs believe that zoos have limited value because too few contribute to conservation research and participate in breeding programs and that overall, breeding programs do not achieve adequate genetic diversity[26].

However, other NGOs and State government agencies that manage in situ conservation programs advised the consultants that[27]:

- While in an ideal world captive breeding would not be necessary, in dealing with the reality of the degradation of natural ecosystems, it is an essential component to support species recovery and reintroduction programs;
- Only zoos have the animal husbandry and veterinary expertise to undertake necessary captive breeding;
- Only zoos can care for animals that cannot be settled in free range enclosures;
- Zoos are well placed to educate and focus the public on conservation and raise funds for in situ activities;
- The remote and on the ground access to veterinary advice that zoos provide is invaluable to in situ work;
- The nature of zoos and their resident expertise them enables them to provide focused and practical assistance to in situ programs, that promotes ecosystem conservation; and
- In situ programs they are involved with would not be as successful without the support that zoos provide through captive breeding, financial contributions, research and veterinary advice.

The views of these NGOs and government agencies are consistent with the notion that zoos play three main roles in relation to conservation. These are:

- Captive or conservation breeding of endangered species;
- Scientific investigation of species biology, natural history and other areas to support field work; and
- Development, articulation and marketing of the conservation agenda to increase support from the public and community and government leaders[28]

One of the clearest methods developed to assess the contribution of zoos to conservation suggests that conservation projects undertaken by zoos should be measured according to the (1) importance of the project to conservation wild species or their habitats, (2) the scale of the project and (3) the impact of the project[29]. It is proposed that these three indicators can be used to assess the following kinds of conservation projects undertaken by zoos:

- Enhancing public education and awareness (education).
- Enhancing the skills of people involved in animal husbandry, habitat management and conservation regulation (training).
- Scientific and conservation research (research).
- Direct action to improve species viability (species).
- Direct action to improve habitats (habitat)[30].

[21] Consultations held with Dr Andrew Tribe, University of Queensland.
[22] Consultations held with Dr Hugh Possingham, Macquarie University
[23] Consultations held with Dr Chris West, Adelaide Zoo
[24] Consultations held with Dr Chris Godden, Chief Economist, NSW Department of Environment and Climate Change
[25] Consultations held with Australian Koala Foundation
[26] Consultations held with Dale Jamieson
[27] Consultations held with Flora and Fauna International (Tiger Conservation Sumatra), Cheetah Outreach Program (Zambia), Free the Bears Foundation (Vietnam) and Department of Environment and Conservation, Government of Western Australia

[28] Conway, W, 'The role of zoos in the 21st Century', International Zoo Yearbook, 2003, pp7-13. See also A, Tribe, Captive Wildlife Tourism in Australia, 2001, p17
29 Mace et al, 'Measuring conservation success: assessing zoos' contribution', Zoos in the 21st Century, Cambridge University Press, 2007, p325
[30] Ibid

This approach to measurement is viable on a project by project basis but more difficult to apply for a high level national assessment like the one undertaken in this report.

However the consultants have identified that this approach to measurement can be adapted to a national assessment by using the internationally accepted norms in the *Convention on Biological Diversity* 1992 (CBD). The CBD's criteria for what parties need to do to achieve in situ and ex situ conservation provides a similar set of assessment tools to the one proposed. Accordingly, the consultants have used the CBD as a framework for their assessment findings about whether, how and to what extent Australian zoos contribute to conservation outcomes.

Judged against the parameters set by the CBD and based on the data and information received from zoos during the preparation of this report, it is clear that Australian zoos contribute to both in situ and ex situ conservation in various ways. These contributions occur in relation to both Australian native and exotic species.

The general value to Australian society of resident zoos in situ and ex situ native species conservation is particularly significant because 93 per cent of frogs, 89 per cent of reptiles, 85 per cent of flowering plants, 82 per cent of mammals, and 45 percent of land birds that occur in Australia are unique in the world[31]. Thus any effort to conserve native species is arguably valuable, regardless of the number of species or specimens within a species that are saved.

Equally, efforts to conserve exotic species can contribute positively to the way the Australian government is viewed internationally. This is particularly because government owned zoos play a major role in ex situ and in situ conservation through captive breeding, and providing funding, resources, and expertise to international in situ programs managed by NGOs[32]. At the same time it is possible that the contribution of zoos to international conservation programs benefits Australian society because conservation efforts of an international nature act to sustain the global common good of which Australia is a part.

Measures by Australian zoos to conserve and improve the volume, genetic diversity and quality of these native species in captivity and the wild is also consistent with the objectives of the Commonwealth Government's *National Strategy for the Conservation of Biological Diversity*. As discussed above, the existence of this Strategy reflects the importance of conservation to the Australian society and therefore efforts to deliver programs supporting the Strategy are inherently valuable.

The contribution of Australian zoos to both in situ and ex situ conservation is equally consistent with international thinking about the conservation capacities of zoos. It is considered for example that:

"*Only zoos, aquariums and the zoo community are pre-eminently suited to emphasise the global aspects of conservation. Scientific knowledge of the interconnections of all life systems and habitats has greatly increased in the last few years and it is becoming increasingly evident that conservation is not only a matter of saving species and habitats, but to be successful, also needs co-operation and a global approach. Zoos and aquariums, because they care for, and have the expertise in collections of living animals from around the world, and because of their global network, can play a major role in promoting conservation on a global scale*"[33].

It is also suggested that zoos are "*uniquely placed to be integrated centres of conservation, providing a portal for the public to understand the meaning of conservation in a wider sense*"[34]. This report discusses this kind of contribution in more detail in chapter 6 which examines the way zoos support conservation education.

[31] Australian Government, National Strategy for the Conservation of Biological Diversity, Introduction

[32] Advice from Flora and Fauna International (Tiger Conservation Sumatra), Cheetah Outreach Program (Zambia), Free the Bears Foundation (Vietnam)
[33] World Association of Zoos and Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, p9
[34] Dickie, Bonner and West, 'In situ and ex situ conservation:blurring the boundaries between zoos and the wild' Zoos in the 21st Century, Cambridge University Press, 2007, p221

5.4 Contribution of Zoos to Ex Situ and In Situ Conservation

The CBD explicitly requires the countries which have ratified it to adopt 5 ex situ conservation activities in order to complement in situ measures. Of these measures, 4 are activities in which zoos can directly participate. These are[35]:

- Conserving the components of biological diversity, preferably in the country of origin of such components.
- Establishing and maintaining facilities for the conservation of and research on animals, plants and micro-organisms, preferably in the country of origin of genetic resources.
- Recovering and rehabilitating threatened species including for their reintroduction into the wild where appropriate.
- Providing financial and other support to conserve components of biological diversity and regulate and manage collection of biological resources from natural habitats in developing countries.

The CBD also explicitly requires parties that have ratified it to apply 13 in situ measures. Zoos can directly participate in implementing 4 of these. These are[36]:

- Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings.
- Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies.
- Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.
- Cooperate in providing financial and other support for in situ conservation outlined in Article 8, particularly in developing countries.

These criteria offer a clear guide to how ex situ and in situ conservation can be valuable to society and a benchmark to judge the contribution of parties, such as zoos. As a result of their survey, the consultants collected a range of information that illustrates how zoos in Australia implement these internationally agreed criteria.

Some of the ex situ and in situ criteria overlap and therefore the way zoos contribute to them is discussed jointly in the report.

The table below summaries the ex situ and in situ criteria, whether zoos implement them, and in which section in the Chapter the report discusses this implementation. Some sections are common because of the overlap of ex situ and in situ activities.

Table 5.1 Australian Zoos Delivery of the CBD Conservation Goals

CBD Ex Situ Criteria	Do Australian Zoos Deliver?	CBD In Situ Criteria	Do Australian Zoos Deliver?
Conserve the components of biological diversity	✓Report section 5.4.1	Promote the protection of ecosystems and the maintenance of viable populations of species in natural surroundings.	✓Report section 5.4.3
Facilities for conservation research	✓Report section 5.4.2	Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies.	✓Report section 5.4.3
Recover and rehabilitate threatened species and reintroduce them into the wild	✓Report section 5.4.3	Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.	✓Report section 5.4.3
Provide financial and other support to conserve biological diversity in developing countries	✓Report section 5.4.4	Provide financial and other support for in situ conservation outlined in Article 8, particularly in developing countries	✓Report section 5.4.4

5.4.1 Conserving the Components of Biological Diversity (Ex Situ)

Australian zoos contribute to this outcome by holding and breeding native and exotic species that fall within the various categories of threatened species determined by the Commonwealth and State governments and IUCN.

The survey conducted as part of this report asked zoos how many native, exotic, vertebrate and invertebrate species they held, how many of these were included on the IUCN Red List of endangered species and how many were extinct in the wild.

In answering these questions, respondents provided the total number of species held in these categories, but only some detailed each species. As a result, while a broad picture of the number of species held by the respondents has been obtained, it is not clear in net terms how many native and exotic species in general, and how many species on the IUCN Red List, Australian organisations actually hold.

In total the 20 organisations (representing 24 zoos) which responded to the survey hold 3898 species of native and exotic vertebrates and invertebrates. Of these 173 are Australian native species and 197 are exotic species included on the IUCN Red List of endangered species. See Appendix 1 for the amount of species held by the responding organisations.

However, as discussed above, this does not represent a net amount of species held. In visiting zoos the consultants did observe that a variety of native, exotic and endangered species are commonly held by many of them, which suggests that the net amount of species held is lower than the figures above suggest.

Nevertheless, by holding and breeding a number of the same endangered species between themselves, Australian zoos do contribute to conserving the components of biological diversity within the meaning of the CBD. This is because the aim of ASMPs managed by ARAZPA is to ensure that endangered species are held and bred as insurance against extinction and that genetic diversity is maintained through breeding programs of species in captivity, particularly endangered species.

To accomplish these outcomes from breeding in captivity it is necessary for various zoos in Australia and the region to hold specimens of the same endangered species.

Case Study
Tasmanian Devil Program[37]

The Tasmanian Devil, a unique Australian marsupial, is facing extinction because of the spread of facial tumours in the wild population. It is listed on the IUCN Red List. A 2007 forum of senior scientists advised, that based on the current rate of disease, the Devil could become extinct in the wild within 25 years.

The Tasmanian Government, IUCN, ARAZPA and seventeen Australian zoos are responding to the crisis facing the Devils by participating in a program to develop a meta-population of animals comprising captive specimens, specimens in wild populations and extensively managed specimens in free range enclosures. Currently the captive breeding program managed by ARAZPA and the Tasmanian Government is the only fully mobilised part of this three pronged strategy.

Should the Devil become extinct in the wild, it is considered that a captive population of 500 animals would need to be maintained in order to achieve the 95% genetic diversity required to support both insurance and re-introduction programs over the next 50 years. It is believed that this number of captive specimens can be safely bred to sustain a combination of about 1500 captive and 5000 wild Devils.

The diversity of zoos involved in the captive breeding program, and the range of their contributions clearly demonstrate the depth of partnership within the Australian zoological industry for the purposes of conserving biological diversity, particularly endangered species. Zoos contribute by:

- Conducting breeding
- Holding animals to free up space in other institutions conducting breeding
- Holding Post Reproductive Females for the Breeding Program
- Providing animal husbandry and veterinary science expertise

The capacity of so many zoos to respond quickly to participate in this program and the fact that captive breeding is such an important component in the species recovery strategy illustrates the value of animal husbandry and veterinary science expertise and facilities that reside within the zoological industry.

As part of the breeding program, many of the animals in captivity are being transferred from the facilities of the Tasmanian Department Government to zoos. Without the facilities and animal husbandry and veterinary expertise available in zoos, the Tasmanian Government would probably be forced to fund capital works for new government owned facilities and expert resources or terminate the animals in its care.

In their visits to some of the zoos involved in the program, the consultants also observed a strong commitment to raising public awareness about the plight of the Devils and stimulating public responses in the form of financial donations to the conservation program at the point where Devils were being displayed.

Thus in the absence of zoos and the contribution of their facilities and resident expertise there would be a range of direct and opportunity costs to Australian society in terms of:

- Lower capacity for the nation to deal with the crisis facing the Devil and therefore increased risk that the animal would become extinct in the wild and possibly altogether;
- Higher fiscal burdens on the Tasmanian Government to provide the facilities and expertise necessary to care for diseased animals and breed a captive population large and genetically diverse enough to support insurance and recovery programs;
- Potentially higher fiscal burdens on the Commonwealth Government to support these outcomes where the Tasmanian Government was unable to do so on its own; and
- Increased risk of the spread of the facial tumour disease to other native species, livestock and humans.

The diverse range of large and SME zoos involved in this program reflect the need for organisations to hold specimens of the same species as part of conservation programs and demonstrate the valuable partnerships that zoos engage in. The organisations involved in the program are described on the following page.

[37] Response of Currumbin Sanctuary, Aegis Consulting and Applied Economics Survey 2009

Consistent with the aim of conserving biological diversity within the meaning of the CBD, Individual zoos can hold a vast array of species as part of what the industry often describes as a 'conservation ark'. These species may be part of the IUCN Red List, nominated for protection under CITES and/or other state and national legislation and policy.

Some of the species may also be subject to breeding for insurance and reintroduction into the wild purposes. In Australia this activity occurs under ASMP managed by ARAZPA.

Institution	State	Size	Ownership
Adelaide Zoo	SA	Large	Zoological Society
Australian Reptile Park	NSW	SME	Private
Australia Zoo	QLD	Large	Private
Ballarat Wildlife Park	VIC	SME	Private
Cleland Wildlife Park	SA	SME	Government
Currumbin Sanctuary	QLD	Large	National Trust
Dreamworld	QLD	Large	Private
Halls Gap Wildlife Park	VIC	SME	Private
Healesville Sanctuary	VIC	Large	Government
Monarto Zoological Park	SA	Large	Zoological Society
National Zoo and Aquarium	ACT	Large	Government
Pearcedale Conservation Park	VIC	SME	Private
Perth Zoo	WA	Large	Government
Taronga Zoo	NSW	Large	Government
Trowunna Wildlife Park	TAS	SME	Private
Western Plains Zoo	NSW	Large	Government
Symbio Wildlife Park	NSW	SME	Private

Case Study
Zoological Society of South Australia[38]

At its Adelaide and Monarto zoos the Society holds 2500 specimens across 350 different species. Of these species, 38 are identified under the CITES and are included in CITES highest risk category. This includes 4 species of reptiles, 10 species of birds, and 24 species of mammals. The zoos also hold 9 species that are included on the IUCN Red List. Two of these Red List species are not covered by CITES, meaning that the zoos hold a total of 40 endangered species.

Two of the species held by the zoo are extinct in the wild.

The zoos breed three of the species (all Australian native species) for recovery and reintroduction into the wild. The other species are held for insurance purposes consistent with conserving the components of biological diversity within the meaning of the CBD.

[38] Response of Zoological Society of South Australia, Aegis Consulting and Applied Economics Survey 2009

5.4.2 Conservation and Scientific Research (Ex Situ)

The value of Australian zoos contribution to conservation research depends largely on:

- How unique their research capacities are;
- How much scientific research they publish;
- What impact their research has had on conservation outcomes; and
- How much they spend on research.

It is considered by some that zoos are unique places for scientific research and conservation activities[39]. This uniqueness can stem from the convergence of the kind of scientific investigations demanded by the operation of zoos, such as animal husbandry, animal biology, species reproduction and predation, veterinary care, species recovery and reintroduction into the wild and consumer responses to conservation. As an alternative university based research may be less integrated and 'hands on'.

The World Association of Zoos and Aquariums (WAZA) suggests that research undertaken by zoos occurs in relation to:

- Research in pure and applied biological science (including small population biology, animal welfare, wildlife medicine, physiology, nutrition, behaviour, reproductive biology, genetics, evolution and taxonomy);
- In situ conservation research such as field based ecology and habitat; and
- Research aimed at identifying and improving institutions' operations such as visitor learning and fund raising[40].

However there is also a wide view that while zoos contribute to conservation research they are not unique in doing so. Discussions that the consultants have had with academics, zoos and government agencies indicate that extensive conservation research is undertaken by universities and research divisions of government conservation agencies, although the latter can vary from state to state[41]. For example while most State governments have outsourced their conservation research work to universities, the Western Australian Department of Environment and Conservation retains a 140 person research team[42].

This means that even if zoos did not exist, extensive conservation research would continue to be undertaken.

Accordingly, rather than being unique places of scientific endeavour, it is more likely that zoos are contributors to research, because of their access to and practical knowledge about wildlife. In some cases there will be strong research relationships between government agencies and zoos, particularly where zoos are also government owned. For example in Western Australia, both Perth Zoo and the Department of Environment and Conservation confirmed their close collaboration on research projects and partnerships with universities for Australian Research Centre grants. In this case the zoo is also an effective advocate within government for conservation projects and priorities[43].

Information in relation to questions about how much scientific research zoos publish, what impact their research has had on conservation outcomes, and how much funding and in kind support they provide for other non-zoo based research was gathered through the survey used in the preparation of this report.

In the survey zoos were asked whether they:

- Undertook conservation and related scientific research;
- Could measure their research output in terms of scientific publications and/or the number of projects approved by an animal ethics committee over the last 2 years; and
- Have any research partnerships with other zoos, government agencies, museums, universities and/or other organisations.

Of the 20 respondents to the survey, 11 undertake conservation and related scientific research. Of these:

- 4 are SMEs and 7 are large organisations owned by State governments, private companies, and trusts.
- 8 provided evidence of their measurement of research output through publications and/or projects approved by animal ethics committees over the last 2 years.

The survey gathered no information on the actual impact of zoos research activities on the conservation of biodiversity and wild populations in their natural habitats.

In terms of spending on their own research, 5 organisation provided information of the cost of research they undertake. Between 2006 and 2008 this was worth $850 000. All of the 5 are large, 2 are owned by State governments, 2 are privately owned and one is owned by a trust[44].

[39] Wharton, D, Research by Zoos, Zoos in the 21st Century, Cambridge University Press 2007, p,178
[40] World Assoc of Zoos & Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, Chapter 3, p,21
[41] Consultations undertaken by Aegis Consulting
[42] Consultations held with the Department of Environment and Conservation, Government of Western Australia

[43] Ibid and consultations with Perth Zoo
[44] Aegis Consulting and Applied Economics Survey 2009

With respect to funding external research, 10 organisations provided information of their contributions to research by universities, NGOs and other institutions. Between 2006 and 2008 the contribution of these organisations to external research was worth over $2 million. Of these 10 organisations:

- Only 3 also fund their own research.
- 6 are privately owned SMEs.
- 4 are large of which 1 is owned by a State Government, 2 are privately owned and 1 is owned by a trust.

While the sample of 11 respondents is small compared to the 107 zoos in Australia, it is clear that larger State owned and private zoos have the resources to conduct their own research and fund external research, while SMEs tend to fund external research.

These results suggest that while some highly resourced zoos can be places of research, all zoos can play a strong role in contributing to external research, particularly where they have the capacity to raising funds for research through the display of animals and public education.

This is supported by the fact that all of 11 organisations participating in conservation research have partnerships with universities and government agencies. Some organisations also have partnerships with NGOs.

Given the small sample of organisations (8) who publish peer reviewed research it would appear that zoos in Australia do not play an enormous role in conservation research. On the other hand, given the small size of the Australian market, the research output of these organisations can be significant relative to the conservation issues needing attention. For example, Seaworld provides significant funds for research into 3 Australian marine species that are critically endangered and this can be regarded as extremely valuable.

The report has identified four case studies which illustrate the variety of contributions made by Australian zoos to scientific and conservation research.

Case Studies

These case studies demonstrate the contribution that zoos can make to ex situ conservation research in terms of:

- financial contribution
- species conservation
- research partnerships with government and academia

(a) Seaworld[45]

Through its Research and Rescue Foundation and its Trust, Seaworld has provided about $650 000 per year for marine research projects for many years. In 2007/08 this funded 29 projects relating to the conservation of various marine species. Key research conservation projects linked to in situ recovery it is currently funding include:

- Grey nurse shark, of which only 700 remain in the wild
- Loggerhead turtles
- Dugong

Arguably these species are iconic for Australia's biodiversity and ex situ programs to conserve them are integral to delivering the goals of the Australian Government's *National Strategy for Biological Diversity*.

Its research grants are provided to university and Queensland and NSW government agency based projects. As a result, in general terms, the value of its contribution can be partly measured by the expenditure it is saving the Queensland and NSW governments in relation to the cost of their programs as well as the funding for university based research that would otherwise need to be funded by other parties, including government.

(b) Perth Zoo[46]

In 2008/09 Perth Zoo has allocated over $275 000 for two conservation research projects. These are:

- Research and breeding to support WA's endangered frog species in collaboration with the WA Office of Science Innovation, WA Department of Environment and Conservation and University of WA.
- Priority research projects for Murdoch University's Veterinary Masters Program. This is generally undertaken with the Zoo's species recovery team and has occurred for endangered species such as Gilbert's Potoroo.

(c) Taronga Conservation Society[47]

The TCS hosts a reproductive research facility that is used by all zoological institutions for the purposes of monitoring the hormone cycles and reproductive status of species. Projects for which it has been used include:

- Australian shark attack research undertaken by the NSW Department of Primary Industries.
- Hosting of the Animal Gene Storage Resource Centre of Australia.
- Research on seals by the Australian Antarctic Division.
- Conservation of bushland on Sydney Harbour.
- Thirteen marine mammal research programs undertaken by Sydney University.
- Development of in vitro fertilisation of rhinoceros with the Leibniz Institute for Zoo and Wildlife Research, Berlin.

Between 2006 and 2008, TCS published 34 scientific research articles and papers in peer review journals.

(d) Zoological Society of South Australia[48]

The zoo's research program covers three broad areas – conservation biology, conservation medicine and conservation psychology. In general terms these themes of research are designed to add to scientific knowledge about:

- Best practice to conserve threatened biodiversity
- The links between the health of wildlife, domestic animals, humans and the environment
- Ways to change human behaviour to support conservation outcomes
- Between 2006 and 2008, zoo staff published 21 scientific research articles and papers in peer review journals and texts.

The zoo has over 40 research partners including NGOs, local indigenous communities, universities, State governments, the Commonwealth government and private enterprise.

[45] Response of Seaworld, Aegis Consulting and Applied Economics Survey 2009
[46] Response of Perth Zoo, Aegis Consulting and Applied Economics Survey 2009
[47] Response of Taronga Conservation Society, Aegis Consulting and Applied Economics Survey 2009
[48] Response of Zoological Society of South Australia, Aegis Consulting and Applied Economics Survey 2009

5.4.3 Activity in Relation to Threatened Species and Ecosystems (Ex Situ and In Situ)

As indicated by the CBD, activity to conserve threatened species and habitats can be both ex situ and in situ[49]. The definitions used in the CBD in relation to these activities overlap to some degree which perhaps contributes to confusion about what can be determined as ex situ and in situ conservation.

To properly analyse the information collected from zoos and assess and report their contributions the consultants have defined the CBD criteria in terms of the following categories:

- Recovery and reintroduction **(RR)** – Recovering threatened species for their reintroduction into the wild through management plans. (ex situ and in situ)
- Habitat and species management **(HSM)** – Promoting protection of natural habitats and the maintenance of viable populations of species in natural surroundings. This can include research and program funding, education to raise public awareness, providing in kind resources and expert assistance (in situ)
- Rehabilitating Wildlife **(RW)** – Rescuing and treating native wildlife (ex situ)
- Alien Species Control **(ASC)** – Preventing the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species (in situ)

5.4.3.1 RR and HSM Programs for Native Species

In their survey, the consultants asked zoos to report on their involvement in significant native species and international conservation programs. To classify as significant the programs must be linked to an in situ project, recognised, documented and coordinated[50].

This classification is consistent with the position of the World Zoo and Aquarium Association which recommends that activities to conserve species in the wild, such as reintroduction and translocation, must be undertaken in concert with government agencies, IUCN/SSC Specialist Groups and NGOs, particularly in the host country[51].

Of the 20 respondents to the survey 12 (representing 16 zoos) indicated that they participate in significant in situ conservation programs for native species within the categories used by the consultants. All of these 12 organisations contribute to native species conservation through RR and HSM programs.

Of these 12 organisations, 6 provided information on their expenditure on in situ conservation. Between 2006 and 2008 these 6 spent over $4.3 million on in situ conservation[52]. Of these 6, 2 are privately owned, 3 are State government owned and one is owned by a trust. One is an SME and 5 are large organisations.

Based on the average expenditure of these 6 organisations, the total spending by 12 would be over $8.5 million. However, in reality this may not be the case because SME zoos are likely to spend much less on in situ conservation.

Nevertheless, this estimate is too low because zoos tend not to account for this kind of expenditure as a separate line item. The bulk of their spending on in situ conservation is allocated through:

- General operating expenditure, such as the employment of experts in field biology, animal husbandry and veterinary science who provide assistance to in situ conservation programs.
- General capital expenditure, such as animal facilities to support breeding programs for reintroduction.
- Distribution of public donations collected at animal displays in support of campaigns about threatened species.
- Donations from Zoo Friends Associations.
- Donations from non-corporate and corporate sources.

As discussed in Chapter 3, total zoo expenditure is about $424 million per year, and it is reasonable to assume that a large proportion of this is spent in the pursuit and/or support of in situ conservation programs.

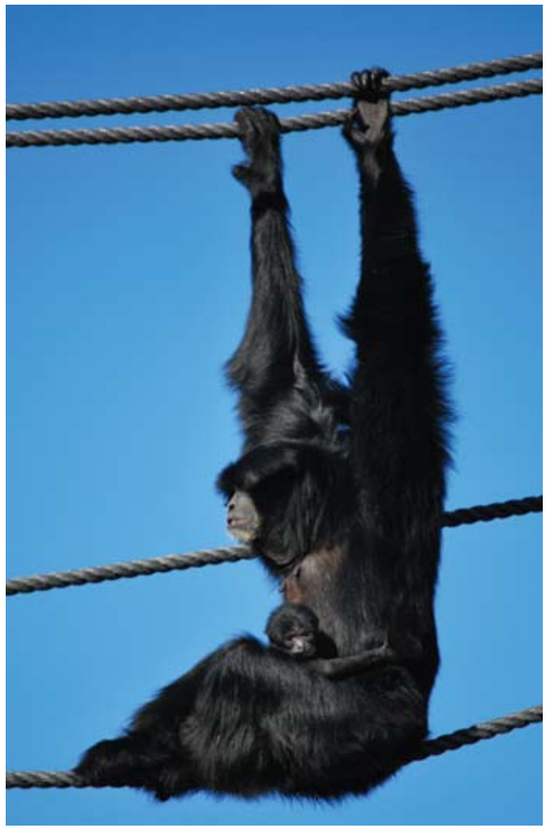
In total the 12 organisations (16 zoos) make RR and HSM contributions to the conservation of 48 endangered Australian native species.

It may be tempting to identify an average number of native species that these 12 organisations act to conserve and extrapolate this average to determine the contribution of all zoos, and suggest that significantly more native species are subject to RR and HMS programs. However this would be misleading because:

- Most zoos in Australia are SMEs and unlikely to have the financial and human resources to make significant RR and HMS contributions to conservation; and
- Of the 12 organisations, 9 are large and 5 are owned by State Governments. In the main, these are the same zoos that make the primary contributions to conserving biodiversity and conservation and scientific research discussed in the sections above. They are the primary agents in the Australian zoological industry's implementation of the CBD.

[49] Convention on Biological Diversity 1992, Articles 8 and 9
[50] Aegis Consulting and Applied Economics Survey of Australian Zoological Institutions 2009
[51] World Assoc of Zoos & Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, Chapter 2, p19

[52] Aegis Consulting and Applied Economics Survey 2009



Thus, it is unlikely that zoos which did not respond to the consultant's survey are involved in the conservation of a significantly larger range of native species.

There is however, one important qualification to this. Because of the low response to the survey by aquariums it is not clear what specific RR and HMS contribution they make to the conservation of marine species. In their visits to three aquariums[53] the consultants did observe a vast array of marine species on display and some very active extensive breeding programs[54].

Nevertheless it is less clear to what extent these programs are focused on RR and HMS as opposed to conserving the components of biodiversity. Given the lack of detailed information about the wider aquarium sector, it may be the case that their RR and HMS programs result in the conservation of a higher number of engendered Australian native species.

The overwhelming contribution of all the 12 organisations is RR programs, with HSM programs playing a minor role. The organisations operate 75 programs of which:

- 15 are undertaken jointly with another zoo.
- 61 are RR contributions.
- 14 are HSM contributions.

The low rate of joint programs reflects the fact that many zoos focus on conservation of native species within their States or Territories. This is a combination of the reality that many species are unique to a particular State or Territory, the conservation program can be managed within that jurisdiction without the need for a national effort, and State government owned zoos who play a major role conservation programs must often reflect the State based political and policy agendas that attach to their funding.

The high rate of RR contributions (81 per cent) in the total number of conservation programs appears to reflect the commitment that most zoos indicate they have to add value to wild populations of threatened species and the conservation of natural habitats and ecosystems.

Many, but not all, of the RR contributions appear to have significantly increased the viability of wild populations in the way intended by the CBD.

See Appendix 2 which details the RR and HMS contributions of organisations in relation to native species.

The consultants have identified two case studies that demonstrate the kinds of impacts zoos have on the viability of wild populations.

[53] The consultants visited Sydney Aquarium, Melbourne Aquarium and Seaworld on the Gold Coast

[54] For example, stingrays at Seaworld

Case Studies

Perth Zoo[55]

Over the last 16 years Perth Zoo has bred about 2000 animals for release by the WA Department of Environment and Conservation into protected habitat areas. These include:

- 350 Chuditch (Western Quoll)
- 346 Shark Bay Mice
- 433 Western Swamp Tortoise
- 143 Numbats
- 179 Lancelin Island Skinks
- 418 Dibblers

The zoo's breeding program has been successful because on its investment in research about reproductive biology and animal husbandry expertise. In addition to breeding the zoo has managed the necessary predation training for species such as Numbats.

According to the Department of Environment and Conservation about 50% of animal translocations in WA have been successful. Fifty per cent of translocations have not been successful because there have not been enough animals to support population groups, and/o predation.

The Department of Environment and Conservation is a strong supporter of the role of Perth Zoo in the RR programs undertaken in WA. It considers that benefits provided by the zoo are:

- The professionalism of its staff which informs the Department's confidence in RR programs. This level of professionalism is particularly necessary when RR programs concern animals that are rare or about whom little is known. The animal husbandry skills of the zoo are extremely important in the situation.
- The science training of its staff.
- The qualifications and experience of its vets.
- That the captive breeding programs upon which RR rely are managed by a group of zoo staff, and not dependent on one person. This is essential to maintain long term certainty and continuity of RR programs.

In relation to the Chuditch RR program the Department considers that the program could not have been successful without the captive breeding by Perth Zoo, particularly because the Department does not conduct captive breeding programs.

With respect to Swamp Tortoise RR program the Department advised the consultants that the Tortoise is critically endangered because is habitat range is naturally small and under threat from farming and urbanisation.

There are two areas where the animals persist and the Department's aim is to create 4 self sustaining populations. Perth Zoo produces 40-50 hatchlings each year, but it takes 10 years for the tortoise to reach maturity. Hatchlings in the wild are not surviving because of predation and climate change effects.

Because of low survival rates of hatchlings in natural populations and the time it takes animals to reach maturity, captive breeding by the zoo is vital for the success of the RR program.

Zoos Victoria[56]

The zoo is involved in captive breeding for various RR programs, with the long established ones having resulted in animals released into the wild. These include:

- 300 Eastern Barred Bandicoot
- 200 Orange Bellied Parrots
- 150 Helmeted Honeyeaters

[55] Response of Perth Zoo, Aegis Consulting and Applied Economics Survey 2009 and consultations with the WA Department of Environment and Conservation

[56] Response of Perth Zoo, Aegis Consulting and Applied Economics Survey 2009 and consultations with the WA Department of Environment and Conservation

5.4.3.2 RR and HSM Programs for International Conservation

In response to the survey, 8 organisations (representing 12 zoos) indicated that they contribute to international conservation through RR and HSM. These organisations are all large and of them 4 are State government owned.

In total these zoos contribute to the conservation of 20 exotic species as well as 5 international programs that have broad aims such as the biodiversity of an entire category of species (eg. whales) or the creation of wildlife sanctuaries in the wild for a number of species (eg. Kenya and Cambodia).

The overwhelming contribution of all the 8 organisations is HSM programs, with RR programs being rare. They operate 37 programs of which:

- 8 are undertaken jointly with another zoo;
- 2 are RR contributions; and
- 35 are HSM contributions.

Almost all of the RR and HSM programs are undertaken in concert with a local or international NGO. The high rate of HSM programs reflects the difficulties of effectively reintroducing species into the wild from captivity across international borders. The high rate of partnership with NGOs demonstrates the support that Australian zoos provide for in situ work often undertaken by NGOs.

The conservation programs supported by Australian zoos occur in over 15 countries.

See Appendix 3 which details the RR and HMS contributions of zoos in relation to international conservation.

Case Study

Opinions of International Conservation NGOs[57]

All of the diverse international NGOs consulted during the preparation of this report consider that zoos perform six key roles in relation to in situ conservation for the purposes of protecting wild populations of species in natural habitats. These are:

- Animal husbandry services and expertise that assists with the care of wild populations in protected natural habitats.
- The capacity to care for wild animals that have been saved from capture and cruelty but cannot be settled in natural protected habitats.
- In kind support, such as veterinary services, research, and human capital, for NGO field based species protection and restoration programs.
- The unique capacity to directly collect funds for NGO field based species protection and restoration programs through the display of and education programs about those species.
- Financial contributions from consolidated revenue received by zoological organisations and zoo friends associations towards NGO field based species protection and restoration programs.
- The capacity to support and drive animal and habitat protection campaigns.

The views of these NGOs reflect the HSM focus of most zoos' contribution to international conservation.

In their visits to zoos the consultants witnessed first-hand a full range of campaigns and promotion about the protection of different species and habitats. These were always located in tandem with animal display to stimulate visitor responsiveness to such campaigns[58].

[57] Consultations with Flora and Fauna International, Cheetah Outreach, Free the Bears Foundation, Tenkile Conservation Alliance

[58] The consultants visited 18 zoos

5.4.3.3 RW Programs for Native Species

In their survey, the consultants asked zoos whether they:

Undertake native wildlife rehabilitation;

- Have formal relationships with government agencies for such programs; and
- Cross subsidise the cost of such programs and how much their costs are.

Of the 20 organisations that responded to the survey, 13 (representing 15 zoos) reported that they provide rehabilitation programs for native species. Of these 7 are large private and government owned organisations. While the consultants did not receive enough information to attempt a proper assessment of the extent, cost and government funding arrangements of these programs it is reasonably clear that these 13 organisations:

- Rehabilitate more than 14 000 animals each year.
- Do not monitor spending on RW in a systematic way that can be used to assess the total expenditure of wildlife rehabilitation.
- Spend at least over $2.3 million each year on RW.
- Fully fund or receive part government or corporate funding for RW programs.
- Have license or other arrangements with government agencies for RW.
- Provide a service that the Commonwealth and State governments would find difficult to substitute with the financial and human resources available in government agencies or NGOs.

See Appendix 4 for the contribution of zoos to native wildlife rehabilitation.

Case Studies

Australia Zoo[59]

The wildlife hospital at Australia Zoo is a world leader in veterinary care and wildlife conservation and treats 7000 animals each year. It cost $5 million to create (of which $2.5 million was a contributed by the Australian Government), and includes state of the art veterinary facilities integrated with an animal rehabilitation centre and veterinary and animal care training and education. It is an ecologically sustainable building encapsulating the latest green building design standards. It undertakes collaborative projects in animal rescue and care with the University of Queensland. Its operational costs are funded by several corporate sponsors.

Seaworld[60]

Seaworld is the key source of marine species rescue, care and rehabilitation services for the Queensland and NSW governments. It has its own fleet of ships and helicopters which are routinely requested to assist Queensland and NSW government agencies deal with injured marine life and major incidents such as stranded whales. Its activities are fully funded by its revenue and it receives no funding from government agencies which rely on its services.

[59] Response of Australia Zoo, Aegis Consulting and Applied Economics Survey 2009

[60] Consultations with Seaworld

5.4.3.4 ASC Programs to Protect Native Species

A few zoos reported that they fund and participate in controlling alien species that threaten native species.

One key example is the efforts of Perth Zoo in providing financial, human resource, scientific research and campaign education assistance to the Stop the Foundation. The Foundation was established to prevent the destructive cane toad from entering Western Australia and is funded by the Australian and WA Government. Perth Zoo is represented on the Board of the Foundation.

This is discussed in more detail in the chapter of bio security.

5.4.4 Providing Support for Conservation in Developing Nations (Ex Situ and In Situ)

As discussed in 5.4.3.3, the 8 organisations that make HSM and RR contributions to international conservation do so in over 15 countries. Of the 25 programs in which they participate, 23 occur in 14 developing countries.

5.4.5 Government Support for Zoos Conservation Activities

Most government and privately owned zoos are commercial enterprises competing with substitutable recreational and leisure facilities, such as theme parks, and in some cases with each other. Thus there is some natural market pressure for captive breeding programs to be driven by the need to produce new attractions, such as infant animals, to boost gate takings and sponsorship revenue. In these circumstances conservation activities may take second place.

Consultations held with zoos report confirm that financial pressure on them may often determine whether captive management and breeding programs are used for mainly revenue or purely conservation purposes. There are occasions when revenue and conservation objectives are mutually exclusive and also occasions when they are perfectly compatible.

For privately owned zoos which, unlike government owned zoos, do not receive government subsidies, broader economic conditions, such as the 2008 global financial crisis, can put serious downward pressure on revenue from gate takings, sponsorship and donations. This can exacerbate the use of captive management and breeding programs for revenue rather than conservation purposes.

Arguably the Commonwealth government's capacity to deliver the objectives of its *National Strategy for the Conservation of Biological Diversity* is reliant in part on the ability of zoos to pursue ex situ conservation, particularly in relation to endangered native species. To ensure that zoos can consistently contribute to these strategies, regardless of wider economic conditions affecting their revenue base, it is sensible for the Commonwealth government to consider providing subsidies to all zoos participating in agreed conservation programs, regardless of their ownership structure.

As many of the case studies in this chapter show there is a clear conservation benefit in maximising the participation of zoos in ex situ and in situ activities. As the Australian government as ratified the CBD and supports ex situ activities such as captive breeding in its *National Strategy for the Conservation of Biological Diversity*, State and Commonwealth government policies should operate to maximise the opportunities for all zoos to participate in conservation programs.

Based on the survey and ABS data the average contribution of State governments to zoos is $2.92 per capita, while the Commonwealth government provided three zoos with about $1.1 million between 2006 and 2008. This is a very low contribution to the conservation activities of zoos given that they at the very least:

- Provide $116 million in net international tourism benefit to the Australian economy.
- Receive 12.1 million visits from Australians and 3.3 million visits from international tourists each year.
- Preserve in gross terms about 3900 native and exotic species for biological diversity purposes.
- Participate in the in situ conservation of 48 native and 20 exotic species.
- Provide assistance for in situ conservation in 14 developing nations.
- Rehabilitate 14 000 native animals each year, largely at their own cost.

During the preparation of this report a number of zoos in Queensland expressed frustration that Queensland government policy regarding captive breeding of native Queensland species, generally prevented them from being able to participate in conservation programs. This seems at odds with the national role that zoos play in conservation activities.

Key Findings

Zoos provide a range of conservation education programs for school and tertiary students, visitors and the general public. All of the 18 zoos (except one) visited by the consultants during the preparation of this report demonstrate a very strong commitment to student and visitor education through all facets of zoo operations ranging from signage to mobile zoos and community based programs.

Zoos meet all the standards of conservation education programs set by the European Association of Zoos and Aquaria (EAZA).

In 2007-08, 19 organisations (representing 23 zoos) provided formal education to about 613 000 students nationally. In many states zoo education programs are either integrated with or reflect state education curriculum.

Education experts consider that zoos are a unique place for:

- Children to learn about environmental issues because they can see and feel animals and this sensory experience is essential to the way children learn.
- Field and zoo biologists to study. Biologists are essential for animal husbandry, animal welfare and connecting environment sustainability with issues of development and economic growth.
- Veterinary science students to learn about animal care and wildlife medicine.

Only 4 organisations seek to evaluate their education programs as part of their visitor surveys or in other ways in relation to school education. The survey conducted by one of these organisations indicates that 83 per cent of visitors discovered new things they didn't know about before visiting the zoo.

Overall, education program evaluation is not highly developed amongst zoos globally. But Australian zoos are investing in new research to understand how education programs can and should change visitor behaviour to support conservation over the long term.

Nevertheless during their visits to zoos, the consultants observed that zoos make strong attempts through animal exhibits and signage and other material about threatened species and habitats to stimulate emotional responses in visitors and suitable reactions in support of conservation. The report has identified some case studies that seem to illustrate that zoo education can stimulate longer lasting behaviour change for conservation.

6.1 The Link Between Education and Conservation

As discussed in Chapter 5, education programs are widely considered to be one of the ways zoos contribute to conservation. In their visits to 18 zoos[1] the consultants observed a common significant commitment in every institution (except one) to ensure that visitors are educated about animals of display, whether and why these animals are endangered, how these animals and their habitats are being protected and what a visitor could do to assist with the conservation of these animals and their habitats (such as donations), or change their behaviour to support better environmental outcomes in general.

The World Association of Zoos and Aquariums (WAZA) considers that the success of ex situ and in situ conservation strategies "*depend in the long term upon the influence of education on human behaviour*"[2].

Experts suggest, and the survey respondents and visits the consultants made to zoos, confirm that education experiences offered by zoos include[3]:

- Animal displays, especially where the exhibits are natural and people have the opportunity to interact with animals.
- Opportunities to stay overnight at zoos to experience and learn about animals.
- Interpretative graphics and text through signage, pamphlets and other material.
- Documentaries and film through zoo based cinema.
- Participation in television and other media programs about wildlife education.
- Opportunities for the public to learn from zoo keepers through feeding and other special daily programs.

Formal education programs for domestic and international school children.

- Outreach education programs for children through mobile zoos.
- Animal husbandry, veterinary and other science training for domestic and international tertiary students from veterinary, education and science faculties.
- Opportunities to visit animals 'back of house' for special interactive sessions and travel with zoo staff to experience animals in their natural habitat in Australia and overseas.
- Public relations and media to promote conservation messages.

[1] The zoos visited by the consultants represented a wide cross section of SME, large, urban, regional, government, private and not for profit zoos

[2] World Association of Zoos and Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, Chapter 5, p35

[3] Sterling et al, 'Conservation education in zoos: an emphasis on behavioural change', Zoos in the 21st Century, Cambridge University Press 2007, p39 and visits by Aegis Consulting to 18 zoos in Australia

To establish and maintain a clear link between education and conservation the WAZA considers that all zoos should adopt the education standards agreed to by the Council of the European Association of Zoos and Aquaria (EAZA) in September 2001[4]. These standards are a solid guide to judge the performance of Australian zoos.

The table below illustrates the extent to which Australian zoos meet these standards. The performance of Australian zoos is based on the 20 organisational responses to the survey used to prepare this report and the consultant's visits to 18 zoos.

Table 6.1 Australian Zoos Delivery of European Zoo Education Standards

Standard Set by EAZA	Do Australian Zoos Deliver?
A zoos education role should be clearly stated in its written mission.	All major zoos and most SMEs do this.
The zoo must have a written policy identifying goals and methods.	All major zoos and most SMEs do this.
Zoo education should target all visitors, not just schools.	All zoos do this.
A zoos education policy must include specific projects and evaluation mechanisms.	All major zoos and some SMEs do this.
At least one member of staff within the institution should be responsible for professional implementation of the education policy.	All major zoos and most SMEs do this.
Signage should highlight threatened species and species that are part of breeding programs.	All zoos do this.
Animal demonstrations must contain an education or conservation message.	All zoos do this.
Animals must be exhibited in the best conditions possible and in enclosures that enable them to live as naturally as possible.	All zoos do this.
Educators should be involved in the exhibit planning and collection planning process.	Major zoos have organisational and decision making structures that enable this, while in SMEs conservation and education roles are generally combined in the role of one person and therefore this would occur.
A reference library should be maintained for use by all zoo staff.	Most major zoos do this.
Resource material and education information should be provided to the general public zoo audience.	All major zoos and some SMEs provide material that the public can take away in relation to threatened species campaigns.

[4] World Association of Zoos and Aquariums, the World Zoo and Aquarium Conservation Strategy, 2005, Chapter 5, p36

6.1.1 The Scale of Education provided by Australian Zoos

6.1.1.1 Formal Education

The survey asked zoos how many students attended formal education classes or groups in their institution in 2007/08. Nineteen respondents (representing 23 zoos) provided information in relation to this question. In total they provided formal education to about 640,382 students nationally. In the case of 3 organisations this included international students.

The table below illustrates the scale of student education provided by zoos in Australia.

Table 6.2 Number of Students Attending Education Classes at Australian Zoos[5]

Number of students at education classes or groups in 2007-08	
Alice Springs Desert Park	6,124
Alma Park	22,000
Armadale Reptile Centre	3,000
Aust Reptile Park	18,000
Australia Zoo	7,000
Cairns Tropical Zoo	5,430
Caversham Wildlife Park	4,000
Currumbin Sanctuary	23,000
Dreamworld	72,994
Northern Territory Bioparks	5,661
Perth Zoo	62,000
Rainbow Jungle	1,000
Rainforest Habitat	1,200
Sea World	30,000
South Aust Zoo Society	66,000
Sydney Aquarium	7,590
Taronga Conservation Society	137,083
Trowunna	3,300
Zoos Victoria	165,000
Total	**640,382**

[5] Aegis Consulting and Applied Economics Survey 2009

The contribution that zoos can make to school education is affirmed by:

- Most Australian States and Territories host a major government owned zoo which assists the delivery of curriculum modules. In States like Queensland, where there is no major government owned zoo, private and national trust zoos provide structured education for school groups.
- In some states education programs provided in schools is based on and integrated with education curriculums for primary and secondary students and educators within schools are qualified teachers with experience in or seconded from the public education system[6].
- In States where zoo education is not linked to the education curriculum zoos also develop professional education programs that are based on informing and motivating behaviour change amongst students[7].
- In some states the role of zoos in school education has been formally recognised and included as part of the Government's application of the Sustainable Schools Initiative. The SSI is a national program agreed by the Council of Australian Governments to educate school children on all aspects of environment conservation and sustainability, including biodiversity. In these states zoos have been given a role to deliver biodiversity education under the SSI[8].
- In some states the government fully funds the cost of students attending the zoo[9].

Education experts consider zoos to be[10]:

- A unique place for children to learn about environmental issues because they can see and feel animals and this sensory experience is essential to the way children learn.
- An important way for children from rural areas to understand that they are part of a bigger world.
- A way for troubled children to learn about self respect and the care of others through caring for animals.
- A place that gives student teachers insights into teaching methods because they can observe the way children respond to senses, ideas and information.
- A unique place for field and zoo biologists to study. Biologists are essential for animal husbandry, animal welfare and connecting environment sustainability with issues of development and economic growth.
- A unique place for veterinary science students to learn about animal care and wildlife medicine.

[6] For example, NSW, Victoria and Western Australia
[7] For example, Australia Zoo and Currumbin Sanctuary in Queensland
[8] For example, Western Australia
[9] For example, Alice Springs Desert Park
[10] Consultations with Dr Jennifer Pearson, Murdoch University, Dr Rob Morrison, Flinders University and Dr Susan groundwater, Sydney University

61.1.2 Informal Education

Zoos provide informal education to visitors and the general public via measures ranging from signage and regular keeper talks to special back of house animal visits and visible support for and promotion of specific public campaigns to conserve threatened species and habitats.

Nineteen respondents to the survey (representing 23 zoos) reported a range of informal education measures and a commitment to raising visitor and general public awareness about conservation and changing behaviour where possible. The consultant's visits to zoos confirmed this commitment.

6.2 Evaluating the Impact of Education

Whilst it is clear that all major and most SME zoos provide a range of education services to formally or informally support the education of school children as well as improve general visitor education, there is less certainty about the actual success these programs have in motivating human behaviour change for conservation outcomes.

Of the 19 respondents to the survey question about the nature and frequency of their visitor surveys:

- 2 conduct visitor surveys continuously
- 2 conduct visitor surveys quarterly
- 4 conduct visitor surveys annually
- 1 conducts visitor surveys randomly
- 2 conduct visitor surveys in another time period
- 8 do not conduct visitor surveys

Of these respondents, only 4 seek to evaluate their education programs as part of these visitor surveys or in other ways in relation to school education. These 4 organisations are large government and trust owned organisations.

One of these organisations deploys sophisticated and independent professional evaluation of both school education classes provided at the zoo and its mobile zoo program as well as general visitor education.

In relation to school education it reports that the teacher satisfaction surveys generally show that 90 per cent of teachers consider the organisation's education programs to be excellent. The organisation has now embarked upon more in depth analysis through its participation in the Australian Government's Australian Quality Teaching Program which is designed to elicit and assess student feedback on education methods and content.

With respect to visitor education this organisation's most recent survey results show that[11]:

- 83 per cent of visitors agreed they discovered new things they didn't know about before visiting the zoo.
- 82 per cent agreed they learned more about issues they already knew about after visiting the zoo.
- 77 per cent agreed that they remembered things they remembered things they hadn't thought of for a while after visiting the zoo.
- 40 per cent agreed that things were already very familiar to them after visiting the zoo.

The lack of evaluation of education programs is not confined to Australian zoos, but rather is a global issue for the zoo industry. It is suggested that a major barrier to evaluating the impact of zoo education is the uncertainty about how to measure results for education and informal learning in general[12]. For example:

"traditional evaluation methods define an education experience as a single visit or a single issue…because these experiences are easier to evaluate than multiple visits and/or programs across institutions. Often the evaluations reflect only immediate reactions and educational experience and do not consider later changes in knowledge or behaviour"[13].

One of the ways these gaps may be addressed is through the field of conservation psychology which seeks to examine the motivations for conservation behaviour and how to structure education programs accordingly. In Australia, a number of zoos are currently funding a conservation psychology research project at Monash University[14].

It is reasonably clear that zoos make strong attempts through animal exhibits and signage and other material about threatened species and habitats to stimulate emotional responses in visitors and suitable reactions in support of conservation[15]. It is also clear that zoos do stimulate emotional responses from visitors[16]. Some experts consider that the emotional responses that zoos stimulate are only bettered by eco tourism, where people interact with animals in the wild[17].

However zoo researchers have yet to establish whether these immediate emotional responses translate into longer lasting behaviour change for conservation outcomes[18].

Although the broader evidence is limited, the report has identified some case studies that seem to illustrate that zoo education can stimulate longer lasting behaviour change for conservation.

[11] Survey conducted in October 2008
[12] Sterling et al, Conservation education in zoos: an emphasis on behavioural change, Zoos in the 21st Century, Cambridge University Press 2007, p42
[13] Ibid p43
[14] Consultations with Taronga Conservation Society and Perth Zoo and Liam Smith from Monash University
[15] The consultants observed this during their visits to zoos.
[16] Smith et al, Measuring emotion at the zoo, International Zoo Educators Association Journal, No.44, 2008, p31
[17] Consultations with Dr Chris Pavey, Department of Environment, Heritage and Arts, Northern Territory Government
[18] Smith et al

Case Studies – Formal Education

Zoos Victoria[19]

In relation to school education, evaluation data is collected from participating teachers on a scale low satisfaction to high satisfaction, covering items such as: appropriate content for students, relevance to curriculum outcomes, appropriate language levels, level of engagement with the educator, whether program expectations were met. Overwhelmingly the zoo receives high ratings across all areas with schools repeatedly commenting on the positive impacts its programs make on student learning.

Over the past 2 years the zoo has also shifted the focus of many of its programs to providing participants with tangible opportunities to take conservation/sustainability action. These programs provide the zoo with a direct opportunity to track the numbers of participants who take up suggested behaviours. For example 88% of students who participated in its 'Trees, Paws and Claws' program over the past year took up one of the 3 recommended actions to conserve native species – fundraising, native grass planting or native tree planting.

Following participation in its 'Conservation Connections' program 1460 students produced over 1000kg of wildlife education resources for the zoo to distribute amongst partner schools in Zimbabwe as part of an in-situ conservation education program. Other examples include the zoos:

- 'Investing in Nesting' program where students build and install nest boxes for a variety of hollow dwelling species.
- 'Web Spinners' program where students collect spider webs for the Helmeted Honey Eater threatened species breeding and release program (web is used by the birds for nest building).
- 'Orang-Utan Browse' program where partner school cultivate browse plants for the zoos Orangs. Rural schools involvement with this program has stimulated their communities to engage the student's assistance with preserving river systems ate associated native species.
- 'Cat Enrichment' program where schools grow enrichment herb gardens to supply the zoos carnivore departments with a supply of suitable herbs for enrichment activities.

These programs have allowed the zoo to track student engagement with conservation issues and long term learning beyond the day of their zoo visit.

Perth Zoo[20]

In 2006 the zoo launched its first School Conservation Competition to enable one winning school to send 35 students to the zoo for no charge. The competition produced 3 winning schools – Armadale Primary School, Forrestdale Primary School, and Campbell Primary School.

In competing for the opportunity to visit the zoo the students has to research and produced conservation plans. Amongst them they:

- Researched the fungus dieback, which is one of the top 10 threats to the WA environment, and raised public awareness about it through all forms of media and produced an education package for distribution throughout WA.
- Researched and learned how to protect the local bandicoot population and commenced a native bush planting campaign to increase the natural food supply for the animals.
- Learned about habitat destruction and how to minimise the impact of development on the natural environment.

[19] Response of Zoos Victoria, Aegis Consulting and Applied Economics Survey 2009 and consultants visit to Melbourne Zoo
[20] Consultations with Dr Jennifer Pearson, Murdoch University

Case Studies – Informal Education

Zoos Victoria[21]

An informal education campaign to promote mobile phone recycling was commenced by the zoo in 2008. It is called "They're Calling on You", and is addressing the fact that:

- A key component in mobile phones manufacture is the mineral coltan, which is predominately found in the Democratic Republic of Congo (DRC); and
- Much of the coltan is found in forested areas in the DRC that overlap with the natural distribution of Lowland Gorillas. Both the Gorillas and their habitat are being severely threatened by coltan mining.

The zoo is partnering with Aussie Recycling Program (ARP) and the Jane Goodhall Institute (JGI) in a campaign that involves making postage-paid mailing satchels available for people to return their old phones to ARP. In doing so the campaign:

- Diverts mobile phones from landfill;
- Generates money to support JGI gorilla conservation in the DRC; and
- Reduces the demand for coltan mining by removing and recycling the coltan capacitor in the returned mobile phone.

The campaign is promoted at the zoo, amongst corporates and in schools. Since the campaign commenced in October 2008, thousands of mobile phones have been returned for recycling.

Armadale Reptile Centre[22]

Armadale Reptile Centre is an SME in regional WA. The centre provides the local and regional community with informal education about native species of reptiles, including how to deal with contact and their habitat.

The Centre reports that as a result of its education:

"the public has shown a greater respect for habitat and fauna, such as no longer killing harmless reptiles but bringing them in alive for identification and contacting the centre for advice first rather than destroying the animal".

[21] Response of Zoos Victoria, Aegis Consulting and Applied Economics Survey 2009 and consultants visit to Melbourne Zoo
[22] Response of Armadale Reptile Centre, Aegis Consulting and Applied Economics Survey 2009

Key Findings

Zoos play an important role in bio security because most diseases over the last 30 years are zoonotic or occur first in wildlife. Bio security management tends to be undertaken by large zoos, universities, NGOs and government agencies working in collaboration because smaller zoos do not have the resources to fund such work.

Wildlife disease surveillance is coordinated nationally through the Australian Wildlife Health Network (AWHN), in which many zoos participate.

A review of Australia's bio security regime in October 2008 found that the AWHN performs an invaluable role in monitoring disease in feral and native wildlife, but requires more personnel and resources to work at an optimal level.

Zoos, collaborate with other organisations to maintain the Australian Registry of Wildlife Health (the Registry) which undertakes diagnostic work, disease investigation, disease surveillance, research, and education.

7.1 Zoos Role in Bio Security

Australia's bio-security arrangements are focused on minimising the risk of entry, establishment and spread of exotic pest and diseases that could harm people, agriculture or the environment[1]. It is suggested that there are strong links between conservation medicine undertaken by zoos and wildlife disease monitoring for bio security[2].

Conservation medicine aims to reduce risks to human and animal populations from diseases manifesting in wildlife because of climate, ecological or development reasons. Wildlife disease monitoring is critical to secure the health of any nation's biodiversity, livestock, agriculture, human population and native species.

Zoos play an important role in bio security management because about 60 per cent of human pathogens and 75 per cent of emerging and re-emerging human diseases over the last 30 years are zoonotic, while most of the emerging diseases over the past 10 years have originated in wildlife[3].

It is widely considered that bio security tends to be undertaken by large zoos, universities, NGOs and government agencies working in collaboration because smaller zoos do not have the resources to fund such work[4]. The information gathered by the consultants in their survey of zoos confirms this conclusion.

[1] Australian Government, Report of the Quarantine and Biosecurity Review Panel (the Beale Report), October 2008
[2] Lewis, J, 'Conservation Medicine', Zoos in the 21st Century, Cambridge University Press, 2007, pp192
[3] Information supplied by the Australian Wildlife Health Network
4 Ibid

Of the 20 respondents to the survey 8 provide bio security services. Of these zoos:

- 2 are privately owned
- 2 are owned by trusts
- 4 are owned by State governments
- 6 are members of the Australian Wildlife Health Network (AWHN)

Wildlife disease surveillance is coordinated nationally through the Australian Wildlife Health Network (AWHN). Funded by the Australian Department of Agriculture, Fisheries and Forestry the AWHN is co-hosted by the Taronga Conservation Society and NSW Department of Primary Industries. The Network's aim is to promote and facilitate collaborative links in the investigation and management of wildlife health in support of human and animal health, biodiversity and trade. The network better prepares Australia for serious disease outbreaks in its wild and feral animal populations[5].

A review of Australia's bio security regime completed in October 2008 concluded that the nation's bio security agencies are significantly under resourced and require further investment of about $225 million to perform effectively[6]. It also found that the AWHN *"provides an effective surveillance framework for Australia for diseases of feral animals and native wildlife as part of their ecology that may impact on human and animal health trade and biodiversity. It urgently needs support in both personnel and resources to make the services it provides both systematic and comprehensive"* [7].

A priority for the AWHN is to critically assess the risks posed by wild animals, particularly feral animals, in the advent of an exotic animal disease entering Australia. Other activities include[8]:

- Preparation of wildlife disease reports for the Office International des Epizooties and Animal Health Surveillance Quarterly;
- Surveillance and dissemination of surveillance data;
- Education and training in wildlife disease preparedness and response;
- Facilitation of wildlife disease investigations; and
- Prioritisation of wildlife research questions, and development of protocols.

State and Territory co-ordinators report on six disease categories, which form the basis for general wildlife disease surveillance. It assists the National Wild Bird Surveillance Steering Committee in management of avian influenza surveillance data, chairs the Australian Bat Lyssavirus focus group and represents Australia to a number of overseas committees[9].

5 Response of Taronga Conservation Society, Aegis Consulting and Applied Economics Survey 2009
6 Ibid
7 Australian Government, Report of the Quarantine and Biosecurity Review Panel (the Beale Report), October 2008
[8] Ibid
[9] Ibid

Case Study

Australian Registry of Wildlife Health[10]

The core activities of the Australian Registry of Wildlife Health (the Registry) include diagnostic work, disease investigation, disease surveillance, research, and education. The Registry operates as a resource centre containing information relating to healthy and diseased native fauna and zoo animals. It is also a diagnostic centre, investigating outbreaks of sudden death or disease on behalf of wildlife managers, conservation departments, wildlife rehabilitation groups, the RSPCA, and Zoos.

This year the Registry mounted an education and lobbying campaign regarding wildlife health and biosecurity, using several high-impact examples of the socio-economic impacts of diseases that have wildlife as part of their ecology.

Further investment by the Taronga Conservation Society Australia has allowed considerable expansion of the Registry. A significant upgrade to this program has occurred through the employment of a full-time Registrar, part-time Information and Resources Coordinator, the co-location of the Registry with the Australian Wildlife Health Network (AWHN) in newly renovated offices, the creation of a dedicated wildlife health resources room, and contribution towards a multi-headed teaching microscope.

The aim of the Registry is to ensure emerging government policies and programs, at a State and Commonwealth level, adopt an ecological approach to biosecurity protection and disease surveillance. This can be achieved through adopting a "One World - One Health" approach to share information and resources across the human, livestock, plant, wildlife and environmental health sectors to better protect collective health. In a global environment where approximately 75% of recently emerging and re-emerging zoonotic diseases emanate from wildlife reservoirs, there has never been more interest in wildlife health.

Additional compelling factors that are driving an interest in wildlife health in Australia include:

- Public concern regarding animal welfare, zoonotic diseases and food safety issues associated with endemic and exotic disease;
- Biodiversity protection, bioterrorism detection, climate change and its effects on animal and human health and disease; and
- Development of a nationally integrated biosecurity strategy.

The Taronga Conservation Society has a longstanding commitment to wildlife health through its 25 year history of supporting the Australian Registry of Wildlife Health (Registry) and eight years hosting the Australian Wildlife Health Network (Network).

Significant projects in 2008/09 have included:

- Integration of wildlife health within the Australian Biosecurity Intelligence Network (ABIN - funded through the National Collaborative Research Infrastructure Strategy). ABIN will be an IT based platform for the sharing of health information, and tools for disease surveillance, research and education.
- Amphibian Decline Disease Investigations - a collaborative program involving Australian Animal Health Laboratories, James Cook University and the Cairns Frog Hospital to document and diagnose the causes of amphibian disease and decline in Australia's wet tropics. This project has lead to the creation of an integrated wildlife disease investigation and health information management system that flows from the wildlife carer or ranger through to the identification and characterisation of novel pathogens. Several "spin-off" research projects related to the characterisation of amphibian pathogens are now underway.
- Organisation of a four day Wildlife Pathology Short-Course to occur 21-24 August, 2008. Four overseas wildlife pathologists and 14 local speakers delivered an intensive and extensive training program never before available in Australia. External funding has been garnered to create three scholarships for veterinarians working in developing countries to attend the course.

[10] Response of Taronga Conservation Society, Aegis Consulting and Applied Economics Survey 2009

This report has identified that zoos make a significant contribution to Australia's economy and society.

In economic terms zoos add about $424 million to gross domestic product and a further $116 million in terms of net tourism benefits. Recent studies confirm that about 76 per cent of international tourists want to experience native Australian wildlife and over half wish to do so in a zoo or wildlife park.

Despite the size and level of activity of a few State government owned zoos in relation to conservation, education and bio security, the private sector, including visitors, contributes 75 per cent of the revenue of zoos, with State governments contributing only 25 per cent. The average contribution of State governments to the zoos sector is equivalent to about $2.92 per capita or $4 per zoo visitor. In terms of direct grants to zoos the Commonwealth government provided a total of only $1.1 million to 3 zoos between 2006 and 2008.

The contributions that governments make to the zoos sector is very low compared to the way in which society values zoos and the contributions that zoos make to conservation, education and bio security.

In addition to supporting overall economic activity and international tourism, zoos provide essential services to government and the community that governments and NGOs would not be able to substitute without the allocation of considerable expert human and financial resources.

These services are wildlife rescue and rehabilitation and wildlife disease monitoring and response for bio security.

In 2007-08 zoos rescued and rehabilitated over 14 000 native wildlife under formal and informal arrangements with State governments. In most cases these services are fully funded by zoos from general operating expenditure and they do not account for such services separately.

The consultants have been able to identify that the cost of this service was at least $2.3 million in 2007-08, but given veterinary, nursing and hospital costs as well as medicine and consumables it would be reasonable to assume that the total value would be many millions of dollars. Zoos, such as Seaworld, maintain their own fleets of aircraft and ships to be able to undertake marine species rescue work.

The value that consumers attribute to zoos is reflected in the fact that zoos attracted about 12 million visits from Australian residents in 2007-08. Around 36 per cent of the population visits zoos every year, more than any other cultural activity (except going to the movies). This has been the case for the last 10 years.

This is a significant choice by consumers given that the median admission price to an ARAZPA member zoo is about $24 per adult, while many museums, libraries and art galleries have free general admission.

Consumers also demonstrate the value they attach to zoos by joining Zoo Friends Associations. The median cost of this membership at State Government owned zoos is about $80 per year. Over 167 000 people are members of these associations, of which over 162 000 joined government owned zoo associations.

In addition, in 2007-08, about 2300 people volunteered their time to work at zoos (worth about $7.8 million), non corporate donations to zoos totaled about $10 million and zoos attracted about 198 corporate sponsors.

Consumer surveys undertaken by zoos suggest high rates of visitor satisfactions, particularly with the education about animals and conservation provided by zoos.

Conservation remains one of the he primary goals of zoos, and when judged against the internationally agreed criteria in the *Convention of Biological Diversity* (CBD) 1992, zoos make significant contributions to ex situ and in situ conservation.

In gross terms zoos hold about 3900 native and exotic species for biological diversity purposes within the meaning of ex situ conservation in the CDB. Of these about 173 are native species listed on the IUCN Red List of endangered species and 197 are exotic species included on the same list.

In net terms the number of species in these categories held by zoos is likely to be smaller because many zoos hold animals of the same species. This is necessary for breeding and genetic diversity purposes envisaged by the CBD and Australian Government's *National Strategy for the Conservation of Biological Diversity*.

Government agencies consulted during the preparation of this report suggest that the success of their species reintroduction programs would not have occurred without zoos' animal husbandry and veterinary expertise and professionalism necessary for successful captive breeding programs.

With respect to in situ conservation, zoos have at least 75 programs for the conservation of 48 native endangered species. Most of these programs (81 per cent) are recovery and reintroduction programs. A diverse range of large, small and medium sized zoos owned by government, the private sector and trusts contribute to in situ conservation programs for native species.

Zoos contribute at least 37 programs for the in situ conservation of 20 exotic species in 15 countries (14 of which are developing). Almost all these programs are for habitat and species management, rather than reintroduction of species to the wild, and are undertaken in support of an NGO in the field.

Field NGOs consulted during the preparation of this report suggest that their program success relies on the human resource contribution that zoos make, such as access to 24 hour veterinary advice, and the capacity of zoos to raise funding through animal displays that promote the need for public and corporate support for threatened species conservation.

While zoos are not unique places of conservation and scientific research, larger zoos undertake research that supports broader scientific endeavour and large, medium and small zoos contribute funding to support research. In 2007-08 zoos contributed over $2 million to fund university based research for conservation outcomes.

Conservation education is another primary goal of zoos and they demonstrate a strong commitment to make visitors aware of conservation issues through signage, keeper talks and community based activities. In 2007-08 zoos provided education classes to about 640,382 students.

Education experts consider that zoos are a unique place for:

- Children to learn about environmental issues because they can see and feel animals and this sensory experience is essential to the way children learn.
- Field and zoo biologists to study. Biologists are essential for animal husbandry, animal welfare and connecting environment sustainability with issues of development and economic growth.
- Veterinary science students to learn about animal care and wildlife medicine.

Education program evaluation is not highly developed amongst zoos globally. But Australian zoos are investing in new research to understand how education programs can and should change visitor behaviour to support conservation over the long term.

The Australian Government's capacity to deliver the objectives of its *National Strategy for the Conservation of Biological Diversity* is reliant in part on the ability of zoos to pursue ex situ conservation, particularly in relation to endangered native species.

To ensure that zoos can consistently contribute to these strategies, regardless of wider economic conditions affecting their revenue base, it is sensible for the Australian Government to consider providing subsidies to all zoos participating in agreed conservation programs, regardless of their ownership structure. There is capacity for this, given the very low contribution governments currently make to zoos relative to the benefits they represent.

Appendix 1 Contribution of Australian Zoos to Biodiversity Conservation

Survey Respondent	Native Animals			Exotic Animals			TOTAL			RED LIST	
	Species	Vert	Invert	Species	Vert	Invert	Species	Vert	*Invert*	*Native*	*Exotic*
Alice Springs Desert Park	122	119	3	0	0	0	122	119	*3*	*14*	*0*
Alma Park	31	28	3	35	35	0	66	63	*3*	*0*	*0*
Armadale Reptile Centre	110	110	0	2	2	0	112	112	*0*	*0*	*0*
Aust Reptile Park	147	129	18	36	24	12	183	153	*30*	*11*	6
Australia Zoo	115			35			150	149	*0*	*0*	*14*
Cairns Tropical Zoo	132	132	0	14	14	0	146	146	*0*	*0*	*0*
Caversham Wildlife Park	160			10			170			*0*	*0*
Currumbin	184			5			189	185	*4*	*15*	*1*
Dreamworld	~100	~100	0	~10	~10	0	>100	>100	*0*	*12*	*2*
Zoos Victoria							354	0	*0*	*32*	*59*
Northern Territory Bioparks	212	190	22	0			212	190	22	6	*0*
Perth Zoo	141			49			190	180	*10*	9	*13*
Pet Porpoise Pool	30	30		0	0	0	30	30	*0*	*0*	*0*
Rainbow Jungle	60	60	0	10	10	0	70	70	*0*	*0*	*0*
Rainforest Habitat	124	124		0	0	0	124	124	*0*	*2*	*0*
Sea World							250	0	*0*	*7*	*1*
Zoological Society of South Australia	204			137			341	332	9	*10*	*30*
Sydney Aquarium	700	453	247	0			700	453	*247*	*14*	
Taronga Conservation Society	291			165			456	427	*28*	*40*	*71*
Trowunna	32			1			33	32	*1*	*1*	*0*
							3898	2765	*357*	*173*	*197*

Appendix 2 Survey Respondents Participating in Significant Native Species Conservation Programs

Key
Recovering threatened species for their reintroduction into the wild through management plans. (ex situ and in situ) - **RR**.
Promoting protection of natural habitats and the maintenance of viable populations of species in natural surroundings. This can include research and program funding, education to raise public awareness, providing in kind resources and expert assistance (in situ) - **HSM**.

	Native Species	Alice Springs Desert Park	Australian Reptile Park	Australia Zoo	Currumbin Sanctuary	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Territory Wildlife Park	Trowunna Wildlife Park	Zoological Society of South Australia	Zoos Victoria
	Mammals												
1	Yellow footed rock wallaby								RR			RR and HSM	
2	Brush tailed rock wallaby				RR				RR			RR	RR
3	Black flanked rock wallaby											HSM	
4	SA tammar wallaby											HSM	
5	Rufous hare wallaby (Mala)	RR											
6	Greater bilby	RR			RR	RR			RR			RR	
7	Brush tail bettong											RR	
8	Burrowing bettong	RR											
9	Eastern barred bandicoot								RR			RR	RR
10	Long nosed bandicoot								RR				
11	Tasmanian devils		RR	HSM	RR	RR			RR		RR	RR	RR
12	Marsupial mole	HSM											
13	Central rock rat	HSM											
14	Mulgara	RR											
15	Numbat	RR					RR						
16	Chuditch	RR					RR						
17	Red tailed Phascogale	RR											
18	Plains Rat	RR											
19	Southern hairy nosed wombat					HSM							
20	Dibbler						RR						
21	Lancelin Island Skink						RR						
22	Shark Bay Mouse						RR						
23	Northern Quoll									RR			
24	Moutain Pygmy possum												RR
	Birds												
25	Regent honey eater								RR			RR	
26	Helmeted honey eater								RR				RR
27	Malleefowl								RR				
28	Orange bellied parrot											RR	RR
29	Cassowary					RR							
30	Little penguin								RR				
	Reptiles												
31	Woma python											RR	
32	Pygmy blue tongue lizard											HSM	
33	Slaters skink	HSM											
34	Broad headed snake								RR				
	Amphibians												
35	Western swamp tortoise						RR					HSM	
36	Spencer's tree frog				RR	HSM							
37	3 species of WA frogs						RR						
38	Green and golden bell frog								RR				

	Native Species	Alice Springs Desert Park	Australian Reptile Park	Australia Zoo	Currumbin Sanctuary	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Territory Wildlife Park	Trowunna Wildlife Park	Zoological Society of South Australia	Zoos Victoria
39	Corroboree frog								RR				RR
40	Booroolong frog								RR				
41	Spotted tree frog								RR				RR
42	Southern barred frog												RR
	Marine Species												
43	Bull Shark							HSM					
44	Dugong							HSM					
45	Loggerhead turtle							HSM					
	Insects												
46	Lord Howe stick insect												RR
	Plants												
47	Bush Tomato	RR								RR			
48	Sunshine Diuris Orchid												RR
	Total Species	**12**	**1**	**1**	**4**	**5**	**7**	**3**	**15**	**2**	**1**	**13**	**11**

Appendix 3 Survey Respondents Participating in Significant International Conservation Programs

Key
Recovering threatened species for their reintroduction into the wild through management plans. (ex situ and in situ) - **RR**.
Promoting protection of natural habitats and the maintenance of viable populations of species in natural surroundings. This can include research and program funding, education to raise public awareness, providing in kind resources and expert assistance (in situ) - **HSM**.

NB: Species are listed randomly and not in any order of importance in terms of eco system conservation

	Exotic Species and International Projects	Alice Springs Desert Park	Australia Zoo	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Zoological Society of South Australia	Zoos Victoria
	Mammals								
1	Sumatran elephant		HSM with NGO flora and fauna international (FFI)						HSM with NGO FFI
2	Cambodian elephant		HSM with NGO FFI				HSM with NGO FFI		
3	Sri Lankan elephant						HSM with NGO biodiversity and elephant conservation trust		
4	Black rhino						HSM with NGO international rhino foundation (IRF) (Zimbabwe)		
5	Sumatran rhino						HSM with NGO IRF		
6	Indian rhino						HSM with NGO IRF (India and Nepal)		
7	Northern while rhino						HSM with NGO IRF (Congo)		
8	Sumatran Orangutan		HSM with NGO Australian orangutan project		HSM & RR				
9	Cross River Gorilla						HSM with NGO great apes survival project and wildlife conservation society Nigeria)		

	Exotic Species and International Projects	Alice Springs Desert Park	Australia Zoo	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Zoological Society of South Australia	Zoos Victoria
10	Silvery gibbon				HSM with NGO Javan gibbon centre				
11	Hatinh Langurs						RR in Vietnam		
12	Cheetah		HSM with NGO the wild cheetah and wildlife trust cheetah outreach (South Africa)				HSM in Botswana	HSM with NGO the wild cheetah and wildlife trust & cheetah conservation fund	
13	Sumatran tiger		HSM with NGO FFI	HSM			HSM with NGO 21st century tiger fund	HSM with NGO 21st century tiger fund	
14	Bengal tiger			HSM					
15	Malayan sun bear				HSM with NGO free the bears (Cambodia & Vietnam)			HSM with NGO free the bears	
16	Polar bear					HSM with IUCN/ SSC			
17	African wild dog				HSM			HSM with NGO painted dog conservation inc	
18	PNG tree kangaroo				HSM with NGO tenkile conser-vation alliance				HSM with NGO tenkile conser-vation alliance
	Reptiles								
19	Fijian crested iguana						HSM		
	Amphibians								
20	Asian turtle						HSM with NGO turtle conservation network		

	Exotic Species and International Projects	Alice Springs Desert Park	Australia Zoo	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Zoological Society of South Australia	Zoos Victoria
	General Habitat and Biodiversity Conservation								
	Millennium Seed Bank	HSM hosts the seed bank							
	Whale species		HSM with Oregon state university marine mammal institute						
	Philippines							HSM for keeper training	HSM and RR with NGO mabuwaya foundation for crocodile recovery
	Cambodia								HSM for wildlife sanctuaries in cardamom mountains
	Kenya								HSM with NGO northern rangelands trust of wildlife sanctuaries
	Total Projects	**1**	**6**	**2**	**5**	**1**	**12**	**5**	**5**

	Exotic Species and International Projects	Alice Springs Desert Park	Australia Zoo	Dreamworld	Perth Zoo	Seaworld	Taronga Conservation Society	Zoological Society of South Australia	Zoos Victoria
	Mammals								
1	Sumatran elephant		HSM with NGO flora and fauna international (FFI)						HSM with NGO FFI
2	Cambodian elephant		HSM with NGO FFI				HSM with NGO FFI		
3	Sri Lankan elephant						HSM with NGO biodiversity and elephant conservation trust		
4	Black rhino						HSM with NGO international rhino foundation (IRF) (Zimbabwe)		
5	Sumatran rhino						HSM with NGO IRF		
6	Indian rhino						HSM with NGO IRF (India and Nepal)		
7	Northern while rhino						HSM with NGO IRF (Congo)		
8	Sumatran Orangutan		HSM with NGO Australian orangutan project		HSM & RR				
9	Cross River Gorilla						HSM with NGO great apes survival project and wildlife conservation society (Nigeria)		
10	Silvery gibbon				HSM with NGO Javan gibbon centre				
11	Hatinh Langurs						RR in Vietnam		

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