

ADELAIDE
ZOO



Threatened Species



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ZOOS
SOUTH AUSTRALIA



Government of South Australia

Department of Education and
Children's Services

Acknowledgements

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For the Teacher

General Information

Welcome to Adelaide Zoo!

The Zoo is a great place for learning. Adelaide Zoo Education aims to support student learning by providing resources to assist classes to have educational and enjoyable experiences at the Zoo.

This booklet will provide a range of activities which may be undertaken by your students during their visit to the Zoo. A map and suggested order of activities is provided to give a logical circuit to travel during the visit.

Animal species change from time to time, and sometimes animals are “off limits” or out of sight during visits, so a flexible approach to completion of activities is recommended.

In planning, please consider whether

- ◆ you would like your class to regroup for lunch, animal feeds, the Discovery Zone or at the Entrance at the end of the visit. If so, relay the times and meeting places to students or supervisors (in writing if possible.)
- ◆ you would like to see the Pandas or use the Nocturnal House: if so, book a time when making the Zoo booking so your students are not disturbed by other school groups.
- ◆ you would like a session with a Zoo Education Officer to support your study theme. Lesson requests are met wherever possible, though at busy times of the year you may need to have a few options with dates to enable a time to be negotiated. Again, this time is arranged at the time of booking your class visit.

If your class is not booked in to a program involving an Education Officer, we will attempt to meet your class at the Entrance on arrival at the Zoo. At this meeting the group will be welcomed and given some information about the Zoo to assist their visit. General behaviour expectations will also be outlined.

Specific information relating to this Zoo Trail will follow for the teachers and for adult supervisors. Please ensure that supervisors have a copy of the relevant pages **before they come to the Zoo** so they can also be mentally prepared to maximise the learning for the students in their care.

Threatened Species- Secondary

TEACHER INFORMATION

This trail includes studies on 6 species of animals. These are:

- Western Swamp Tortoise Critically Endangered (CR)
- Giant Panda Endangered (EN)
- Sumatran Tiger Critically Endangered (CR)
- Southern Bell Frog Endangered (EN)
- Mallee Fowl Vulnerable (VU)
- Hooded Plover Lower Risk, Near Threatened (LR nt)

The animal studies are independent of each other, so they can be done in any order, or particular studies can be omitted if time is limited.

Group work is recommended so students can discuss their ideas and observations before committing pen to paper. They should also read signage for information on distribution and threats to the animals and to ask questions if zoo keepers are available.

Students should arrange to do the Panda study during the time period that the class is booked into the Panda forest area.

Pre-visit ideas

- Useful vocabulary / terms
 - Threatened Species
 - Extinct
 - Extinct in the Wild
 - Critically Endangered
 - Endangered
 - Vulnerable
 - Data deficient
 - Introduced species
 - Insurance population
 - Genetic diversity
 - Biodiversity
 - Endemic
 - Habitat
- Use the IUCN web site www.iucnredlist.org to find definitions for the different Threatened Species categories
- Brainstorm extinct species. For each one, discuss possible causes of the extinctions.
- In groups, brainstorm species of animals, which exist in the world today, which are Threatened Species. For each one put it into a category – “Australian”, “Exotic” or “Found in Australia & elsewhere”. List the threats which affect each one.

Post – visit ideas

- Research topics using the IUCN web site www.iucnredlist.org . Eg.
 - Why is the Data Deficient category a concern to conservationists?
 - Are there many threatened **plant** species in Australia?
 - How does IUCN determine the categories used to classify Threatened Species?
 - Use <http://www.iucnredlist.org/photos/2009> . Go through animals & plants in these galleries and identify different types of threats to organisms. Eg. Introduced predators / disease etc
- Use the summary statistics from the IUCN web site to create graphs –eg.
 - The number of Australian animal species in EX, EW,CR, EN and VU categories
 - The Top (worst) 10 countries in the world in terms of extinct or threatened animal species – ie. In EX, EW,CR, EN & VU categories
 - Numbers of Extinct and Threatened Species of animals from different **habitats** of Australia / the world.
 - The number of extinct and threatened species in Australia of the different animal groups – Mammals, Reptiles, Birds, Amphibians, Fish, Invertebrates.
- Find out how zoos are helping in conservation. Eg. Visit the websites.
- List ways to save animal species from extinction. (Methods which could be applied by individuals, community groups, government and non-government organisations.) Discuss these in terms of how easy each method would be to implement in Australia. Would these be easier or harder to implement in other countries, eg. Uganda, China.
- Research an extinct animal which once lived in Australia. How, when and where did it live? What factors contributed to its demise?
- Research a threatened animal species. Find out the reasons why it is threatened, and what is being or could be done to help. Design a pamphlet or poster to promote interest and action for this species.
- Find a species of animal in your **local community** which is threatened. How could you help?
- Debate the statement: “Species have been evolving or going extinct for millions of years – it is just part of the natural world. People shouldn’t waste their time and money trying to stop this.”
- Consider the effect of climate change on habitats and the plants and animals which live in them. What are some probable effects on particular species? Eg. Corroboree frog, Polar bear.
- Find out about the activities of one respected wildlife conservation organization. eg. World Wildlife Fund (WWF), Painted Dog Conservation, International Flora and Fauna (IFF), Animals Asia, Amphibian Ark, Save the Tiger Fund, Marine Conservation Society, World Parrot Trust, Australian Orang-utan Project
- Investigate the link between successful conservation programs and involvement of local human communities

Background notes for teachers and students on the day.

This trail is designed for students to work individually, in pairs or in small groups.

Students will study up to 6 animals in detail, and scan signage to identify other species which are also Threatened Species.

Students should read any background information at the start of each study and use the Zoo map to move around the Zoo to study the animals. The order that animals are studied in does not matter.

Students are encouraged to discuss their ideas with their group, to use their observational skills, to read the signs and to talk to Zoo staff.

Key



Observe carefully



Discuss and share ideas with your group



Write down your thoughts



Did you know?

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

- 1 M3 African Wild Dog
- 2 K4 Aldabra Tortoise
- 3 L11 Lyrebird
- 4 M7 Barbary Sheep
- 5 P6 Mandrill
- 6 G7, Q9 Meerkat
- 7 E12, G6 Otter
- 8 P5 Orangutan
- 9 M13 Peccary
- 10 J8 Pelican
- 11 U13 Penguin
- 12 H5 Pheasant
- 13 L12 Quokka
- 14 S9 Sealion
- 15 K3 Serval
- 16 K7 Squirrel Monkey
- 17 L6 Sun Bear
- 18 I6 Tamarin
- 19 H9 Tasmanian Devil
- 20 P3, M5 Tiger
- 21 N9 White-cheeked Gibbon
- 22 D10 Wallaby
- 23 R9 Water Dragon
- 24 P10 Westpac Envirodome
- 25 G8 Wombat

- Q7 Leopard
- C14 Lion
- P8 Lyrebird
- C11 Malay Tapir
- E8 Meerkat
- L9 Otter
- I3 Orangutan
- M7 Peccary
- G9 Pelican
- L3 Penguin
- M9 Pheasant
- I10 Quokka
- F7 Sealion
- E14 Serval
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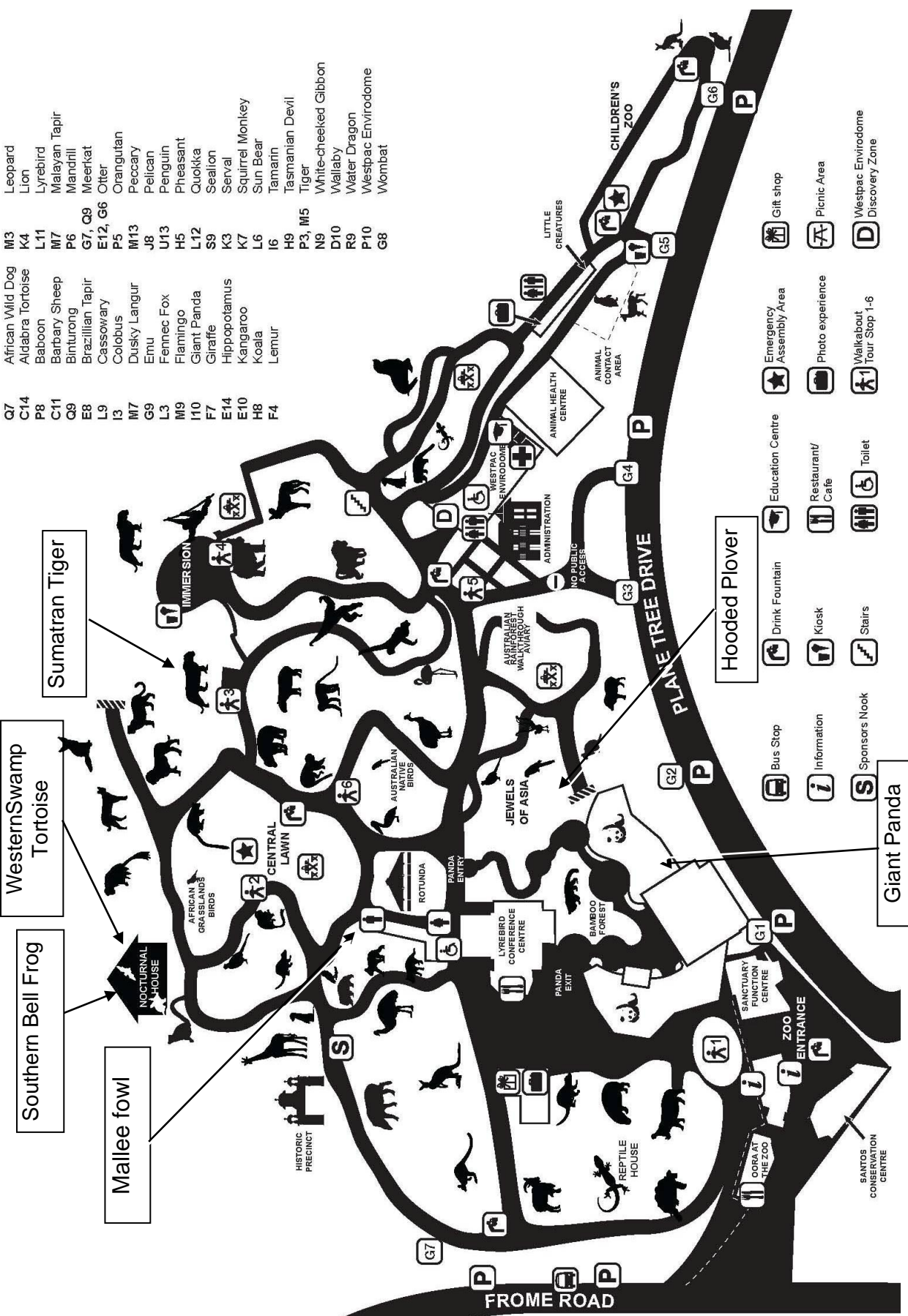
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1 2 3 4 5 6 8 9 10 11 12 13 14 15 16 17 18



Southern Bell Frog

Mallee fowl

WesternSwamp Tortoise

Sumatran Tiger

Hooded Plover

Giant Panda

Southern Bell Frog

Mallee fowl

WesternSwamp Tortoise

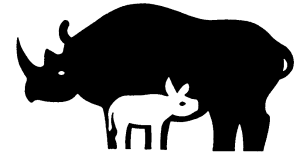
Sumatran Tiger

Hooded Plover

Giant Panda

THREATENED SPECIES – SECONDARY

?



Q. What does THREATENED SPECIES mean?

A. Threatened Species is a general term used to identify species that are threatened with extinction. Species are placed into the following categories according to how threatened they are:

Extinct (EX) - The last member of a species is dead.

Extinct in the Wild (EW) - When a species is known only to survive in captivity or in a population well outside the past range.

Critically Endangered (CR) - A species facing an extremely high risk of extinction in the wild in the immediate future

Endangered (EN) - A species facing a very high risk of extinction in the wild in the near future.

Vulnerable (VU) - A species facing a high risk of extinction in the wild in the medium-term future.

Lower risk (LR)- Species that do not satisfy the criteria for any of the categories CR, EN, or VU. Species included in the Lower Risk category can be separated into 3 sub-categories:

1. Conservation Dependent
2. Near Threatened
3. Least Concern

Data Deficient (DD) - a species is Data Deficient when there is not enough information to make an assessment of its risk of extinction based on its distribution and/or population status.

“Threatened Species” are species which are listed as Vulnerable, Endangered or Critically Endangered from the categories above.

Q. Who decides if a species is “Threatened”?

A. The International Union for Conservation of Nature, **IUCN**, is an organization based in Switzerland.

The IUCN uses information from scientific researchers, government and non-government organisations and field projects from all over the world to assess populations against a set of criteria. If there is sufficient data to categorise a species it will do so. If not, the species will be “Data Deficient.”

See www.iucnredlist.org

WESTERN SWAMP TORTOISE (CR)

Pseudemydura umbrina

?

The Western Swamp Tortoise, or Western Swamp Turtle, is Australia's smallest freshwater tortoise. Its natural habitat is wetlands, that were once found in and around Perth, which dry out in the summer.

This habitat is now almost completely gone, either beneath the expanding suburbs of Perth or having been drained for agriculture. Two swamps where these tortoises historically lived are now conservation reserves surrounded by predator-proof fencing.

Perth Zoo has been breeding Western Swamp Tortoises since the 1990s, and has released over 400 back "to the wild" – to the reserves with the predator-proof fencing.

Adelaide Zoo has the only Western Swamp Tortoises outside of WA. Two are displayed in the Nocturnal House, for educational purposes, and five others are in outdoor enclosures where seasonal changes should trigger a natural breeding cycle. The aim is to establish a breeding group at Adelaide Zoo.



Adult Western Swamp Tortoise



Newly hatched Western Swamp Tortoise at Perth Zoo

👁️ Western Swamp Tortoises are active in the winter and spring, when there is water in the swamps. They dig a hole and sleep, or aestivate, through the dry summer, waking up again when the autumn rains begin.

Western Swamp Tortoises are predators. What do you think they would eat?

(Note, the babies are as big as a 10 cent coin.)





In captive breeding programs, it is essential that **genetic diversity** is maintained. Accurate and detailed records must be kept showing relationships between individuals so that inbreeding (breeding between closely related animals) does not occur.

Inbreeding often causes offspring to be weaker, more prone to diseases and sometimes even deformed. It can result in the extinction of a population or species.



The photograph of the newly hatched tortoise at Perth Zoo shows 2 white (liquid paper) spots on its shell. What purpose would these spots serve?



In Western Australia, fossils of tortoises, virtually identical to today's Western Swamp Tortoises, have been found, that are over 5 million years old!!

Why do you think this species, which has been able to survive all these years, should suddenly have declined to the point where extinction was certain without intervention?



When species are critically endangered, and dependent on captive breeding programs, conservationists consider the chance of a disease infecting the last group and causing species extinction. Often **insurance populations** are established in locations a long way from the main group – just in case.

Where is the insurance population in the case of the Western Swamp Tortoise?



What introduced species are likely to be predators of Western Swamp Tortoises or their eggs?





Observe one of the Western Swamp Tortoises for a while.

Describe or draw features of this animal which would help it to survive in its natural habitat.



THE SUMATRAN TIGER (CR)

Panthera tigris ssp. sumatrae



?

There were 9 tiger subspecies 100 years ago. Now there are only 6, as the Caspian, Javan and Balinese tigers have been hunted to extinction.

The South China tiger is almost certain to become extinct soon. There are probably none remaining in the wild now, and only 59 individuals in captivity. These are all descended from just 6 animals, so there is probably not sufficient genetic diversity to enable the sub species to be maintained into the future.

There are less than 500 wild Sumatran Tigers alive today. Between 1998 and 2000, 66 were shot either to use their bodies to supply the traditional medicine market or due to human-tiger conflicts. Habitat destruction continues, with logging and the establishment of palm oil plantations occurring even in “protected” national parks.



Look at the map of Sumatra near the “underwater viewing” area at the Tiger enclosure, adjacent to the Sumatran Orangutan enclosure.

Historically, Sumatra was entirely covered by tropical rainforest.



Estimate the percentage of Sumatra which is now covered by rainforest. _____


What are some implications for Sumatran Tigers of having a reduced and fragmented rainforest habitat?


1 _____

2 _____

3 _____




 Read the signage at the far left of the viewing area about the uses of Tiger body parts in traditional Asian medicines.


 Which do you think is most interesting? _____


Traditional medicine has been practiced for centuries. Why do you think animals such as Tigers, Bears and Rhinoceros are considered so important in these traditions?


 _____

 Habitat destruction in Sumatra usually involves :


- multinational companies bulldoze rainforest areas. (This continues to occur even in “Conservation Areas”.)
- Valuable furniture timbers are separated from the debris and sold at a premium.
- Other timbers are sold as wood chip for paper production.
- The area is set on fire and once cleared, plantations for plants such as Palm Oil are established.
- Palm Oil is a valuable export product which is used in food production, shampoos, cosmetics and even biofuel.
- The native people can no longer make their living from the forest, so many of them move to the cities to seek employment.

 What **actions** could be taken by individuals or organisations in Australia which would reduce the habitat destruction in Sumatra and other parts of Asia?

 _____

 Zoos in Australia and New Zealand work together on managing captive populations of Threatened Species. By agreement, the species of Tiger which these Zoos focus on is the Sumatran Tiger.

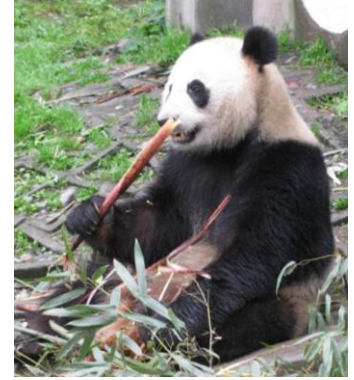
Can you suggest reasons why Zoos **cooperate** on conservation breeding, rather than “doing their own thing” with whichever Tiger subspecies they want?

 _____



THE GIANT PANDA (EN)

Ailuropoda melanoleuca





The Giant Panda is one of the most widely recognized threatened species in the world.

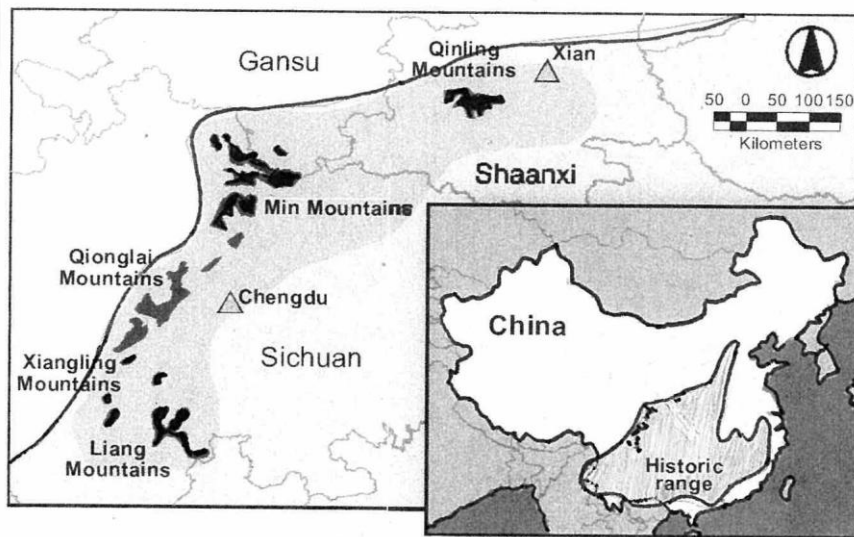
Its image has been the logo for the WWF (World Wildlife Fund for Nature) since 1961. The founders needed a strong, recognisable symbol that would overcome all language barriers. They decided that the big, furry animal with appealing, black-patched eyes would make an excellent logo.

The Giant Panda has since come to stand as a symbol for the conservation movement as a whole.



 Observe the map below, which show the areas in China where Giant Pandas are now living as well as their historic range.

 Using your own knowledge and the signage in the Panda Forest area, list some reasons why Panda numbers and distribution have declined so much in recent centuries.



Historic Distribution of Giant Pandas (inset map) and present-day distribution. (IUCN, 1999)

In China the government is demonstrating a strong commitment to Giant Panda conservation, with a range of *in situ* (in the wild) and *ex situ* (in captivity) programs.

There are estimated to be about 1600 Giant Pandas living in the mountains of South West China, and there are now over 30 reserves in these areas, where the Giant Pandas and the habitat are protected.

Explain why it is important to protect natural habitat in order to save species from extinction.



There are currently about 290 Giant Pandas in captivity. Of these, only 33 are found in Zoos outside of China.

In China, as scientists learn more about Giant Panda physiology and behavior, the success of breeding programs has increased greatly. However, there have been no successful attempts to reintroduce captive-bred Giant Pandas back to the wild.

Zoos SA has had considerable success with reintroduction programs for native species such as Bilbies, several wallaby species and Eastern Barred Bandicoots.

One reason for the Giant Panda partnership between the Chinese government and Zoos SA is to enable Chinese scientists to learn how to improve reintroduction programs.

At the same time, Adelaide Zoo scientists will learn the best methods of Giant Panda husbandry (or care) and breeding from their Chinese counterparts.



Why is each of the following practices important for successful reintroduction programs for captive bred animals?

- Research into wild populations: their habitat, food sources, lifestyle, behavior, predators, diseases, reproductive behavior, physiology and timing, other survival threats, relationship to other species in their communities.

- Minimal handling, petting and domestication of animals which will be reintroduced.

- “Hardening” of animals in a semi-wild area prior to full reintroduction.

- Surveying released animals (by tracking them using signals from radio collars or similar) for a year after their release.



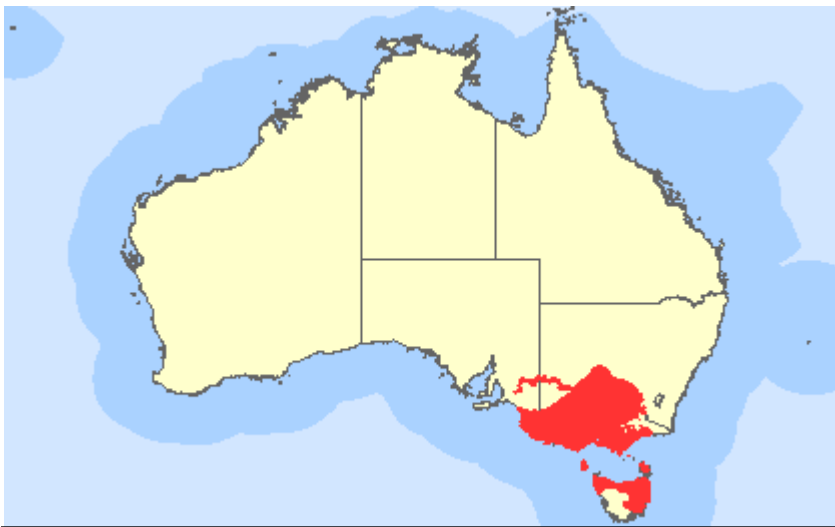
THE SOUTHERN BELL FROG (EN)

Litoria raniformis



?

The Southern Bell Frog was once widespread along the waterways and wetlands in South Western Australia, including Tasmania, up to altitudes of 1300m above sea level. They are one of Australia's largest frog species, with females growing to over 10 cm and males 6½ cm in length. There numbers have seriously declined in Australia in recent decades. They were introduced into New Zealand in 1867, and they have become widely distributed there.



Previous range of the Southern bell frog

© Australian Government
Department of Environment, Water, Heritage and the Arts



For each of the factors below, state why you think this may have reduced the numbers.



FACTORS AFFECTING SOUTHERN BELL FROG POPULATIONS	IMPACT
Habitat loss and fragmentation (draining or filling wetlands)	
Habitat degradation (caused by overgrazing of livestock)	
Altered flooding regimes	
Predation by introduced fish	
Drought over a series of years	
Chemical pollutants eg pesticides	
Salination (saltiness)	
Road kills	
Ultraviolet B radiation	
Disease –especially Chytrid fungus	



The Chytrid fungus (pronounced kit-rid)

In 1998, scientists discovered that a fungus, *Batrachochytrium dendrobatidis*, or Chytrid fungus, was responsible for infecting and killing amphibians around the world. The disease infects the skin, but seems to produce a toxin that enters the blood and causes death. Some amphibians, such as the Cane toad, are resistant to the disease, but in other species, populations have been devastated by the disease and a number of extinctions are now blamed on this disease.

The first death in Australia which is known to have been caused by the Chytrid fungus occurred in Queensland in 1978. It is believed that the disease originated in Africa, and was brought to Australia on African Clawed Frogs, who are largely resistant to it. These frogs were brought to Australia for use in reproductive research, and somehow the frogs and fungus escaped to the wild.

Infected frogs have now been found in populations along the East coast of Australia, in southern Victoria, Adelaide, South-West Western Australia and Tasmania.



The Australian Quarantine Inspection Service (AQIS) works to stop diseases and other risky organisms from entering Australia.

How do you think the Chytrid fungus disease “slipped through the AQIS net”?



Why do you think African frog species are not affected by Chytrid fungus, though many species from Australia, New Zealand, North and South America and Europe are?





Observe the Southern bell frogs for a few minutes.

What are some of the big differences between their bodies and humans?



You could draw diagrams in this space to answer this question!





HOODED PLOVER (LR n/t)

Thinornis rubricollis



The Eastern sub-species of Hooded Plover is found along the coastlines of NSW, Victoria, South Australia, Tasmania and some nearby islands. The Western subspecies is found in southern Western Australia.

Both the total numbers (4,500 Eastern and 6,000 Western) and range of Hooded Plovers have declined in recent years, and although they are not yet a threatened species, they are close: Lower Risk – near threatened.

They are generally found on wide sandy beaches, especially at mouths of rivers or where seaweed has been deposited. They eat insects, sandhoppers (shrimp-like crustaceans), sand worms and mollusks. They nest in depressions in the ground, amongst seaweed or in sand dunes. Their chicks cannot fly until they are 3 weeks old.

Human activity is linked to the declining populations of Hooded Plovers.



Think about habitat in South Australia which may be suitable for Hooded Plovers, eg. Along the coast near Port Adelaide, Port Noarlunga, Carrakalinga, Robe or Goolwa.

What are some aspects of human activity which present clear risks to Hooded Plovers or their habitat?



1. _____
2. _____
3. _____

Notice the ground surface around the pond in the enclosure. What material is it?



In the past, many of the Hooded Plovers at Adelaide Zoo have suffered from cracks in the skin on their feet – a condition called Bumblefoot.

What would the ground surface of **wild** Hooded Plovers be like and why is it difficult to replicate this in a zoo situation?





Are the Hooded Plovers walking OK? _____

The following is an extract from a brochure to off-road vehicle users

From Parks & Wildlife Service, Tasmania

Dunes and beaches

- Drive on and off beaches at designated points only.
- Drive on dunes only in designated vehicle recreation areas and do not drive on vegetated dunes and shore facing dune fronts. Vehicles can easily remove dune vegetation, which in turn can lead to severe erosion.
- Drive on damp firm sand below the high tide mark. Above this mark, birds such as Oystercatchers and Plovers lay eggs in small scrapes on the soft sand. These are almost impossible to see while driving. Chicks tend to hide in the cast seaweed and they are also extremely difficult to see. So, especially between October and March, keep to the hard, clean wet sand.



Why do you think the period between October and March is important?





If off-road vehicle users follow the advice above, what are several positive outcomes that will result?



1. _____
2. _____
3. _____



Consider the size of a Hooded Plover. What predators would eat them or their eggs and how these would have changed since European settlement in Australia?



List as many as you can think of below.

PREDATORS

> 200 years ago

Today



|

MALLEE FOWL (VU)

Leipoa ocellata

?

MALLEE FOWL REPRODUCTION

Mallee fowl live in Mallee scrubland. They have unusual reproduction strategies.

- A breeding pair of Mallee Fowls build a large mound of leaf litter and dirt. This may be 3 metres in diameter and 1 metre high in the middle.
- They then scoop out a nesting chamber near the centre. The female lays a large egg there (which weighs over 10% of her body mass.) Several days later she lays another, and repeats this pattern until often more than 20 are laid.
- Then she leaves the male on his own!
- The male covers the eggs with leaf litter, and the eggs are warmed by the decomposing leaf litter.
- For 7 to 14 weeks he stays at the mound, testing the temperature of the egg chamber with his beak: if too warm he scratches away some of the material on top. If too cold, he puts some more on.
- Finally they are about to hatch. Then he leaves them on their own!

The chicks hatch underground and spend many hours climbing up to the surface. They are fully feathered, looking very unusual for newly hatched chicks. After a short while on the ground they fly up into trees and spend their early days above the ground.

As they get larger, they tend to spend most of their time on the ground.



Explain why Mallee Fowl are not found in Mallee habitat which has had a fire within the previous 5 years.



Compare the two maps below: Map A shows the changes in distribution of Mallee Fowl in 1800 and 2004. Map B shows the location of the Australian wheat growing districts.

Map A



Mallee fowl distribution 1800 and 2004

Map B



Australian Wheat Belt
Ref: <http://www.awb.com.au/aboutawb/communityeducation/grainproduction/>



Explain how the 2 maps are related.





Comment on the colouring of the Mallee Fowls.





Mallee Fowl are vulnerable to predation by introduced species such as foxes and feral cats. They also disappear from areas where grazing farm animals are allowed into their habitat. Many populations of Mallee Fowl are now small and isolated from other populations. In such cases, inbreeding is a threat to the viability of the population.



The following conservation measures are being used to help Mallee Fowl conservation. For each one, explain how it helps.

Securing and monitoring existing populations,



Maintaining and creating habitat corridors between fragmented populations,



Reducing threats from

- introduced species



- grazing animals



- wildfire



Promoting community involvement in research and management