

Wildlife Trade Management Plan – Queensland Crocodile Farming and Crocodile Egg Harvesting

1 November 2018 - 31 October 2023

Prepared by: Conservation and Biodiversity Policy, Department of Environment and Science

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November 2018

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1. Introduction

1.1 Purpose and objectives

Crocodile farming in Queensland is predominantly based on the estuarine crocodile, *Crocodylus porosus*, with limited farming of freshwater crocodiles, *Crocodylus johnstoni*. Crocodile farming and crocodile egg harvesting in Queensland involves captive breeding, limited harvest of wild crocodile eggs, and the importing of eggs and young that have been legally harvested from the wild in the Northern Territory.

The purpose of this Wildlife Trade Management Plan (WTMP) is to outline the various activities in Queensland that involve the take, keep, use or movement of wild crocodiles associated with trade. The WTMP sets out the methods and safeguards to ensure that these activities will have no detrimental impact on wild crocodile populations, and specifically to fulfil the requirements for a WTMP under Part 13A, Section 303FO of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) (see [Section 2.2](#)). The objectives sought are that:

1. Farming of estuarine and freshwater crocodiles in Queensland does not negatively impact the conservation of crocodiles in the wild in Queensland.
2. Harvesting of estuarine crocodile eggs does not negatively impact the conservation of crocodiles in the wild in Queensland.
3. Crocodiles are humanely treated in accordance with the Code of Practice for the Humane Treatment of Wild and Farmed Australian Crocodiles (the Australian Code).

This WTMP is supplementary to, and should be read in conjunction with, the [Nature Conservation \(Estuarine Crocodiles\) Conservation Plan](#) and the [Queensland Crocodile Management Plan](#).

This WTMP is valid for a maximum of five years from 1 November 2018.

1.2 Background

Estuarine crocodiles (*Crocodylus porosus*) inhabit coastal areas of Northern Australia, South East Asia and the South West Pacific. They occur in estuaries, rivers, wetlands, beaches and inshore areas, including freshwater areas. The largest populations in Queensland exist in coastal areas in the Gulf of Carpentaria and Cape York Peninsula, where temperatures are warmer and there are large intact coastal wetland systems and estuaries that provide ideal habitat for the animals.

The population of estuarine crocodiles in Queensland has been recovering from extensive culling and harvesting which was banned in Queensland in 1974. Current processes that threaten crocodiles in Queensland include (refer Fukuda et al. 2007; Messel and Vorliceck, 1986; Read et al. 2004; Webb and Smith 1987):

- habitat destruction through clearing of riparian vegetation and urban, rural residential and agricultural development
- feral pest predation and weed incursions into nesting habitat
- deliberate killing (e.g. illegal shooting)
- accidental mortality from commercial and recreational fish netting in estuaries
- climate change (increased egg mortality and juvenile mortality from storm surges/flooding, changes in sex ratio arising from temperature changes in nesting areas, and changes in distribution and/or range).

To establish a better scientific understanding of Queensland's wild population of estuarine crocodiles, the Queensland Government commenced a three year crocodile survey and monitoring program in April 2017.

Freshwater crocodiles are endemic to Australia and live in the inland waterways of northern Australia. In Queensland, they are found in the rivers and swamps of Cape York Peninsula, areas bordering the Gulf of

Carpentaria and the north-west. There are also east coast populations found in the upper Herbert River, the Burdekin River catchment and the Ross River. Freshwater crocodiles also live in the tidal reaches of some rivers.

2. Legislative Framework

2.1 International

Australia is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Populations of both the Australian freshwater crocodile and the Australian estuarine crocodile are listed in CITES Appendix II, which is a list of species not necessarily threatened now with extinction, but in which trade must be controlled in order to avoid use that is incompatible with their survival.

A 2006 review prepared for CITES by the International Union for the Conservation of Nature, Crocodile Specialist Group (IUCN CSG) examined the harvesting of crocodilian eggs to supply farms (also known as ranching) which has become a widespread practice in many countries. The review found that there was no evidence or allegations that any of these programs have had detrimental effects on wild populations, and that there is considerable evidence that egg harvesting of crocodilian species is inherently safe (Jenkins *et al* 2006).

To export Appendix II specimens, an export permit is required and skins must be tagged in accordance with a tagging system that complies with the provisions of CITES Resolution Conference 11.12.

2.2 Commonwealth

Both the estuarine crocodile and freshwater crocodile are listed by the Australian Government as a Marine species under Section 248 of the EPBC Act and as a Migratory species under Section 209 of the EPBC Act.

The Australian Government regulates the export of CITES listed species (including issuing of export permits) through the EPBC Act. To obtain a permit for the export of crocodile specimens from Queensland for commercial purposes, the production of those specimens must be in accordance with the approved WTMP. The EPBC Act requirements for a WTMP are documented in Appendix A.

Any commercial shipment of tagged skins or other natural crocodile products or derivatives (e.g. teeth, skulls) for export from Australia must be authorised with an Australian CITES export permit, which may be issued by the Commonwealth on application. The export permit must be retained by the owner of the crocodile product as proof of its legal acquisition. A permit is not needed to legally export or import up to four manufactured crocodilian products worn on the person or carried in accompanied baggage for personal purposes. However, to help with customs clearances the CITES Management Authority of Australia has instituted personal baggage permits.

CITES tags are sourced from the Australian Government and distributed by the Queensland Department of Environment and Science to licensed crocodile farms and meat processing premises. Each skin must be tagged as soon as practicable after removal from the crocodile carcass. The tag must remain attached whether the skin is in an unprocessed or tanned state (that is the tag must remain attached during and after the tanning process). Skins must be tagged in accordance with a tagging system that complies with the provisions of CITES Resolution Conference 11.12.

The Code of Practice for the Humane Treatment of Wild and Farmed Australian Crocodiles (the Australian Code) provides a nationally consistent set of minimum standards for the humane treatment of crocodiles. The standards are based on current knowledge of crocodile welfare issues and best practice in humane handling techniques, and applied a precautionary approach in the light of incomplete knowledge.

2.3 State

2.3.1 Conservation

The Queensland Government, through the Department of Environment and Science, administers the following legislation and policy relevant to the conservation of crocodiles:

- *Nature Conservation Act 1992 (NC Act)*
 - Nature Conservation (Wildlife Management) Regulation 2006
 - Nature Conservation (Administration) Regulation 2017
 - Nature Conservation (Wildlife) Regulation 2006
 - Nature Conservation (Estuarine Crocodile) Conservation Plan 2007
- Queensland Crocodile Management Plan

Both species of crocodiles are protected under the NC Act. The conservation status of the estuarine crocodile is vulnerable, while the freshwater crocodile is a least concern reptile. Removing live crocodiles from the wild for commercial purposes is not allowed under Queensland law. Harvesting crocodile eggs can only occur in accordance with a valid wildlife authority and these authorities are only issued under strict conditions (see [Section 3.2](#) for more detail.)

'Problem crocodiles' can be removed from the wild to protect humans and prevent the loss of aquaculture fisheries resources, stock and working dogs. The circumstances under which an estuarine crocodile may be considered to be a problem crocodile are set out in the Nature Conservation (Estuarine Crocodile) Conservation Plan 2007, while detailed guidance on when and where a crocodile may be considered a problem crocodile due to the risk posed to public safety is contained in the Queensland Crocodile Management Plan. Once removed from the wild, problem crocodiles are typically placed with crocodile farms.

2.3.2 Welfare and exhibition

The Department of Agriculture and Fisheries (DAF) administers legislation relevant to animal welfare and animal exhibition, including the *Animal Care and Protection Act 2001 (ACP Act)* and the *Exhibited Animals Act 2015*. In addition, crocodile farming licenses and commercial wildlife harvesting licences (for estuarine crocodile eggs) include a condition requiring compliance with the Australian Code, which includes a range of welfare requirements. Therefore, inhumane treatment of crocodiles outside of the requirements of the Australian Code may be subject to compliance action under both the NC Act and *Animal Care and Protection Act 2001*.

3. Management Arrangements

To achieve the purpose and objectives of this WTMP, the Queensland Government, in conjunction with crocodile farm operators and egg harvesters, will implement a range of management actions to regulate the harvest, farming and trade of crocodiles in accordance with the EPBC Act and NC Act. Table 1 sets out the management actions and corresponding performance indicators. The actions are described in more detail in the following sections.

Table 1 Management actions and performance indicators

Management action	Performance indicator
Restrict take of live crocodiles from the wild to the removal of 'problem crocodiles' only.	All crocodiles taken from the wild meet the circumstances outlined in the Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 and the Queensland Crocodile Management Plan (see Section 3.1).
Restrict take of crocodile eggs (egg harvesting) to circumstances which meet the sustainability criteria established under the Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 and other nature conservation legislation.	Licences are only issued in accordance with the criteria in the Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 and other relevant criteria (see Section 3.1).
Assess, issue and administer licences for crocodile farming and crocodile egg harvesting, for compliance with the NC Act and other relevant requirements.	All licences are consistent with relevant provisions of the NC Act, Australian Code and WTMP and all farming and egg harvesting licences include a condition that the Australian Code must be complied with (see Section 3.2).
Audit crocodile farms' compliance with the NC Act and Australian Code.	A targeted sample of farms is inspected each year (see Section 3.3).
Monitor crocodile populations each year in areas subject to egg harvesting to detect any detriment to the species in the wild.	Annual monitoring report showing the results of monitoring (See Section 3.3).
Monitor the movement of eggs and live crocodiles to determine whether egg harvesting may be occurring illegally in Queensland.	All farming licences include a condition that the records of when and where eggs and live crocodiles were obtained must be kept and made available during inspections or upon request (See Section 3.3).
	All egg harvesting licences will be required to keep, and make available on request, complete records of when and where all eggs were obtained (see Section 3.3).
	Samples of returns of operations and annual statements received from Queensland crocodile farms are compared to data from farm inspections to identify any anomalies in crocodile numbers (see Section 3.3).
	Any evidence of anomalies in the movement of eggs or live crocodiles into or out of the state are investigated (see Section 3.3).
Investigate suspected breaches of the NC Act, licence conditions, etc.	Appropriate enforcement action is undertaken when there is evidence of breaches of the NC Act, for example breaches of the Australian Code (see Section 3.3) by a crocodile farm licence holder, or breaches of licence conditions for egg harvesting activities.
Submit annual reports regarding the implementation of this plan to the Australian Government.	An annual report for 1 November to 31 October is submitted to the Australian Government by the 30 June the succeeding year (see Section 4).
Review the implementation of the WTMP in order to assess the success of the plan in achieving its purpose and to inform the development of a subsequent plan.	A review of the implementation of the WTMP is completed no later than one year prior to the expiry of this plan (see Section 4).

3.1 Take from the Wild

The Queensland crocodile farming industry makes use of captive breeding, eggs commercially harvested in accordance with this wildlife trade management plan, a small number of crocodiles taken from the wild for public

safety purposes, as well as eggs and hatchlings that are harvested in the Northern Territory in accordance with the Northern Territory's *Wildlife Trade Management Program for the Saltwater Crocodile (Crocodylus porosus) in the Northern Territory of Australia, 2016-2020*.

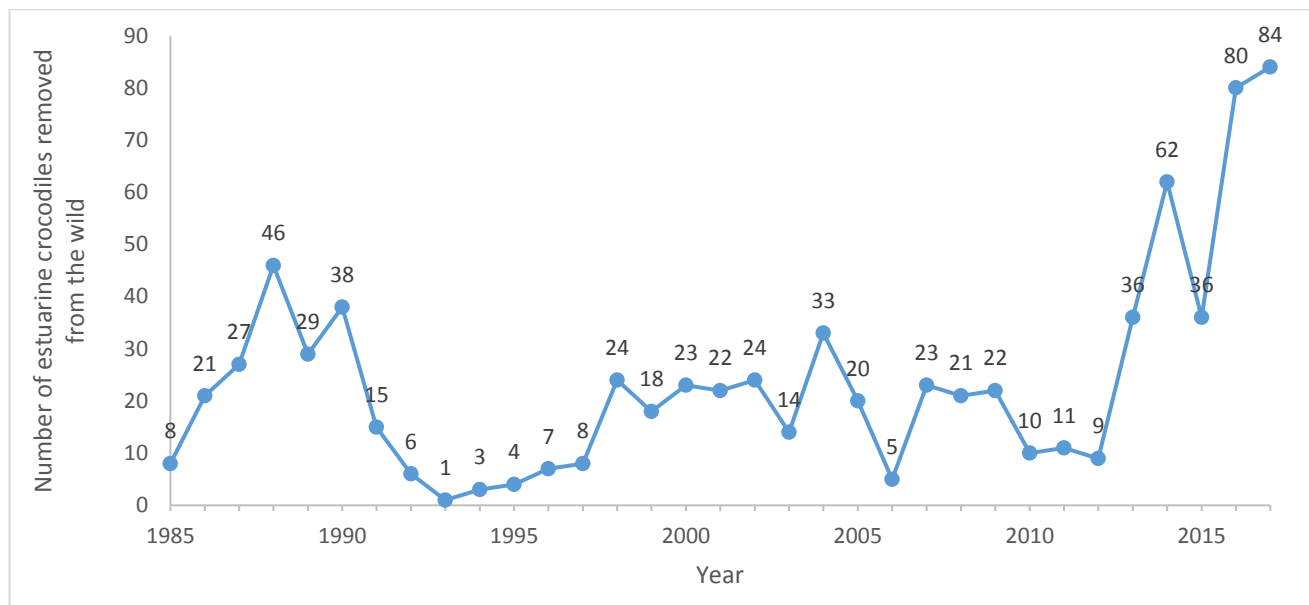
3.1.1 Keep and Use of Problem Crocodiles

In circumstances where a crocodile is considered, by the chief executive administering the NC Act, to be a 'problem crocodile', that crocodile may be removed from the wild and given to a licensed crocodile farm in Queensland to be kept and used for breeding purposes. The Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 sets out when an estuarine crocodile may be considered a problem crocodile, namely, when it is, or is likely to become, a danger to humans, aquaculture resources, stock or working dogs.

The Queensland Crocodile Management Plan provides further clarification about the circumstances where a crocodile may be considered a danger to humans.

The number of 'problem crocodiles' removed per year is shown in Figure 1. The vast majority of these crocodiles were removed from coastal wetlands and estuaries between Cooktown and Townsville. For example, 90 percent of the crocodiles removed from the wild in 2016 were from these areas.

Figure 1 Number of estuarine crocodiles removed from the wild per year in Queensland between 1985 and 2017¹



¹ Additionally, three freshwater crocodiles were removed in 2017, two freshwater crocodiles were removed in 2016, and one freshwater crocodile was removed in 2015.

The Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 establishes the arrangements for providing problem crocodiles to licensed crocodile farms in a fair and equitable way. In limited cases, problem crocodiles are humanely euthanised rather than given to a farm – e.g. 14 of the 84 estuarine crocodiles removed from the wild in 2017 were euthanised. This primarily occurs where the crocodile is in a remote location and transporting it to an appropriate facility would create a significant risk to the crocodile’s welfare, and would be likely to cause suffering and potentially the death of the animal.

3.1.2 Take and Use of Crocodile Eggs

The estuarine crocodile egg harvesting program for Queensland will draw on the experience and knowledge gained from the egg harvesting program in the Northern Territory over the last 30 years. Harvesting in the Northern Territory has been supported by a long term monitoring program. The monitoring program has demonstrated that even with very high levels of egg harvesting across the Northern Territory (120,000 total eggs/ year), which supports an increasingly profitable egg harvesting industry, crocodile numbers in the Northern Territory have continued to increase (Saalfeld, Fukuda, Duldig & Fisher, 2015).

Queensland’s egg harvesting program will commence with modest harvest numbers (anticipated maximum of 5000 eggs/year statewide) and will be restricted to approved geographical areas only. The harvest program has been designed to use adaptive management principles through a conservative harvest, and monitoring of any impacts of the harvest. To support this approach, annual monitoring of local estuarine crocodile populations and nests will be required. The results from this monitoring will be used to guide the ongoing management of egg harvesting so that the harvesting does not impact negatively on local estuarine crocodile populations.

Queensland legislation provides for the commercial harvest of various animals (including animal eggs), under commercial wildlife harvest licenses, when the proposed harvest meet certain criteria. The Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 provides additional criteria specific to the harvest of crocodile eggs, designed to ensure that egg harvesting will cause no detriment to wild populations of crocodiles.

A licence for crocodile egg harvesting will only be issued for specific areas, where:

1. There is sufficient monitoring and research to understand the density, age structure and nesting activity of the population in the area proposed to be harvested.
2. The harvest will be supported by an annual population monitoring program sufficient to detect any negative impacts of the harvest on local estuarine crocodile populations.
3. The supporting evidence and monitoring program have been undertaken by a suitably qualified, nationally, or internationally recognised expert.
4. The harvested eggs can be readily provided to an authorised buyer, such as a licensed crocodile farm, capable of incubating and hatching the eggs in accordance with the Australian code.

Initially egg harvesting is proposed to occur at Pormpuraaw on the west coast of Cape York (see Appendix B for more details). This harvest proposal, and the associated monitoring plan, has been reviewed by the Crocodile Specialist Group within the International Union for the Conservation of Nature (IUCN CSG), a leading global authority on the conservation and management crocodilian species. The IUCN CSG (2018) review:

1. Supported the finding that there is no evidence to suggest that egg harvesting at Pormpuraaw could remotely threaten the population status of *C. porosus* in Queensland;
2. Provided key recommendations for the design of the associated monitoring program; and
3. Noted the proposed egg harvesting program for Pormpuraaw is considered a safe harvest strategy for crocodiles and the modest quantity of eggs proposed for harvest under the proposal is ‘highly conservative’.

3.2 Wildlife authorities

As the conservation status of estuarine crocodiles is vulnerable in Queensland, a wildlife authority is required under the NC Act to keep, use, move or deal with crocodiles for trade. The type of authority required depends on the activity:

- crocodile farming (including the incubation of wild eggs) and processing requires a wildlife farming licence
- harvest of estuarine crocodile eggs requires a commercial wildlife harvesting licence
- processing of crocodile parts requires a commercial wildlife licence
- the movement of crocodiles by sale to and from licensed farms or zoos within or between states requires a wildlife movement advice or wildlife movement permit.

A wildlife movement advice or wildlife movement permit is not required for skin products that have been appropriately tagged and are accompanied by an Australian CITES export permit.

When considering an application for an authority, the Department of Environment and Science is required under the NC Act to consider compliance with any relevant Australian or international code, instrument, protocol or standard or any relevant intergovernmental agreement². Compliance with legislative requirements, as well as conditions of a wildlife authority, will be monitored as described in [Section 3.3](#).

3.3 Compliance and Monitoring

3.3.1 Compliance and Monitoring of Crocodile Farms

The Department of Environment and Science will monitor the compliance of crocodile farms with the NC Act and the Australian Code by:

- inspecting new licenced crocodile farms at least once during the first year of operation
- inspecting a sample of farms every year with the sample selected by taking into consideration:
 - farms identified as having matters of concern in a previous audit
 - farms receiving lawfully harvested crocodile eggs
 - farms that have been reported by members of the public or other government departments as being potentially in non-compliance
 - open source data, such as newspaper reports or legal cases involving the legal entity
 - time since the last audit
- collecting information on the movement of crocodiles into and out of the state using return of operations
- collecting information on the movement of harvested eggs into farms using return of operations and annual statements.
- investigating any alleged breaches of the NC Act in relation to the commercial take, keep and use of crocodiles in Queensland

3.3.2 Comprehensive Monitoring of Egg Harvesting

Each licenced commercial egg harvesting operation must be supported by a monitoring program which will include as a minimum annual population counts and annual nest surveys in all waterways where harvest is occurring.

These annual population counts will occur from July to August in accordance with standards established by the Department of Environment and Science.

Nest monitoring will provide information on where the nests are detected, how many eggs are collected from each nest, and information on how many of those eggs were viable at the time they were sold.

3.3.3 Enforcement

Any breach of the NC Act or its subordinate legislation will be considered in the context of the Department of Environment and Science's Enforcement Guidelines, which explain how the department determines the

² I.e. Section 13 of the Nature Conservation (Wildlife Management) Regulation 2006 requires consideration of whether the place where the animal will be kept is compliant with a relevant code of practice for the animal, while Section 26 of the Nature Conservation (Administration) Regulation 2017 requires that when considering an application for an authority that there is regard to any relevant Australian or international code.

enforcement action it may take on the basis of the seriousness of the breach of legislation. The range of enforcement actions the department can undertake include:

- warning notices and letters
- penalty infringement notices
- administrative notices and orders made under legislation
- proceedings for court orders provided for under legislation
- prosecution
- suspension or cancellation of permit, licence or authority.

In addition, enforcement action for serious non-compliance with welfare aspects of the Australian Code that may constitute animal cruelty or neglect offences will be coordinated for response by DAF under the *Animal Care and Protection Act 2001*.

The holder of a Wildlife Farming Licence, Commercial Wildlife Harvesting Licence or a Commercial Wildlife Licence for processing crocodile products must maintain records in an approved form (e.g. a record book or record and return book, or an electronic record system) and submit annual return data in an approved form (i.e. a return of operations for wildlife farming licence).

To help identify whether illegal egg harvesting (i.e. the taking of eggs or crocodiles from the wild to be grown or used for commercial purposes) is occurring in Queensland, the movement of crocodiles (including eggs) into and out of the state, and between farms within the state, will be monitored and any apparent anomalies be investigated. This would include requesting records showing when and how all eggs and live crocodiles were obtained.

4 Reporting

The Department of Environment and Science will submit a report to the Australian Government each year that the plan is in operation. The report will be submitted by 30 June in the succeeding year. The report will provide a summary of:

- The total number of problem crocodiles removed from the wild in accordance with the Queensland Crocodile Management Plan and outcomes for each crocodile.
- The number of licenses issued for crocodile egg harvesting and their location.
- For areas where harvest is occurring, the results of annual population monitoring and nest surveys (including total number of eggs harvested).
- The number of live crocodiles (including eggs) imported into the State (collated from annual return of operations and annual statements).
- Industry compliance statistics, including:
 - number of premises inspected
 - number of offences and type detected, and any enforcement action undertaken.

The Department of Environment and Science will review the implementation of the plan no later than 12 months prior to the expiry of this plan to assess its success in meeting its goals and objectives.

Additionally, the Queensland Government CrocWatch program will provide reporting data on a range of crocodile management activities, including crocodile sightings and information on crocodiles removed from the wild.

5. References

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Appendix A: Requirements of a Wildlife Trade Management Plan

As per Section 303FO of the EPBC Act, the Commonwealth Minister responsible for the Environment may declare a WTMP only if satisfied that:

1. *The plan is consistent with the objects of Part 13A of the EPBC Act.*
2. *There has been an assessment of the environmental impact of the activities covered by the plan, including (but not limited to) an assessment of:*
 - a. *the status of the species to which the plan relates in the wild*
 - b. *the extent of the habitat of the species to which the plan relates*
 - c. *the threats to the species to which the plan relates*
 - d. *the impacts of the activities covered by the plan on the habitat or relevant ecosystems.*
3. *The plan includes management controls directed towards ensuring that the impacts of the activities covered by the plan on:*
 - a. *a taxon to which the plan relates*
 - b. *any taxa that may be affected by activities covered by the plan*
 - c. *any relevant ecosystem (for example, impacts on habitat or biodiversity) are ecologically sustainable.*
4. *The activities covered by the plan will not be detrimental to:*
 - a. *the survival of a taxon to which the plan relates*
 - b. *the conservation status of a taxon to which the plan relates*
 - c. *any relevant ecosystem (for example, detriment to habitat or biodiversity).*
5. *The plan includes measures to:*
 - a. *mitigate and/or minimise the environmental impact of the activities covered by the plan*
 - b. *monitor the environmental impact of the activities covered by the plan*
 - c. *respond to changes in the environmental impact of the activities covered by the plan.*

The objects of Part 13A of the Environment Protection and Biodiversity Conservation Act 1999 are:

- (a) *to ensure that Australia complies with its obligations under CITES and the Biodiversity Convention*
- (b) *to protect wildlife that may be adversely affected by trade*
- (c) *to promote the conservation of biodiversity in Australia and other countries*
- (d) *to ensure that any commercial utilisation of Australian native wildlife for the purposes of export is managed in an ecologically sustainable way*
- (e) *to promote the humane treatment of wildlife*
- (f) *to ensure ethical conduct during any research associated with the utilisation of wildlife*
- (h) *to ensure that the precautionary principle is taken into account in making decisions relating to the utilisation of wildlife.*

Appendix B: Proposed harvesting pilot at Pormpuraaw

- An initial pilot harvest of crocodile eggs is proposed to be conducted at Pormpuraaw Aboriginal Shire, on the west coast of Cape York. The pilot is proposed to be authorised by licence and run for a total of ten years.
- Significant research has been undertaken at Pormpuraaw to build a detailed knowledge of the local crocodile population, along with detailed data on potential egg harvesting impacts. The research showed that there is a healthy crocodile population in the area, and also found that the nests were subject to high levels of mortality due to flooding and predation.
- The pilot harvest proposal was developed by an independent crocodile expert, and reviewed and endorsed by the International Union for the Conservation of Nature's Crocodile Specialist Group, as a harvest proposal that will cause no detriment to the wild estuarine crocodile population.
- The harvest is proposed to be conducted by Pormpuraaw Indigenous Land and Sea Rangers, who are well trained to harvest eggs, and have ready access nearby to a fully-operational crocodile farm with all necessary facilities for incubation of eggs and rearing of hatchlings.
- Initially the harvest license is anticipated to only allow for eggs to be harvested in a defined window of the peak nesting season, to retain some nests laid later that have a higher chance of surviving flooding, however this is yet to be confirmed.
- It is anticipated that the total number of eggs harvested at Pormpuraaw would not exceed 800 eggs/year for the duration of the ten year pilot harvest.
- The pilot at Pormpuraaw is proposed to include egg harvesting from: Malaman Creek, Chapman River, Mungkan Creek, Edward River and Balurga Creek. It may also include the Kendall River to the extent that it is within the Pormpuraaw Aboriginal Shire.
- To ensure that the ten-year pilot harvest at Pormpuraaw will cause no detriment to wild estuarine crocodile populations, a monitoring program for each year that harvest occurs is proposed to track the local crocodile population, allowing for annual assessment of any substantial biological impacts over the course of the pilot. Monitoring will be conducted by the Department of Environment and Science.
- Monitoring at Pormpuraaw will include:
 - Annual population counts from July to August in all waterways where harvest is occurring or is planned to occur. Surveys will be conducted in accordance with standards established by the Department of Environment and Science
 - Nest surveys by licensee will provide information on where nests are detected, how many eggs are collected from each nest, and information on how many of those eggs hatch.
- The monitoring program for the pilot at Pormpuraaw is proposed to include all of the waterways from which eggs are harvested. These waterways have all been studied in previous research and are therefore ideal for studies of population trends over the longer term.