

Code of Practice

Wildlife management

Crocodile farming

Code of Practice for Crocodile farming

Nature Conservation Act 1992



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Prepared by EHP in consultation with the Australian Crocodile Industry Group (and members), the Zoo Aquarium Association Queensland, and specialist officers of the Department of Agriculture, Fisheries and Forestry, Biosecurity Queensland and the Department of Justice and Attorney-General (Workplace Health and Safety Queensland).

Approved by the chief executive of EHP in accordance with section 174A of the *Nature Conservation Act 1992*.

The administering department is EHP, 400 George Street, Brisbane, GPO Box 2454, BRISBANE QLD 4001.

1. Introduction

This code is for use by people responsible for the welfare and husbandry of estuarine or saltwater crocodiles (*Crocodylus porosus*) and freshwater crocodiles (*Crocodylus johnstoni*) that are maintained in captivity for closed-cycle captive breeding and production of products such as meat, leather and taxidermied whole or part specimens. Unless a licence has been granted under the *Nature Conservation Act 1992* (the Act), it is illegal to capture wild crocodiles in Queensland.

Any person or organisation proposing to farm crocodiles must be prepared to do considerable research into various aspects of crocodile husbandry and farming. The Department of Environment and Heritage Protection (EHP) will only consider fully documented and soundly based proposals for crocodile farming.

If crocodile exhibition is conducted or intended as part of a crocodile farm or farming proposal, sections 4(g) and 11 of this code apply.

2. Definitions

In this code of practice:

‘chief executive’ means the Director of the Department of Environment and Heritage Protection.

‘crocodile’ means a crocodile of the species *Crocodylus porosus* or *Crocodylus johnstoni*.

‘closed-cycle captive breeding’ means a regime for breeding crocodiles that —

- a) is maintained without relying on augmentation of crocodiles from the wild;
- b) is managed to reliably produce second-generation offspring;
- c) has a perimeter boundary that is designed and managed to prevent the unintended entry, departure, introduction or removal of crocodiles.

‘crocodile farm’ means a closed-cycle captive breeding establishment that is managed so that crocodiles have artificial housing, veterinary care, artificially supplied food and protection from predators. The proprietor of a crocodile farm must hold a Wildlife Farming Licence issued under the *Nature Conservation (Wildlife Management) Regulation 2006*.

‘crocodile farming’ means the closed-cycle captive breeding and keeping of crocodiles in captivity intended for producing for sale products such as skins, meat, oil and claws.

‘crocodile ranching’ means the removal from the wild of crocodile eggs and/or juveniles for growth in a farm, often for the purpose of slaughter, and the manufacture for sale of products such as skins, meat, oil and claws.

‘Department’ means the Department of Environment and Heritage Protection.

Other terms are defined in the *Nature Conservation Act 1992*, the *Nature Conservation (Wildlife Management) Regulation 2006*, the *Nature Conservation (Administration) Regulation 2006*, and the *Nature Conservation (Wildlife) Regulation 2006*.

3. Purpose of code

3.1 The purpose of this code is to assist in the:

- a) establishment of husbandry principles and management practices ensuring the welfare of crocodiles in captivity;
- b) understanding of the health and nutritional requirements of farm crocodiles;
- c) promoting public understanding of the value of crocodiles in the wild; and

- d) compliance with any legislative requirements of the State or the Commonwealth relating to crocodile farming.

4. Application requirements

The Department requires proponents to submit a detailed economic feasibility study, prepared by a qualified person, relating to the establishment of a crocodile farm.

This economic feasibility study should identify projected cash flows and the proponent's financial capacity to meet both establishment and operational funding. It should also identify an adequate source of income to support the proponent until the facility yields a return, which may take 10 years or more.

Other factors to consider in the study include proposed development stages, management structures and staffing, anticipated annual operational costs, and a detailed analysis of anticipated markets for products.

In addition to the economic feasibility study, the proponent is required to supply the following information to the Department:

- a) Documentation showing that the proposed source of stock is from legally held captive populations. Crocodiles are protected wildlife in Queensland and must not be removed from the wild for commercial farming purposes. Ranching, when permitted in Queensland, should be undertaken in conjunction with established farms.

Licensed zoos and crocodile farms may be invited to participate in crocodile management procedures to remove problem *C. porosus* from selected locations. Such occurrences are not common and must not be relied upon to provide stock for a crocodile farming venture.

The proponent is to identify the anticipated total number of stock required plus, age and sex ratios (in total and by pen grouping).

- b) Details of staff expertise in the handling and husbandry of crocodiles. Past work experience in crocodile farms would be an advantage. Farm managers should address training needs for crocodile handlers and implement procedures that comply with the *Workplace Health and Safety Act 1995*.

Animals are to be kept under the supervision of a qualified veterinary practitioner or zoologist. This requirement may be met by retaining a visiting veterinary practitioner.

- c) Details of the projected annual requirements and sources of food supplies, and proposed dietary composition.
- d) Disease control measures and quarantine facilities.
- e) A site analysis report, including proposed farm location, area, land tenure, and property description. An engineer's report on site suitability will also be necessary if the area is subject to flooding.
- f) Two copies each of professionally prepared, to-scale plans of the proposed site and of the proposed animal holding structures. The plans are to include design specifications and material lists of all site works and infrastructure. This is to include all lagoons, buildings, pens, nurseries and incubators, sheds, food preparation rooms, water supplies, pedestrian access (if open to the public), and security fencing details.

All zoning and plans must be in accordance with and approved by the local authority.

If it is proposed to open part or all of the farm for display to the public, the proponent is to comply with the *Code of Practice of the Australasian Regional Association of Zoological Parks and Aquaria Queensland, Part E, 'Australian Crocodiles and American Alligators'*.

5. Basic crocodile welfare requirements

5.1 The basic requirements for the well-being of farm crocodiles are:

- a) appropriate and sufficient food and water to sustain health and vitality;
- b) sufficient area to maintain well-being and to allow crocodiles to exhibit normal behaviour;
- c) protection from predation;
- d) protection from disease, including disease that can be exacerbated by management;
- e) protection from extremes of climate, particularly during certain phases of their lives; and
- f) protection from pain, distress, suffering and injury.

6. Perimeter fencing requirements

6.1 The area of a licensed crocodile farm, or that part of a licensed crocodile farm on which crocodiles are farmed, must be enclosed by a perimeter fence.

6.2 The function of a perimeter fence is to:

- a) prevent the escape of farm crocodiles from the farm complex in the event of escape from internal enclosures;
- b) prevent the entry of animals into the farm that may harm crocodiles or be a risk of harm from crocodiles; and
- c) deter the unauthorised entry of persons.

6.3 The perimeter fence must be constructed of:

- a) line posts of pressure-treated pine, hardwood, metal or such other material of adequate strength and durability, which must be placed at a minimum depth of 600mm in the ground and a maximum spacing of 4m between line posts;
- b) strainer posts of pressure-treated pine or hardwood of a minimum diameter size of 200mm, or of metal or such other material of equivalent adequate size, strength and durability, which must be placed at a minimum depth of 900mm in the ground and braced;
- c) chain mesh, welded mesh or such other wire of equivalent strength, which must be properly strained and affixed to the line posts to the side of the fence; and
- d) concrete or galvanised wire mesh (or other approved material of equal resilience), footing wall, which extends at least 500mm into the earth to which the fence is attached or embedded along its length.

6.4 The perimeter fence must be constructed in a manner that prevents the movement of crocodiles into or out of the licensed crocodile farm.

Note: Other fence construction arrangements will be considered by the chief executive if the proponent can demonstrate their structural and functional suitability.

6.5 The perimeter fence must be constructed to a minimum height of 1.8m, except where, in the opinion of the chief executive, the conditions of confinement (e.g. topography) require that a specified section or sections of the fence should be of greater height, in which case the minimum height of such section or sections may be required to be higher.

- 6.6 The perimeter fence must incorporate sufficient gates for the efficient operation of the licensed crocodile farm. These gates must be constructed to the same height as the perimeter fence, from the same or similar material and in the manner specified in 6.3 to 6.5 above.
- 6.7 The licence holder must at all times maintain the fencing to a standard of security which meets the purpose of its construction. Fencing should be closely monitored to detect any corrosion in metal components.

Internal fencing requirements where crocodiles are on display to visitors

- 6.8 Public safety is paramount. All enclosures within the perimeter fence that may be accessed by visitors should be fenced to comply with the requirements of the *Code of Practice of the Australasian Regional Association of Zoological Parks and Aquaria Queensland, Part E, 'Australian Crocodiles and American Alligators'*.

7. Housing

Farms must have buildings and management systems that provides basic standards of care for crocodiles, including:

- a) incubation and neonatal treatment;
- b) maintenance of a high metabolic rate; and
- c) elimination of stress;

7.1 General housing arrangements

- 7.1.1 The type of housing and yard dimensions required by crocodiles will vary with the geographic location of the crocodile farm, the age of the crocodiles, the management practices to be employed and the stocking density. The stocking density should be reviewed regularly and adjusted, taking into account age, pen conditions, behavioural needs and the likely occurrence of disease.
- 7.1.3 All crocodiles need to be protected from climatic extremes, and crocodiles kept in pens, or an extensive impoundment, should be provided with adequate shade and protection from the elements.
- 7.1.4 All crocodiles must have access to clean water at all times.
- 7.1.5 Pens must be constructed to prevent unwanted movement of crocodiles into or out of enclosures.
- 7.1.6 Farm design must include facilities that allow for the isolation and treatment of individual or limited numbers of crocodiles for extended periods. This must allow treatments to be administered in the water or in food.

7.2 Breeding facilities

- 7.2.1 Breeding facilities for *C. porosus* must be designed to reduce interaction between breeding males and other males, and between breeding females and other females. A breeding pair in an enclosure would require additional barriers to reduce visual stimuli and aggressive behaviour and allow the animals the ability to retreat from each other or separate pens should be provided.
- 7.2.2 Crocodiles must have basking or 'haul out' sites in an enclosure that are large enough to allow the largest animal in the enclosure to lie to its full length and width without any physical restrictions. All

specimens in the enclosure must be able to bask or rest on a dry surface simultaneously without physical contact and this surface must not be exclusively concrete.

The two most common breeding systems used on crocodile farms are large communal pens, typically with multiple females and males in large ponds, and small breeding enclosures with one male and one to five females. The proportion of adult females that nest in large communal pens varies from year to year, and this may reflect general ambient weather conditions (the same variation occurs in the wild) as well as other factors (food, pen design, stress, etc.). In small breeding enclosures, mixed results have been obtained (pen design, water quality, and food may be far more important factors in this situation). Small breeding enclosures should be partly subdivided so that the male and female can use separate areas in the enclosure. These enclosures should also be visually isolated from adjacent pens and have constant water levels and water at least 1–1.2m deep.

7.3 Handling

7.3.1 Excessive or rough handling of eggs is to be avoided.

Eggs should be carefully removed from the nest and always kept in the same orientation. A pencil line drawn along the top of the egg can be used to indicate its original position.

7.3.2 Eggs should be collected and moved as soon as possible after laying — ideally within the first 24 hours.

Eggs can be successfully collected and transported at any stage of development, although more care is needed between eight and twelve days after laying.

7.3.3 Regardless of embryo age, the eggs must not be overheated or dehydrated during collection and transportation.

Temperature of eggs should be around 30° C. Eggs must not be kept in dry, exposed positions as they are likely to dehydrate.

7.4 Incubation

The incubation environment is extremely important. The three major variables of the incubation environment are temperature, humidity and gas exchange.

7.4.1 Eggs should be incubated at constant temperature between 30° C and 33° C.

7.4.2 Crocodilian eggs need to be incubated in humidity (99%+). The eggs should not be in direct contact with water and be able to absorb oxygen from the surrounding air.

7.4.3 A wide variety of incubators is used successfully for crocodile eggs, and no single system is recommended.

7.5 Neonatal treatment

7.5.1 Hatchlings must always be treated gently.

In general, hatchlings should immediately be subjected to the conditions they will experience as an adult, and these should be unchanging. With *C. porosus*, transferring hatchlings directly from the incubator to the raising pens at 32° C gives high survival and growth rates.

7.5.2 Crocodiles should be held at temperatures of 32° C or above. Within this range, 32±0.5° C is usually considered optimal for post-hatching growth.

Temperature affects the metabolic rate of crocodilians and, their environment largely determines their body temperature.

7.5.3 Unnatural and excessive stimuli, such as unusually high or fluctuating temperatures, dehydration, noise, movement and handling, should be avoided.

There are three main approaches to managing disturbance stress in neonatal crocodiles:

- provide artificial screens, often low over the water, to take advantage of the hatchling's natural desire to find cover, under which it feels secure,
- keep the animals in reduced light and do not expose them to excessive stimuli, or
- condition the animals to low-level disturbance through constant background music or other low-level noise and activity.

7.5.4 **Hatchling and juvenile crocodiles must be provided with adequate nutrition.**

A typical juvenile crocodilian will consume about 15–20 percent of its body weight in food every week at a constant temperature around 32° C. However, in outdoor pens, food consumption will vary greatly depending on ambient temperature and season.

The most common dietary deficiencies are those associated with calcium, vitamin A and vitamin E/selenium in fish-fed animals. Calcium is usually added at 1– 2 percent of the crocodile's weight in a palatable form such as bone-meal. A standard vitamin supplement is widely used, although vitamin A is readily oxidised and degrades. Only fresh vitamin supplements should be used and always stored in a refrigerator.

Hatchlings are usually fed ground, minced or chopped food. 'Chunks' of food seem to be preferred, but grinding/mincing allows any supplements to be mixed into the food effectively.

Intervals between feeding should change as an animal grows. Hatchlings are best fed once each day, juveniles of 1.2m once every second day.

8. Inspections by farm personnel

8.1 The frequency and level of inspections should relate to the needs of the crocodiles, but should be conducted at least daily.

Inspections are best made at feeding times. More frequent inspections may be required during hot weather, during outbreaks of disease, or when groups of crocodiles have been mixed. Where automated feeding systems have been installed they should be checked regularly to ensure they are operating effectively.

9. Crocodile health

9.1 All people responsible for the care of crocodiles must be able to identify the early signs of ill-health in these animals.

Signs of ill-health include separation from other crocodiles, lethargy, refusal to eat, changes in faeces or urine, vomiting, coughing, panting, lameness, and swellings on the body or legs. The farm manager should, if unable to identify the causes of ill-health and correct the problem, seek prompt advice from a veterinary surgeon, preferably with experience in the treatment of crocodiles.

9.2 Viruses, chlamydia (virus-like agents), bacteria, protozoa, fungi and helminth worms have all been isolated from crocodilians, and some of these infective agents are of significance in farming operations.

Nutritional deficiencies, or occasionally excesses, may also cause health problems in crocodiles.

Identifying these specific disease-causing agents will usually require professional assistance and farm managers should become familiar with appropriate veterinarians, pathologists or researchers, as a precaution against a possible disease outbreak occurring.

Crocodile farmers must have an effective program in place to prevent infectious disease, and internal and external parasitism.

- 9.3 Sick and injured crocodiles should be treated as soon as possible. They should be isolated if necessary. Records of sick animals, deaths, treatment given and response to treatment must be kept to assist in disease investigations. Controlling the spread of infectious disease requires the identification, isolation and rapid treatment of all exposed animals. Disease is most prevalent among hatchlings and particular attention should be paid to all aspects of the management of this age group.

Particular attention must be paid to the stocking densities used for yearling and adult groups, as aggressive behaviour and injuries may occur during the breeding season when the stocking density is high.

- 9.4 Crocodiles with an incurable sickness or injury, or painful deformity must be euthanased, where possible by a veterinary surgeon, in an appropriate and humane manner.

Dead crocodiles must be removed from the enclosure promptly and, if not required for post-mortem examination or taxidermy purposes, disposed of in a hygienic manner, such as by deep burial.

10. Human safety

- 10.1 In accordance with the Queensland *Workplace Health and Safety Act 1995*, administered by the Department of Justice and Attorney-General, farm management practices must provide for the safety of farm personnel. Farms that are open to public visitation must provide for their safety. Please contact the Department of Justice and Attorney-Generals' Workplace Health and Safety Queensland for a copy of the *Workplace Health and Safety Guidelines for Working with Crocodiles in Captivity* and further information.
- 10.2 Guidance for safe crocodile handling and display practices may also be obtained by referring to the *Code of Practice of the Australasian Regional Association of Zoological Parks and Aquaria Queensland, Part E, 'Australian Crocodiles and American Alligators'*.

11. Conservation education and exhibition

- 11.1 A crocodile farm that is open to the public must provide information on crocodile conservation and on crocodile biology in the wild in accordance with the requirements set down in the *Code of Practice of the Australasian Regional Association of Zoological Parks and Aquaria Queensland, Part E, 'Australian Crocodiles and American Alligators'*.
- 11.2 It is recognised that certain crocodile farm operations may be conducted in areas of a farm that do not meet all display standards set down in the above code. However these operations may be of interest to the public and provide an educational experience. In these circumstances, such areas must be designated 'off display' to the public, unless visitors are accompanied by farm guide personnel who provide educational interpretation of those farm operations.
- 11.3 The *Nature Conservation (Estuarine Crocodile) Conservation Plan 2007* does not authorise the display of an estuarine crocodile that has attacked a person in the wild, furthermore it does not authorise the processing of an estuarine crocodile that was a problem crocodile unless it is no longer suitable for breeding.

11.4 Injured crocodiles must not be displayed if unacceptably disfigured or in obvious discomfort. Where injured crocodiles are displayed, signage must be provided outlining the nature and cause of their injury and should enable the public to understand the reason the animals are on display.

11.5 All displays must be educational.

12. Slaughter and processing

12.1 Crocodiles must be slaughtered in a humane manner.

There is an international expectation that humane methods will always be used to slaughter crocodiles. These methods should give instant brain death, or, at the very least, immediate and complete unconsciousness with minimum agitation and discomfort. Lethal drugs are expensive and may render the meat unfit for human consumption.

Shooting is capable of causing the minimum of disturbance and stress both to the individual and other crocodiles. Usually a .22 short calibre, silenced rifle is used point blank to destroy the brain from behind while the animal is still in its rearing enclosure. In all cases, the spinal cord must be severed once an animal is removed from the enclosure.

The other mechanical method commonly used, the 'nape-stab', involves the physical restraint of the crocodile and, usually, its removal from the rearing enclosure. Wet, heavy material is placed over the animal's eyes and its head is lowered in a downward position to extend the neck vertebrae. A sharp chisel-like implement is then quickly forced between the base of the skull and the first spinal vertebrae, severing the spinal cord, in order to ensure that the animal is unconscious. It is then essential that a rod of 3mm diameter (ideally stainless steel) be used to probe and totally destroy the brain (pithing). It is an advantage to skinning if the spinal column is destroyed similarly, preventing local reflex actions.

13. Tagging requirements for crocodiles and products

13.1 **Stock and skin identification procedures**

The Department has a mandatory tagging and marking system for identifying skins, skin products and other parts, products and derivatives of crocodiles, any of which may potentially be destined for overseas export (either as commercial shipments or as personal effects carried by tourists).

The marking system is to distinguish the following categories of crocodiles;

13.1.1 Wild-caught captive farm and zoo stock

'Problem crocodiles' (now known as 'crocodiles of concern') taken into farms do not have to be tagged. They are only eligible for slaughter after being scientifically examined by Department staff and should be held alive until then. Progeny of 'crocodiles of concern' are not subject to this requirement. Disposal of 'crocodiles of concern' may also be through sales of live animals to other farms or to zoos, subject to authorisation under the *Nature Conservation Act 1992*.

13.1.2 Captive-bred stock

The tagging or other marking of live farm-bred crocodiles is not required.

13.2 **Marking of crocodile products**

Products derived from crocodiles include:

- whole skins;
- other skin products, including taxidermied 'stuffers' (preserved whole animals — normally hatchlings), wallets, handbags and belts;

- meat (including offal); and
- various low unit-value parts and derivatives, including teeth, claws, skin remnants and skulls.

13.2.1 Whole skins

An approved CITES skin tag is to be attached to each skin as soon as is practicable after its removal from the crocodile carcass, and must remain attached to a whole skin both during and after the tanning process.

Tags must be locked to the final 5–10 cm (approximately) of the tail. In order to minimise the potential for tag ‘loops’ becoming caught and tearing free of the skin during tanning, a hole must be punched in the skin (not cut with a knife) and the tag attached and locked in a manner that reduces the size of the resulting ‘loop’.

A skin tag must be attached and locked to each skin prior to consignment from the place at which the skin has been removed from the crocodile carcass. Skinning may take place at a licensed crocodile farm or at a premises accredited for meat processing by the Queensland Livestock and Meat Authority.

Each skin must bear a skin tag upon export from Australia. Skin tags are produced by the Australian Department of Environment, Water, Heritage and the Arts and are distributed by the EHP to crocodile farms and meat processing premises accredited by the Safe Food Queensland. These tags bear Commonwealth export marks in compliance with the requirements of CITES.

A skin tag may be removed when the skin is cut into two or more major segments. A ‘nick’ cut in the side of a whole skin would not warrant tag removal — a skin cut into two equal halves or into multiple watch-strap strips would.

Under the provisions of the *Nature Conservation Act 1992*, the movement of a whole tagged skin into, within and out of Queensland requires the issuing of either a Wildlife Movement Permit or a Movement Advice. However, a whole tagged skin that is labelled with an ‘Export Permit (manufactured crocodile products)’ issued by the Australian Department of Water, Heritage and the Arts for that skin does not require keeping or movement authorisation under the Nature Conservation Act.

13.2.2 Other skin products

Each processed skin product, such as a ‘stuffer’, handbag, wallet or hat band, must be labelled at the point of manufacture with an ‘Export Permit (manufactured crocodile products)’ issued for that product. These labels are issued to manufacturers by Department of Environment, Water, Heritage and the Arts under the provisions of CITES. These labelled products do not require keeping or movement authorisation under the Nature Conservation Act.

13.2.3 Meat

Meat (including offal) and carcasses consigned from a Safe Food Queensland accredited premises are to be packed in accordance with the requirements of the *Meat Industry Act 1993* ‘Standards and Conditions for Accreditation’. Commercial Wildlife Licensees who obtain carcasses or meat from a crocodile farm in Queensland and Wildlife Farming Licensee (crocodiles) are required to maintain records concerning acquisition (Commercial Wildlife Licensee) or disposal (Wildlife Farming Licensee) of those products and to submit return of operations to EHP.

The movements of carcasses and meat within Queensland (and the importation of carcasses and meat into Queensland) must be undertaken in accordance with either a Wildlife Movement Permit or a Movement Advice under the provisions of the Nature Conservation Act.

13.2.4 Low unit-value items

Low unit-value items comprise other crocodile parts, products and derivatives and include crocodile teeth and claws, processed and unprocessed skin remnants (including 'hornback') and skulls.

Each item to be used for trade and commerce must be labelled at the point of manufacture/processing with an 'Export Permit (manufactured crocodile products)' issued for that product. However, many items of the same type (e.g. teeth) may be packaged together where necessary for reasons of size and practicality. In such circumstances, each package must be transparent and must be labelled at the point of manufacture/processing with a single 'Export Permit (manufactured crocodile products)' issued for those products.

These labelled products do not require movement authorisation under the Nature Conservation Act.

14. Further reading

The following literature on crocodiles covers aspects of their biology, conservation, management and farming.

Bolton, M. 1989. *The Management of Crocodiles in Captivity*. FAO Conservation Guide 22, Food and Agriculture Organisation of the United Nations, Rome.

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Webb, G.J.W., Manolis, S.C. and Whitehead, P.J. (eds) 1987. *Wildlife Management: crocodiles and alligators*. Surrey Beatty and Sons, Chipping Norton, NSW, Australia.

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Disclaimer

This publication contains only advisory information. While considerable care has been taken in researching and compiling the information, neither the Department of Environment and Heritage Protection nor the Queensland Government accepts responsibility for errors or omissions or for any decisions or any actions taken on the basis of this document.

Readers are referred to the Nature Conservation Act 1992, the Nature Conservation (Wildlife Management) Regulation 2006, the Nature Conservation (Administration) Regulation 2006, the Nature Conservation (Wildlife) Regulation 2006, and current amendments.