

ESTABLISHMENT OF A CROCODILE MANAGEMENT TEAM  
IN THE KIMBERLEY IN 1988

J.A.K. Lane

January 1988

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### APPENDICES

TO: A.A. BURBIDGE, DIVISIONAL MANAGER RESEARCH.  
FROM: J.A.K. LANE, PRINCIPAL RESEARCH SCIENTIST.  
SUBJECT: ESTABLISHMENT OF A CROCODILE MANAGEMENT TEAM IN THE  
KIMBERLEY IN 1988

## 1.0 BACKGROUND

CALM is considering the establishment of a specialist Crocodile Management Unit in the Kimberley. It is envisaged that this unit would be responsible for a wide range of activities, including population monitoring, research, patrols, maintenance of permanent traps, removal of problem crocodiles, public education, monitoring of future commercial utilization and liaison with Aboriginal communities.

The Department has presented a draft policy statement and a number of staffing and resource options to the Minister (Attachments A and B). The Department's preferred option is for two teams to be established, each of three people, with one team based in Kununurra and the other in Broome, plus a professional officer in Broome. The least expensive option presented is for one team of three people (including the professional officer), based in either Broome or Kununurra.

As indicated in recent discussions with you and Roger Underwood, I am looking for a new challenge and am particularly interested in the professional officer position. Following your encouragement, I have given some thought to the minimum requirements for establishment of a three member Crocodile Management Unit (plus office backup) and to arrangements necessary for my move from Perth and from the Waterbirds and Wetlands Research Program. This paper is presented as background for a possible submission to the Policy Directorate.

## 2.0 PROPOSED ACTIVITIES OF CROCODILE MANAGEMENT UNIT

The draft policy statement and submission to the Minister provide a long list of activities to be performed by a seven member Crocodile Management Unit. It would not be possible for all of these activities to be undertaken at the levels of intensity proposed with only one team of three people. It is therefore proposed that the initial team of three should concentrate on the following activities, in order of priority.

- Within the limitations of staff and resources, respond to legitimate concerns about "problem" saltwater crocodiles (Crocodylus porosus).
- Develop procedures for monitoring saltwater crocodile distribution, abundance and population structure.

- Develop an understanding of local ("European" and Aboriginal) attitudes to saltwater crocodiles and their management.
- Assist in increasing public understanding of saltwater crocodile habits and dangers, and assist in educating people about safe behaviour in crocodile habitat.
- Assess the status of saltwater crocodile habitat in the Kimberley and identify threats to it.
- Maintain close liaison with other crocodile specialists in Australia and overseas.

The team would be largely dependant on reports of problem crocodiles by members of the public and by other CALM staff. Frequent patrolling of all three proposed crocodile "control" zones would not be feasible and, for various reasons, may be of limited value. The usefulness and practicality of patrols would, however, be examined.

The team would be operational for 10.5 months each year, with a 1.5 month period each wet season (low tourist season) being set aside for leave entitlements.

Law enforcement activities, e.g. illegal shooting or trapping, crocodile industry inspections, would continue to be the responsibility of the region's District Wildlife Officers.

Initially, little attention would be paid to the Freshwater Crocodile, Crocodylus johnstoni, but it may be necessary to develop a Species Management Plan for these animals at a later date.

Due to the magnitude of the crocodile management task and the limited resources allocated to it, team members' involvement in other CALM regional functions would, of necessity, be limited to emergencies.

### 3.0 THE FIRST FIVE YEARS (1988-1993)

Several phases would be involved in establishing a three member Crocodile Management Unit with office backup, and in developing procedures. I envisage something along the following lines.

#### Preparatory (6 months)

- Appointment of Team Leader.
- Reconnoitre of available facilities at Broome and Kununurra by Team Leader. Decide on base for Team.

- Team Leader to complete current activities and arrange transfer of current responsibilities (refer 7.1 and 7.2).
- Team Leader to select Technical Officer (second member of Crocodile Management Team).
- Arrange housing in Broome or Kununurra for Team Leader and Technical Officer.

#### Year 1 (Establishment Phase; ideally April-March incl.)

- Review scientific and popular literature, CALM files and other sources.
- Familiarization visit to Kimberley for Team Leader and Technical Officer (1 week each).
- Training in Northern Territory (CCNT) for Team Leader and Technical Officer (four weeks each, plus two weeks each).
- Visit to Queensland NPWS by Team Leader (2 weeks).
- Obtain offices, laboratory, compound, and storage shed.
- Purchase vehicles, boats and equipment.
- Establish filing, accounting, and stock taking systems.
- Move from Perth to Kimberley location (timing will depend primarily on availability of housing and office accommodation).
- Appoint wages employee (third member of team).
- Appoint office backup (one person, full time).
- Begin development of procedures for monitoring saltwater crocodile distribution, abundance, size and age structure.
- Begin development of crocodile capture and translocation techniques.
- Consider public attitudes to crocodiles and consider public relations needs.
- Deal with any problem crocodiles.
- Annual recreational leave (whole team - November and December).

#### Year 2

By the end of Year 1, the Crocodile Management Team should be adequately trained, in position, equipped, and reasonably

familiar with region and crocodile. The primary activity in Year 2 would be the further development of procedures for monitoring saltwater crocodile populations. Particular problems, e.g., the accuracy and precision of census techniques, would be addressed. A start would also be made on developing procedures for monitoring the status and condition of crocodile habitat, particularly freshwater nesting habitat. A public awareness campaign would be developed in conjunction with Region and Information Branch staff. "Problem" saltwater crocodiles would be shot or captured as necessary, within the limitations of staff and resources.

#### Years 3,4 and 5

Procedures for monitoring saltwater crocodile distribution, abundance, size and age structure should be well established by the end of Year 3. Habitat assessment procedures would probably take four to five years to develop. Related problems (e.g., impact of feral pigs and pastoral activities on crocodile nesting success) would be investigated. "Problem" crocodiles would continue to be shot or captured as necessary, within the limitations of staff and resources. Public awareness and education efforts would continue. Biological advice relating to proposed commercial activities (crocodile ranching, farming or harvesting) would be provided as required.

### 4.0 MANAGEMENT UNIT REQUIREMENTS

These are the minimum requirements for the least expensive option presented to the Minister (a three member team based in either Broome or Kununurra) - plus office backup. An additional team would be needed to perform the level of activity envisaged in the draft memorandum to the Minister (particularly the frequency of patrols of proposed crocodile "control" zones) and to provide a year round presence.

#### 4.1 Location

There are many factors to be taken into account in deciding upon the most suitable location for a single three member team. These are listed in Appendix 1. In some respects, e.g., proximity to large numbers of saltwater crocodiles, Kununurra is the most suitable site. In other respects, e.g., proximity to two of the three proposed crocodile "control" zones and (probably) lower operating costs, Broome would be a better choice. I propose that a final decision not be made until (assuming appointment) I have had an opportunity to inspect first-hand (in May 1988) the CALM facilities which exist in the two towns and the availability and cost of additional facilities and services which will be required, including housing.

#### 4.2 Reporting

It is proposed that the team be part of CALM's Research Division for years 1 and 2, and that the situation then be reviewed. There will be a strong research element initially. Population and habitat monitoring procedures need to be developed and these must be scientifically sound. Although operating as a discrete unit, the team would develop a close cooperative relationship with other staff in the region, particularly the Regional and District Managers and the Kununurra and Broome-based District Wildlife Officers.

#### 4.3 Staff (Refer to Appendix 2 for costs)

The Management Team would comprise three people, plus office backup:

- Team Leader
- Technical Officer (Level 4 - it is essential that this officer be experienced, capable and prepared to accept a high level of responsibility).
- Full time, permanent Wages (or CALM Act, PS Act ?) Position.
- Full time, permanent Office person.

#### 4.4 Field Equipment and Operations (Refer Appendix 3 for details and costs)

Equipment would be placed at both Kununurra and Broome to facilitate rapid response to crocodile problems.

#### 4.5 Offices, Laboratory, Compound and Storage Shed (Refer Appendix 4)

#### 4.6 Office Equipment and Furniture (Refer Appendix 5)

#### 4.7 Computing, Statistics and Word Processing (Refer Appendix 6)

Ready access to advice and assistance from David Ward, Mike Choo and Paul Gioia on statistical and computing matters, particularly during the first two years of establishment, would be essential.

#### 4.8 Housing (Refer Appendix 7)

Two GEHA houses would be needed.

- Four bedroom, airconditioned house with shaded area outside (for Team Leader).
- Three bedroom, airconditioned house with shaded area outside (for Technical Officer).

The Wages Person would be hired locally and it would not be necessary to provide accommodation.

#### 4.9 Public Awareness Campaign (Refer Appendix 8)

This would be developed in conjunction with Region and Information Branch staff.

#### 5.0 BUDGET

Attachment B contains costings of the various staff and resource options which have been put to the Minister in draft form. Of these, a three member team based in Broome is the least expensive, with an initial cost of \$59 000 and annual costs of \$146 000. The Minister has been advised that these figures are substantial underestimates. They do not include the cost of initial training of team members by the Northern Territory CCNT, or GEHA accommodation, vehicle or boat replacement, the annual education/information campaign or additional office, laboratory or storage facilities. Charter of aircraft and survey vessel (estimated at \$40 000 per annum) is also not included.

I am preparing revised budget estimates and will supply these as soon as possible.

#### 6.0 FTE's

The Department should seek to have 4 Full Time Equivalents added to its quota to meet this major new initiative. A Cabinet Submission may be required.

#### 7.0 TRANSFER FROM WATERBIRDS AND WETLANDS RESEARCH PROGRAM

The Waterbirds and Wetlands Program has an FTE of 3.55 persons. It is the smallest program in the Research Division, accounting for 3.8% of total research expenditure. At the same time, waterbirds and wetlands are under threat and the need for their conservation is a matter of high public profile. Additionally, the Minister has made a recent public pronouncement CALM is to increase the level of research activity into loss of wetland quality and into the status of waterbird populations.

It is therefore assumed that, if I am appointed to lead the Crocodile Management Unit, a replacement will be appointed to Waterbirds and Wetlands Research, thereby retaining the FTE currently assigned to this program.

#### 7.1 Reallocation

Nonetheless, some decisions would need to be made about the reallocation of my current duties and responsibilities. I suggest as follows:



- Chairmanship of Midge Research Steering Committee (July 1987 - June 1990). Transfer to Co-Chairman Dr. R. Humphries of EPA. Have my replacement (i.e. new Program Leader) or Mr. J. Blyth join the Committee as CALM's representative.
- Membership of CONCOM Working Group on Treaties Relating to Migratory and Wetland Birds (ongoing). Transfer to my replacement (i.e. new Program Leader) or Mr. J. Blyth.
- Technical Advisor to Working Group on Criteria for Wetlands of International Importance (1987 - approx. 1990). This five nation working group was established at the "Ramsar" Wetlands Conference in Regina, Canada in 1987. Either hand over to ANPWS or another State, or to my replacement.
- Woodvale Research Centre Manager. Transfer to another Woodvale-based research scientist. Suggest rotate every three years and remunerate.
- Supervision of RAOU Waterbird Survey Projects (currently funded to 31st December 1988 - continuation is proposed beyond 1988). Transfer to my replacement.
- Annual assessment of conditions for waterfowl breeding and advice on biological aspects of duck hunting. Transfer to my replacement.
- Vasse-Wonnerup Regional Park proposal and advice to EPA on Port Geographe ERMP. Transfer to my replacement or (preferably) to proposed Busselton Wetlands Management Officer.
- Chairmanship of Yenyenning Lakes Working Group. Transfer to Wheatbelt Regional Manager or his delegate, or to Water Authority.
- Membership of Associated Minerals Consolidated Wetlands Management Committee. Transfer to my replacement.

## 7.2 Completion

A period of six months is proposed for completion of current research activities. Tasks to be completed are as follows, in order of priority.

- Lead shot study. Complete analysis of lead content of duck wings and gizzards. Analyse and publish results.
- Complete and publish "History of Duck Hunting in Western Australia".
- Analyse and publish results of Fisheries and Wildlife Pelican Breeding Status and Movements study.

- Publish results of Peel-Harvey and Leschenault Inlet waterbird surveys.

#### 8.0 TIMING

It would be preferable to commence Year 1 at the beginning of the annual dry season, i.e., in April. April 1988 would not be possible, however, without drastically reducing the amount of time available for completion of projects and transfer of responsibilities (six months is proposed, see 7.1 and 7.2 above). April 1988 would also be very difficult financially as there is no provision for a crocodile management team in the 1987/88 budget allocations.

Given the Department's and the Minister's desire to establish a team as soon as practicable, postponement until April 1989 would be unsatisfactory. I therefore propose that we simply aim at starting Year 1 as soon as possible in 1988/89 following acquisition of the necessary funds and adequate housing and office accommodation.

-----

## APPENDIX 1. LOCATION.

Factors to be taken into consideration in deciding upon the most suitable location for a single, three member team are:

### 1.0 WORK

- Proximity to main populations of saltwater crocodiles. (K)
- Proximity to proposed crocodile "control" zones. (2B,1K)
- Regional coverage of Kimberley and northern Pilbara coast. (B)
- Cost of obtaining suitable office, laboratory, compound and storage facilities. (?)
- Cost of obtaining suitable housing. (?)
- Lowest operating costs, including costs and convenience of fixed wing aircraft, helicopter and survey vessel charter. (?)
- Access to existing CALM regional support. (K)
- Access to "services" including regional headquarters of other relevant Departments, e.g., Tourism, (K)
- Distance from SOHQ (Broome 2365 km, Kununurra 3361 km) (B)

### 2.0 FAMILY

- Adequate housing - airconditioned, comfortable, shaded area outside. (?)
- Proximity to work areas (minimum days away) (K)
- Least stressful climate. (B)
- Best medical services. (?)
- Best community and recreational facilities/opportunities. (?)
- Most healthy environment (arboviruses etc.) (B)
- Best range of commodities and services available (?)
- Lowest living costs. (B)

Notes: (B) = Broome; (K) = Kununurra. (Derby has not been considered as there is no CALM presence to build on.

APPENDIX 9. BUDGET FOR PROPOSED CROCODILE MANAGEMENT TEAM  
 (Version May 1988, prices March 1988)

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4
Staff	145 400	140 400	140 400	140 400
Field Equipment & Operations	253 500	85 900	85 900	91 200
Buildings & Maintenance	193 900	21 300	21 300	21 300
Office Furniture & Equipment	26 200	2 500	2 500	2 500
Word Processing & Computing	20 900	1 400	1 400	1 400
Housing	227 500	-	-	-
Public Awareness	12 800	12 800	12 800	12 800
TOTALS	880 200	264 300	264 300	269 600

NB: Additional replacement costs would be incurred in Year 6 for boat replacement and computer upgrade, \$18 000.

Costs for all years are at March 1988 prices. No allowance has been made for inflation.

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Given the Department's and the Minister's desire to establish a team as soon as practicable, postponement until April 1989 would be unsatisfactory. I therefore propose that we simply aim at starting Year 1 as soon as possible in 1988/89 following acquisition of the necessary funds and adequate housing and office accommodation.

---

## APPENDICES

Appendix 1 lists factors to be considered in deciding upon the most suitable base for the management team. Policy Directorate decided at its March 28, 1988 meeting that the location should be Kununurra. This appendix is available if required.

Appendices 2-8 provide detailed costings of all items included in the proposed Budget. These appendices are also available if required.

Appendix 9, the proposed Budget, is attached.

## APPENDIX. 1. LOCATION.

Factors to be taken into consideration in deciding upon the most suitable location for a single, three member team are:

### 1.0 WORK

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- Proximity to proposed crocodile "control" zones. (2B,1K)
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- Access to "services" including regional headquarters of other relevant Departments, e.g., Tourism, (K)
- Distance from SOHQ (Broome 2365 km, Kununurra 3361 km) (B)

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- Best range of commodities and services available (?)
- Lowest living costs. (B)

Notes: (B) = Broome; (K) = Kununurra. (Derby has not been considered as there is no CALM presence to build on)

APPENDIX 2. STAFF (Version May 1988, Prices March 1988)

1. INITIAL COSTS

1.1 Staff Transfer

- Team leader, Perth to Kununurra.	2 500
- Technical officer, Perth to Kununurra.	2 500
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	5 000

TOTAL INITIAL COST	-----	5 000	-----
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2. ANNUAL OPERATING COSTS

2.1 Salaries and Wages

- Team leader (Scientist Level 7) (note that if this position is filled by transfer, the real cost will be that of the team leader's replacement, which is likely to be Level 2/4 or 5 (\$34 000).	46 250
- Technical officer (Level 4) (It is essential that this officer be experienced, capable, level headed and prepared to accept a high level of personal responsibility.	30 130
- Wages employee	19 000
- Office Person (essential office backup) (Level 1, 21 yrs)	16 000
	-----
	111 380

2.2 Allowances

- District allowance (Kununurra \$3950) (3)	11 850
- Annual recreational leave loading (17% x 4/52 x \$111 380)	1 460
- Air fares to Perth (ARL) (averaged at officer, spouse and 1 child; \$800 each) (3)	7 200
- Furniture storage (\$50/month) (2)	1 200
- Overtime and penalty rates (tech officer \$2 260 and wages employee \$....)	4 260
- Flying allowance (45 hrs @ \$8.90/hr) (2)	800
- Telephone rental (2)	250
- Airconditioning allowance (2)	2 000
	-----
	29 020

TOTAL ANNUAL COST	-----	140 400	-----
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APPENDIX 3. FIELD AND LABORATORY EQUIPMENT AND OPERATIONS  
(Version May 1988, Prices March 1988)

1.0 INITIAL COSTS

1.1 Vehicles

- 4WD diesel station wagon (LWB)	29 400
- 4WD diesel tray top (LWB)	24 900
Include long range fuel tank, water tank, sump and track rod guards, winch, roof rack, tow bar, bull bar, spotlights, airconditioning, twin batteries, tool kit, first aid kit, shovel, axe, k'roo jack, tow rope, vehicle compass, fire extinguisher, spares, star pickets, chains etc.	
- Trailer (tandem, 3.3 x 2.0 m)	3 000
	-----
	57 300

1.2 Boats and Trailer

- Survey and capture boat (6 metre aluminium, centre console)	15 900
- 110 hp outboard motor, power tilt, push pull steering (Note: 60 hp is \$5000)	6 600
- 15 hp outboard motor (auxilliary)	1 600
- Fuel tanks (20 l) (3)	240
- Trailer (rugged construction, power winch, for 6m boat)	3 000
- Dinghy (4 metre aluminium, slingable by heli- copter)	1 500
- 15 hp outboard motor	1 600
- 4 hp outboard motor (auxilliary)	680
- Fuel tanks (20 l) (2)	160
- Safety gear (6 lifejackets, flares, signal flag, water containers, first aid kit, oars, rowlocks)	1 400
- Equipment (boat compass, 3 anchors, spare plugs, pins, props, tool kit)	800
	-----
	33 480

1.3 Radios

- Vehicle HF Codan radio (5 channels)	3 000
- Boat HF Codan radio (8 channels)	3 200
- Portable (handheld) VHF radios (3)	6 000
	-----
	12 200

1.4 Capture Gear

- Steel traps (<4.5m crocs) (3)	2 100
- Buoys (15) or pontoons	1 050



- Rope trap (>4.5m crocs)	1	500
- Radio alarms (3)	2	850
- Repeater station	1	600
- Croc harpoons (<4.0m crocs)		600
- Ropes		200
- Boards		100
- Block and tackle		410

-----  
10 410

#### 1.5 Other Gear

- Spotlights (boat) (3)		200
- Hammon salinity bridge	4	000
- Firearms(12 gauge \$400, .243 & scope \$1020)	1	420
- Boat sling for helicopter (approx)		400
- Field tables (2)		120
- Generator		900
- Binoculars (Nikon 10x50) (3)	1	005
- Telescope (Nikon 60mm x 20x eyepiece) (2)	1	120
- Tripod (2)		400
- 35mm camera; 55mm, 200mm,500mm lenses (2)	2	900
- Flash guns and 2x converters (2)	1	000
- Dissecting microscope, light source, transformer	3	000
- Hand compasses (3)		150
- "Engel" freezers (field) (2)	2	100
- Chest freezer		700
- Refrigerator (standard)		700
- Field incubator		840
- Laboratory incubator ("Memmet" controlled humidity)	8	000
- Preservatives ( 200l alcohol and 25l formaldehyde)		510
- Drum pump (alcohol)		60
- Sample containers (glass and plastic)		200
- Scales (25 kg x 50g)		650
- Tape measures and vernier calipers		200
- Jerry cans (fuel and water)		100
- Crates (gear stowage)		50
- Containers (waterproof); e.g. plastic drums		80
- Miscellaneous (maps, aerial photography, satellite imagery,contact plastic, torches....)	1	000
- Books (standard croc texts, field guides to birds, mammals, reptiles, amphibians, fish, insects, flora)	1	000

-----  
33 005

#### 1.6 Training (CCNT charge only)

Two training sessions (2 weeks and 1 week each) with Northern Territory CCNT for team leader and technical officer.

-----  
6 000

- 1.7 Travel Costs and Airfares (Operational)
- Kimberley famil/zation (7 days @ \$115/day) (2) 1 610
  - CCNT training (21 days @ \$60/day) (2) 2 520
  - QLD visit (team leader only) (7 days @ \$80/day) 560
  - Round trip airfare (2) 2 200

-----  
6 890

1.8 Safety

- Helmets (3) 90
- Overalls (3) 90
- Boots (3) 90

-----  
270

1.9 Contingencies

- Add 5% (to \$159 555) 7 978

-----

TOTAL INITIAL COST 167 530

-----  
-----

2. ANNUAL OPERATING COSTS

2.1 Vehicle Running and Maintenance

- 4WD station wagon (25 000 km @ 21c/km, plus \$95/fortnight) 7 720
- 4WD tray top (25 000 km @ 21c/km, plus \$95/fortnight) 7 720
- Trailer 400

-----  
15 840

2.2 Boat and Boat Trailer Running and Maintenance

- Fuel (250 hrs) 4 000
- Maintenance 625
- Repairs 500

-----  
5 125

2.3 Radio Repairs and Maintenance

- Vehicle & boat Codans, VHF portables

-----  
500

2.4 Aerial Survey

- Helicopter (35 hrs @ \$650/hr) 22 750
- Aeroplane (10 hrs @ \$185/hr) 1 850

-----  
24 600

2.5 Boat Charter

- 15 metre vessel charter for survey of remote river systems (10 days @ \$1200/day)

-----  
12 000

2.6 Travel Costs and Airfares (Operational)

- SOHQ conference (5 days @ \$85/day, airfare \$800) (2) 2 450
- Regional (hotel) (20 days @ \$115/day) (3) 6 900
- Regional (camping) (60 days @ \$40/day) (3) 7 200

-----  
16 550

2.7 Equipment Replacement, Repair and Expendables

- Miscellaneous (traps, nets, ropes, immobilizing agent, preservatives, gas refills, film, ammunition, batteries, maps,...)

-----  
3 500

2.8 Contingencies (10%)

Unforeseen costs including breakdowns, repairs and rapid response to crocodile "incidents". Will probably average one crocodile attack in remote area each year requiring boat/ floatplane charter, victim evacuation, possible crocodile removal etc.. (add 10% to \$78 115)

7 811

TOTAL ANNUAL COSTS -----  
85 930  
-----

3.OCCASIONAL COSTS

3.1 Boat and Outboard Motor Replacement

- Boats (6 yearly, 40% trade in) 6 960
- Outboards (3 yearly, 50% trade in) 5 240

-----  
5.

APPENDIX 4. OFFICES, WET AREA, COMPOUND AND STORAGE SHED  
(Version May 1988, Prices March 1988)

1. INITIAL COSTS

1.1 Offices (\$750/sq m, + 60%)

- Office, 5 x 4m, a/c (team leader) 24 000
- Office, 4 x 4m, a/c (tech. officer) 19 200
- Open work area, 7 x 4m, a/c (to accommodate wages employee, filing cabinets, map cabinets, plan and work tables, firearms safe, aboriginal trainees, temporary assistants, visiting staff and scientists) 33 600
- Public reception and display area, 6 x 5m, a/c, (to accommodate crocodile information displays, reception and Office Person's desk) 36 000

-----  
112 800

1.2 Wet Area (\$1000/sq m, + 60%)

- 6 x 4m, washdown floor, a/c (for croc dissection, autopsies - requires bench, sink, taps, shelves, fridge and freezer space, exhaust fan, fume hood)

-----  
38 400

1.3 Compound

- 40 x 40m, gravel surface, including 15 x 15m concrete washdown area, 3m high security fence, 4m wide gates, floodlights (for secure storage of boats, vehicles, trailers, traps, fuel and bulky field equipment)

-----  
14 700

1.4 Storage Shed

- 6.1 x 7.7 x 2.7m, steel, roller (2) and standard doors, 75mm concrete floor, lockable (with power, fluorescent overheads, shelving, cupboard, work bench - for secure out-of-sight storage of outboard motors, field equipment, fuel drums etc. and for equipment maintenance, minor repairs and construction)

-----  
6 750

TOTAL INITIAL COSTS 172 650  
-----

2. ANNUAL COSTS

Power \$8000, water \$500, building maintenance  
\$4000, telephone \$4500, cleaning \$3500, rubbish  
removal \$800

TOTAL ANNUAL COSTS	----- 21 300 -----
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APPENDIX 5. OFFICE FURNITURE AND EQUIPMENT. (Version May 1988,  
Prices March 1988))

1. INITIAL COSTS

1.1 Desks

- Team leader (D3-003)	320
- Tech officer (D5-005)	230
- Wages employee (D7-007)	180
- Office person (D8-008)	200
	-----
	930

1.2 Chairs

- Team leader (CH2-042)	150
- Tech officer (CH2-042)	150
- Wages employee (CH2-042)	150
- Office person (CH3-043)	130
- Reception chairs (CH7-195) (2)	120
- Visitor chairs (CH6-196) (2)	100
- Work stools (CH4-044) (3)	450
- Ergonomic chairs (word processor, computer terminal) (CH3-)	160
	-----
	1 410

1.3 Other Furniture

- Filing cabinets; vertical suspension, 4 drawers (MC7-034) (3)	500
- Map cabinet; vertical suspension (MCAO)	670
- Map table (TI-012)	160
- Work table (2.4m x 0.6m) (2)	260
- Bookshelves (2.64m x 1.64m) (SF13-237) (2)	600
- Cabinets (CI-016, wood) (2)	450
- Cabinets (MCI-028, metal) (2)	400
- Coffee tables (reception area) (T3-014) (2)	180
- Shelving (metal; for open work area)	400
	-----
	3 620

1.4 Miscellaneous

- Safe (firearms, ammunition, and data storage)	4 500
- Video (public education and training)	1 000
- Desk lamps (4)	200
- Bins (5)	50
- Display boards (reception area), 6 x 6m and 5 x 5m.	250
- Magazine stand	50
- Furnishings	250
- Files	100
	-----
	6 400

1.5 Office Equipment		
- Telephones (2 lines, 4 handsets)	3 900	
- Recorded message and call diversion facilities (a/h)	400	
- Photocopier (enlarge, reduce and multiple reports)	7 000	
	-----	
	11 300	
		-----
TOTAL INITIAL COSTS		23 660
		-----

## 2. ANNUAL COSTS

2.1 Miscellaneous		
- Stationery	500	
- Postage	1 000	
- Freight	1 000	
	-----	
	2 500	
		-----
TOTAL ANNUAL COSTS		2 500
		-----

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APPENDIX 6. WORD PROCESSING, COMPUTING AND STATISTICS (Version  
May 1988, Prices March 1988)

1. INITIAL COSTS

1.1 Word Processing

- Olivetti Electronic Typewriter + Parallel interface	1000
- 360K disk drive	150
	-----
	1150

1.2 Computing & Statistics

- NEC Powermate with 62Mb Hdisk & Colour Monitor	6000
- 3 1/2" disk drive	300
- Epson LQ1000 Dot matrix Printer	1200
- Dbase III (3)	2250
- LOTUS 123	750
- MsWord (3)	1800
- NEC Multispeed field data recorder (2)	4000
	-----
	16300

1.3 Other

- Diskettes	500
- Stationery	100
- Diskette Storage Boxes (2)	50
- Computer Table (2)	500
- Printer Stand	250
- Monitor Arms (2)	500
- Manuals and Books	150
	-----
	2050

TOTAL INITIAL COSTS 19 500

2. ANNUAL OPERATING COSTS

- Stationery	250
- Maintenance	750
- Diskettes	300
- Manuals & Books	100

TOTAL ANNUAL COSTS 1400

3. OCCASIONAL COSTS

3.1 Replacement

- Cost after 5 years	11000
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TOTAL OCCASIONAL COSTS 11000

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APPENDIX 7.            HOUSING. (Version May 1988, Prices March 1988)

1. INITIAL COSTS

1.1 Houses (GEHA)

- 4 bedroom, a/c, (team leader, Level 7)	117 000
- 3 bedroom, a/c, (tech. officer, Level 4)	110 500
	-----
	227 500

TOTAL INITIAL COST	-----
	227 500
	-----

2. ANNUAL OPERATING COSTS

NIL

-----

APPENDIX 8. PUBLIC AWARENESS CAMPAIGN (Version May 1988,  
Prices --- 1987)

STRATEGY	INITIAL COST	ANNUAL COST
Warning brochure (Take care in crocodile areas) 10,000 p.a. : already printed for 1987/88.		2,000
Educational brochure (Living with crocodiles) 5,000 p.a. : in preparation for 1987/88.		2,500
Drinks coasters (Take care in crocodile areas) 100,000 p.a. : being printed.		4,000
Television community announcement, GWN : under investigation.	2,000	-
Warning signs on site (assuming 30 stolen p.a.) : already purchased.		250
Souvenir warning signs (200 for first year then 100 p.a.; costs will be recouped): being printed.	900	450
Interpretative displays on-site (3 one-sided two panel kits)	9,000	400
Travelling educational display (single portable stand)	3,700	300
Video (purchase and copies of "Living with Crocodiles")	500	100
Slide kits (4 kits to back up talks to groups)	400	-
Advertisements (seasonal warnings in local press; 3 papers x 4 weeks and 2 weeks x \$200		3,600
	16,500	13,600
<u>TOTAL COSTS</u>		
1987/88 financial year	\$25,000	
Subsequent years		\$13,600
<u>TOTAL REVENUE</u>		
1987/88 financial year	\$1,200	
Subsequent years		\$800

APPENDIX 9. BUDGET FOR PROPOSED CROCODILE MANAGEMENT TEAM  
 (Version May 1988, prices March 1988)

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4
Staff	145 400	140 400	140 400	140 400
Field Equipment & Operations	253 500	85 900	85 900	91 200
Buildings & Maintenance	193 900	21 300	21 300	21 300
Office Furniture & Equipment	26 200	2 500	2 500	2 500
Word Processing & Computing	20 900	1 400	1 400	1 400
Housing	227 500	-	-	-
Public Awareness	12 800	12 800	12 800	12 800
TOTALS	880 200	264 300	264 300	269 600

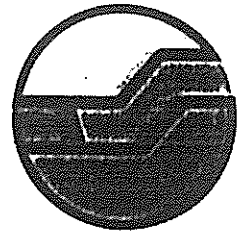
NB: Additional replacement costs would be incurred in Year 6 for boat replacement and computer upgrade, \$18 000.

Costs for all years are at March 1988 prices. No allowance has been made for inflation.

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HON MINISTER FOR CONSERVATION  
AND LAND MANAGEMENT

ATTACHMENT B

## CROCODILE MANAGEMENT

The purpose of this memo is to canvass several issues concerning crocodile management. In response to earlier briefings and correspondence, you have indicated your intention to take this matter to Cabinet.

At Attachment A is a first draft of a Departmental policy statement on Saltwater Crocodiles. I emphasise that it is a first draft only and that it is yet to be discussed at length within CALM or approved by the Policy Directorate. Nevertheless I thought it would be appropriate to provide you with a copy now because of the general approach it outlines and particularly because of the background it provides to consideration of commercial utilisation of crocodiles.

### Commercial Utilisation of Crocodiles

As stated in Attachment A, commercial utilisation of crocodiles for skin and other products can take place in three ways: farming, ranching and harvesting or culling from the wild. In this discussion it is important to distinguish between crocodile farms (which raise crocodiles for their commercial products but may or may not display their crocodiles to the public) and crocodile parks (which are wildlife parks specialising in the display of crocodiles to the public but do not raise crocodiles for their commercial products).

CALM has received six written applications for crocodile farm and/or park licences in Wyndham and Kununurra. It is understood that some other parties also have an interest but have yet to submit written applications. Interest in farming has also been expressed by the existing crocodile park in Broome.

The applications to date vary from short letters to more substantive proposals. However none of them demonstrate that they fully appreciate the complexities involved. I am advised that some criticism is being directed towards CALM because applicants have not been given a clear answer. It is known that proponents of crocodile farming have approached the Departments of Agriculture and Regional Development and the North West.

CALM is not opposed to commercial utilisation of crocodiles subject to appropriate controls. In fact it can be argued that public support for crocodile conservation is enhanced by giving crocodiles commercial value. This approach has been adopted in the Northern Territory and Dr G Webb, a consultant to the Conservation Commission of the Northern Territory has written."

"(The secure status of wild populations of Saltwater Crocodiles) is dependent on the maintenance of crocodile habitats. If we are concerned with long-term conservation, then this is what should attract our attention. If there is a way of making crocodiles sufficiently valuable that it becomes economically viable to protect their breeding habitats with revenue derived from crocodiles, then, in my opinion, that avenue should be pursued vigorously. The philosophical arguments for and against killing and utilising wildlife become pseudo-academic claptrap if we neglect habitat protection and kill enormous numbers of animals by default."

The commercial utilisation of crocodiles in Australia has been the subject of heated debate in Australia and overseas. It is likely that there would be criticism from some quarters if WA decides to allow commercial utilisation.

So that we can deal with the increasing interest in crocodile utilisation, I propose the following approach:

- (1) that before any decision is made with respect to crocodile farming and/or ranching, an appropriate agency (or agencies) with a commercial or industry development charter, should be asked to produce an analysis of the commercial viability of crocodile farming and/or ranching;
- (2) subject to commercial viability being demonstrated, that you approve the drafting of a Cabinet Minute seeking approval in principle of the commercial utilisation of crocodiles through farming and/or ranching, subject to appropriate conditions and the provision to CALM of adequate staff and resources to meet its responsibilities for crocodile conservation and management;
- (3) that CALM takes a proactive rather than a reactive role to the extent that it invites other agencies (Agriculture, Regional Development and the North West, Land Administration, Technology and Industry Development Authority, Aboriginal Affairs Planning Authority and WA Tourism Commission) to a meeting where CALM would:
  - (a) outline the conservation status of crocodiles and the State, national and international requirements covering commercial utilisation;
  - (b) indicate the proposal to go to Cabinet as outlined in (2) above but subject to the study outlined in (1) above;
  - (c) seek, from among the agencies present, an appropriate agency or agencies who will undertake that study at their cost;
  - (d) suggest that the number of farms be limited to one or two in the first instance (if two, one to be in the West Kimberley [e.g. Broome] and the other in the East Kimberley [e.g. Wyndham or Kununurra] noting that approval of a farm in either of these locations could lead to complaints from the other);
  - (e) suggest that, in order that the "best" applicant(s) be selected, there be public advertisement and letters to existing applicants calling for expressions of interest to be lodged using standard application forms and that an appropriate group of agencies (i.e. government

agencies with a commercial or industrial development charter, plus CALM) recommend the selected applicant(s) for your approval;

- (f) suggest that the chosen applicant(s) then be required to submit detailed proposals (including site plans, stocking details, tagging/marking arrangements, food sources, etc.) for final approval;
  - (g) require that, if ranching is involved, the chosen applicant(s) (either themselves or jointly with Government agencies with a commercial or industrial development charter) prepare a management program for approval before any licences are issued and suggest that for that purpose they engage a consultant such as Dr G Webb, who as well as being a leading expert on crocodile biology also has considerable knowledge of farming and ranching and of Commonwealth and CITES requirements;
  - (h) state the intention that a substantial fee and/or royalty structure should be put in place;
  - (i) state the intention that farms would be required to be open to the public and play a role in public education;
- (4) that commercial harvesting from the wild (other than provided for in farming and ranching) be prohibited and that it not be introduced without a full review of the effects of harvesting on the wild population or without an approved management program;
  - (5) that no further crocodile parks should be approved until policy on crocodile farms is settled and furthermore, if approval is given for two farms as outlined above, then no further crocodile parks should be approved (conversely, if no crocodile farm is approved for the East Kimberley, then proposals for a crocodile park there should be considered).

With respect to the above references to adequate staffing and resources, and to fees and royalties, I emphasise that these should be in place before commercial utilisation of crocodiles commences. There is a parallel with emu farming, where the recent expansion is placing some strain on CALM in the absence of any additional resources, and where there

is minimal financial return to the State. These matters will be pursued in the Emu Farming and Processing Working Party for submission to Government as part of an overall industry package.

For your information, in 1972 State Cabinet decided to reserve the right to undertake crocodile (and turtle) farming to Aborigines exclusively provided that the situation was reviewed after five years.

#### Staffing and Resources

CALM cannot implement the attached draft policy and strategies without additional specialist staff and resources to cover population monitoring, research, continual patrolling, maintenance of permanent traps, removal of problem crocodiles, public education and overseeing of commercial utilisation. In particular the effectiveness of strategies aimed at maintaining a high level of public safety, is directly related to the amount of time staff spend patrolling and to the speed with which staff can respond to reports of problem crocodiles. The problems of doing so are exacerbated by the fact that demand for public safety is highest at the two extremities of the Kimberley Region, i.e. Broome and Wyndham/Kununurra.

For your information, crocodile management by the Conservation Commission of the Northern Territory is based upon a substantial research and survey knowledge base, crocodile specialists on staff and "permanent" contract, a staffing and resource infrastructure in the Top End which is substantial (by comparison with CALM in the Kimberley), and two three-man specialist teams who maintain Darwin Harbour as a crocodile-free zone and remove problem crocodiles elsewhere (one team is always on standby). The CCNT removed 71 problem crocodiles from the wild, including 57 from Darwin Harbour, during the period July 1984 to June 1986, making a total of 451 (including 354 from Darwin Harbour) removed from the wild throughout the NT since protection. In an October 1984 publication the CCNT records its expenditure on crocodile research and management since 1978 as \$1 million.

CALM has examined a range of options for staffing and resources. Initial estimates of the costs associated with each option are given in Attachment B. Full details of these costings can be supplied if required. The costs at Attachment B are substantial underestimates as they do not include initial training from the CCNT (\$6,000 - \$10,000), GEHA accommodation, vehicle and boat replacement, aircraft charter and the annual education/information campaign.



Based on our own examination and the experience of the CCNT, our preferred option is for two specialist teams, each of three people, with one based in Kununurra and the other in Broome. Anything less would detract substantially from our ability to implement the proposed policy and strategies. In addition a professional officer should be appointed in Kununurra to become the focal point for all aspects of crocodile management. All positions would be appointed to the Regional staff.

The team size of three is essential for safety reasons, given the areas where the teams would be working and the dangers associated with catching and shooting crocodiles. Teams of three are also the minimum requirement in terms of covering night and weekend patrols and annual leave. It would be necessary for the staff to obtain training from the CCNT, as leaving these tasks to untrained, general staff would be likely to result in serious accidents.

Clearly, the total costs associated with adequate implementation of the proposed policy and strategies are substantial. Furthermore the commitment of resources would need to be made on an ongoing basis.

#### General

I seek your reaction with respect to the general directions proposed in the draft policy statement and I seek your advice as to how you wish to deal with the issues of commercial utilisation and adequate staffing and resources. It may be worthwhile for Departmental officers to discuss these matters with you.

In particular, I seek your approval to convene a meeting as outlined above with respect to crocodile farming and ranching. Furthermore, in order to avoid a situation where CALM, you and the Government are criticised over this matter, it could be helpful if there were to be an announcement or advice to interested parties, setting out the position the Government is taking and the time-frame in which decisions will be made.

Syd Shea  
EXECUTIVE DIRECTOR

4 December 1987

Att

## OPTIONS

	Initial Cost (purchase of vehicles, boats, radios & equipment)	ANNUAL COST			
		Salaries & Allowances	Vehicle Running	Boats	Equipment
1. Team of 3 in Kununurra Team of 3 in Broome One Scientific officer	145,000 <u>145,000</u>	260,000	27,000	8,000	? <u>295,000</u>
2. As for '1' but with 4 employed locally as wages staff	145,000 <u>145,000</u>	245,000	27,000	8,000	? <u>280,000</u>
3. Team of 3 in Kununurra One scientific officer	83,000	170,000	24,000	4,000	? <u>198,000</u>
4. Team of 3 in Broome	<u>59,000</u> <u>59,000</u>	126,000	12,000	4,000	? <u>142,000</u>
5. Team of 3 in Kununurra	<u>59,000</u> <u>59,000</u>	130,000	12,000	4,000	? <u>146,000</u>