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**CABINET DECISION**

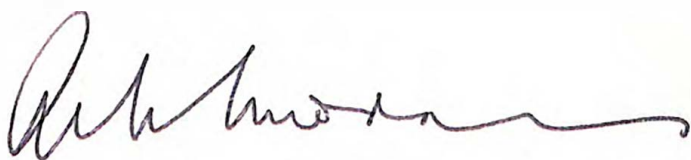
No. **4679** .....

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Submission No.: 4002

Title: CONTROL OF CANE TOADS

Cabinet noted the information.



**A. G. MORRIS**  
Secretary to Cabinet.

16 June 1986

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FOR CABINET

SUBMISSION No: 4002

Title:	Control of Cane Toads
Minister	Hon. T. R. McCarthy, M.L.A.
Purpose:	To inform Cabinet of the CONCOM sponsored agreement regarding research into the biological control of cane toads.
Relation to existing policy:	Consistent
Timing/legislative priority:	N/A
Announcement of decision, tabling, etc:	A draft Press Release is attached.
Action required before announcement:	
Staffing implications, numbers and costs, etc:	No staffing implications.
Total cost:	\$25,000 (approx.) for 1985/86 \$45,000 (approx.) per year for the remainder of the 3 year programme.

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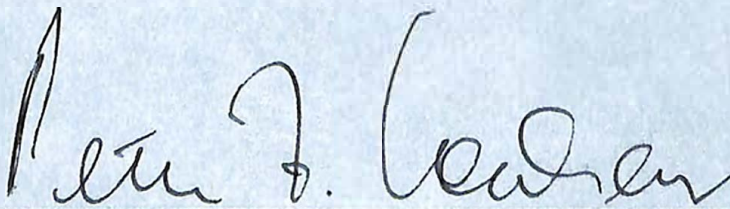
Department/Authority ..... LAW .....

COMMENT ON CABINET SUBMISSION No.

TITLE: ..... CONTROL OF CANE TOADS .....

**COMMENTS:**

There appear to be no constitutional or legal barriers to the proposal.



SIGNED: Peter F. Conran

DESIGNATION: Director, Executive and Policy Unit

DATE: 9 April 1986

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Department/Authority.....NORTHERN TERRITORY TREASURY.....

COMMENT ON CABINET SUBMISSION No.

TITLE: .....CONTROL OF CANE TOADS.....

**COMMENTS:**

Treasury notes the information paper. However, should funding be required it should be on a substitution basis or included as a new initiative in the 1986/87 Budget.



SIGNED: R C MADDEN  
DESIGNATION: UNDER TREASURER  
DATE: 15 April 1986

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NORTHERN TERRITORY OF AUSTRALIA

G.P.O. BOX 4398  
DARWIN N.T. 5794  
TELEPHONE 89 6172

SECRETARY  
DEPARTMENT OF THE CHIEF MINISTER

25 April 1986

Chairman  
Conservation Commission of the Northern Territory  
PO Box 38496  
WINNELLIE NT 5789

ATTENTION: Mr. R.A. Davis

DRAFT CABINET SUBMISSION - CONTROL OF CANE TOADS

I refer to your letter of 7 April 1986 in which you request comment on the above draft Cabinet Submission.

The Background section of the Submission makes reference to a proposal which has been approved by the Territory Government and other Governments, for research into the biological control of cane toads. You may wish to consider providing a copy of that proposal as an attachment to the Submission, or providing a summary in the body of the Submission.

The previous Submission on this subject, which was considered by Cabinet in September 1984, proposed that the Department of Primary Production and Conservation Commission would both be involved in implementing the proposed research activity. The question of involvement of the Department of Primary Production has not been raised in this draft Submission, and you may wish to address this point.

A handwritten signature in blue ink, appearing to read 'R.D. Allen'.

R.D. ALLEN  
for Secretary

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THE ISSUES

To inform Cabinet of the CONCOM sponsored agreement on interstate and Federal co-operation for research into biological control of cane toads.

BACKGROUND

In September 1984 Cabinet decided (Decision No. 3745) "that the Premiers of Queensland and Western Australia and New South Wales be approached with a view to formulating a joint proposal to the Commonwealth including funding for implementing a research programme into biological control of cane toads". The matter has been pursued within the framework of CONCOM and a working group produced a proposal for the research. This proposal now has the approval of the Queensland, Western Australian, Federal and New South Wales Governments.

A copy of the agreement is contained in Attachment A

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CONSIDERATION OF THE ISSUES

CONCOM Standing Committee has recommended a specific research proposal and suggested joint funding by the Northern Territory, Queensland, New South Wales, Western Australia and the Commonwealth. The CONCOM initiative for cane toad research is the direct result of Northern Territory Government efforts to produce a co-ordinated national approach to the cane toad problem. It has taken the Conservation Commission nearly two years to reach this stage. In addition, approximately half the research programme will be carried out under the direction of Conservation Commission staff. Earlier plans to involve the Department of Primary Production in pathological investigations of Cane Toads have been abandoned in favour of the work being done in Townsville where Toads are readily available.

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THE PUBLIC IMPACT OF THE PROGRAMME

The cane toad invasion of the Northern Territory has received great attention from the Territory, national and international media during the past six years. The Northern Territory Government's cane toad research and management efforts have received wide public support. The public is aware of efforts towards the development of a co-ordinated national research programme.

The research programme is likely to receive considerable public support.

FINANCIAL CONSIDERATIONS

All contributing Governments will share costs of the programme on an equitable basis. Funding is to continue for an initial period of three years. At the end of this time, the results will be evaluated and a possible additional

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three year programme will be instituted to investigate actual biological control. Projected costs to the Northern Territory are approximately \$25,000 for the remainder of 1985/86 and approximately \$45,000 per year for the remainder of the three year programme. Possible costs for the additional three years cannot be estimated at this time.

COMMONWEALTH STATE AND LOCAL GOVERNMENT RELATIONS

The agreement coordinates cooperation between the Commonwealth, the Northern Territory and the States of Queensland, New South Wales and Western Australia. Each Government will be an equal partner in the endeavour.

PUBLICITY

An appropriate draft press release is attached as Attachment B.

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RECOMMENDATION

It is recommended that Cabinet note the paper.

Hon. T.R. McCarthy, MLA  
Minister for Conservation

A handwritten signature in blue ink, appearing to read 'T.R. McCarthy', is written over the typed name. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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ATTACHMENT A

RESEARCH INTO CONTROL OF CANE TOADS

PROPOSAL FOR CONSIDERATION BY STANDING COMMITTEE

BACKGROUND

At its meeting in March 1985, Standing Committee discussed the development of co-operative research into the control of cane toads in northern Australia, noting that:

- (i) In July 1984, Council expressed support for a study to determine whether a disease agent was causing a reduction of cane toad populations in certain coastal areas of Queensland.
- (ii) Council had also requested Standing Committee to explore possible joint funding arrangements between the four affected States (the Northern Territory, Queensland, New South Wales and Western Australia) and the Commonwealth for this and other research into cane toad control.
- (iii) A meeting of representatives of three of the States and the Commonwealth had been held in Brisbane in November 1984 to revise an earlier Northern Territory research proposal for consideration by Standing Committee as the basis for a joint funding arrangement between the relevant CONCOM agencies.

Following examination of this draft research program, Standing Committee agreed to commend it to the Ministers from the four States and the Commonwealth for endorsement, with a view to having it included in their agencies' research budgets for 1985/86. The Secretary to Council then wrote to the five Ministers (through their representative Standing Committee members) on 28 March 1985. As at mid-September 1985, positive responses had been received from the Commonwealth, Northern Territory and Western Australian Ministers.

The question of management of the proposed research was considered by Standing Committee at its meeting in May 1985, and in order to provide the desired degree of control members agreed that an ad hoc working group be established to prepare recommendations to Standing Committee covering:

- (i) A detailed brief and timetable for the draft program which would ensure that it was cost effective.
- (ii) a steering mechanism for the draft program which would ensure that there was adequate consultation between the interested State agencies and the research supervisors.

The working group was also instructed to report to the October 1985 meeting of Standing Committee.

#### I. MEETING OF WORKING GROUP

The working group was convened at CSIRO Division of Tropical Animal Science, Long Pocket Laboratories, Brisbane on 4 September 1985. The Chairman was Dr. T.D. St. George, Senior Principal Research Scientist, who is a veterinary virologist. He is a member of the CSIRO ANAHL Research Advisory Committee. Also present were the following representatives:

Mr R. Jenkins, Australian National Parks and Wildlife Service;

Dr W. Freeland, Conservation Commission of the Northern Territory;

Dr L. Llewellyn, New South Wales National Parks and Wildlife Service;

Dr R.B. Floyd, CSIRO, Division of Entomology;

Mr D. McAllister, CONCOM Secretariat, Canberra.

A telex was received from CSIRO, Division of Wildlife and Rangelands Research as follows:

"OUR CONTRIBUTION TO A POSSIBLE FUTURE PROGRAM IS SEEN AS EXPERTISE IN AN ECOLOGICAL APPROACH TO THE STUDY OF VERTEBRATE PESTS. ACTUAL PARTICIPATION MAY FOLLOW A FORMAL REQUEST: APPROVAL AND GOODWILL OF STATE FUANA AUTHORITIES: THEN PROCEED IF ADEQUATE MANPOWER AND FUNDS AVAILABLE,

AS YOUR INITIAL MEETING IS LIKELY TO BE 'DISEASE' ORIENTATED OUR REPRESENTATION AT THIS POINT APPEARS UNWARRANTED."

Dr M. Taylor of Adelaide University, telexed his forceful view in a long telex that a cane toad pathogen introduction should be proceeded with.

Dr St. George elaborated on the procedure to be followed for the introduction of an exotic virus to CSIRO ANAHL. There is insufficient information available to formulate a case for the introduction of an exotic virus to ANAHL. There is no knowledge of whether the virus referred to in the earlier case is already present in Australia or not. Dr Freeland presented a well prepared bulletin of the state of knowledge of cane toads in Australia. Copies of this should be made available to all parties interested in cane toad research control. Various views on the relative importance of search for disease agents and population studies were presented. A position paper prepared by Dr St. George formed a structure

for discussion and elaboration by the working party. The project document which follows is the product of those discussions.

## II. INTRODUCTION

The prospects of importing a pathogen which might be lethal for Bufo marinus from abroad are nil until such time as the factors presently controlling cane toad populations in Australia are defined; the presence or absence of the candidate pathogens in Australia is known; the methodology and competence for handling an imported pathogen is established; the impact on related species of amphibians is thoroughly established; and there is unanimous consent of all the interested parties, state and federal, together with community acceptance.

The case for importation of an exotic frog pathogen has to be carefully prepared. The need for a pathogen based on hard data and every aspect of potential effect on the existing fauna must be thoroughly researched before a submission can enter the complex process involved in obtaining approval for use of an exotic virus in ANAHL. The flow chart of this process from submission to ultimate consideration by cabinet is shown in Appendix I. The basic data to initiate such a process simply does not exist. The proposed exotic virus has not been sufficiently designated and its effects described for import in the earlier working party document nor its properties described.

A program of research directed towards defining the pathogens presently affecting cane toads both within and outside Australia and the present impact and their future spread will assist the direction of long-term policy. This will assist a decision as to whether indigenous or exotic pathogens would be the more useful.

It is very important to have a perspective as to what control of a pest by biological means involves. The commonest fault is to underestimate the scale of action involved. Very often the problem itself turns out to be more than a single factor problem and thus requires more than one solution. There is no place for the one-off intuitive solution described in the earlier proposal. A biological control agent as exemplified by the cane toad itself, cannot be turned off once released into the environment.

## III. AMBIT FORECAST

The problem of the control of cane toads must be considered on a broad scale starting with problem definition, development of a promising control option and implementation. The total span of such a project is likely to be 10 years. The initial research input of approximately \$160,000 per year allows for a very limited program for Phase 1.

The overall time plan can be considered in phase with an approximate duration from date of commencement:

A. Phase 1

Problem definition 3 years: Explore the existing situation with annual reviews.

Major review at 2 1/2 years and plan phase 2.

B. Phase 2

Development 3 years Concentrate effort into the most promising area. This may involve an overseas cooperative component or stationing Australians abroad.

Major review between years 2 and 3 of development phase to plan phase 3.

C. Phase 3

Implementation 4 years Prepare for implementation of derived findings and apply the control means. This phase requires a major consultative process and public acceptance.

ANAHL would become involved in phase 2 to 3 only if phase 1 defined a need. Phase 1 is the only part of the full program that can be considered in any detail at this stage and is prosed in terms of the financial support foreshadowed.

D. Terms of Reference for the Project

The project is to define the factor (s) presently affecting cane toad populations in Australia and to identify any agent which may be useful for their control.

IV. PHASE 1 OF PROPOSAL

A. Population Dynamics

The objective of this segment is to establish the factors affecting developing cane toad populations in newly colonised areas. This should be a Northern Territory Conservation Commission responsibility as the expertise is already in place. A study program should be placed within a

river system where the cane toad is flourishing. In addition a skeleton survey should be established to cover the possibility of the non-lateral extension from existing populations by the intervention of man.

Complementary work should be aimed at documenting the interaction with other vertebrate species as the cane toads build up their population. It would be desirable for a second and complementary population program to be established to monitor the old established cane toad population in north-east Queensland but the forecast resources meant that a lower priority had to be given to this worthwhile work and this must depend on supplementary funding. Dr Freeland's suggestion of utilising two PhD students in this work should be endorsed.

### B. Control Agent

The objective of this investigation would be to determine what significant agents of an infective nature are circulating in the cane toad population of the east coast. The program of study should not start out with the idea that a virus infection is the be all and end all target, however, virus infections should be considered. It is important that the centre selected for this phase have the facilities for a broad look at the pathology of disease and define initiating agents. The range of possible pathogens includes viruses, bacteria, fungi, haemoprotozoa and other parasites. Any of these may interact with adverse environmental influences.

The principal worker should be at least a post-doctoral researcher. He should be primarily disease oriented and preferably have experience or an inclination towards amphibia and reptiles. He should be provided with a technician with complementary skills, plus vehicle, equipment and maintenance and travel funds adequate for the task.

The most suitable location for the search for pathogens is the midst of the oldest established toad population. This is where the probabilities of success are greatest. It has two Townsville is well situated for the work. The Animal Health Station, Oonoonba). The persons whose names are suggested for Manager or Management Committee are accustomed to co-operating in research projects.

Institutions in other centres were considered but had fewer advantages than those in Townsville.

### C. Overseas Aspects

Consideration should be given to gaining information on work in Central or South America where the introduced cane toad is endemic. The control agent team leader should visit the most promising areas to familiarise himself with the direction of research on pathogens for possible later use

with the program. Besides being useful for familiarisation with other research, such a visit could scout locations where a worker on Phase 1 or 2 could spend a longer time, or serve as a base for an overseas component of any pathogen source. If the introduction of a pathogen from abroad becomes a likely event after the problem has been defined, an overseas research component involving a pathogen source will become a mandatory requirement of the relevant state and federal authorities concerned with approval.

## V. MANAGEMENT

The deficiencies in the formulation of the first proposal demonstrated that the project needs experienced senior scientific management. This manager does not need to have specific knowledge of cane toads but must be a senior scientist. In the first phase (3 years), the manager should have an appreciation of infectious disease research. The project manager should have the power to influence the course of the research and also be able to influence the composition of the budget in the second and third years of Phase 1. He should be located in Townsville where he can directly influence the team to be established to define agents. CSIRO has scientists capable of managing the project but they are fully committed and not well placed to oversee the scientific work.

Management expenses should be an integral part of the cost structure. This expense would be supplementary to contributions by the Secretariat of CONCOM towards arranging meetings, coordinating reports and liaising with CONCOM. The manager has to divert some of his time and interest towards the project and use his own secretarial support. If he is to seek supplementary funds he has to channel his expertise into convincing funding bodies. This is a time-consuming business.

The project manager needs the support of a committee of designated specialists. The scientists carrying out the actual work should not be members of the supervisory committee, though they will attend relevant parts of the committee meetings to present their reports. An administrator should attend the Annual Management Committee Meeting so that the budget is considered adequately.

### A. Project Manager

1. Terms of Reference for Project Manager:
  - (a) To carry out the terms of reference for the cane toad project for 3 years under the overall control of CONCOM.
  - (b) To supervise the research activities and funding as outlined in the project document within the budget, as approval annually by CONCOM and to assist staff recruitment.



- (c) To convene the management committee as determined in consultation with the scientific team leaders, but not less than once a year.
- (d) to seek external sources of funding especially to improve the studies of old cane toad populations and community aspects of the affects of toads.
- (e) The most suitable is:

Professor R.S.F. Campbell PhD (Glasgow)  
MRCVS, FRS (Path), FACVSc,  
Head of Graduate Schoold of Tropical  
Veterinary Science,  
James Cook University,  
Townsville.

Professor Capmbell has considerable experience in the management of scientific projects in Australia and abroad including those related to defining disease situations, over and beyond his responsibilities as head of a major university group. He is well placed to select and supervise staff during the establishment of a team seeking control agents. He also has the necessary experience in seeking outside funding so that this aspect would not be foreign to him.

The second possibility is:

Dr D. Hoffmann, BVSc, PhD, Diploma Trop. Vet. Med.,  
Officer-in-Charge,  
Animal Health Station  
Oonoomba Veterinary Laboratory,  
Townsville.

Dr Hoffmann is a veterinarian with a wide experience of disease investigation. He is trained in virology and pathology. He has had post-graduate training in tropical animal diseases in Edinburgh, as well as having practical experience in Papua-New Guinea and Indonesia. He heads a multidisciplinary team, engaged in the diagnosis of animal disease plus various research projects. He is also well placed to select and supervise the establishment of a team to investigate control agents.

**B. Management Committee**

The Committee should comprise three scientists with complementary expertise related to the project:

1. Wildlife Manager:  
To be nominated by CONCOM.
2. Disease Experts: (in order of choice)
  - (a) Dr. D. Hoffmann, BVSc, PhD, Dip. Trop. Vet. Med., Officer-in-Charge, Animal Health Station, Oonoonba Veterinary Laboratory, Townsville - if not selected as manager. He is well known to Professor Campbell and has a compatible personality and complementary experience.
  - (b) Dr J.G. Atherton, Departmental Head, Microbiology Department, University of Queensland, St. Lucia. Dr Atherton heads a department which investigates and teaches the microbiology of human, animal and plant diseases.
3. Ecologist/Population Biologist: (in order of choice)
  - (a) Professor Rhonda Jones, BSc, PhD, Department of Zoology, James Cook University, Townsville. Dr Jones has a background in population dynamics and has an interest in cane toad populations. She is well placed in Townsville to assist with advice on a continuing basis.
  - (b) Dr. G.J. Caughley, BSc, PhD, Senior Principal Research Scientist, CSIRO, Division of Wildlife & Rangelands Research, was consulted as a second choice. His opinion was that he could not do nearly as good a job as Professor Jones and that she is a very logical first choice.
  - (c) Dr R.B. Floyd, BSc, PhD, CSIRO, Divison of Entomology, Long Pocket Laboratories, Brisbane. Dr Floyd is presently engaged in insect population studies. His PhD Thesis was on the population modelling and eco-physiology of cane toads. He is a junior scientist.

All persons have been contacted and asked in principle if they will serve without CONCOM being committed to appoint any of them. A very workable committee under the chairmanship of Professor Campbell can be formed if Dr Hoffmann and Professor Jones are chosen together with a wildlife manager appointed by CONCOM.

C. Study Teams - Population Dynamics

1. Responsible Organization:

Northern Territory Conservation Commission.

2. Terms of Reference:

This team is to work in the area where the cane toad is recently established with particular attention to demography of the cane toad encompassing age specific survival, fecundity, growth rates, density and migration. These data will be used to:

- (a) Develop population models for simulation of controls.
- (b) Determine effects of cane toads on interacting species.
- (c) Report as required by project manager.
- (d) The team will cooperate with the study team on control agents when healthy toads are needed for laboratory experiments.

The composition of this study team can be left in the hands of the Northern Territory Conservation Commission.

D. Study Team - Control Agents

1. Responsible Organization:

James Cook University to be invited to submit a proposal based on the terms of reference and within the outline budget. The team is to be lead by a researcher of post-doctoral calibre with experience with infectious agents and able to develop expertise with those of amphibia. The proposal could well involve the participation of the Animal Health Station, Oonoonba Veterinary Laboratory, Townsville, for skills or techniques not available at James Cook University.

2. Terms of reference:

It is envisaged that the research will be carried out in north eastern Australia where an old population of cane toads exists and is apparently presently in decline.

The team will determine whether agents exist in Australia that are presently able to control

cane toads or possess the potential of being developed or genetically manipulated to this purpose.

The team will work cooperatively with the population dynamics study team when exchange of information and material is required.

E. Funding

1. The cooperating agencies will contribute the sums proposed to one managing agency.
2. Outside funding obtained by the Project Manager or CONCOM will be channelled in the same way.
3. Disbursement of funds will be done by the agency, which accumulates them, to the parent organizations of the research teams in accordance with the annual budget, as approved by CONCOM.

VI. COMMENCEMENT DATE

A. Inauguration

There was unanimous agreement on a need to undertake urgent action to initiate the project. Once the project has approval; action should be taken to appoint the consultant manager and committee, and to authorise them to advertise for the team leader and technician for control agents, and to start the population dynamics study.

B. Interim Arrangements

Pending the appointment of the Project Manager, Dr T.D. St. George of CSIRO, in consultation with the delegates at the meeting of 4 September 1985, is prepared to assist the setting up of the project.

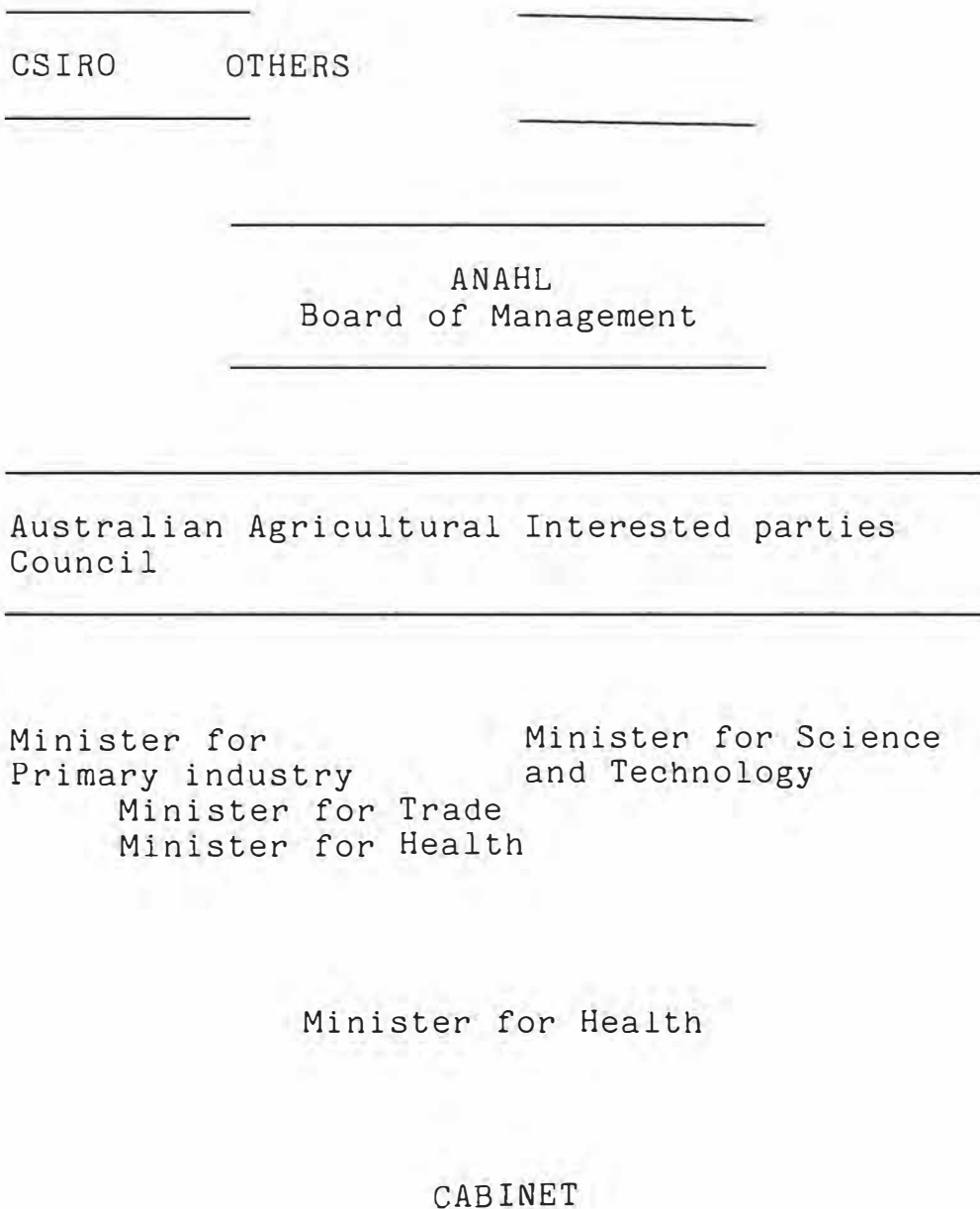
C. Target Date

A target date for the first expenditure should be 1 January, 1986. To meet this date, approval of the project proposal and budget outline is necessary at the October meeting of Standing Committee.



APPENDIX I

Flow Chart for Introducing Exotic Viruses



\_\_\_\_\_ formal proposal  
 - - - - - comment

APPENDIX II

Structure of Project

CONCOM

Consultant Manager

Management Committee  
Chairman (Consultant Manager)  
Members:  
Specialist in Wildlife Management  
Specialist in Infectious Disease  
Ecologist/Population Biologist

<u>Team Leader</u>	<u>Team Leader</u>
Population Dynamics Team (Northern Territory)	Control Agents Search Team (James Cook University)*

\* Technical support by Queensland Department of Primary Industries, Animal Health Station, Oonoonba, may be necessary.

## APPENDIX III

## Outline of Budget in Fiscal Years

<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4*</u>		
1 Jan - 30 June			1 Jul - 31 Dec		
Population Dynamics NT		47,000*	45,500	54,000	28,000
Control Agent Team		49,000	81,000	82,000	42,000
Overseas Travel		9,500			
Consultant Manager		3,000	6,000	6,000	3,000
Annual Meeting Townsville		2,000	2,000	2,000	-
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\$101,000	\$1 44,000	\$144,000	\$ 73,000		

\* includes costs of appointment of staff namely advertisement, selection and removal expenses.

Detail - Year 1 Budget (6 months)

<u>Control Agent</u>	<u>Population Dynamics</u>	<u>Team</u>	<u>Team</u>	
<u>Nonrecurring costs</u>				
Motor Vehicle - 4 Wheel Drive			10,000	15,000
Motorbikes -		3,000		
Camping Equipment		-	2,000	
Other equipment		5,000	3,000	
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\$ 15,000	\$ 23,000			

Recurrent costs

Post-doctoral fellow students \$ 10,000	16,000	** Stipends, 2 PhD	
Technical 8,000 **			-
Overhaul charges parent institution			4,000
Maintenance 5,000			7,000
Travel 1,000			2,000
Air charter -			4,000
Computing -			1,000
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\$ 34,000	\$ 24,000		

\*\* includes on costs such as leave loadings, superannuation etc.

# *MEDIA RELEASE*

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MR TERRY McCARTHY,  
MINISTER FOR CONSERVATION

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REF:D-186

DATE://

CABINET WAS TOLD TODAY OF A TERRITORY GOVERNMENT INITIATIVE ON AUSTRALIA'S CANE TOAD PROBLEM THAT'S LED TO A HALF A MILLION DOLLAR RESEARCH PROGRAM BACKED BY FIVE GOVERNMENTS.

THE RESEARCH IS DESIGNED TO LAY A BASIS FOR FUTURE BIOLOGICAL CONTROL OF CANE TOAD POPULATIONS AND WILL CONTINUE FOR THREE YEARS.

IN A REPORT TO CABINET ON THE PROGRAM, THE CONSERVATION MINISTER, MR TERRY McCARTHY SAID A TERRITORY GOVERNMENT PROPOSAL TWO YEARS AGO FOR A NATIONALLY CO-ORDINATED APPROACH TO THE CANE TOAD PROBLEM HAD FINALLY RESULTED IN THE COUNCIL OF CONSERVATION MINISTERS ADOPTING A RESEARCH STRATEGY.

THE PROGRAM IS JOINTLY SPONSORED BY STATUTORY AUTHORITIES RESPONSIBLE FOR NATIONAL PARKS AND WILDLIFE IN QUEENSLAND, NEW SOUTH WALES, WESTERN AUSTRALIA, THE NORTHERN TERRITORY AND THE AUSTRALIAN NATIONAL PARKS AND WILDLIFE SERVICE.

THE RESEARCH WILL BE PLANNED AND CO-ORDINATED BY A SPECIAL MANAGEMENT COMMITTEE HEADED BY PROFESSOR R. CAMPBELL OF THE SCHOOL OF TROPICAL VETERINARY SCIENCE AT THE JAMES COOK UNIVERSITY IN TOWNSVILLE.

RESEARCH WILL CENTRE ON THE POPULATION BIOLOGY OF CANE TOADS IN THE QUEENSLAND/NORTHERN TERRITORY GULF COUNTRY AND AROUND TOWNSVILLE, AND INVESTIGATE PATHOGENS CURRENTLY INFECTING CANE TOAD POPULATIONS IN AUSTRALIA.