RECOVERY PLAN FOR THE NUMBAT

Endangered Species Program - Project No. 351

Review of the recovery process

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for the Numbat Recovery Team

1. INTRODUCTION

The Numbat (*Myrmecobius fasciatus*) is one of Australia's more threatened mammals. Since European settlement, its distribution has shrunk to less than 1% of its former extent and numbers had fallen well below 500 by the late 1970s. Intensive research aimed at the conservation of the species commenced in 1980, and even since then a number of small populations have become extinct. Total population numbers are still below 1500, and a very substantial increase in population numbers is required before the Numbat can be regarded as secure.

Only two original populations have survived, at Dryandra Woodland and Perup Nature Reserve in the south-west of Western Australia. Fox control by regular distribution of 1080 meat baits has caused substantial increases in those two populations. A reintroduced population, at Boyagin Nature Reserve 40 km north of Dryandra, was judged to be self-sustaining by 1994. Establishment of further Numbat populations is under way through translocation, predominantly from Dryandra, to areas of former occurrence in Western Australia and one site in South Australia (Friend 1994).

The Numbat Recovery Team was established in 1993. The Recovery Plan for the Numbat (RP) was completed in 1994. The Plan presents objectives and criteria for recovery of the species and specifies a number of actions to achieve recovery to be carried out over the 10 years from 1995-2004, extending the research and conservation program that has been in progress since the early 1980s (Friend 1994). The RP was submitted to the Australian Nature Conservation Agency, ANCA (now Environment Australia, EA) in May 1994 as an application for funding under the Endangered Species Program for 1994/95. This application was successful, the funding requested was granted in that year and the program was approved for three years. Consequently, from January 1995, the Western Australian Department of Conservation and Land Management received funding through the Endangered Species Program of ANCA to implement the Recovery Plan for the Numbat. A review of the progress of the recovery process is now required by EA before further funding is considered.

2. RECOVERY ACTIONS

4.1 Management of existing populations

4.1.1 Exotic predator control

1995-1997 funding: $88 488 (13.6% of Total Cost); CALM $88 488, ESP $0

- ***Progress made to date.***

The recovery plan identifies the existing populations of numbats as those at Dryandra Woodland, Perup/Kingston and Boyagin NR, all in the south-west of Western Australia. Fox control by 1080 baiting has been carried out in all these areas since prior to the implementation of the current Recovery Plan. All baiting undertakings in the RP were completed in from January 1995 to the present time.

In addition, some further baiting in those areas has been commenced or will be implemented in the next year. In January 1995, Dryandra and Boyagin were being baited monthly and Perup/Kingston twice each year. Through the implementation of the Western Shield program in 1996, baiting at Perup/Kingston has been brought in line with the minimum Western Shield baiting standard, that is four times per year and is now carried out by aircraft with perimeter baiting from the ground. The effectiveness of the baiting program is not assessed directly through monitoring fox numbers, but by monitoring fauna response. Baiting intensity has been extensively researched by Kinnear and others (e.g. Kinnear *et al.* 1988) and baiting programs are designed around the experimental regimes that were found to reduce fox densities by over 90% (CALM 1997). At Dryandra, the largest two blocks, measuring approximately 18 000 ha, have been baited monthly since 1989. During the next year, baiting will be extended to a further 9 satellite blocks, comprising an additional baited area of 9 131 ha.

At the present time there is still no proven inexpensive cat control method available. Predation by cats has not been a very large source of mortality amongst monitored numbat populations, but there is a possibility that significant predation by cats may inhibit future translocations to semi-arid sites. Intensive work by CALM on the development of a cat bait that may be spread from the air, and research by CALM in association with the Victorian Institute of Animal Science on a cat-specific toxin has been progressing well. It is likely that an operational cat bait will be available soon. No funding for cat control for numbat translocations was identified in the current RP.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** This is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** This action is entirely funded by CALM and is crucial to the plan. The result of discontinuing this action would be reinvasion by foxes and the collapse of the mammal faunas of these areas, including the numbat populations.

- ***Has alternative means of resourcing the action have been sought?*** This action is now funded through Western Shield, an extensive program funded by CALM and corporate sponsors to control exotic predators in strategic reserves and reintroduce locally extinct vertebrates.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.1.2 Monitoring of existing populations

1995-97 funding: $47 845 (7.4% of TC); CALM $26 433, ESP $21 412

- ***Progress made to date.***

Driven surveys have been carried out at Dryandra, Boyagin and Perup/Kingston in 1995 and 1996 and are currently being completed for 1997. The results of these surveys have been documented as sighting rates per 100 km in annual reports and progress reports to EA as appropriate.

The annual driven survey is carried out at Perup in February or March, at Boyagin in October and at Dryandra in November. After a strong decline in sighting rates at Dryandra in 1993 (prior to the implementation of the RP), a further annual survey was implemented, in April. This has been carried out each year since 1994. In 1994 a more intensive monitoring program was implemented at Dryandra, based on the regular checking of radio-collared animals. This program continues, but so far has revealed that there are no unusual causes of mortality still operating. The rapid decline in numbers ceased in 1993 and it appears that it was the result of the numbat population outstripping the carrying capacity of the environment at Dryandra.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** This is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** *Yes.*

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** If this action were discontinued it would be impossible to assess whether the existing populations can sustain the removal of animals for the translocation program and some or all of the existing populations could be over-harvested. Three of the four Criteria for Recovery could not be assessed.

- ***Have alternative means of resourcing the action have been sought?*** As foreshadowed in the RP, CALM District staff have been increasingly involved in the monitoring effort at all three sites, in order to train local officers and to ease the increasing load on SID and EA-funded staff. This has involved Narrogin District staff at Dryandra and Boyagin and Manjimup District staff at Perup/Kingston. In 1997, however, Narrogin District staff have been withdrawn from monitoring, due to a funding crisis within the Department (see also Action 3.4.4). In December 1996, an additional driven survey at Perup/Kingston was undertaken, with the assistance of volunteers from the Friends of Perup group, using the RP survey routes. It is proposed to carry this out annually at the optimum time of year in late November, when SID staff cannot carry a survey at Perup because they are committed to the Dryandra monitoring. There is concern, however, about the consistency of results where different personnel carry out the surveys each year. It is unlikely that using current methods, volunteers will be able to entirely replace staff in driven surveys.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.1.3 Habitat management research

4.1.3.1 Effectiveness of silviculture guidelines

1995-1997 funding: $27 298 (4.2% of TC); CALM $27 298, ESP $0

- ***Progress made to date.***

During the writing of the RP, logging commenced in the Kingston forest area adjacent to the Perup NR. This offered a possibility to assess the impact of logging on numbats. The method proposed was to radio-track at least three numbats before, during and after logging, monitoring the effect of logging on their use of logs and burrows. This would allow an assessment of whether the current silviculture guidelines under which logging is carried out in WA provided adequately for the numbat's requirements.

The sole method of capture available at Kingston was to drive along logging tracks until a numbat was sighted, then chase it on foot into a log. However, low numbat densities in the whole Perup/Kingston area at that time resulted in the capture of only two numbats in logging coupes in the Kingston forest. One of these was in an area in which logging had already commenced. Both numbats were radio-tracked for four days, recording all day refuge and night dens. Both transmitters failed before the next session of radio-tracking could be carried out. The result was that an assessment of the effectiveness of the silviculture guidelines in adequately providing for the numbat was impossible based on the data collected, other than a broad comparison of the types of shelters and dens used by the animals in the logged and unlogged situations. Further searches for animals in the coupes were unsuccessful. It was concluded that the methodology used was inappropriate for the situation and that an alternative study method should be devised.

- ***Is the action is running to schedule?*** No.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No.

- ***Is the action is scheduled to continue into the next plan or phase of funding***: According to the existing RP, the action is scheduled to finish in 1997. The RP is currently being revised. At the review meeting in October 1997 the Recovery Team decided that further research using a more appropriate experimental design would be incorporated in the revised plan.

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** This action is entirely funded by CALM. The impact of not continuing funding for it is that the action will not be carried out. Consequently, the current situation will persist, that is, no areas where logging is proposed will be considered as reintroduction sites and the effect of logging in areas of existing populations (i.e. Kingston) will be unknown. This may have an impact on the ability to meet Objective (i) and Criterion 2).

- ***Have alternative means of resourcing the action have been sought?*** The RT's decision was to ask CALM to continue to resource this action.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.1.3.2 Effect of hazard reduction burning in jarrah forest

1995-1997 funding: $0 (0% of TC); CALM $0, ESP $0

- ***Progress made to date.*** This action is not scheduled in the current RP until 1999.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few month?*** No.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** It is scheduled to commence in the next phase of funding.

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** If funding were not available for this action it could not be carried out. As the agency responsible for the management of most current and proposed numbat habitat, CALM would then be unable to assess the effect of the prescribed burning necessary for hazard reduction and it would be impossible to manage fire to the benefit of species recovery. This is also an important question in relation to public perceptions of forest and threatened species management.

- ***Have alternative means of resourcing the action have been sought?*** No.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.1.3.3 Research on Numbat home range size

1995-1997 funding: $25 852 (3.9% of TC); CALM $9 156, ESP $16 696

- ***Progress made to date.*** This action was scheduled to commence in 1997 and finish in 1998. During 1997, the home ranges of six numbats at Dryandra (3 males and 3 females) have been determined by radio-tracking over two weeks in June and two weeks in September. Another radio-tracking session is proposed in December. At Perup, only two numbats (one male, one female) were captured. Home ranges were determined in September.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No. This action is currently scheduled to be completed at the end of 1998.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** If funding were not available for this action it could not be carried out. Accurate home range data would not be available for estimation of carrying capacities for planning purposes and to assess the effect of removing animals for translocation. Criterion 4) of the RP requires a minimum total number of animals of 4 000. Currently estimations of the carrying capacity of given habitat (e.g. the Appendix to the Recovery Plan) are based on knowledge of the home range size and social organisation of numbats. Home range data currently available were collected at Dryandra in the early 1980s when numbat densities were much lower than they are now. These data may not be relevant to carrying-capacity calculations.

- ***Have alternative means of resourcing the action have been sought?*** Volunteers have been used to assist project staff. However, the availability of skilled volunteers is limited.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.1.4 Modification and implementation of prescriptions

1995-1997 funding: $0 (0% of TC); CALM $0, ESP $0

- ***Progress made to date.*** This action is required when new information becomes available through research in relation to land management practices that may impact on numbat recovery (chiefly Actions 4.1.3.1 and 4.1.3.2). As yet, there is no major new information available through the actions in this section.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** This action is ongoing.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** This action has no funding identified. The action must continue in order to incorporate the results of research into management.

- ***Have alternative means of resourcing the action have been sought?*** N/A.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.2 Genetic survey of existing populations

1995-1997 funding: $0 (0% of TC); CALM $0, ESP $0

- ***Progress made to date.*** This action is scheduled to be carried out at five-year intervals. It consists of a survey of the genetic variability within and between populations, both existing and reintroduced. The first of the two surveys is scheduled for 1999.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** N/A.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it:*** If funding were not available for this action it could not be carried out. Although samples can be collected without additional cost, the DNA analysis and consumables such as reagents used in the analysis require the availability of funds. If the action is not carried out, loss of genetic variability in existing or reintroduced

populations would not be detected and the need for corrective measures would not be known.

- ***Have alternative means of resourcing the action have been sought?*** No.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.3 Translocation

4.3.1 Selection of reintroduction sites

1995-1997 funding: $4 744 (1.0% of TC); CALM $4 744, ESP $1 780

- ***Progress made to date.*** Although a tentative program of translocations was included in the RP, it was necessary to carry out detailed inspections of proposed reintroduction areas to make a final decision on their suitability and if suitable, to select release sites. In 1995 the scheduled translocation to Dragon Rocks was carried out after a trip for habitat inspection and selection of a release site. In 1996, a translocation to Dale Conservation Park was carried out after a further unsuccessful survey for surviving populations in the northern jarrah forest and inspections of a number of promising reintroduction sites. In 1997, the recovery team decided to postpone the scheduled translocation to Karroun Hill NR pending the development of an operational cat bait and further investigation of the distribution of numbat habitat in that reserve. The RT decided instead to carry out a release at the Stirling Range National Park. A preliminary inspection of proposed release sites has been carried out and a final decision will be made after another visit. No costs for site selection had been allowed for in the 1997 budget because the past release site at Karroun Hill NR was to have been used again.

- ***Is the action is running to schedule?*** Yes.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes, this action is scheduled for completion in 1999

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding were not available for this action it could not be carried out. If site selection visits were not carried out, there would be a risk of selection of sub-optimal release sites. Site selection visits also allow location of release sites and streamline the release procedure so that the transfer can be accomplished in the minimum time.

- ***Have alternative means of resourcing the action have been sought?*** Yes. It has been necessary to divert other funds to carry out the unscheduled site inspections in 1997.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** The only change to this action has been consequent on the change of 1997 translocation site from Karroun Hill NR to Stirling Range NP. The implications of this change are discussed under action 4.3.3.

4.3.2 Exotic predator control

1995-1997 funding: $70 008 (10.8% of TC); CALM $5 724, ESP $64 284

- ***Progress made to date.***

This action concerns baiting programs at translocation sites that was not being carried out by CALM. In 1995 it involved the maintenance of the baiting program at Karroun Hill NR and implementation of the new baiting program at Dragon Rocks NR. In 1996 it involved no funds for new baiting as the new translocation site, in the northern jarrah forest, was already being baited under Operation Foxglove. Again in 1997 no funds for new baiting were requested as the scheduled translocation was to Karroun Hill NR, where baiting under the Numbat RP was already being carried out. With the change from Karroun Hill NR to Stirling Range NP, funds for baiting will be provided by CALM, since baiting has commenced there under the south coast section of the Western Shield program (dubbed "Coastal Storm").

When the baiting of Karroun Hill NR was taken over by the Western Shield program, baiting frequency was increased from twice to four times per year, in line with all Western Shield operations.

- ***Is the action is running to schedule?*** Yes.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding were not available for this action it could not be carried out. There is little doubt that translocations would fail and the reintroduced populations would die out if fox control were withdrawn.

- ***Have alternative means of resourcing the action have been sought?*** Yes. Recently the expanded baiting program under Western Shield has taken over the baiting at Karroun Hill NR and Dragon Rocks NR. In future this cost will be borne by the Western Shield budget..

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** The only change to this action has been consequent on the change of the 1997 translocation site from Karroun Hill NR to Stirling Range NP. The implications of this change are discussed under action 4.3.3.

4.3.3 Translocation program

1995-1997 funding: $78 207 (12.0% of TC); CALM $15 378, ESP $62 829

- ***Progress made to date.*** The RP established a tentative translocation schedule, as discussed under Action 4.3.1. The scheduled translocations were carried out in 1995 (to Dragon Rocks), with some more animals being released at Batalling. In 1996, the second scheduled release at Dragon Rocks and the first release in the northern jarrah forest (at Dale CP) were carried out.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No; this an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding were not available for this action it could not be carried out. It would be impossible to meet Criterion 4, which requires the establishment of six self-sustaining populations in addition to Dryandra, Perup/Kingston and Boyagin. Currently only one other population, (Tutanning) can be confidently regarded as self-sustaining, with the possible addition of the small Yookamurra population in South Australia.

- ***Have alternative means of resourcing the action have been sought?*** No.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.3.4 Monitoring reintroduced populations

1995-1997 funding: $104 292 (16.1% of TC); CALM $28 401, ESP $75 891

- ***Progress made to date.***

This action concerns the program by which the status of new populations (i.e. those additional to the "existing" populations) is monitored. Monitoring involves three phases: the first, intensive phase during which radio-collars are maintained on animals

and young of collared animals are collared if possible and all collared animals are checked every month or two; the second phase, during which diggings searches are conducted in order to monitor the spread of the population; and the third phase, involving a regular driven survey, which is commenced at a stage when the population has grown sufficiently that sightings are likely. Only at the third stage can population numbers be calculated.

Thus in 1995 this action concerned the monitoring of populations at Tutanning (phase 3) and Batalling (phase 1). In 1996, phase 1 monitoring was carried out at Dragon Rocks NR and at Batalling and phase 3 monitoring at Tutanning. In 1997, phase 1 monitoring has been carried out Dale CP and Dragon Rocks, phase 2 monitoring at Batalling and phase 3 monitoring at Tutanning.

The results of this monitoring can be summarised as follows: the population at Tutanning is now self-sustaining; at Batalling and Karroun Hill numbats can still be found several years after the last release, but there is no evidence of continued population growth. At Karroun Hill the situation is difficult to assess because of the lack of vehicle access within the reserve. At Dragon Rocks the survival and breeding rate of released animals and their young has been very high. As the most recent release was less than 12 months ago it is too early to make a judgement of self-sustainability but the situation is very promising. At Dale CP the 20 released animals dispersed very widely from the release site and only 6 were located, none close to each other. Neither of the two surviving collared females produced young. Much better results are required over the next two years for there to be any hope of producing a self-sustaining population.

- ***Is the action is running to schedule?*** Yes

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding were not available for this action it could not be carried out. If new populations were not monitored, the situation might exist where released animals were not surviving and further releases were made without the problem having been resolved. Without this action, it would be impossible to assess the status of the new populations and also whether criterion 4 was satisfied.

- ***Have alternative means of resourcing the action have been sought?*** Yes. As with Action 4.1.2, until recently CALM District staff assisted with all three phases of monitoring reintroduced populations. In the second half of 1997 this assistance was withdrawn by Narrogin and Katanning Districts due to budgetary constraints. Clearly this action involves an increased workload with each new translocation site. This workload will only begin to decrease as monitoring can move into phases 2 and 3. So far, District involvement has not resulted in a decreased annual workload for SID staff. If assistance is not forthcoming, it may be impossible to

adequately monitor new populations without additional project staff. In revising the RP, firm commitments will be required from all parties before the plan is finalised.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.3.5 Genetic management of populations

1995-1997 funding: $0 (0% of TC); CALM $0, ESP $0

- ***Progress made to date.***

This action involves the transfer of individuals between populations if appropriate, in order to maximise genetic variability and to link the populations genetically. The program has not commenced because the genetic comparison of the Dryandra and Perup populations is running well behind schedule and the results are not known.

The in discussions during the review the Recovery Team decided that animals would not be moved around between populations for this purpose until the results of the five-year review (Action 4.2.) are known.

- ***Is the action is running to schedule?*** Yes.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** This action places no additional costs on the program, as animals can be captured and moved during other operations. It has a low priority until the results of the genetic comparison are known.

- ***Have alternative means of resourcing the action have been sought?*** No. No specific funds are required for this action.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.4 Health monitoring

1995-1997 funding: $11 400 (1.8% of TC); CALM $6 300, ESP $5 100

- ***Progress made to date.***

This action proposed the collection of blood and faecal samples before and after translocation in order to monitor health status of individuals through this process. After the finalisation of the RP in 1994, some further investigations were made on field anaesthesia of numbats for blood sampling. It was concluded that blood sampling in the field was too traumatic at the best of times, let alone prior to translocation. Faecal samples have been collected and analysis of faecal parasite levels has been carried out for numbats from most populations. However the proposed thorough faecal screening needed to detect the presence/absence of a potentially lethal acanthocephalan infection was not possible because it was too time consuming for Murdoch Parasitology laboratory to perform. It has not yet been possible to divert SID personnel from field duties for sufficient time to carry out this work.

In the meantime, all numbats are wormed by subcutaneous injection with Ivomec before release in the wild.

- ***Is the action is running to schedule?*** No.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** This action is scheduled to continue into the 1998 funding phase. Funds will be used to complete faecal parasite screening of numbats from all populations. The RP to be revised during 1998 will contain some health monitoring, but perhaps in another form.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding is not available it will be impossible to finalise basic faecal screening. This aspect of health monitoring is inexpensive and easily carried out with no trauma to the animals.

- ***Have alternative means of resourcing the action have been sought?*** Attempts have been made to carry out acanthocephalan screening in-house but it has proved to be too time-consuming.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** This action has been changed in that the blood sampling was found to be impractical. This action is not directly related to the success of the plan or to meeting objectives and criteria, but it may give early warning of problems which might only be picked up later through detected mortality, lack of breeding or low juvenile survival.

4.5 Captive breeding

1995-97 funding: $180 000 (27.7% of TC); Perth Zoo $180 000, CALM $0, ESP $0

- ***Progress made to date.***

At the commencement of funding in 1995, 16 young numbats captive-bred at Perth Zoo had just been released at Batalling and Tutanning as part of the 1994 translocation program. In all, 19 young had been bred and raised to weaning at Perth Zoo following the record-breaking 1994 breeding season. Since the operation of the RP, the breeding success has been lower. In 1995, five young were bred and raised to independence, in 1996, none and in 1997, 4 young have been bred and raised to independence.

Over the last two years a more scientific approach has been taken to the management of breeding in the numbat program at Perth Zoo. Husbandry procedures have been accurately recorded and monitored, and varying management regimes have been tried to measure differential success. This program promises to result in more consistent breeding success in future.

This action has contributed towards the numbat recovery effort by forming a valuable resource for raising public awareness of the plight of the numbat and work involved in the recovery effort. It has not yet provided a significant source of animals for the reintroduction program, which still relies on wild-wild translocation. The current holdings at Perth Zoo comprise 12 wild-caught and 8 captive-bred animals (not counting the four wild-born young mentioned below), so the colony still relies on a substantial input of animals from the wild.

In 1997 two individuals were brought into captivity from the wild population at Dryandra in order to increase the founder population of the captive breeding colony. A new strategy was trialled, by bringing in a female with four young, with the intention of releasing her young as part of the translocation program after weaning. All four young are now weaned. If the young show similar survival rate after release as wild-raised translocated young, this strategy could be used increasingly in future as a method to reduce the predation of wild-bred young prior to translocation.

In March 1997, by arrangement with CALM and PWCNT two old captive-bred females were transferred from Perth Zoo to Alice Springs Desert Park for display. This is the first transfer of numbats from Perth Zoo to another institution and will greatly increase public awareness of numbats.

- ***Is the action is running to schedule?*** Yes.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** If funding were not available for this action it could not be carried out. This action is entirely funded by Perth Zoo and its sponsors.

- ***Have alternative means of resourcing the action have been sought?*** Yes, through Perth Zoo's public sponsorship program and corporate sponsors.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

4.6 Public awareness and support

4.6.1 Education and publicity

1995-1997 funding: $9 475 (1.5% of TC); CALM $8 475, ESP $1 000

- ***Progress made to date.***

This action proposed the formulation of an education strategy to increase public awareness by CALM in co-operation with other relevant organisations. The approach taken by CALM has been to develop a holistic program relating to the recovery of native mammals through the Western Shield program. On advice from EA, a schools program was not developed, but schools have been involved in public relations events such as the launch of Western Shield, and through the positive response by project staff to the demand for talks on the numbat recovery and other topics related to conservation of native mammals. The Western Shield program involves a community-based education strategy that targets the public in rural areas near reintroduction sites. Public awareness is being raised through the development of an presentation package to assist CALM officers, and the production of brochures outlining the program. Amongst the aims of the strategy is to gain support for community fox-baiting programs near reintroduction sites and if appropriate, to involve local volunteers in population monitoring work. Funds were raised for the production of a brochure on the numbat recovery program (see below). The brochure has been drafted and will soon be finalised.

- ***Is the action is running to schedule?*** Yes.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** This action is ongoing.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** This is a vitally important action. If funding were not available for it, many aspects of education and publicity would have to be funded from alternative sources.

- ***Have alternative means of resourcing the action have been sought?*** Funds for the production of a brochure were sought from the Royal Australian Mint from the special release of a silver $10 coin on which an image of the numbat appears, and $1000 was received as a result.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

- ***Describe education activities carried out.***

During the funding period 1995-97, the Chief Investigator has given 40 talks to schools, naturalists clubs and "Friends" groups as well as other public seminars on this topic. In addition, he is Course Leader for CALM's Dryandra Woodland Ecology Course, a two-day course for the public which is run twice a year by Narrogin District and SID and includes a session on the numbat recovery program. The Senior Technical Officer gave a talk on numbat conservation in September 1997 to a Mammal Conservation Course for the public at Perth Zoo. The Western Shield numbat release at Dale CP involved participation by about 70 students from a local school.

Project staff have been involved in the making of a documentary on the numbat

- ***Describe public awareness and consultation carried out.***

Liaison with neighbours in all numbat population sites in relation to baiting.

- ***Number, names and nature of groups and the number of group members actively involved with the project.***

Friends of Perup, 15 members involved in annual numbat survey.

- ***Describe on going community commitment.***

- The Friends of Perup are now committed to carrying out this survey annually.

- ***Describe planned activities or refinements to activities***

Rewriting this section of the RP in the upcoming review, to set clearer aims for the generation of public awareness and support. These will include a plan to encourage such actions as buffer baiting, corridor planting and increased volunteer input.

4.6.2 Grants and sponsorships

1995-1997 funding: $4 410 (0.7% of TC); CALM $4 410, ESP $0

- ***Progress made to date.***

Funds for the production of a brochure were sought from the Royal Australian Mint from the special release of a silver $10 coin on which an image of the numbat appears. $1000 was received as a result.

Funding has also been gained to support the numbat recovery program through the profits from the Dryandra Woodland Ecology Course (see under Action 4.6.1). Participants are currently charged $185 each for the weekend and 30% of profits go towards the numbat recovery program. In the 1995-97 funding period this course has produced $ 1 373 to pay for extra transmitters required for work on the numbat RP.

Large grants to CALM from corporate sponsors, such as Alcoa and Capel Sands have funded the enlarged baiting program (Western Shield) over areas in the south-west of the state including Karroun Hill, Dragon Rocks and the northern jarrah forest. These baiting campaigns have directly benefited the numbat recovery plan and have allowed a decrease in the funding requested from EA. The Western Shield project specifically includes the numbat.

- ***Is the action is running to schedule?*** No schedule was drawn up in the RP.

- ***Has the action has been successfully completed or will it be completed in the next few months?*** No, this is an ongoing action.

- ***Is the action is scheduled to continue into the next plan or phase of funding?*** Yes.

- ***If the action is ongoing, discuss the impact of not continuing funding for it.*** Funding required for this action include an input by CALM's Sponsorship Co-ordinator. This input is necessary and desirable due to CALM's sponsorship policy.

- ***Have alternative means of resourcing the action have been sought?*** N/A.

- ***If the action has been changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.

3. OBJECTIVES AND CRITERIA:

Progress towards meeting the criteria and likelihood of meeting the objectives: Criteria 1)-3) relate to Objective (i), ensuring that the species persists within its present range. They specify sighting rates during driven surveys which should be maintained at Dryandra, Perup/Kingston and Boyagin. These sighting rates have not always been achieved in surveys (Table 2) and it appears that they were too high, having been set while the populations were at high levels following the introduction of fox control. A possible problem at Dryandra is that animals are captured for translocation by driving along many of the tracks that are also used for the driven survey. It is possible that the regular removal of established adults results in artificially depressed sighting rates along the standard route. This will be addressed in future by attempting to procure adults on other tracks, and by sourcing some animals for translocation from other reserves, such as Boyagin.

Criterion 4 relates to objective (ii), increasing the range of the species. It specifies that six or more new populations need to be established. During the current funding period, substantial progress has been made towards this 10-year goal. Tutanning has been shown to be a self-sustaining population, and Dragon Rocks promises to be self-sustaining soon. The contribution of Batalling is not clear, but occasional surveys over the next 2-3 years will show whether it has reached self-sustaining status. Karroun Hill will need further translocations and monitoring before its potential contribution can be fully measured. The potential contribution of Yookamurra to the recovery effort still needs to be assessed, and while numbats have persisted at Karakamia, the small extent of habitat there means that it will always be at high risk of losing its population through stochastic processes.

The first three years of funding have indicated that the goal of six new populations is definitely achievable in the 10-year time frame.

Threats: The major threats to achievement of these objectives are as follows:

Cats. The potential of predation by feral cats in the more arid regions and in the semi arid areas over long time periods is still unknown. There is still no operational cat bait, although the development of a bait has made substantial progress in the last three years.

Fire. Reserves in the eastern wheatbelt have been managed by a policy of excluding fire. The possibility of a large fire at Dragon Rocks or the Stirling Range cannot be discounted, and while numbat populations can recover after fire, a large fire may reduce the carrying capacity of an area for several years.

Discontinued funding. The numbat translocation program is high in cost as monitoring is labour-intensive and requires a high skill level. Given departmental budgetary constraints over the last year, it has been impossible to incorporate more of the monitoring work into District activities. This has resulted in an excessively high field commitment by the project staff and costs which exceed the budget. It is likely

that if external funding were unavailable, the numbat recovery program would fail to meet the current objectives.

Amending the criteria to meet 1994 IUCN Red List categories: The categories relevant to the numbat are Endangered, Vulnerable and Near Threatened (Conservation Dependent). As it currently meets the criteria for Vulnerable but not Endangered, the revised objectives might include the down-listing of the species from Vulnerable to Conservation Dependent.

As only one of the criteria A-E needs to be satisfied for listing as Vulnerable, all must be exceeded (failed) for removal from the category.

Criterion A is exceeded if:

> The population has not suffered a reduction of 20% or more over the last 10 years (based on any of A1a-e), and is not expected to experience such a reduction over the next ten years (based on any of A1b-e).

Criterion B is exceeded if:

> Extent of occurrence is greater than 20 000 km^2 *and* area of occupancy is greater than 2 000 km^2 *or* two of the following are true:
>
> there are more than ten subpopulations
> continuing decline in any of B2a-e is absent
> extreme fluctuations in any of B3a-d are absent
>
> Only self-sustaining subpopulations are used in this analysis.
>
> Extent of occurrence: Counting only Dryandra, Perup/Kingston, Boyagin and Tutanning, the extent of occurrence is about 5 000 km^2. With Dragon Rocks it is 10 000 km^2, and with Karroun Hill it is 50 000 km^2. If an interstate location such as Yookamurra is added, 20 000 km^2 is greatly exceeded.
>
> Area of occupancy is currently about 800 km^2. Adding Dragon Rocks gives 1 100 km^2, and with Stirling Range NP, 2300 km^2 is achieved. Karroun Hill is 3 000 km^2 in area but it has apparently been only patchily occupied by numbats so far and it might never be appropriate to include the whole area.
>
> There are currently four self-sustaining subpopulations. If Karroun Hill, Batalling, Dragon Rocks, the northern jarrah forest and SRNP achieve self-sustaining status and Yookamurra is included, this would have increased to the ten required.
>
> Once all those standards are met, the lack of either continuing decline or extreme fluctuations must be demonstrated before this criterion is exceeded.

Criterion C is exceeded if:

> Although there is an *estimated* continuing decline of more than 10% over 10 years, *or* although there is continuing decline (*observed, projected or inferred*) and no subpopulation greater than 1 000 mature individuals, the total population is greater than 10 000 mature individuals.
>
> It is likely that a single subpopulation of 1 000 adult numbats will be achieved before a total population of 10 000. At that stage, the issue of continuing decline, either estimated at 10% over 10 years, or observed, projected or inferred (no value given) will be the key to exceeding this criterion. Population growth, or at least stability, needs to be demonstrated.

Criterion D is exceeded if:

> The total population is greater than 1 000 mature individuals, the area of occupancy is greater than 100 km^2 *and* there are 5 or more self-sustaining populations.
>
> The first two components are already exceeded, so this criterion will be met when it is judged that another subpopulation is self-sustaining (in addition to Dryandra, Perup/Kingston, Boyagin and Tutanning).

Criterion E: Quantitative analysis is more important in meeting the criteria for Vulnerable than for removing a species from that category.

The key features to include in the recovery criteria for the numbat in order to incorporate the 1994 IUCN Red List criteria appear to be:

(i) at least ten populations
(ii) at least one population over 1 000
(iii) extent of occurrence greater than 20 000 km^2
(iv) area of occupancy greater than 2 000 km^2
(v) either a total population over 10 000, or continuing decline estimated at less than 10% over 10 years, or not observed, projected or inferred.

The Recovery Criteria should be amended for the next plan to incorporate these key features.

Changes to Objectives and Criteria: There were only two changes to the Actions. The first was to Action 4.3,the translocation program, in that the Stirling Range National Park was chosen for the 1997 translocation instead of Karroun Hill Nature Reserve, because of the lack of an operational cat bait and because of the success of the translocation to vegetation of similar structure at Dragon Rocks. The RT made the judgement that this change would increase the likelihood of a self-sustaining population resulting from the translocation commencing in 1997. In addition, it would be easier to determine the status of a numbat population at the SRNP than at KHNR, and therefore easier to assess the program against the RP criteria.

The second change was to the Action 4.4, Health Monitoring. This action has been changed because the proposed blood sampling in the field was found to be impractical. This action is not directly related to the success of the plan or to meeting objectives and criteria, but it may give early warning of problems which might only be picked up later through detected mortality, lack of breeding or low juvenile survival.

4. CONSERVATION STATUS:

Current status: Application of the 1994 IUCN Red List criteria results in the classification of the numbat as Vulnerable. The numbat satisfies the following criterion for Vulnerable:

D2 *Population is characterised by an acute restriction in its area of occupancy (typically less than 100km^2) or in the numbers of locations (typically less than 5).*

There are only four self-sustaining numbat populations (Dryandra, Perup/Kingston, Boyagin and Tutanning). With respect to application of the five year rule, whereby taxa should not be moved to a lower category of threat until the criteria for the higher category have been breached for over five years, only three self-sustaining populations should be considered, because in 1992 the Tutanning population had not reached a self-sustaining state.

Population change over time: The current program of numbat conservation research, commenced in 1981. At that stage there were populations in the northern jarrah forest and on the Swan coastal plain, as well as at Dryandra and Perup. By 1985, however, only the two latter populations survived. By that stage the Dryandra population had begun to recover, under the experimental baiting program. It is estimated that in the late 1970s the Dryandra population was as low as 100 animals, and there were probably not many more at Perup, although driven surveys were not being conducted there then. The total population was probably as low as 300 animals. By 1992 the population of the main block of Dryandra alone had risen to 450 adults and a new population had been established at Boyagin by translocation. Total numbers at that stage were probably around 1 000. Since then, a further small self-sustaining population has been established at Tutanning, there are persisting populations of unknown status at Karroun Hill and Batalling, and another population at Dragon Rocks that promises to be self-sustaining within two years. Smaller populations exist within fenced enclosures at Yookamurra (SA) and Karakamia (WA). The total population numbers are probably now well in excess of 1 000, in four established populations and four more of unknown status (the Dale CP release is not considered here). Figure 1 shows sighting rates on regular driven surveys at Dryandra, Boyagin, and Perup/Kingston.

There has certainly been a significant improvement in the conservation status of the numbat since 1980. The first three years' funding under the recovery plan (1995-97) has consolidated work in progress since the 1980s and has allowed the expansion of the translocation and monitoring programs. If the increased recovery effort that has been possible with EA funding over the last three years is sustained, it will be possible

to establish another two or three self-sustaining populations and to approach the stage where the species will qualify for reclassification as Near Threatened (conservation dependent).

5. WHERE THERE HAS BEEN AN IMPROVEMENT IN STATUS, DESCRIBE AND DISCUSS THE REASONS FOR THIS, IN PARTICULAR WHETHER IT WAS IT A RESULT OF:

management actions;
improvement in the knowledge of the species to allow a more accurate assessment of status (1994 IUCN Red List Categories); or
other factors (e.g. improved climatic or productive conditions, or changes in IUCN status criteria etc.).

When the Recovery Plan was written, the numbat was listed as Endangered by ANZECC (1991), using the former IUCN classification. When the numbat's status was considered against the 1994 IUCN criteria at the Australian Monotremes and Marsupials Action Plan workshop in Sydney in December 1995, the classification recommended was Vulnerable. While this was partly due to the fact that the 1994 criteria for Endangered were much harder to satisfy than the earlier criteria, the numbat's status has certainly improved since 1980, when it would have been classified as Endangered even under the current criteria. This improvement in status has been entirely due to management actions, in particular, fox control and translocation. The actual changes in numbers and distribution that have led to the change in status are listed above.

6. ALTERNATIVELY, WHERE THERE HAS BEEN A DETERIORATION OR NO CHANGE IN THE STATUS, DISCUSS:

why the actions have not lead to an improvement in status;
any proposed changes to overcome the problems;
impacts on status if funding is discontinued; and
whether a greater funding contribution from implementing agency or other sources been considered. **N/A.**

7. KNOWLEDGE/UNDERSTANDING OF SPECIES:

At the commencement of this funding period, the management techniques required for the recovery of the numbat were already well researched and documented. However, some significant improvements in knowledge and techniques have occurred during 1995-97:

- Radio-collars, which are vital for monitoring the early stages of reintroductions and even in the efficiency of the translocation process, have been greatly improved during this project by changing manufacturers and by close liaison during the design process.
- It has been possible to gain a greater understanding of the habitat requirements of numbats in areas other than Dryandra and Perup through monitoring

reintroductions. This will enable the assessment of the suitability of other reserves for numbat reintroduction and facilitate the selection of future reintroduction sites.

- Research into the effects of logging has not yet resulted in significant advances in our understanding of this impact, but this will be addressed in future.
- A more scientific approach to the management of the captive colony at Perth Zoo promises to result in more consistent breeding in future, and has already yielded new knowledge of reproduction in numbats.

8. PUBLICATIONS RESULTING FROM THE PROJECT

Friend, J.A. and N.D. Thomas (1994). Reintroduction and the numbat recovery program. Pp. 189-198 **in** M. Serena (ed) "Reintroduction biology of Australian and New Zealand Fauna". Surrey Beatty & Sons, Chipping Norton.

Friend, J.A. (1995). Numbat (*Myrmecobius fasciatus*). Pp. 160-162 **in** R. Strahan (ed) "The Mammals of Australia", Revised edition. Reed Books, Sydney.

Friend, J.A. (1996). Protecting endangered native fauna from predators. Pp. 127-142 **in** B. Diekman (ed) "Unwanted Aliens? - Australia's Introduced Animals". Nature Conservation Council of NSW, Sydney.

Friend, J.A. (1997). Numbats on a junk food diet. *Nature Australia* **25(9)** : 40-49.

REFERENCE

Friend, J.A. (1994). Recovery Plan for the Numbat, 1995-2004. Report to the Australian Nature Conservation Agency under Project 351, Endangered Species Program. Department of Conservation and Land Management, Perth.