O16892

WOYLIE RECOVERY PLAN

Project 182

FINAL REPORT FOR 1995
AND FINAL REPORT FOR THE PROJECT

December 1995

Tony Start and David Armstrong

for the Woylie Recovery Team

CONTENTS

SUMMARY
This has been the last year of actions to recover the woylie under the prescriptions of the Recovery Plan. All actions have been implemented with emphasis on the continuation of feral predator control at all mainland locations. This is an on-going commitment that will continue and expand in future years.

A new population has been established at Julimar Conservation Park. This is the last of the key populations prescribed in the Plan for WA. It has been integrated into an Edith Cowan University project to study the genetic consequences of bottle-necking when new populations start from relatively small founder numbers. Under CALM's Operation Foxglove and the VBC Ecology Project 3.4 , woylies have been introduced to nineteen monitoring sites in the northern jarrah forest where aerial baiting of foxes over 550,000 ha has been undertaken. Second generation young born in the new sites have been recorded for the first-established populations. This program is additional to the requirements of the Plan.

Further translocations of WA stock to SA and the removal of a rogue cat have established a population at Venus Bay Conservation Park. There was another attempt to diversify the genetic base of a SA island population by introducing wild-caught WA stock to the inbreed island population.

The Plan was modified as fore-shadowed in last year's Annual Report and in November the Team reviewed the status of woylies using the IUCN Red List Categories (Version 2.2 published by IUCN/SSC in 1994). It concluded that woylies did not meet any of the criteria that would warrant classification under the Threatened categories but did meet the criteria for Lower Risk (Conservation Dependent). It made appropriate recommendations to ANCA, CALM and SADENR.

Lessons learned in the process of writing, revising and implementing this Plan are outlined in the Conclusions Sectio (7) where we make a recommendations for atention of people writing Recovery Plans in future. They are:

We recommend that:
- **Recovery Plans identify all the international, Commonwealth and State policies/statutes that will have to be considered in the re-evaluation of the status of a species.**

- **The primary purpose of species-specific Recovery Criteria should be to identify specific targets for an action program which will ensure that, at re-evaluation of the species status by the requisite international, Commonwealth or State policies/statutes, the stated Recovery Plan Objective for recovery will be achieved.**

1. INTRODUCTION

This is the final report for the Woylie Recovery Team. The Recovery Plan (as amended) specified actions and received funding to the end of 1995 at which time the Recovery Team was to review the status of woylies by internationally accepted criteria. It did so using the IUCN Red List Categories Version 2.2 (published by IUCN/SSC in 1994) and concluded that that woylies did not meet any of the criteria that would warrant classification under the Threatened categories but did meet the criteria for Lower Risk (Conservation Dependent). It prepared a comprehensive review paper containing recommendations which it forwarded to ANCA, CALM and SADENR.

This report details the actions taken by the Recovery Team during 1995, culminating in the review.

2. THE RECOVERY TEAM

2.1. Meetings

The Recovery Team met twice during 1995, on June 29 at the Wildlife Research Centre, Woodvale, WA and on 15 November at the Hills Forest Centre, WA.

2.2. Membership

The Recovery Team comprised:

- Tony Start (CALM, Chair)
- David Armstrong (SADENR Scientist)
- Andrew Burbidge (CALM, WA Threatened Species and Communities Unit)
- Sally Stephens (ANCA Endangered Species Unit)
- Brian Macmahon (CALM Wheatbelt Region)
- Bob Hagan (CALM Southern Forest Region)
- Paul Brown (CALM Swan Region)
- Kim Williams (CALM Central Forest Region)
- Keith Morris (CALM Science & Information)
- Graeme Liddelow (CALM Science & Information, Manjimup)

- Ray Nias (WWFA) attended the November meeting
- Jackie Courtenay (Edith Cowan University) attended both meetings.

There were some changes from the 1994 membership:

- Sally Stephens (ANCA) returned to the Team in place of Stephanie Maxwell.
- Gordon Wyre resigned from the team. Nature Conservation Division is now represented by Andrew Burbidge as WATSCU is a component of that Division.

On occasions CALM Regional Members were represented by alternatives

3. THE RECOVERY PLAN

The Annual Report for 1994 noted that the first Criterion for WA would need revision to make it biologically realistic. Furthermore the foreshortening of the plan's life to the end of 1995 would mean that the new population to be established at Julimar would probably not meet trap success rates set for other sites. It was agreed that provided a population was established and had a good prognosis, the review of woylie conservation status should proceed.

At its June meeting the Team resolved both issues by modifying the first criterion for WA to read *At least six populations of woylies, each occurring in areas of at least 1,500 ha of suitable habitat and each increasing in density (and area where there is contiguous suitable habitat) or plateaued at a trap-success rate greater than 7.5%.* At the same time it agreed to give greater recognition of woylie translocations planned under a CALM/VBC project to ascertain the efficacy of Operation Foxglove (a program of baiting foxes over 550,000 ha of forest) and tidy minor omissions and inaccuracies. The additional populations would not be a requirement of the plan but their progress would be monitored.

A discussion paper addressing these issues and tabled at the June meeting is attached as Appendix 1. The minutes of the meeting were documented in the mid-year progress report. The Plan has since been endorsed by the CALM's Corporate Executive and the National Parks and Nature Conservation Authority of WA and prepared for publication.

4. ACTIONS IN WESTERN AUSTRALIA

4.1 Exotic predator control.

Exotic predator (primarily fox) control using 1080 has been continued at Batalling (area baited is now extended to 33,565 ha), Dryandra, Tutanning and Boyagin Nature Reserves as routine monthly operations. Regular baiting has continued at Kingston where the experiment on the impact of forest operations on woylies is progressing. Baiting (ground) has continued at six monthly intervals at Perup. CALM is examining the feasibility of a broad scale aerial baiting program that will include the Perup, Lake Muir area amongst others. Fitzgerald River National Park may also be incorporated into a routine, extensive aerial baiting program to protect several threatened species although earlier reports of woylies in this NP have not been confirmed despite extensive trapping. (J. Kinnear, personal communication).

Fox baiting has been carried out for four years at Julimar Forest as an action under the Chuditch Recovery Plan. This site received woylies in early 1995. The translocation comprised two sets of 20 animals. One established well from the outset but the other suffered significant losses to predators. The latter area had a complex boundary configuration which, with the need to allow a one km buffer between aerially-baited forest land and adjacent farm land, probably made fox control less effective. CALM is now ground-baiting the buffer and the problem seems to be resolved.

In addition to these measures, 550,000 ha of northern jarrah/wandoo forest is being baited under Operation Foxglove. This has been going for more than a year (June 1994). Under the monitoring program for that project and a VBC project (prey response to fox control) woylies have been introduced to nineteen monitoring sites within that area and second generation young born in the new sites have been recorded for the first-established populations.

4.2. Population survey and monitoring.

Standardised monitoring has continued at Batalling where capture rates have risen to 24% in the baited area of Batalling Forest (July 1995) and persist in the adjacent Godfrey and Leach Forest blocks. The area now baited has extended to 33,565 ha, Standard monitoring has now been extended to all the other key sites. The monitoring transects were established by contract scientist Dr. Jackie Courtenay (except at Perup - Graeme Liddelow). They consist of trap-lines containing fifty permanently marked trap sites at 200m intervals. Each trap-line will be run for three consecutive nights and the monitoring will in future be conducted by field-based operational staff. Prescriptions, including frequency, and reporting protocols are to be written into a Wildlife Management Program that will replace the Recovery Plan.

In all sites except Julimar and Tutanning woylie trap success rates were twice the criterion rate of 7.5%. Table 1.

Table 1. Area, trap success and notes on six sites recognised as key sites by the Recovery Team in Western Australia.

Site	Trap	Area (ha)	Notes
Batalling	24%	3,617	33,565 ha now baited. Woylie density varies as they spread from the original Batalling site.
Boyagin	47%	4,781	Data from West Boyagin but woylies are present in both Blocks of this reserve.
Dryandra	>50%	12,192	Population estimated about 6000 woylies. This has been the source of animals sent to SA
Julimar	New	24,117	Approx. 16,000 ha of additional, contiguous, fox-baited forest on Commonwealth land to the north.
Perup	35%	37,640	Excludes areas outside proposed Perup NR, Eg. Kingston and Lake Muir where there are woylies.
Tutanning	13%	2,369	69 of 150 traps caught other species and were at least partially unavailable to woylies.

Julimar is a new population, but as explained above it is well established after an adjustment to the baiting program in one portion of the area. It should be noted that interpretation of trap success (TS) becomes increasingly difficult as populations of fauna recover. This is illustrated by data from Tutanning. In July 1995 fifty traps were set over three nights to give 150 trap nights. Table 2 presents the results.

Table 2. Trap data for the routine woylie monitoring transect at Tutanning. Mid 1995. (Numbers in parenthesis exclude animals recaptured during the session.)

Date	Woylie	Possum	Quenda	Bird	Total Animals
31/07/95	6 (6)	22 (22)	2	1	31 (31)
01/08/95	8 (7)	14 (12)	4	2	28 (25)
02/08/95	6 (3)	19 (15)	5	0	30 (23)
TOTAL	20 (16)	55 (49)	11	3	89 (79)

Woylie trap success is -

- 13.3% using all captures
- 10.6% using all individuals but excluding recaptures during the session
- 24.6% assuming all traps that caught other species were unavailable to woylies.

In presenting trap success data we have used total woylie captures because some early data did not differentiate new from recaptured animals during any one trapping session. Our assumption that all traps were available means that, in many instances, the data is conservative. The problem of measuring abundance by trap success as a monitoring technique is highlighted by this example.

A new population of woylies was reported from a development site on the coast just south of Perth. On behalf of the Team, a consultant investigated the report. Three dead woylies were recovered. One was recovered from a trap set by Landcare volunteers. It initiated the investigation. A second was an animal that had died some time previously and a third was caught alive by our consultant and released but subsequently found dead in a stolen trap. A report to the Hon. Minister for the environment was tabled in the House. It demonstrated that the animals had been imported to the area, presumably in an attempt to stop development. The affair created considerable media coverage.

4.3. Range expansion (where feasible) and translocation

The translocation of woylies to Julimar and to monitoring sites in the northern jarrah/marri forest have been described above. Translocations to South Australian sites has been detailed in the report on action in that State. (Section 5.)

4.4. Determine the effects of forest management practices

The discovery of woylies at Kingston was made during a pre-logging fauna survey some years ago. There were also other threatened mammals present. These species occupied un-logged forest as well as forest logged about six years previously. Logging was postponed to allow time to set up experiments to quantify the impact of operational timber harvesting on fauna in the jarrah forest. Information from the experiment will be used to determine whether it is necessary to modify management prescriptions so that the species like woylies can recolonise all suitable forest habitat irrespective of tenure or use but under cover of fox control.

The experiments have been set up. Pre-logging data have been collected. Logging took place this year (1995). Preliminary results indicate woylies were not seriously affected by the operation. The experiment will run its full, planned course and CALM will assess the suitability of the current prescriptions when the results are available. The results of the experiment will be published.

An experiment to assess the impact of prescribed fuel-reduction fire on woylies and other mammals has been set up near Batalling. Preliminary results indicate woylies were not seriously affected by the operation. The experiment will run its full, planned course and CALM will assess the suitability of the current prescriptions when the results are available. The results of the experiment will be published.

4.5. Genetic assessment and re-stocking.

Blood samples have been collected from animals at all six key sites. The translocation to Julimar was carried out by Dr. Jackie Courtenay as a post-doctoral research project for Edith Cowan University. Her objective is to study the genetic consequence of small founder populations. The founder stock comprised 40 animals with an equal sex ratio. Each founder was bled for analysis of genetic variability. Follow-up studies will examine the individual genetic contributions of the founder animals to the future population and the implications for genetic diversity. If severe genetic loss is demonstrated, further introductions will be made to redress the effect of a small founder stock.

4.7 Education and Publicity.

During the year CALM produced a graphic summary of the progress of woylie recovery. It was intended for use in WA and thus focused on actions in this State but incorporated key points from the Plan and information on the Team. It was published in CALM's Annual Report. (Appendix 2.) We anticipate that the recommendations of the review and the subsequent statutory changes will generate considerable media interest and Tony Start will write a full article on the recovery experience for CALM's magazine Landscope.

5. ACTIONS IN SOUTH AUSTRALIA

In South Australia a mixed, although generally positive result in woylie population development was achieved. The small Baird Bay Island population, which was not considered viable in the long term, was lost due to foxes gaining access to the island during an extreme low tide. An attempted introduction of new genetic stock to the Wedge Island population failed, probably due to a combination of strong competition for food and shelter from the large resident woylie population and severe weather in the week following release. More positively, the remaining island populations appear to be thriving, with increased captive rates recorded for all three. The Yookamurra population continues to be monitored by Sanctuary staff, with the help of SA Department of Environment and Natural Resources.

The Venus Bay reintroduction began in April, with 52 woylies, originating from Dryandra, having been released to date. Two separate release sites have been established, and recapture data indicates increased body weights and successful reproduction. Whilst two of 34 radio collared woylies have been predated by foxes, the reintroduction is progressing well with an optimistic view for long term success.

Exotic Predator Control

At Venus Bay the established fox baiting regime of replacing baits at fixed points 200m apart, along tracks, fences and accessible beaches, at two monthly intervals was continued. Fox activity within the baited zone is now extremely low, with tracks being observed only once or twice during each one to two week visit to the area, and only one fox seen whilst spotlighting during the entire year. From this, it is assumed that no resident foxes exist and any entering the area are therefore naive and more easily baited.

Limited rabbit control, in spotlight shooting and fumigation of any reopened warrens, was also continued to maintain the large reduction in numbers, achieved through the 1080 baiting, carried out in February 1993. Thus, encouraging foxes to take baits in the absence of their major prey item.

Feral cat numbers were high during the first half of the year, almost certainly due to increased survival of kittens following the mouse plague of 1993. Control was both time consuming and labour intensive, with 32 cats being caught from 977 trap nights. This population boom has subsided, and whilst occasional tracks are seen, cats are not considered a major problem at present. However, in view of the difficulty in trapping cats when prey items are more readily available, during spring and summer, regular trapping will continue during 1995 with a more accurate assessment being made in view of results over the winter months.

FERAL CAT TRAP EFFORT, VENUS BAY 1994

Month	Cage Trap Nights	Leg Hold Trap Nights	Cats Caught
February	91	105	5
April	258	161	19
May	21	-	2
June	94	28	5
August	71	2	1
Sept/Oct	50	-	0
November	96	-	0
Total	**681**	**296**	**32**

In the past exotic predator control has not been necessary for the island populations of woylies. While this situation continues for the Wedge and St Peter Island populations, and for the smaller less significant Venus Bay Island A population, a fox (or foxes) was able to gain access to the unnamed island in Baird Bay , presumably due to an extreme low tide exposing a sand bar, connecting it to the mainland a few hundred metres away. As no fresh sign of woylies (or foxes) was found and this population had not been considered viable in the long term, the only action taken was the distribution of a small number of fox baits as a precautionary measure to protect the remaining resident seabirds.

Population Survey and monitoring

Venus Bay Island A was again visited in February; 45 captures (29 males, 15 females, 1 unknown) were made, of 40 individuals, from 89 trap nights (over two nights), for 51% trap success. This is a small increase from last year (44%), although 11 (8 males, 3 females) of the 40 individuals were new (untagged) animals. However, only slightly under half of the females caught (7 of 15) were carrying young. Again, it appears this population is relatively stable at this level, in response to the available resources and conditions. In view of this, and the increased workload necessary on the Venus Bay peninsula it has been decided to reduce the frequency of monitoring of this population from annually to two yearly, and redirect the resources allocated to monitoring this and the Baird Bay Island population in 1995, to another attempt at introducing new genetic stock to Wedge Island.

The Baird Bay unnamed island population no longer exists due to a fox gaining access to the island via a sand bar exposed at extreme low tide. The possibility of this occurrence has always existed since the woylies were first introduced in July 1982, but had increased recently due to high fox numbers resulting from the mouse plague of 1993. Fears were raised during the first minutes on the island when no fresh diggings or tracks of woylies were observed. 35 traps were laid on one night producing no captures. A thorough search of the island revealed the remains of two bettongs, dozens of sea birds carcasses, and four sets of fox scats. As this population was not considered viable in the long term no attempt will be made to replace the woylies and monitoring has been discontinued.

St Peter Island monitoring was carried out in March, producing a considerable increase in trap success on last year, from 37% to 60%. 90 captures (57 males, 31 females, 2 unknown) of 88 individuals were made from 150 trap nights, at fixed trap locations, over three nights. There is no doubt that this population is expanding rapidly as 58 of the individuals caught were new (untagged) and only one of the 32 females caught did not have a pouched young.

Wedge Island was trapped in May, and also showed a marked increase on last year (the first year of systematic trapping since release in 1983) from 49% to 84% trap success. This consisted of 101 (66 males, 35 females) captures of 100 individuals, from 120 trap nights over four nights. Whilst not significant in relation to other populations, as individual marking only commenced in 1993 it is worth noting that 80 of the 100 individuals caught were unmarked animals. Only 21 of the 35 females were carrying pouched young.

At Yookamurra 100 trap nights were carried out over three nights from 7 September for the same result as last year, 12 captures or 12% trap success. This consisted of 8 males, 3 females and one unknown. All three females had pouched young. Eight of the 12 captures were untagged. However, as this is only the second year of monitoring, the ratio of tagged to untagged animals is not yet considered significant, except for future reference.

Range Expansion and Translocation

Following more than 12 months preparatory fox baiting and associated rabbit control, woylies were reintroduced to Venus Bay Conservation Park, beginning in April. Initially, six males were released on 5/4/94, followed by 10 females on 16/6/94. All 16 were fitted with radio collars. On assessment of this trial release in late September, 13 were found alive and well, two had died from non predator related causes, and one was missing, presumed transmitter failure. Subsequently, it was decided to proceed with a major release of a further 50 woylies.

Due to the logistics involved in handling such a large group it was necessary to separate the release of this number into three stages to be carried out in October and November 1994, and January 1995. Thus, at years end, 52 (23 males, 29 females) woylies, originating from the Dryandra population, have been released at Venus Bay. Of these, 34 were fitted with radio collars. In early December it was known that 28 (and several of the uncollared animals) were surviving, one was missing, three had died from non predator related causes and two had been predated by foxes. Another 15 woylies (5 males, 10 females) will be released in late January 1995 to complete the release programme.

All woylies caught during recollaring have at least maintained, if not increased the weight recorded at time of release, and the majority of females handled are carrying pouched young. In fact, in early December, two females released in June were known to be carrying their second young since arriving at Venus Bay.

Genetic Assessment and Restocking

In early May, ten male woylies (originating from Dryandra), fitted with radio collars were released on Wedge Island in an attempt to supplement the genetic variability of this population. One died within five days of release following a severe storm. On returning to the island in early August only two were found alive, four more were dead, and the remaining three could not be relocated. Two of the dead had been taken by diurnal raptors. This combined with the poor quality nesting sites in which the two live animals were found indicated that the new introductions had extreme difficulty establishing, due to competition with the already abundant resident woylies (84% trap success, 1994).

Blood samples were collected from 39 of the woylies (originating from Dryandra) which were released at Venus Bay and all ten released on Wedge Island. They were stored by the Evolutionary Biology Unit (EBU) at the South Australian Museum. 18 of these samples have since been sent to La Trobe University (Vic) for use in DNA studies.

Results obtained in July from DNA work at Curtin University (WA), confirmed the expected low genetic variability of all the South Australian Island woylie populations. This reinforces the necessity of continuing attempts to introduce new unrelated animals to the Wedge and St Peter Island populations to secure their long term genetic viability.

ARM\WOYLIES

6. REVIEW OF THE STATUS OF THE WOYLIE

In accordance with the Recovery Plan Objective, in November the Recovery Team reviewed the conservation status of woylies by internationally accepted criteria. It used the IUCN Red List Categories Version 2.2 (IUCN/SSC 1994) and concluded

Woylies do not qualify as Vulnerable, the least critical of the Threatened group of categories). However they would probably be Endangered or Critically Endangered if remnant populations had not been protected from fox predation and new populations established in the safety of feral predator control. Undoubtedly their status would revert to a Threatened category if active management, particularly of feral predators, were to be discontinued. Woylies are therefore unequivocally classified as "Lower Risk (Conservation Dependent)". Conservation Dependent taxa are those which are the focus of a continuing taxon-specific or habitat-conservation program, the cessation of which would result in the taxon qualifying for one of the threatened categories within five years.

The review also examined criteria set in the Recovery Plan, relevant State and Commonwealth legislation and State policy documents. The Recovery Team's conclusions in these other areas were compatible with the general conclusion quoted above except in South Australia where State legislation requires the conservation status of all taxa to be assessed in respect to State land, irrespective of their status elsewhere. Accordingly the Recovery Team has made the following recommendations.

1. We recommend to the Chief Executive Officers of CALM and ANCA and to ANZECC that our conclusions are conveyed to their Ministers together with a recommendation that Bettongia penicillata *be downgraded:*

- *under the Commonwealth Endangered Species Protection Act, by deletion from Schedule 1, "Listed Species".*
- *under the Western Australian Wildlife Conservation Act, removal from listing as "fauna which is likely to become extinct or which is rare" and addition to the Reserve List as defined by Policy Statement 33.*

And we recommend to the Chief Executive of SADENR that in South Australia its conservation status within the State be reviewed.

2. CALM and SADENR write or review monitoring and management programs to ensure that the management necessary to maintain woylies as Conservation Dependent species is implemented and effective. The plans should:

- *provide for further improvement in the conservation status of woylies and*
- *commit to action to address any significant decline detected by the monitoring programs.*

The Review and recommendations have been formally forwarded to the Chief Executives of ANCA, CALM and SADENR and arrangements made to refer it to ANZECC.

7. CONCLUSION

The Recovery Plan for woylies has been successfully implemented. As one of the first plans to be written for an Australian taxon it has been useful, not only for the management of a threatened species, but also for the lessons it has taught us in the process of writing and implementing Recovery Plans. Dr. Burbidge used this plan as a case study in the recent Threatened Species Recovery workshop in Sydney. His paper will be a useful reference to our experience.

The most important lesson that we learned was a need for flexibility. New and unforseen factors emerged during the life of the plan and our flexibility to adjust was critical. Indeed we more or less rewrote the plan after three years of a ten year program, foreshortening it to five years. It is not only factors (or knowledge of factors) about the subject species that change. Legislation and policy change, and even the IUCN/SSC Criteria were evolving as the plan was being implemented. The down-side of our flexibility was the difficulty in finalising and publishing the Plan.

Even the process of reviewing the woylies' status at the end of the life of the plan exposed a factor that we think needs more careful attention in future plans.

This last lesson is the need to ensure that the Plan clearly identifies the international (IUCN/SSC), Commonwealth and State statutory and/or policy requirements that will have to be used in the evaluation of the threatened species' status at the conclusion of the plan (particularly where more than one State is involved). In the case of the woylie plan, an Objective was to review woylies' status at the end of the life of the Plan by internationally accepted criteria. The taxon-specific Recovery Criteria identified in the plan were essential to the development of the Action Program that was successful in recovering the species. However they were **not** the primary criteria against which the status of woylies was assessed.

We recommend that:

- **Recovery Plans identify all the international, Commonwealth and State policies/statutes that will have to be considered in the re-evaluation of the status of a species.**

- **The primary purpose of species-specific Recovery Criteria should be to identify specific targets for an action program which will ensure that, at re-evaluation of the species status by the requisite international, Commonwealth or State policies/statutes, the stated Recovery Plan Objective for recovery will be achieved.**

APPENDIX 1.

PROPOSED AMENDMENTS TO THE WOYLIE RECOVERY PLAN

For Consideration By The Recovery Team On June 29 1995.

BACKGROUND.
At our meeting in December 1994 we noted that we would have to modify two components of the Recovery Plan. They were
- Include reference to Operation Foxglove
- Modify Criteria in Western Australia

The accuracy of some other sections have also changed with time. Eg. Recovery Team membership. These also need correcting

OPERATION FOXGLOVE
In our foreword to the current draft plan we summarised why we had extensively revised the original draft. We referred to Operation Foxglove there but we did not refer to it in the body of the plan.

CALM, with financial assistance from Alcoa, is routinely baiting foxes over the northern jarrah/wandoo forest, an area exceeding 0.5 million ha. The effectiveness of the operation is being measured by Paul de Tores of SID[i] (with funding from CALM, ANCA and the VBC[ii])

Because woylie populations, when relieved from fox predation, can recover faster than any other similar sized mammal that occurred naturally in this area, Paul will translocate woylies to many of his study sites (pilot translocations have already occurred) as key species in the assessment of the effectiveness of fox control.

Establishing woylie populations within the area covered by Operation Foxglove is not essential (except the Julimar population) to the recovery criteria in the plan (six populations in areas exceeding 1 500 ha). However, if it is successful, it could more than double the area occupied by woylies. It is therefore likely to be a very important extension to the on-going recovery process and the early indications of its success would be useful supporting information when the status of woylies is reviewed at the end of 1995.

It should be recognised in the Recovery Plan.

Recommendation.
The following modifications (which do not affect cost estimates attributable to the Recovery Plan Actions or the Recovery Criteria) be made to the text:

---

i. SID = CALM's Science and Information Division

2. VBC = CRC for Biological Control of Vertebrate Pest Populations.

Section 3.1 Exotic Predator control. (p9)
Delete from paragraph 2
(Experiments under another program are seeking the optimum baiting regimes in large areas of Jarrah forest)

Insert after paragraph 2.
Note. CALM, under a project codenamed Operation Foxglove, is baiting foxes in an area exceeding 0.5 million ha in the northern jarrah/wandoo forest. Much of it is probably suitable habitat for woylies. The effectiveness of the operation is being measured by CALM in conjunction with the VBC and ANCA. This will provide opportunities, additional to the Recovery Plan actions, to expand the current range of woylies (see sections 3.2 and 3.3.1)

Section 3.2 Population monitoring and survey (p10)
Insert after paragraph 1
Data relevant to woylies that is gathered while measuring the efficacy of Operation Foxglove will be monitored by the Recovery Team and taken into account when reviewing the status of woylies.

Section 3.3.1 Range extensions and translocations; Western Australia (p11)
Insert after paragraph 1.
Note. Because woylie populations, protected from foxes, can recover faster than populations of any other similar sized mammal which occurred naturally in the area of Operation Foxglove, CALM will translocate woylies to many sites where the efficacy of the operation is being measured (pilot translocations have already occurred). These will be additional to the actions necessary to effect recovery of woylies as specified in the Recovery Plan's Criteria. Nevertheless the project will be very valuable and its progress will be monitored by the Recovery Team.

CRITERIA IN WESTERN AUSTRALIA
The first criterion for recovery of woylies in Western Australia reads
Maintenance of at least six populations of woylies, each extending over at least 1 500 ha at densities that, when trapped under standard techniques, provide a minimum 20% trap success rate.

We need to reconsider whether 20% minimum trap success rate is either biologically or logistically realistic. There are several relevant factors.

1. Origin of 20%.
The figure 20% was a "best guess" and not based on biological data; after all when the plan was first written we knew very little of woylie population growth rates or potential densities. Our earlier concepts were heavily influenced by our Dryandra experience where trap success can be >70% (47% on Jackie Courtenay's 1994 standard transect) and Christensen's Perup data. Per often achieved >20%. However he used pre-baited funnel traps as well as cage traps. Using only cages his success was usually well below 20% whereas funnel traps alone often yielded rates well above 20%.

2. Current status in the six areas.

Dryandra, Perup, Tutanning

Jackie (Courtenay 1994[iii]) reported that in May 1994 populations at "Dryandra, Perup and probably Tutanning meet this criterion" (18% on the standard Tutanning transect).

Boyagin

Jackie reported "The population at Boyagin is small but growing" (founded in 1992; she obtained 7.5% trap success in May 1994 including some founder animals)

Batalling

Jackie reported "the population at Batalling appears to have stabilised at around 10% trap success". Keith Morris confirms this is still the case in 1995 but notes that they are still expanding the area they occupy.

Julimar

The translocation was unavoidably delayed until early 1995. The founders have established well. However a density that will yield 20% trap success rate by December this year is unattainable.

3. Life of the plan.

We have brought forward the final year for the recovery plan from 2000 to 1995 (halved from the usual 10 year life of recovery plans)

One consequence is some successfully established, growing populations will still be below the potential carrying capacity of their habitat (and the 20% criterion) in December 1995, notably at Julimar. Nevertheless they are populations that are growing in density

4. Area occupied by some Populations.

Several populations occupy much larger areas than we were aware of originally (Perup/Kingston/Lake Muir) while others are expanding the area they occupy, some by orders of magnitude larger than the criterion requirement of 1 500 ha.(Eg Batalling; remember also the potential of Operation Foxglove).

5. Carrying capacities.

It seems that at Batalling the population has plateaued at a density yielding about 10% trap success although the area it occupies is still expanding. This may be true of other sites. To require 20% at all six sites would be to condemn the recovery to failure because of a biologically impossible and scientifically flawed criterion.

6. Management following the Recovery of woylies

One Recovery criterion (Both States) stipulates

Establishment of monitoring programs (to include genetic diversity) and action plans to address any adverse trends detected.

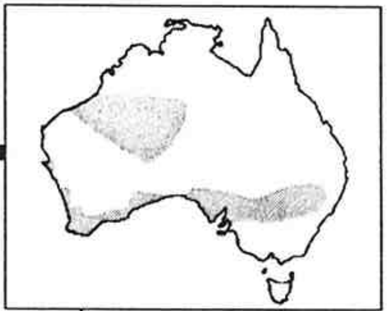
In WA the Recovery Plan will be followed by a Wildlife Management Program which will incorporate these requirements. Thus provision will be made to foster and monitor the full development of populations not yet at carrying capacity.

[iii]. Courtenay, J. 1994. Woylie monitoring project; Final Report to Department of Conservation and Land Management.

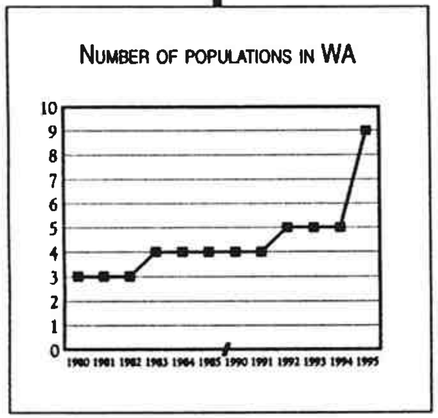
Recommendation
Criterion 1 (WA) be altered to read
Establishment of at least six populations of woylies each extending over 1 500 ha and each increasing in density (and area where there is contiguous suitable habitat) or plateaued at a trap success rate greater than 7.5%.

Criterion 3 (WA) be altered to read (addition only in italics)
Establishment of experiments to determine the effects of timber harvesting (at Kingston Forest) and fuel-reduction prescribed burning (at Batalling Forest) on woylies *and commitment in a Wildlife Management Plan to modify forest management prescriptions to ensure compatibility with maintaining woylie populations.*

Natural Woylie populations Pre-European

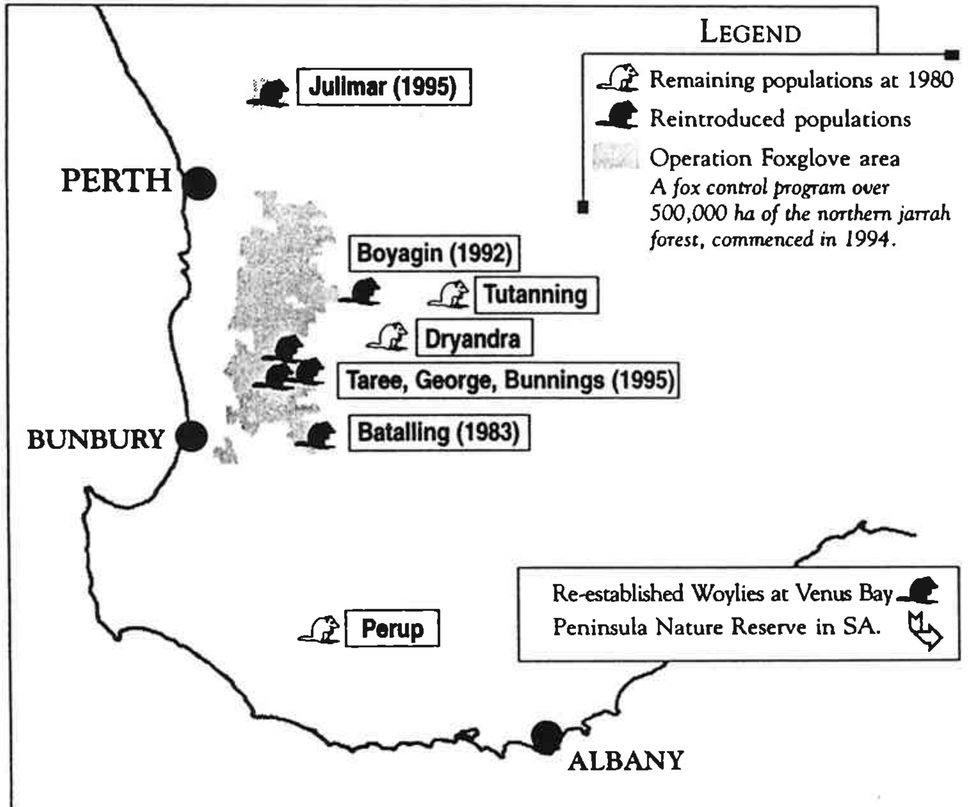


Natural Woylie populations 1980



WOYLIE RECOVERY PLAN

A five year plan has been guiding the recovery of the woylie since 1990. Its objective for Western Australia is to establish at least six populations, each extending over 1,500 hectares in area and each yielding a trap success rate greater than 7.5%. By the end of 1995, the Recovery Team hopes it can be reclassified from Endangered to Conservation Dependant. Even so, woylies will need on-going protection. A Wildlife Management Program will prescribe action to ensure they continue to expand their range and flourish.



WOYLIE RECOVERY TEAM

WA	Department of Conservation and Land Management
SA	Department of Environment and Natural Resources
	Australia Nature Conservation Agency

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT