Dibbler Research Plan

A Review Prepared for Environment Australia Endangered Species Program

Endangered Species Program Project Number 496

Prepared by
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1. Introduction:

A brief summary of the situation prior to funding the current research plan.

The Dibbler, *Parantechinus apicalis* (Marsupialia, Dasyuridae) was first collected by Gilbert in 1838 on "Moore's River" (near the present town of New Norcia, WA) but was described by Gray in 1842 from a purchased specimen "doubtless from Australasia". By 1842 Gilbert had also collected dibblers near Wanneroo (just north of Perth) and at King George's Sound (Albany). He recorded Aboriginal names including 'Dib-bler' used at King George's Sound and wrote notes for Gould, who used them extensively in his text for *The Mammals of Australia.*

Several other early collectors obtained specimens but recorded little about them. The last was taken by Tunney at Gracefield (near Kojonup) on 3 July 1904. It is in the Dublin Museum (Clemency Fisher[1] personal communication). Thereafter the dibbler was presumed to have become extinct. However, in 1967 photographer Michael Morcombe caught one in a trap set for honey possums on a *Banksia baxteri* bloom at Cheyne Beach, east of Albany on the south coast of WA.

Between 1967 and the start of this project dibblers were recorded sporadically on the south coast from Torndirrup National Park near Albany to Jerdacuttup near Hopetoun. Most came from Fitzgerald River National Park (FRNP). In 1985 Phil Fuller found dibblers on two small islands, Boullanger and Whitlock Islands, off Jurien, a fishing and holiday town about 200 km north of Perth.

At the time of European settlement the dibbler may have been endemic to parts of the (modern) wheatbelt and adjacent coastal areas of WA. There is an unconfirmed nineteenth century record from South Australia where skeletal remains are known from sub-fossil deposits on the Eyre Peninsula (Alex Baynes, personal communication). A Queensland record is probably erroneous. Although it is known from Western Australian sub-fossil deposits between Shark Bay and Israelite Bay and as far inland as Peak Charles, it may have contracted from the more arid areas before Europeans arrived. Significantly, it is not known from the extensive sub-fossil records in the largely forested south west corner of the State between Perth and Albany.

Since Gilbert's day, and prior to this project, the only information on the biology and habitat of dibblers had been gleaned from descriptions of the sites where they were collected, observations on captive animals by Dr Pat Woolley at La Trobe University and a largely unpublished study on Boullanger and Whitlock Islands by Dr Chris Dickman, now at Sydney University.

A brief summary of the current situation.

The dibbler is now known to occur on Boullanger and Whitlock Islands and in FRNP. It may also occur at other south coast locations between Torndirrup National Park and Israelite Bay where there is suitable habitat within its former range.

2. Actions:

This is a Research Project, not a Recovery Plan. At the start of each of the three one-

[1] Curator of Birds and Mammals at Liverpool Museum.

year funding contracts progress was assessed and the actions were reviewed. All the actions are reviewed here, each being prefaced by the year it was current. Comments under each action are pertinent to the year(s) that action was current. Opportunistic progress has been made on some of them subsequently. They are referred to where appropriate.

Action 95.1. Re-survey known sites; ascertain details of preferred habitat.

- ***Progress made to date.*** All accurately recorded sites were revisited. Dibblers were still present on Boullanger and Whitlock Islands. They were not located at any other sites although a population was located in FRNP near to previously recorded dibbler locations. Some sites, eg Cheyne Beach, had been severely degraded by fire or dieback diseases and may no longer support dibbler populations. Others, eg. Torndirrup NP still had habitat that was more or less intact. On the south coast Dibblers have been caught in habitats with widely differing floristics. However, there are some common factors.
    1. Vegetation is usually dense heath or mallee-heath
    2. Vegetation is long un-burned, although dibblers will use younger vegetation (<8 years) adjacent to long un-burned sites
    3. Vegetation is usually, floristically complex. Banksias and species with nectar-rich flowers are often prominent
    4. The surface substrate is usually sandy and it often, but not always, has a dense litter layer.

  The habitat on Boullanger and Whitlock Islands has been described. The vegetation is typical of small limestone and sand islands off the west coast of south western Australia. It is probably not typical of mainland dibbler habitat.
- ***Is the action running to schedule.*** Yes. (completed).
- ***Has the action been successfully completed or will it be completed in the next few months.*** Successfully completed.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** No but it will continue opportunistically.
- ***The impact of not continuing funding.*** N/A.
- ***Have alternative means of resourcing the action been sought.*** N/A.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A. It was completed.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** This action did not have these elements. They are not considered for the future as this action is complete.

Action 95.2. Initiate media coverage to gather further distribution records.

- ***Progress made to date.*** In 1995 several interviews were given to radio stations about the project and its findings. The regional TV station ran a short segment. Local interest groups were given information. Colour pictures and dibbler identification details were distributed to all appropriate national parks, shire offices, Land Conservation District Committees and amateur naturalist groups. A pamphlet was prepared and widely distributed. Perhaps because dibblers are small and secretive, there were very few useful reports from the public and no new populations were discovered from public reports.
- ***Is the action running to schedule.*** Yes (finished, although the pamphlet is still

being distributed and dibbler conservation is promoted whenever possible. In particular, Perth Zoo has used TV news programs, radio interviews and newspaper articles to promote the dibbler conservation program. (see Action 97.4). The Recovery Team has decided to revise the pamphlet).

- ***Has the action been successfully completed or will it be completed in the next few months.*** Completed, although dibbler conservation will still be promoted whenever possible.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Yes. The Research project concludes in December 1997. The next phase, if funded, will be the implementation of an Interim Recovery Plan (IRP). Publicity will be an action.
- ***The impact of not continuing funding***. N/A.
- ***Have alternative means of resourcing the action been sought.*** Not by the Recovery Team but the Fitzgerald River National Park Association has obtained funds from the World Wide Fund for Nature to promote the dibbler in communities along the south coast.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** None.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** This action served an educational and awareness function and sought community involvement through its request for information.

Action 95.3 Use BIOCLIM and GIS databases to predict location of other populations.

- ***Progress made to date.*** BIOCLIM predicted that, in WA, dibblers were widespread near the coast and for some distance inland between Albany and Israelite Bay. Elsewhere in WA there were small scattered patches of potential habitat, particularly north east of Albany and on the west coast, north of Perth. It also indicated large areas of potential habitat in South Australia. In WA, not surprisingly, the prediction corresponded closely with the specimen-based knowledge of dibbler distribution but indicated that dibblers may occur in the extensive Cape Arid National Park. A biological survey of the Park in the early 1990s did not locate dibblers. Vegetation and land tenure types in these areas are sufficiently known to obviate the need to use GIS.
- ***Is the action running to schedule***. Yes (completed).
- ***Has the action been successfully completed or will it be completed in the next few months.*** Successfully completed.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** No.
- ***The impact of not continuing funding.*** N/A.
- ***Have alternative means of resourcing the action been sought.*** N/A.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A. It was completed.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** This action did not have these elements. They are not considered for the future as this action is complete.

Action 95.4 & 96.1 Regular monitoring of known populations. Examine

reproduction, population dynamics and habitat use in relation to fire history and occurrence of pathogens

- ***Progress made to date.*** Mainland. None of the populations located before this project began were re-located while the action was current. In 1997 trapping under another program located one dibbler at each of two old sites in FRNP. However, while the action was current two new populations near previously known populations were located in FRNP and it was decided to concentrate study on that population. Progress is detailed under Action 95.5 & 96.2 below. The Action was replaced by 97.6 in 1997 and is discussed under that Action.
- Islands. These populations were monitored, but not intensively, during 1995/96. Habitat use in relation to fire history and pathogens is not relevant to the island populations. However other aspects of habitat use and disturbing factors are important. They are discussed under 97.1 to 97.3 below. The seasonal reproductive cycle was confirmed and many males survived after breeding. This is interesting because Dickman had previously recorded a post-breeding male die-off on the islands. The islands are long un-burned and dieback is not an issue on them.
- ***Is the action running to schedule.*** Yes (completed).
- ***Has the action been successfully completed or will it be completed in the next few months.*** The action has been completed but efforts to locate dibblers on historic sites will continue opportunistically.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Appropriate actions will be included in the IRP to be written by the end of 1997 and implemented if the plan is funded.
- ***The impact of not continuing funding.*** Dibbler populations on the islands will not be monitored. Fauna monitoring will occur in the FRNP through Western Shield (a program to control foxes and cats) but it will not specificaly target known dibbler populations.
- ***Have alternative means of resourcing the action been sought.*** Yes.
  1. An application to fund an IRP after 1997 has been made to Environment Australia.
  2. FRNP Association unsuccessfully sought funds from the World Wide Fund for Nature to continue this work on the mainland.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** The action was discontinued after the sites had been visited at least once so as to give more emphasis to island populations.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** This action did not have these elements. However, the FRNP Association (or other appropriate groups) will be encouraged to participate in the implementation of the IRP if it is funded.

Action 95.5 & 96.2. Extensive surveying of predicted sites of occurrence with follow-up studies (as in 95.4) on positive sites.

- ***Progress made to date.*** A population was found in the northern part of FRNP in 1995 and (under a different program) another was located in 1996 on Thumb Peak in FRNP. Access to the latter was difficult and it has not been monitored. However, the former was monitored to the end of 1996. Radio tracking was not useful for long term monitoring of individuals and, without that facility, it was not feasible to

monitor the population or investigate habitat use in relation to fire, etc., except by trapping. The fate of animals not re-trapped is unknown. Many dibbler populations have seemingly disappeared after a few months or years. However, it is not certain that they have died out.

Radio tracking failed because collared animals routinely moved beyond the range of the largest collars deemed safe to use. Towers may have extended the range, but providing access could have jeopardised dibbler habitat and other conservation values. (FRNP has one of the world's most diverse heath floras and many species are highly susceptible to dieback diseases.) Nevertheless this remains an option. The seasonal reproductive cycle was confirmed and, as on the islands, it was demonstrated that a post-breeding male die-off does not always occur; they can survive to breed in succeeding years. Dibblers were only located in long-un-burned (8 to 30 years) vegetation although they may enter younger areas close by (J. Kinnear and B. Newby, personal communications). No dibblers were located in areas affected by dieback disease.

- ***Is the action running to schedule***. No (discontinued).
- ***Has the action been successfully completed or will it be completed in the next few months.*** No. The action was discontinued to allow more emphasis to be given to island populations.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Appropriate actions will be incorporated into the IRP which will be written by the end of 1997. See Action 97.5.
- ***The impact of not continuing funding.*** Failure to locate more dibblers and obtain additional basic knowledge on the ability of dibblers to withstand various habitat disturbances to which they may be exposed.
- ***Have alternative means of resourcing the action been sought.*** Yes.
  1. An application to fund an IRP after 1997 has been made to Environment Australia.
  2. The FRNP Association sought funds from the World Wide Fund for Nature to continue this work on the mainland.
  3. New populations may be located in the FRNP, and other reserves where dibblers may persist while monitoring the effects of Western Shield (a program to control foxes and cats).
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** It was changed in 1997 to allow greater emphasis on island populations which were deemed to be genetically important to dibbler recovery and more vulnerable than populations in FRNP where all the actions necessary to reduce perceived threats are operational as far as possible.
- ***Experimental design.*** N/A.
- ***Education, public awareness or community involvement.*** This action did not have these elements. Community involvement through the FRNP Association and other interested groups will be encouraged and this will be incorporated into the IRP.

Action 97.1. Monitor size of Dibbler and Boullanger Island Dunnart populations on the Jurien islands.

- ***Progress made to date.*** Dibbler. A program of research covering this and the next two actions has commenced. It is being undertaken by a post-graduate student from

The University of WA. Regular visits are made to the islands and all trapped dibblers are marked with transponders to avoid problems from loss of ear-tags. This program has already allayed some fears that arose from the less intensive surveys of previous years.

Boullanger Island Dunnart. This animal was thought to be a distinct taxon endemic to Boullanger Island. It was added to the scope for 1997 on that assumption because work could progress alongside dibblers. Recent genetic work has shown it is not genetically distinct from mainland *Sminthopsis griseoventer*. It does not readily enter Elliott traps used to catch dibblers. Therefore this species has not received any detailed attention. This comment applies to the following actions as well.

- ***Is the action running to schedule.*** Yes.
- ***Has the action been successfully completed or will it be completed in the next few months.*** No
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Appropriate actions will be incorporated into the IRP which will be written by the end of 1997 and implemented if funded.
- ***The impact of not continuing funding.*** These critically important, small and vulnerable populations will not be adequately monitored.
- ***Have alternative means of resourcing the action been sought.*** Yes.

1. An application has been made to EA to fund an Interim Recovery Plan after the conclusion of this Research project. T
2. he University of WA is providing considerable support.

- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** This action has been upgraded for 1997.
- ***Experimental design.*** The action does not have an experimental design.
- ***Education, public awareness or community involvement.*** This action is providing the subject matter for a post-graduate research project. Hands-on community involvement is not appropriate because the islands are fragile. There are numerous seabird burrows, that may be important to dibblers (see 97.2), which are easily collapsed by people walking.

Action 97.2. Identify the important resources (including sea-bird burrows) for both species on the Jurien islands.

- ***Progress made to date.*** Dibbler. A program of research covering this has commenced. It is being undertaken by a post-graduate student from The University of WA. Radio-tracking (which is possible because the islands are so small that the animals can not move out of range) is being used to determine the use of natural resources, including seabird burrows.
  Boullanger Island Dunnart. see comments under 97.1.
- ***Is the action running to schedule.*** Yes.
- ***Has the action been successfully completed or will it be completed in the next few months.*** An initial study will be complete by December 1997 but it is planned to extend the study.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Yes. Appropriate actions will be incorporated into the IRP which will be written by the

end of 1997 and implemented if funded.

- ***The impact of not continuing funding.*** The importance of various natural features of the islands to these critically important, small and vulnerable populations will not be well documented. This will impact on the ability to complete 97.3 and hence the ability to manage the islands so as to optimise the dibblers habitat.
- ***Have alternative means of resourcing the action been sought.*** Yes.

1. An application has been made to EA to fund an Interim Recovery Plan after the conclusion of this Research project.
2. The University of WA is providing considerable support.

- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** It was initiated in 1997.
- ***Experimental design.*** The action does not have an experimental design.
- ***Education, public awareness or community involvement.*** This action is providing the subject matter for a post-graduate research project. Hands-on community involvement is not appropriate because the islands are fragile. There are numerous seabird burrows, that may be important to dibblers, which are easily collapsed by people walking.

Action 97.3. Investigate the effects of weeds, house mice and other potentially threatening processes including changing numbers of breeding seabirds on both species on the Jurien islands.

Progress made to date. Dibblers. Weeds are not a serious issue at present. The salty coastal vegetation is not considered fire prone. Nevertheless, a Fire Management Plan has been prepared. The diet of dibblers is being examined by collection of scats. This will provide information on the extent to which dibblers eat mice. The ecology of mice and their impact on dibblers will require work in future years. The use of seabird burrows is being investigated (Action 97.2). There is anecdotal evidence to suggest that seabird breeding on Boullanger Island may have declined recently; however, changes in seabird use of the islands will also require work in future years.

Boullanger Island Dunnarts. See comments under 97.1

- ***Is the action running to schedule.*** Yes. However resources and the fragility of the islands (which limits the number of people on them) means that the work will have to progress cautiously over some years.
- ***Has the action been successfully completed or will it be completed in the next few months.*** No.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Yes. Appropriate actions will be incorporated into the IRP which will be written by the end of 1997 and implemented if funded.
- ***The impact of not continuing funding.*** The significance of environmental disturbances to the security of these critically important, small and vulnerable dibbler populations will not be known. This will impact on the ability to manage the islands for dibblers.
- ***Have alternative means of resourcing the action been sought.***

1. An application has been made to EA to fund an Interim Recovery Plan after the conclusion of this Research project.
2. The University of WA is providing considerable support.

- ***If the action was changed or dropped, describe the implications for other***

actions, the meeting of criteria and objectives. It was initiated in 1997.

- ***Experimental design.*** The action does not have an experimental design.
- ***Education, public awareness or community involvement.*** This action is providing the subject matter for a post-graduate research project. Hands-on community involvement is not appropriate because the islands are fragile. There are numerous seabird burrows, that may be important to dibblers (see 97.2), which are easily collapsed by people walking.

Action 97.4. In collaboration with Perth Zoo, establish captive breeding colonies of both species from the Jurien islands.

Progress made to date. Dibblers. Two pairs from each island have been brought into captivity at Perth Zoo. Three females gave birth and nineteen young have been raised and weaned. Two litters were probably conceived in the wild but the third may have been conceived in captivity. The female that did not breed died. All males survived the breeding season and are healthy. Husbandry techniques have been developed. The real test of success will be the breeding of the young born in captivity.

Relatively little is known about the reproductive biology of dibblers. A new PhD project is examining the reproductive biology and genetics of the dibbler using the colony at Perth Zoo and wild animals. Support for the project is provided by the Departments of Animal Science (Faculty o Agriculture) and Zoology at the University of WA, Perth Zoo, CALM and the Marsupial CRC.

Boullanger Island Dunnarts. See comments under 97.1

- ***Is the action running to schedule.*** Yes.
- ***Has the action been successfully completed or will it be completed in the next few months.*** No.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Yes. Appropriate actions will be incorporated into the IRP which will be written by the end of 1997 and implemented if funded.
- ***The impact of not continuing funding.*** This action has substantial funding from the Marsupial CRC, Perth Zoo and the University of WA. The EA component provides consumables. These would have to be sourced elsewhere or the project terminated. The latter would mean that there is no 'insurance' colony of the island genetic stock in case of emergency and animals for translocation would not be available without depleting the small wild populations.
- ***Have alternative means of resourcing the action been sought.*** Yes. See above.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A. It was initiated in 1997.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** This action is providing the subject matter for a post-graduate research project. Hands-on community involvement is not appropriate because the captive colony requires specialist care in a dedicated building "behind the scenes" at Perth Zoo. However Perth Zoo is promoting dibbler conservation to a large section of the community.

Action 97.5. Prepare three year Interim Recovery Plan for the Dibbler.

- ***Progress made to date.*** An early draft was prepared in 1996 by A.N. Start and

comment made by the Recovery Team. Since then several issues have been identified and some difficult issues resolved.

- ***Is the action running to schedule.*** Yes.
- ***Has the action been successfully completed or will it be completed in the next few months.*** Yes. It will be completed by December 1997.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** The next phase, if funded will be the implementation of the plan.
- ***The impact of not continuing funding.*** Nil. It will be completed under the present funding contract.
- ***Have alternative means of resourcing the action been sought.*** N/A.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** N/A.
- ***Experimental design.*** The action did not have an experimental design.
- ***Education, public awareness or community involvement.*** When completed it will have potential educational and public awareness value. It will contain actions for these issues. There is community input through the Recovery Team and the plan will provide an opportunity for community involvement in its implementation, assuming it is funded.

Action 97.6 Continue to record new information on south coast Dibbler populations on an *ad hoc* basis.

- ***Progress made to date.*** Trapping for dibblers has been incorporated into the Western Shield monitoring program for FRNP and other reserves on the south coast that have potentially suitable habitat. This has not taken place as yet in 1997 because of plant disease risks from vehicle access in wet soil conditions.
- ***Is the action running to schedule.*** Yes.
- ***Has the action been successfully completed or will it be completed in the next few months.*** No.
- ***Is the action scheduled to continue into the next plan or phase of funding.*** Yes. It will be ongoing.
- ***The impact of not continuing funding.*** CALM is funding this program as a component of Western Shield. Failure to carry it out would mean that there is no routine program to monitor dibblers on the south coast.
- ***Have alternative means of resourcing the action been sought.*** No, besides CALM's program described above.
- ***If the action was changed or dropped, describe the implications for other actions, the meeting of criteria and objectives.*** It was initiated in 1997 and will be ongoing anyway.
- ***Experimental design.*** The action does not have an experimental design.
- ***Education, public awareness or community involvement.*** Western Shield has a very high public profile providing awareness and education. Torndirrup is still monitored for small mammals by Dr. Vic Smith, member of the Albany community and a member of the Recovery Team. (It was he who previously located dibblers in this NP.) The FRNP Association has obtained funding from the World Wide Fund for Nature to promote dibblers as the emblem for the FRNP Biosphere Reserve program. This promotion is targeted at residents of the area.

3. Objectives and criteria:

This is a Research Project. Thus it does not have defined recovery objectives or criteria. The objective was to obtain sufficient information to write and implement a Recovery Plan. A new scope item added to the program for 1997 is the preparation of an Interim Recovery Plan by the end of the year. That objective will be met, although it may take some more time for the IRP to receive endorsement from all concerned.

The Recovery Team's objective after 1997 is to obtain funding and implement the IRP and to be able to upgrade the IRP in time to a full Recovery Plan.

4. Conservation status:

An assessment of the species against the 1994 IUCN Red List Categories.

The conservation status of the dibbler was assessed against the 1994 IUCN Red List Categories for the preparation of the 1996 Action Plan for Australian Marsupials and Monotremes. It was classified ENDANGERED under criteria B1+2c,e. Its status has not changed since then.

Due to geographic isolation between populations found on islands and on the mainland the issue of the taxonomic status of extant Dibbler populations in WA has been raised. The Boullanger Island Dibblers are significantly larger than those found on the mainland. It is apparent that Dibblers have been spatially separated for a considerable time, and a comparison of genetic differences between the island (Boullanger and Whitlock) and mainland forms would be useful for elucidating the taxonomy. This needs to be clarified as quickly as possible, so that genetic findings can be incorporated in subsequent management decisions and recovery plans.

This work is being conducted by Perth Zoo, through the the Marsupial CRC and aspects are also being undertaken as part of a UWA PhD project. The project will use microsatellite analysis to explore the genetics of the island *vs* mainland populations and mitochondrial DNA analysis to answer taxonomic questions.

An analysis of population change over time and the implications of this in terms of conservation status.

The dibbler may have contracted from parts of its Holocene distribution before European settlement. Thus it is known in the sub-fossil record of Shark Bay and South Australia but there are no confirmed, post-European records from these areas. It may have still been contracting when Europeans arrived. In the nineteenth century collectors were able to obtain specimens from many areas where it has not been recorded in the last 100 years. This dearth of specimens occurred before widespread land clearing and the arrival of foxes and rabbits, although cats would have been here and fire regimes may have changed in some places.

The only west coast populations known to be extant are those on two small islands. There is no evidence that they have declined since they were discovered in 1985. Dibblers have been recorded at several locations on the south coast since 1967. They have probably gone from some places where small patches of suitable habitat have been degraded by dieback disease or fire, eg, at Cheyne Beach. The majority of records have been from FRNP and the six locations at which dibblers have been trapped during this project have been in the park. Dibblers are thought to be

widespread if patchily distributed in suitable habitat within FRNP. There is no evidence that dibblers have declined in FRNP in the last decade and these populations are probably as well protected from known and perceived threats as current knowledge allows.

Potential dibbler habitat in FRNP and other south coast reserves will continue to be managed as though dibblers are present. Improvements can be expected through improved control of cats and dieback diseases. CALM is researching both issues. If radio tracking technology improves sufficiently we will also be able to manage (eg, translocate on the mainland) and study dibblers more effectively. More emphasis will then be directed to mainland dibblers. In any event, recovery of both the island populations and those on the south coast will remain high priority.

5. Where there has been an improvement in status, describe and discuss the reasons for this.

There have been no significant improvements in the status of the species in the wild. However the establishment of a breeding program at Perth Zoo has provided the following benefits which improve our ability to manage the species.

- Insurance against disasters befalling the island populations.
- A source of animals for future translocations, possibly to a third, mouse-free island.
- Development of husbandry techniques so that captive breeding can be included in the Interim Recovery Plan with confidence that it is achievable.
- The opportunity to study breeding biology much more intensively than would be possible in the wild.

This development does not alter the status of dibblers under the 1994 IUCN Red List Categories.

6. Where there has been a deterioration or no change in the status, describe and discuss the reasons for this

There was an apparent deterioration of the species status on the south coast between Morcombe's rediscovery in 1967 and the start of the project in 1995 as a consequence of environmental degradation. For example, Morcombe's site at Cheyne Beach has been badly affected by dieback disease and fire. Fire affected 80% of the known FRNP dibbler locations in 1995, before the start of this project. At other sites the habitat appears to have been intact when they were revisited in 1995, eg, Torndirrup NP. Failure to re-trap dibblers there may not mean that they are not still present. However, it seems that FRNP is the stronghold.

Improvements. The actions have not lead to an improvement in status on the mainland because this has been a Research Project preparing the way for a Recovery Plan. At the conclusion of this project an Interim Recovery Plan will be written.

Discontinued funding. If funding is discontinued most actions in the interim recovery plan will not be implemented. Those elements that can be resourced from elsewhere will continue.

Additional or alternative funding. An application has been made to EA for funding for the IRP at the conclusion of this Research Project (ie, from 1998). Substantial resources have already been committed by Perth Zoo and the Marsupial CRC. The UWA is committed to one PhD student (working on breeding systems in captive and wild dibblers) and is keen for another post-graduate student (working on the ecology of dibblers on the islands) to convert from a Postgraduate Diploma to a PhD. CALM is also committed to actions under Western Shield that will involve dibblers.

7. Knowledge and understanding of species:
Improvements that have been made to the knowledge of management of the species, or other threatened species, as a result of this project.
Mainland
FRNP has been confirmed as the most important known dibbler refuge. It is a large and diverse National Park that is listed as a Biosphere Reserve. Dibblers have been located at several sites within the Park during the last ten years (six in the past year).

These locations have collectively yielded data on habitat preferences and (minimum) distribution within the park. These data have been used to develop a habitat profile. Most dibblers have been found in areas of floristically diverse heath or mallee heath in the drier, northern part of the park. Plants that produce copious nectar are often prominent. Soils at dibbler sites vary considerably and include deep sands, shallow sand over clay, shallow loamy sand and skeletal soils around exposed granite. All dibbler sites are in or close to long un-burned (>8years and usually much older) vegetation and in areas not affected by dieback disease. These areas mayhave deep litter layers through which dibblers move, but that is not always so.

The habitat profile allows identification of potential dibbler habitat and application of management prescriptions for factors that could alter the profile. These include feral predators, fire and dieback disease. The same profile can be applied to other areas on the south coast between Albany and Israelite Bay. This will help to pinpoint areas where dibblers may occur. Thus, the best possible management practices can be applied to areas in which dibblers may occur whether or not they have been located in recent times. It is significant that there are other threatened fauna species (not to mention plants!) in the areas in which dibblers occur. It is important to understand the requirements of these species in order to develop integrated management programs that aid the recovery of them all.

The work on the south coast has also yielded information on breeding patterns (including the ability of males to breed in two or more years) and shown that dibblers are highly mobile. They routinely move over long distances, so much so that radio tracking was of very limited use and not practical for long-term monitoring of individuals. Cotton spooling is also not effective but florescent dyes may provide useful short-term movement information allowing one to study use of different vegetation strata and other components of the habitat.

Islands

The most important progress has been the establishment of the captive breeding program. Husbandry techniques have been developed and 19of 21 young from three mothers have been reared and weaned. This:

- provides insurance against a disaster befalling the wild populations,
- provides a source of animals for translocation so as to increase the number of populations and reduce the risk of disasters eliminating this genetic stock,
- provides animals for intensive study of dibbler biology,
- commits a number of institutions to dibbler recovery,
- provides education opportunities for students interested in managing threatened species, and
- through the high visitation to the zoo, offers excellent opportunities to enhance public awareness.

The Recovery Team considers that the island populations, which have adapted to the harsher climate of small islands 600 km north of the known mainland populations, are critical to recovery of the full array of dibbler genetic stock and thus the adaptive capacity of the species.

The project has also begun to shed light on the interactions of dibblers, seabirds and mice. This will be very important to prescribing the best management actions for these populations.

8. Publications and reports (other than those to Environment Australia) resulting from the project.

Cooper, S. and Birrell, J., 1996. *A population study of* Parantechinus apicalis *using DNA sequence markers.* Unpublished report to Western Australian Threatened Species and Communities Unit, Western Australian Department of Conservation and Land Management.

Hockey K., 1996. *Fire Occurrence Contingency Plan, Boullanger and Whitlock Islands, Jurien Bay.* Unpublished Operational Plan, Western Australian Department of Conservation and Land Management. Geraldton.

Three papers are in preparation by N. Baczocha and other authors.

1. to be co-authored with C.R. Dickman and G. Friend, will discuss male die-off,
2. will present findings of the work carried out under this project on the south coast,
3. to be co-authored with A. Sanders, will document the fauna of the Yilgarn Block portion of Fitzgerald River National Park, WA.