THE DIBBLER (*PARANTECHINUS APICALIS*): STATUS AND ECOLOGY IN WESTERN AUSTRALIA

Project Number 496

Annual Report 1997
And Final Report for the three-year Research Plan

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1. Introduction.

The project.

The Threatened Species and Communities Unit of Environment Australia (EA) has financially supported a three-year Research Plan conducted by the Western Australian Department of Conservation and Land Management. The project commenced in early 1995 and finished in December 1997. It aimed to learn enough about dibblers to plan a recovery program. The dibbler proved to be a difficult species to study. Nevertheless, by reviewing and adapting the focus of the project each year, sufficient has been learned to allow an Interim Recovery Plan (IRP) to be written.

Two substantial, recent documents have recorded our knowledge of dibblers and progress with the project.

- *The 1996 Annual Report.* Because the focus of work shifted from mainland to island populations in 1997, the 1996 annual report (Baczocha and Start 1997) was prepared as a comprehensive account of our knowledge of dibblers to that time. Apart from some additional mainland location records little has been learned of mainland dibblers since then and that report remains an up-to-date report on the activities of the Research Plan implementation on the mainland. .
- *The Project Review.* In September 1997, at the request of EA and in accordance with a format provided by EA, the Recovery Team prepared a detailed review of the project, including progress with all actions over the three years (Start 1997).

To avoid extensive reiteration of the information supplied to EA in those documents, this report will focus on the actions required under the scope for the 1997 contract year and developments that post-date the Review. It also provides a summary of the project outcomes and looks to the future program for dibbler recovery. It has been prepared as a stand-alone report.

A brief summary of the situation prior to this Research Plan.

The Dibbler, *Parantechinus apicalis* (Marsupialia, Dasyuridae), was described by Gray in 1842 from a purchased specimen "doubtless from Australasia" (Gray 1842). Ride (1970) states that it was first collected by Gilbert in 1838 in the vicinity of Moore River near the present town of New Norcia but Gilbert did not visit the Moore River until August 1842 (Whittell 1942). Gilbert also collected dibblers near Wanneroo (just north of Perth) and at "King George's Sound". He recorded Aboriginal names including 'Dib-bler' used at King George Sound and wrote notes for Gould, who used them extensively in his text for *The mammals of Australia* (Gould 1863)

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

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[1] Dr Clemency Fisher, Curator of Birds and Mammals, Liverpool Museum.

Between 1967 and 1995 (when, with support from Environment Australia, this recovery research plan commenced) dibblers were recorded sporadically on the south coast from Torndirrup National Park near Albany (Smith 1990) to Jerdacuttup near Hopetoun (Woolley 1977, 1980). Most locations were within Fitzgerald River National Park (Chapman and Newby 1995). In 1985 dibblers were found on two small islands, Boullanger (25.9 ha) and Whitlock, (about 8 ha) off Jurien, a fishing and holiday town about 200 km north of Perth (Fuller and Burbidge 1987)

No subspecies of *Parantechinus apicalis* have been described. However, animals on the islands are substantially smaller than those on the south coast. It has been suggested (but is unlikely) they may warrant recognition as a distinct taxon. A survey of allozymes at 46 loci found no genetic differences between island and mainland forms and no allozyme variation within the Boullanger Island population. (Cooper and Birrell 1996). However low levels of allozyme variation between species have been reported for dasyurids by Baverstock *et al.* (1984). More recent attempts to examine the genetic relationship between island and mainland populations using mtDNA were hampered by technical problems (Cooper and Birrell 1996).

The issue is unresolved but it is significant that the island populations occur about 600 km north of the south-coast populations. Thus the two groups are exposed to substantial differences in climate as well as habitat. The Recovery Team believes it is important to dibbler recovery that both south coast and west coast island populations are recovered, and that the genetic and taxonomic issues are resolved.

At the time of European settlement the dibbler seems to have been endemic to parts of the (modern) wheatbelt of WA. Old South Australian and Queensland records are apparently erroneous. Although it is known from 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.

BIOCLIM analysis by C.R. Dickman (unpublished data) suggests that, in WA, dibblers may have been widespread coastally and for some distance inland between Albany and Israelite Bay. Elsewhere there were small scattered patches of potential habitat, particularly north east of Albany and on the west coast north of Perth. Not surprisingly, the prediction corresponded closely with the specimen-based knowledge of dibbler distribution but indicated that dibblers may occur in Cape Arid National Park where there are large areas of habitat with a similar profile to that in which dibblers occur in Fitzgerald River National Park. The BIOCLIM analysis also indicated large areas of former potential habitat in South Australia.

A brief summary of the current situation.

In 1995, the research plan actions concentrated on re-surveying previous locations and searching for new populations. Dibblers were only found in Fitzgerald River National Park and on Boullanger and Whitlock Islands. In 1996, actions focused on researching the biology of a population in Fitzgerald River National Park but the animals proved difficult to study. Nevertheless, it was concluded that dibblers were relatively secure in Fitzgerald River National Park where land was managed for conservation, and Western Shield, a program to control feral predators in south western Australia (Anon 1966a, Bailey 1996) and a Management Plan (Moore *et al.* 1991) addressed the perceived threatening processes. Therefore, in 1997, the last year of the research plan's life, the emphasis moved to the

populations on Boullanger and Whitlock Islands where several potential threats were identified (Baczocha and Start 1997).

The dibbler is now known to occur on Boullanger and Whitlock Islands and in Fitzgerald River National Park. 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, although none were caught during surveys in 1995 (Baczocha and Start 1997). There have been unconfirmed sightings on the mainland in the vicinity of Jurien and there are extensive areas of heath and other natural vegetation types in which they may persist north of Perth. There are also extensive areas of heath and mallee-heath in Cape Arid National Park and the Nuytsland Nature Reserve, which are, in part at least, within the sub-fossil range of the species. They warrant survey.

Biology and ecology

Prior to the recovery Research Project, there was scant information on the biology of dibblers. Gilbert's notes included information obtained from Aboriginal people about nests (Gould 1863). The label on the Gracefield specimen collected by Tunney states 'in hollow log' (Fisher personal communication). Some habitat data has been gleaned from post-1967 mainland sites

Morcombe (1967) recorded his observations of dibblers from Cheyne Beach. He found they were semi-arboreal with some 'dependence' on large flowers for nectar and insects. They preferred dense stands of *Banksia*-dominated heath with a thick litter layer through which they moved. His specimens, and a later one found by George Duxbury (Muir 1985), all came from long-unburnt vegetation. This led to the assumption that dibblers are restricted to old vegetation and that frequent or extensive fire is a serious threat to their survival. The assumption was supported by Chapman and Newby (1995).

However Baczocha found a population in relatively young vegetation (approximately 10 years post fire). The significance of the vegetation age in dibbler habitat and the ability of dibblers to use fire edges remain unclear. Nevertheless, most specimens that can be associated with the habitat in which the animals were living have come from thick heath or mallee-heath that was at least 10 years old (or from close by). Most have been found on sandy substrates but animals caught in 1995 and 1996 on Thumb Peak, Fitzgerald River National Park, by Sarah Barrett and Natasha Baczocha respectively, were trapped on more shallow, lateritic soils supporting open vegetation (Baczocha and Start 1997).

Dibbler habitat on Boullanger and Whitlock Islands is very different from that on the south coast, particularly in its floristic composition. However, it may have changed considerably since the islands were formed and may not be a useful guide to modern dibbler habitat on the west coast mainland.

Lynam (1987) examined aspects of inbreeding and juvenile dispersal of the island populations. He suggested that reduced genetic variation and developmental instability (indicated by significant morphological asymmetry) were important factors limiting these populations. He ascribed the persistence of dibblers on the islands to an absence of environmental perturbations, eg. habitat destruction and fire. However, the habitat is certainly harsh and is not without disturbance by humans and, to a greater extent, by burrowing seabirds. The latter may be important and beneficial as dibblers use the seabird burrows and the birds import nutrient. Furthermore, there are large populations of *Mus domesticus* and several weed species

on the islands. These may have adverse effects although dibblers will occasionally eat the mice (Dickman 1986) and the weeds have not extensively replaced native plants. Lynam's conclusions on the genetic relationship of island populations are questionable (Adams[2] personal communication in Baczocha and Start 1997).

Dickman examined aspects such as population dynamics and the effects of *Mus* removal, reproduction, genetic structure and parasite loads during a three year study of the island populations. His data are as yet unpublished. (personal communication in Baczocha and Start 1997)

Woolley (1971, 1991) has examined aspects of their reproductive biology using captive animals. Unlike related species which breed in late winter to spring, dibblers breed in autumn. They produce up to eight young. There is some evidence of promiscuous matings (Dickman 1988). On the islands Dickman and Braithwaite(1992) observed a post-mating male die-off on three consecutive years but this is not always the case (Fuller and Burbidge 1987, Baczocha and Start 1997) and males in a population in Fitzgerald River National Park were also able to bred in at least two successive years (Baczocha and Start 1997). The life history strategy of *P. apicalis* may be quite variable, both between populations and between years within any one population. The breeding biology is the subject of a current PhD research program.

Recovery Team Membership.

Although this project implemented a Research Project, not a Recovery Plan, I decided that it would be valuable to have people with appropriate expertise provide input to the direction of the project. Accordingly I set up a 'Recovery Team'. There are ten members of the Recovery Team including two corresponding members who live inter-State but who have expertise and field experience relevant to recovering dibblers. At its December 1997 meeting the Team agreed to seek endorsement for Dr. Roberta Bencini of the University of Western Australia to join the Team. Dr. Bencini supervises the two post-graduate students who are working on dibbler projects. In addition to the members, Harriet Mills, Callum McCulloch (UWA students) and Cathy Lambert (Perth Zoo, Keeper responsible for daily management of the captive dibblers) attend meetings and report on their activities.

Table 1. Membership of the Recovery Team.

Organisation	Position	Present member
CALM SID	Supervising Scientist, Dibbler Project	Tony Start (Chair)
CALM WATSCU	Director of WATSCU	Andrew Burbidge
CALM South Coast Regn	Leader, Nature Conservation Program	Kelly Gillen
CALM Midwest Region	Senior Ranger, Moora District	Keith Hockey
South Coast Community	South coast resident	Vic Smith
Jurien Community	Jurien resident	Jeremy Carter
Environment Australia	TSCS; Dibbler Project Officer	Sally Stephens
Perth Zoo	Director of Research	Mark Bradley
University of WA[3]	Research Student supervisor	Roberta Bencini
La Trobe University	Scientist with expertise in dibblers	*Pat Woolley
University of Sydney	Scientist with expertise in dibblers	*Chris Dickman

* Corresponding members appointed for their expertise in dibbler biology.

[2] Dr. Mark Adams - Evolutionary Biology Unit, South Australian Museum.

[3] pending endorsement

Recovery Team Meetings.

The Recovery Team has met twice yearly since it was established. In 1997 it met on 4 July and 19 December. In addition to formal meetings, members have given me 'out-of session' comment on the IRP and the major Review that EA required this year and, frequently, advice on particular matters where I have sought assistance.

Scope items for 1997.

The Contract Scope Items for 1997 were to:

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

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

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.

4. In co-operation with Perth Zoo, establish captive breeding colonies of both species from the Jurien islands.

5. Prepare three year Interim Recovery Plans for the Boullanger Island Dunnart and the Dibbler.

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

Unlike previous years, they incorporated the Boullanger Island dunnart with the dibbler. The former was thought to be a distinct and Critically Endangered taxon, endemic to Boullanger Island (Maxwell *et al.* 1996). It was added to the scope for 1997 because work could progress alongside dibblers. Recent genetic study 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 attention and is not referred to further.

Actions addressing the Scope Items.

Scope Items 1-3 have been addressed by a post-graduate student at The University of Western Australia, supported by the funding allocated to this project. The student, Callum McCulloch, has submitted his thesis for examination. As soon as corrections have been addressed and the thesis accepted, a copy will be forwarded to EA. It will provide detail of all the data acquired by implementing these Scope Items. A summary is provided here. It is hoped that the work will be expanded into a three year PhD project.

Scope item 4 has been addressed by a University of Western Australia PhD student, Harriet Mills. She is examining the reproductive biology and genetics of the dibbler using the colony at Perth Zoo and wild animals on Boullanger and Whitlock Islands. Support for the project is provided by the Departments of Animal Science (Faculty of Agriculture) and Zoology at the University of WA, Perth Zoo, CALM through this project and the Marsupial CRC.

Scope Item 1. Monitor size of dibbler populations on the Jurien islands.

Regular visits have been made to the islands and all trapped dibblers have been marked with Trovan passive transponders (PITs) to avoid problems caused by loss of ear-tags. The less intensive surveys of previous years had caused some concern that dibbler numbers were

declining, particularly on Bollanger Island, and that the decline may have been associated with a reduction in seabird burrowing. This year's work suggests that the concern was unfounded.

Recapture data suggest that most animals on both islands have been marked and that there were about 80 animals on each island in 1997. Many males survived the 1997 breeding season and are still present at the beginning of the 1998 season.

Scope Item 2. Identify the important resources (including sea-bird burrows) for dibblers on the Jurien islands.

Radio-tracking (which, in contrast to the mainland, is possible on the islands because the islands are so small that the animals can not move out of range) was used to determine movement of individuals. The use of nylon thread dispensed from spools attached to dibblers has also been practical and provided valuable data.

Dibblers are not uniformly distributed across the islands. They were more abundant in heath than dune habitats and they have discrete foraging home ranges. They spent considerable time off the ground, climbing in shrubs and they frequently made brief visits into seabird burrows while foraging. One is known to have spent >10 hours in a seabird burrow.

We still do not know whether they are finding invertebrate food in the burrows or nesting there, but they may be doing both. Analysis of faecal pellets obtained from captured dibblers suggested that their diets comprised about 65% animal and 25% vegetable matter. (10% was unidentified). Animal food was mostly invertebrates, but at least two lizards and three seabird chicks had been eaten. Significantly no *Mus* remains were found in any of the samples. The succulent berries of ruby saltbush (*Enchylaena tomentosa*, Chenopodiaceae) were particularly favoured and dibblers climbed extensively to obtain them.

Scope Item 3. Investigate the effects of weeds, house mice and other potentially threatening processes including changing numbers of breeding seabirds on dibblers on the Jurien islands.

Weeds are not a serious issue at present. Ten introduced plants have been recorded on Boullanger Island and 17 on Whitlock Island (Keighery and Alford[4], unpublished data). However, at present, none of them are serious environmental weeds on the islands. The salty coastal vegetation is not considered fire prone. Nevertheless, a Fire Management Plan has been prepared (Anon 1996b). As noted above, no evidence of mice was found in dibbler scats, but the ecology of mice and their impact on dibblers will require more work in future years. 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. This is a substantial task which may make a good post-graduate project.

Scope Item 4. In collaboration with Perth Zoo, establish captive breeding colonies from the Jurien islands.

Two pairs from each island were 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 is thought to have been conceived in captivity. The female that did not breed died. All males survived the breeding season and, with two of the founder females, are healthy

[4] G. J. Keighery and J. J. Alford . Department of Conservation and Land Management.

as they approach the 1998 breeding season. One founder female has been unwell, exhibiting symptoms similar to those experienced by the one that died in early 1997.

The real test of success will be to breed the young born in captivity because hormonal development that leads to reproduction will have to occur in captivity this time. Woolley (1971) reported asynchronous spermatogenesis and oestrus in captive-reared young dibblers.

Scope Item 5. Prepare three year Interim Recovery Plan for the Dibbler.
A draft IRP has been written. It was discussed at the Recovery Team meeting in December 1997. A copy was sent to the EA (TSCU) Dibbler Project Officer (Sally Stephens) who was unable to attend the meeting but who has since sent comment. The comments have been addressed and a revised draft has been sent to members, including EA (attention Bruce Male in Sally Stephens' absence) for comment 'out of session'. Once those comments are addressed it will be submitted to the Director of Nature Conservation (CALM) to initiate the process of formal endorsement by CALM. Although the process of finalisation may cause some minor changes, the draft version ('Draft of 22 Jan 1998') sent to EA is probably close to its final form.

Scope Item 6. Continue to record new information on south coast Dibbler populations on an *ad hoc* basis.
Trapping has occurred in Fitzgerald River National Park under various programs and dibblers have been caught at three new sites. One of these was a location set up as a standard monitoring site for assessing the effectiveness of CALM's broad scale feral predator control program, Western Shield. Dibblers have not been caught outside Fitzgerald River National Park during the three years of the Research Project.

Future program.
The research Plan concluded after three years, at the end of 1997. The future program for Dibbler Recovery will be the implementation of an Interim Recovery Plan for three years, at the end of which a full Recovery Plan will be written and implemented if possible. Implementation of the IRP and the full RP will depend on funding support from all participants, but particularly the Threatened Species and Communities Unit of Environment Australia. The Recovery Team has almost completed the preparation of the IRP and has applied to EA for financial support for its implementation.

References.
Anon. 1996a. *Western Shield; bringing wildlife back from the brink of extinction.* Department of Conservation and Land Management. Perth.

Anon. 1996b. *Fire occurrence contingency plan; Boullanger and Whitlock Islands, Jurien Bay*. Department of Conservation and Land Management, Moora, WA.

Baczocha, N. and Start A.N. 1997. *Status and ecology of the dibbler, (*Parantechinus apicalis*) in Western Australia*. 1996 Annual Report. Unpublished report to Environment Australia. Department of Conservation and Land Management, Perth.

Bailey, C. 1996. Western Shield; bringing wildlife back from the brink of extinction. *Landscope* **11(4) (Winter 1996)**

Baverstock, P.R., Adams, M. and Archer, M. 1984. Electrophoretic resolution at species boundaries in the *Sminthopsis murina* species complex (Dasyuridae). *Australian Journal of Zoology* **32:** 823-832.

Chapman, A. and Newby, K.R., 1995. A biological survey of the Fitzgerald area, Western Australia. *CALMScience* **Supplement 3:** 1-258.

Cooper, S. and Birrell, J. 1996. *A population genetics study of* Parantechinus apicalis *using DNA sequence markers.* Unpublished report. Evolutionary Biology Unit, South Australian Museum. Adelaide. 4 pages

Dickman, C.R. 1986. Return of the phantom dibbler. *Australian Natural History.* **22(1):** 33.

Dickman, C.R. 1988. Body size, prey size, and community structure in insectivorous mammals. *Ecology* **69(3):** 569-580.

Dickman, C.R. and Braithwaite, R.W. 1992. Postmating mortality of males in the dasyurid marsupials, *Dasyurus* and *Parantechinus*. Journal of Mammalogy **73 (1):** 143-147.

Fuller, P.J. and Burbidge, A.A. 1987. Discovery of the dibbler, *Parantechinus apicalis*, on islands at Jurien Bay. *The Western Australian Naturalist* **16:** 177-181.

Gould, J. 1863. *The Mammals of Australia.* Taylor and Francis. London.

Gray, J.E. 1842. A new species of Tapering-tailed Phascogale in the collection of the British Museum. *Annals and Magazine of Natural History.* **IX:** 518.

Lynam, A.J. 1987. *Inbreeding and juvenile dispersal in insular populations of two dasyurid marsupials; the dibbler,* Parantichinus apicalis, *and the Grey-bellied Dunnart,* Sminthopsis griseoventer. Honours Thesis. University of Western Australia.

Maxwell, S., Burbidge, A.A. and Morris, K.D. (Editors) (1996). *The 1996 Action Plan for Australian Marsupials and Monotremes.* Wildlife Australia, Endangered Species Project Number 500. Environment Australia, Canberra.

Moore, S., Cavana, M., Gillen, K., Hart, C., Hopper, S., Orr, K. and Schmidt, W. 1991. *Fitzgerald River National Park Management Plan; 1991 - 2001.* Department of Conservation and Land Management. Perth.

Morcombe, M.K. 1967. The rediscovery after 83 years of the dibbler *Antechinus apicalis* (Marsupialia, Dasyuridae). *The Western Australian Naturalist.* **10(5):** 103-111.

Muir, B.G. 1984. *Report on search for possible dibbler (*Parantechinus apicalis*) Habitat.* Unpublished report. Western Australian National Parks Authority. Perth. 4 pages.

Ride, W.D.L. 1970. *A guide to the native mammals of Australia.* Oxford University Press. Melbourne.

Smith, V. W. 1990. The terrestrial vertebrate fauna of the Torndirrup National Park. *The Western Australian Naturalist* **18(3):** 82-92.

Start, A.N., 1997. *Dibbler Research Plan: A Review prepared for Environment Australia, Endangered Species Program*. Unpublished report. Department of Conservation and Land Management, Perth.

Whittell, H.M. 1942. A review of the work of John Gilbert in Western Australia. Part II. *Emu* **41:** 216-242.

Woolley, P.A. 1971. Observations on the reproductive biology of the Dibbler, *Antechinus apicalis* (Marsupialia: Dasyuridae). *Journal of the Royal Society of Western Australia.* **54 (4):** 99-102.

Woolley, P.A. 1977. In search of the Dibbler, *Antechinus apicalis* (Marsupialia: Dasyuridae). *Journal of the Royal Society of Western Australia.* **59 (4):** 111-117.

Woolley, P.A. 1980. Further searches for the Dibbler, *Antechinus apicalis* (Marsupialia: Dasyuridae). *Journal of the Royal Society of Western Australia.* **63 (2):** 47-52.

Woolley, P.A. 1991. Reproductive pattern of captive Boullanger Island Dibblers, *Parantechinus apicalis* (Marsupialia: Dasyuridae). *Wildlife Research* **18:** 157-163.