MAMMAL CONSERVATION COURSE 1995

ECOLOGY AND MANAGEMENT OF THE WOYLIE, TAMMAR QUOKKA AND GILBERT'S POTOROO.

1. BY WAY OF INTRODUCTION.

Woylies, tammar wallabies, quokkas and **Gilbert's potoroo** are all marsupials that are indigenous to the south west of WA. Quokka are endemic (only occur) in this region but the others are represented by different sub-species in other States.

All four are "Critical Weight Range" (CWR) mammals. That is to say they weigh between 50 grams and 5.5 kilograms. In an analysis of the patterns of decline and extinction of Australian mammals, Andrew Burbidge and Norm McKenzie[1] showed that our appalling record is more or less confined to mammals in this range; larger and smaller species have fared better.

Table 1. Scientific names, Families and weights of Gilbert's potoroo, woylie, quokka tammar wallaby with fox, rabbit and two other macropods for comparison

Common Name	Family	Scientific Name	Weight (gm)[2]
Gilbert's Potoroo	Potoroidae	*Potorous tridactylus gilbertii*	1,000
Woylie	Potoroidae	*Bettongia penicillata ogilbyi*	1,300
Quokka	Macropodidae	*Setonix brachyurus*	3,250
Tammar wallaby	Macropodidae	*Macropus eugenii*	4,200
Brush wallaby	Macropodidae	*Macropus irma*	8,000
Westn Grey Kangaroo	Macropodidae	*Macropus fuliginosus*	38,500
Rabbit	Leporidae	*Oryctolagus cuniculus*	1,580
Fox	Canidae	*Vulpes vulpes*	5,500

Many CWR species that have disappeared from most of their former mainland range have survived on islands. Those that have survived on the mainland have often persisted in their most mesic habitats. Even there most have only survived in special circumstances. Amongst CWR mammals, species that fly (bats), or live in trees or in rock piles have been more resilient. We could perhaps add extremely dense vegetation to the list of habitats that have offered some shelter because that has probably been critical to Gilbert's potoroo and mainland quokka.

Habitats containing an abundance of plants that naturally contain 1080 also seem to have provided protection. For instance it is easy but wrong to think of woylies as typically forest animals. In our grandfathers' time they occurred from the Darling Range to the Great Dividing Range including many of the deserts. Wood-Jones[3] recorded that early this century they had been common over most of South Australia and sold in Adelaide "by the dozen at about ninepence a head for coursing *(greyhounds)* on Sunday afternoons". They have survived in the wild only in WA where dwindling populations hung on at Perup, Dryandra and Tutanning. These three areas are notable for the abundance of

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[1] Burbidge A.A & McKenzie N.L. *Biological Conservation.* Vol. 50 Pages 143-198

[2] mean weights taken from Burbidge A.A & McKenzie N.L (see above) except Gilbert's potoroo, from animals at Two Peoples Bay.

[3] Wood Jones, F. 1924. *The Mammals of South Australia.* Part II. Government Printer. Adelaide

Gastrolobium in the understory. *Gastrolobium* contains 1080 and it seems probable that secondary poisoning of foxes kept predation to a lower level.

2. DESCRIPTIONS

I have attached copies of the accounts of each species from the Australian Museum's **Complete Book of Australian Mammals.** You will find descriptions, basic ecological and biological information and distribution maps. A new and extensively revised edition will be in the shops very soon. In particular the woylie distribution map will look very different. I have also attached a status sheet for woylies which has a map similar to the one that will be in the new edition of the book. Gilbert's potoroo had not been rediscovered when the book was published. I have attached a copy of the recent Landscope article about it.

Woylie (also called Brush-tailed Bettong, especially in the eastern States where it may be an appropriate name for the now-extinct sub-species that once lived there).

Woylies are rat-kangaroos, a rather inappropriate name given to members of the family Potoroidae. This is a small family related to the true wallabies and kangaroos. Most of them include the fruiting bodies of hypogeal (underground) fungi, as major components of their diet, and so dig characteristic conical holes to obtain food. These fungi (technically mycorrhizal fungi) are related to truffles and live in a symbiotic relationship with vascular plants, helping their hosts to acquire minerals from the soil in return for photosynthetic products. Thus woylies probably play an important ecological role in dispersing the spores. Many of our plant species seem to germinate more readily when the ground is disturbed so perhaps woylies are important to them as well.

Like kangaroos, woylies hop but they hold their bodies horizontally; in fact they often appear hunched over. This contrasts with the much more upright posture of kangaroos. They have short faces, small ears and long tails that are tufted You will see these features if you catch one in a spotlight because they move slowly when dazzled by the light.

If you flush one during the day it will probably "explode" from a bush right under your feet. You may see a small brown body hurtle through the bush, zig-zagging now and then before it disappears. You may also see the long, tufted tail, longer than the head and body (bandicoots have much shorter rat-like tails) but you will be lucky to see more detail.

Gilbert's potoroo, is also a rat-kangaroo. Like woylies it digs extensively for hypogeal fungi and perhaps other morsels and probably performs similar ecological functions. While the woylie is essentially an arid adapted animal that reaches the drier forests, most potoroos live in dense vegetation of the high rainfall areas. Gilbert's potoroo is known to have lived from coastal areas between the Leeuwin-Naturaliste Ridge (where its bones are frequent in cave deposits) to somewhere just east of Albany. Before its rediscovery in 1994 only three Europeans are known too have collected specimens, all from near Albany, and all before 1880.

The only ecological information available before its re-discovery was in notes written by John Gilbert to the artist John Gould. Gould included a painting of one of Gilbert's specimens, and Gilbert's notes, in his book on Australian mammals. Gilbert noted that they were the constant companions of quokkas and that they lived in swampy places. The population at Two Peoples Bay indeed live in the same habitat as quokkas, but in this instance in heath, high on the slopes of Mt. Gardner.

So far we have caught 14 Gilbert's potoroos, all on Mt Gardner and we have evidence of at least two more from hair caught a hair tube. They are timid, trap-shy and denizens of dense vegetation under which they move in well-trodden tunnels. You are unlikely to see one but it is important that if near the south coast you find areas of dense vegetation through which there are well-defined tunnels, you find out what lives there.

Quokkas should be familiar to most Western Australians who have visited Rottnest. On the mainland you are unlikely to see one because, like potoroos, they live in extremely dense vegetation, often in swampy places. However, get on your hands and knees in a well used quokka swamp and you will find their tunnels are clear open "roadways" under a mat of rushes etc. The tunnels are almost big enough for you to force your way along, those of bandicoots and potoroos are much smaller (but the latter will use the quokka runs if they are available!). If in doubt you should be able to find the characteristically square droppings.

Tammar wallabies are typical small wallabies. They have distinctive face patterns that should make it easy to distinguish them from young kangaroos and brush wallabies. They often favour thickets but can be seen in fairly open country, even the edges of paddocks, at night.

3. STATUS and DISTRIBUTION

Woylies are gazetted "rare and likely to become extinct" under the Wildlife Conservation Act. A Recovery Plan, funded by ANCA which incorporates actions for WA and SA, is in the last year of a five year life. Like most recovery plans the first edition was written for ten years but encouraging news about the rate of increase of small populations when protected from foxes at Batalling and evidence that they are much more widespread in the Southern Forest Region than previously known were important factors in the revision of the Plan. At the end of this year the Recovery Team will review its status by the criteria set in the Pan and international standards and, if appropriate, recommend a change in its status. (A recent assessment by WATSCU indicated that it should drop from the "threatened" group of categories to "Conservation Dependent".

Today woylies occur in WA at:

Dryandra	natural population
Tutanning	natural population
Perup (include Kingston to L. Muir)	natural population
Boyagin	Re-introduced and well established
Batalling	Re-introduced and well established
Julimar	recent Re-introduction, establishing
Northern Jarrah Forest	about 12 new sites under cover of Operation Foxglove

In SA there are populations on three off-shore islands at Venus Bay Peninsula NR on the mainland and in Yookamurra Sanctuary. They are all derived from WA stock.

Gilbert's Potoroo was presumed extinct as it had not been recorded since the 1870s when it was re-discovered on Mt. Gardner at Two Peoples Bay in December 1994. It is considered critically endangered as it is still known only from species-rich and dieback-free heath on Mt Gardner. 14 animals have been caught. Half are being kept in captivity to "put some eggs in another basket". It may occur on Mt. Manypeaks.

Quokkas are not gazetted as "rare and likely to become extinct" as there are sound populations on Rottnest and Bald Islands. Twenty years ago they were known from swampy gully sites along the Scarp and more extensively in the Southern Forest Region, and reaching east to Mt. Manypeaks/Waychinicup and in the Stirling Range. Because of the very thick vegetation in which they live on the mainland they are seldom seen and could easily disappear without being missed unless thy are monitored regularly. There is some evidence that they have been declining quite significantly in the last 20 years. Their status on the mainland is being reassessed at present.

Tammar wallabies are gazetted "rare and likely to become extinct" under the Wildlife Conservation Act. A recovery plan was written for the species in 1991 but it was not funded; other species were in more urgent need of recovery. The species is probably secure on the Wallaby Islands (Houtman Abrolhos), Garden Island and two islands in the Recherche Archipelago. It also occurs naturally at Dryandra, Boyagin, Tutanning and Perup and it has been reintroduced to Batalling. Until recently, there was a population in Kalbarri NP and in Fitzgerald River NP. Other populations may be persisting in the south-west, but without predator protection their prognosis would not be good.

4. MANAGEMENT

Potential and realised range. An animal's niche is bounded by that combination of environmental parameters that provide conditions within which it can live. If some factor (such as predation by a feral animal) reduces the types habitat it can occupy (say because it is eaten in more open areas) its **potential niche** is reduced to a more restrictive **realised**

niche or one could say its **potential habitat** is reduced to a smaller area of **realised habitat.**

For Example the disappearance of woylies from almost all of their range implies that some factor(s) have made much of their potential habitat unsuitable. If we are to prevent the decline continuing, perhaps to extinction , or better still, reverse the decline, we need to identify the factor(s) and through management, alter them to a state that woylies can tolerate.

Where the landscape has been fragmented by clearing or where we may want to achieve a major extension back to former habitat in a short time, we may have to translocate animals after we have dealt with the factors that eliminated them from their previously realised habitat. Occasionally there are circumstances under which it is prudent to introduce animals to areas they did not previously occupy, such a an island.

Woylies have been translocated to several mainland sites in WA and to both mainland and island sites in SA. Tammar wallabies have been translocated to Batalling. Neither quokkas or Gilbert's potoroos have been translocated yet. Fox control has been the most important pre-requisite management action.

Predation and fire. There are two particularly important factors that affect the availability of potential habitat for these four species on the south west mainland. They are often inextricably mixed. The most important is predation by foxes. In the case of woylies and tammar wallabies there has been a dramatic increase in population density wherever foxes have been baited. Indeed the three sites where the last few animals held on were Dryandra, Tutanning and Perup, all places with abundant thickets of *Gastrolobium.* It seems plausible that fox numbers were lower there because of secondary poisoning when foxes ate prey that had fed on poison bush.

The other factor is cover. The density of cover is, of course, related to fire. Fire removes dense vegetation but with time it recovers. In some cases it will eventually become senescent and open up again until fire regenerates it. This scenario is typical of poison thickets at Perup where the use of fire to maintain habitat for tammar wallabies has been advocated.

However let us consider quokkas. It seems from the accounts of old-timers that quokka hunting was a popular pass-time before the 1930s. Today one would have little chance of getting any because they are confined to such dense vegetation that they usually have to tunnel through it. It is likely that quokkas used to have a much wider realised niche than they do now. Today they are confined to sites that are so dense that they can avoid foxes. Operation Foxglove and other baiting programs may well see quokkas again occupy more open sites and perhaps heathlands on the south coast - look at their habitat on Rottnest!

There is one very important point about quokka habitat and fire. Quokkas seem to have become scarce or vanished from some of the creek lines along the scarp. This may reflect

susceptibility to predation after fire has removed their cover in swampy thickets. If possible quokka swamps should not be burnt, or if necessary they should be burnt in sections ensuring there is always some dense cover. If a quokka swamp burns, intense fox baiting is essential until the cover has regrown. This is probably true for potoroos and many other species like bandicoots.

5. CONCLUSION

All four species are CWR mammals and all are susceptible to fox predation.
All four have declined to varying degrees and they all need active management, particularly fox control, for survival.

Islands provide relatively secure habitat for quokkas and tammar wallabies in WA. There are no island populations of woylies except in SA (introduced WA stock). However woylie response to fox baiting in the sw is so strong that it now meets "conservation dependent" rather than one of the "threatened" categories under IUCN criteria and its status under State legislation will soon be reviewed. Gilbert's potoroo is known from an apparently small population on one mountain. It is critically threatened.

It is not clear how important thick vegetation is as a primary component of their niche requirements, particularly potoroos, quokkas and perhaps tammar wallabies too. In the absence of fox predation they may be able too live in more open habitats than they generally do today. Be that as it may, fire management of habitat is important and protection from foxes is probably most vital when fire has reduced the availability of dense vegetation to a population.