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RINGTAIL AND BRUSHTAIL POSSUMS

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Introduction to the species

Brushtails and Ringtails are arboreal marsupials, and so depend on trees. Both are primarily folivores, and a major dietary component is the leaves of Myrtaceous species common in the habitat. Trees also provide shelter in the form of hollows or rest sites used during daylight.

Both have the pouch well developed and carry the young to a relatively advanced stage. Large pouch young have short fine fur that facilitates them moving easily within the pouch, but within a few days of the first emergence the fur rapidly grows relatively long and fluffy and the young then becomes too large for the pouch. Unlike kangaroos the young are not permanently attached to the nipple. After emergence young may ride the mother's back for a week or two while learning how to get around the trees. There is usually only a single young, but sometimes twins are born.

Ringtails are recognised in the field by the following characters: the ears are short and rounded; the fur on the tail is short dense and lies flat along the skin; the fur on the distal part of the tail is white. Adult ringtails of both sexes weigh about 1000g. Brushtails differ by having: erect tapering ears; the fur on the tail is longer and bushy (fur sits at 90° to the long axis of the tail); the fur on the distal part of the tail may be black, white or grey. Female adult brushtails weigh about 1300g and males about 1600g. Both species have similar pink-orange eyeshine.

Both SW possums have sister groups in Eastern Australia. The (few) studies on western possums suggest that the southwest populations of both species differ from their eastern relatives in a number of important biological parameters. That both southwest taxa are unique, and distinct from the eastern populations suggests co-evolution with the forest communities of the southwest. In those forests that support them they are an integral unit of the ecosystem.

W.A. Possum Populations

Both species have suffered extensive local decline or extinction throughout much of the species original (pre-European) range. Comparison of current and original distributions suggests that within W.A. local extinction (or extensive decline) has affected roughly 70% or more of the original range. For both species the geographic pattern in decline shows that populations in the relatively drier and less densely wooded areas are much more likely to have declined than those in wetter parts of the range. Within the SW forests brushtails are still relatively common. But the decline of ringtails has been far more extensive.

Few formal studies of either species have been undertaken in the SW forests, though the biology of their eastern relatives is better understood. Studies at Tuttaning (Sampson late 60's, and more recently

Kinnear) and Perup (Inions 1985) made observations of brushtails. In the early seventies Mike Ellis recorded his observations of a captive group of ringtails, and of populations at East Augusta and Two Peoples Bay Recently the W A. Museum completed a field study of ringtails. Further, a substantial amount of data (mostly from spotlight surveys and trapping) exists within some CALM groups.

Translocation of both species has frequently occurred, primarily using nuisance or rehabilitated animals from urban areas. Within the Busselton area a group of carers raise and rehabilitate derelict ringtails, which are released to the Leschenault Peninsula with the intent of establishing another ringtail population on coastal CALM land.

Habitat and Natural History

The abundance of possums varies considerably between sites, suggesting that better quality habitat is able to support more individuals. Thus possum abundance can be used as an indicator of habitat quality at different sites.

Several WA studies identify habitat parameters likely to influence the abundance of possums. At Tuttaning Jack Kinnear's studies showed that brushtail abundance increased dramatically in seasons following commencement of intensive fox baiting. The WAM ringtail study showed that the most abundant ringtail populations inhabit coastal forests characterised by high foliage nutrient levels in Peppermint leaves and a relatively dense, continuous canopy. In such habitat high density ringtail populations seem able to coexist with the resident fox population, even though some predation does occur. Inions work at Perup showed that brushtails tended to preferentially use those parts of their home range which had higher levels of foliage nutrients. Recent studies of possums at Ludlow have shown that, in that area, possum abundance is positively correlated with both hollow abundance and the amount or density of canopy, and that both factors have the potential to limit population size.

The distribution of ringtails in the SW shows that most extant populations occur in coastal and near-coastal areas, or associated with drainage lines or watercourses (Collie R., Warren R. catchment). On the southern tip of the Swan Coastal Plain the species is relatively abundant. All coastal populations live in vegetation containing Peppermint as a common tree. If eucalypts are present as a common vegetation component (as at Ludlow) then brushtails are present also.

In coastal forests of Peppermint there are few hollows and brushtails are extremely rare (the habitat appears unsuitable for them). In such habitats ringtails use a variety of rest sites, but most commonly build nests in trees (called **dreys**). These range from flimsy platforms for temporary use to large spherical nests woven from pliable vegetation collected and carried in the tail to the construction site.

The degree of arboreality differs between the two species. Brushtails use the ground frequently (at Perup Inions found they spent about one-third of their active period on the ground), and as a consequence are frequently caught in cage traps. If sufficient canopy connections exist ringtails are primarily canopy dwellers and consequently are rarely seen on the ground or caught in traps. Where trees are more widely spaced ringtails must descent to ground level more frequently.

Ludlow and the Perup area are the only SW forests that have both species present throughout a relatively large area. A recent survey of ten Ludlow sites showed that possum abundance varied by up to a factor of ten between sites, and one site had more than twice as many possums as any of the other nine. Survey data for both Perup and Ludlow shows that the relative abundance of each species varies between different habitats. Sites with the highest densities of possums tend towards a one to one ratio

of brushtails to ringtails. In lower density areas it is more likely that one species outnumbers the other.

Ringtail and Brushtail Possums in S.W. of W.A.

At Abba River (Ludlow) the older Tuart trees provide hollows and the Peppermint forms an extensive lower strata. Here both species use Tuart hollows (3-8 each year) as their major rest site, and both eat predominantly Peppermint leaves. Young ringtails and males sometimes rest in dreys (only near the watercourse), temporary platforms, or amongst dense vegetation or under logs. Breeding female ringtails at Abba River always use Tuart hollows. Ringtails very occasionally rest on the ground during daylight, but more frequently during relatively hot summer weather, when they rest in cool damp spots. Dreys are extremely rare in eucalypt woodlands since they don't provide adequate shelter during hot summer weather.

These patterns suggest hollow parameters influence abundance; brushtails are absent from the Peppermint forest even though its leaves form the staple diet at Abba River. Dreys are only abundant in cooler, humid areas.

Ringtails at Perup use about 2.5 ha of forest each (and 4-8 hollow trees each), at Abba River about one ha and at Locke Estate less than one ha. Home range size for brushtails rarely exceeds 5ha. Both species show home range overlap, with only small core areas used exclusively by one individual. Excursions from the home range are rare.

Reproductive patterns differ between the species. Brushtails tend to breed seasonally. At Abba River there is a single breeding season, with births concentrated May and June. Ringtails in nearby populations may have different reproductive patterns and growth rates of young. Females at Abba River had one young each year which was born during winter, but some females gave birth at other times of the year. At Locke Estate twenty percent of births were of twins and some females raised two consecutive young in a single year. At Locke Estate breeding was more evenly spread throughout the year with somewhat fewer births during late summer.

In Victoria Pahl observed in his study population of drey dwelling ringtails (*Pseudocheirus peregrinus*) extensive deaths following a period of unusually hot weather. Some years in Busselton similar observations have been made by wildlife carers who treat distressed *P.occidentalis* found under water tanks, or on lawns during daylight trying to get water from reticulation systems. In contrast with the cool, wet weather of summer 1991-92 there were several hot periods in early 1991 which were associated with numerous observations of dehydrated and thirsty animals active during daylight in urban Busselton. This information highlights the importance of adequate shelter from high daytime temperatures, and of macro- and micro-climatic factors associated with condensation during darkness. Brushtails occur in far more arid areas than ringtails, and presumably are able to more economically balance cooling costs and water availability.

Survey Techniques

Because possums eat plant tissue they produce relatively abundant faecal pellets. Defecation patterns differ to some degree, with most ringtail pellets falling from the canopy, while many brushtails deposit small clusters of pellets at ground level. While the shape of pellets is generally distinctive, the best feature of pellets for identification purposes is the general size of fragments within the pellet. The digestive system of ringtails is more specialised for browsing than brushtails', and as a consequence faecal pellets contain finer, smaller fragments than brushtails. Identification of the species using faecal pellets requires an adequate sample of pellets because sometimes young animals produce odd pellets, and as ringtails age, their teeth become less efficient.

In more open woodland scratch-tracks result from repeated use of an ascent path on favoured trees. Both species have very sharp claws which usually mark the trees surface. They are particularly prominent on pale barked species such as Wandoo. Scratch-tracks are rare in areas with denser forest, since canopy travel is usually preferred.

Night surveys are conducted by spotlighting or headtorching, the former being more applicable in open eucalypt forest and the latter better in more dense Peppermint associations. Unfortunately spotlight results form a very soft measure of abundance, primarily because different people vary greatly in experience and ability to pick eyeshine amongst foliage. Further, comparison of results from different habitats is more likely to reflect differences in possum visibility due to patterns of penetration of light through different vegetation.

Trapping programs are ideal to determine brushtail abundance, but may fail if used to identify presence/absence in low density populations. Similarly, spotlighting may yield no sightings in low density areas.

Dry abundance and occupancy rates (percentage of dreys occupied of the total number checked) vary dramatically between sites. At Two Peoples Bay dreys are very abundant, but only about 10% were occupied, but at other sites occupancy rates are as high as 40%. In Peppermint forest each ringtail frequently uses 3-8 different rest sites each year within the home range and dreys are relatively abundant structures in Peppermint forest with a resident ringtail population.

Management of Habitat for Possums

The following habitat parameters have been implicated as having the potential to influence possum abundance:

FOX ABUNDANCE and/or CANOPY CONTINUITY
NUTRITIONAL QUALITY and abundance of food species
HOLLOW ABUNDANCE and quality
SUMMER MOISTURE (primarily ringtails)

Sites with lots of possums of both species are characterised by the positive nature of all parameters except fox abundance. Studies aimed at identifying habitat which may be occupied using maps should consider the relationship between vegetation type, drainage patterns, topography and soil and leaf nutrient levels to identify the potentially best areas within the survey area. Day searches of four to six sites can quickly determine the relevance of the selection procedure by providing a relative assessment of the abundance of faecal pellets, hollows, scratch-tracks etc.

While nutritional quality is not easily influenced, structural characters of forests are constantly influenced by land management procedures. The disturbance associated with structural changes to forest may be short term (e.g. small areas cleared for temporary use) or long term (e.g. hollow formation).

Some short-term considerations are easily implemented. At Ludlow some Tuart regeneration proceeds on plots roughly the size of the area flattened by one or two falling tuarts. Initially some of the peppermint trees in an area are knocked down and left to dry. At this stage possums may be displaced from the canopy until they establish and scent mark alternative routes. Fox baiting one week prior to and again during clearing can provide temporary gaps between fox home ranges for the temporarily exposed possums. This consideration has application to the development of recreation areas, which in coastal peppermint forests are frequently in the best ringtail habitat.

Another short-term application of baiting is to provide temporary protection during translocation.

Animals released into habitats with adequate canopy cover may still be exposed while the area is explored and until regular canopy routes are established. Ringtails may also come to ground during hot weather: fox baiting in January may have a greater impact on reducing annual predation of ringtails than winter baiting.

Hollow abundance is a long term issue in habitat management. Brushtails appear to be absent or very rare in SW forests that lack hollows. The ringtails sensitivity to dehydration and overheating implies that it survived in inland areas only where some rest sites provided adequate thermal insulation, or where water supply was adequate. A small reduction in the abundance of hollows may result in dramatic decline in availability of the highest-quality hollows necessary for ringtails to survive one or two weeks of each summer, or perhaps as little as a few days every two or three years.

Similarly, structural changes to forest they may appear minor to us might have major impact on population numbers. Thinning forest may affect nightime condensation patterns by increasing air flow (and hense inhibiting condensation). Reduced ground cover may increase summer soil surface temperatures and hence decrease the frequency of summer dews. Reduction of the understory may also increase the success fox predation. While there is little hard data to guide managers with respect to these habitat parameters a knowledge of the potential of such factors to cause local decline may assist in ensuring the persistence of possum populations. Particularly for ringtails habitat disturbance they may have little impact during winter may, if carried out during hot weather, cause decline in ringtail numbers.