WESTERN SHIELD RESEARCH ADVISORY PANEL

Report from Dryandra meeting
7- 9 November 2006.

Introductory remarks

Over November 7-9 2006, the Western Shield Advisory Panel met with the Director of Science, Science Advisor and key project staff involved in Western Shield research projects. The panel members collectively reviewed a series of presentations by individual project leaders, along with some supporting documentation. Verbal feedback from reviewers was made at the conclusion of the meeting, and this written summation made subsequently.

As an overall comment, we congratulate the Department of Environment and Conservation for making such a comprehensive response to data indicating a decline in some populations of woylie and other marsupials in areas subject to Western Shield fox baiting. We are very pleased with the high quality of planning and implementation evident in all research projects initiated as part of this response, and in the process DEC has put in place to ensure independent expert review.

General Comments

Genotyping hair samples

We note that all projects plan to undertake surveys of foxes and cats based on individual identification from genotypes assigned to hair samples. This is a critical step in mitigating the reliance each project has on sand-plot indices of activity. While the technical aspects of genotype assignment from hair samples have been achieved, reliable hair sampling for foxes and cats has not. For this reason we view the development and/or identification of techniques that consistently yield hair samples of sufficient quality to allow genotype assignment as the single highest priority across all projects. As such, we strongly recommend that a single research effort (supported by all projects) be made to rapidly undertake this work.

Sand-plots

We are pleased to see that sand-plots employed by each project have been standardised. The only outstanding issue was Adrian Wayne's use of tuna oil rather than Pongo on active plots. We understand that Adrian will now use Pongo, providing comparative predator activity data across all projects.

Baiting efficiency for foxes and cats

A strong feature of the Dryandra and Lake Magenta projects is the high apparent levels of residual fox activity under current baiting regimes. This raises the question of whether foxes in each area are re-invaders or non-poisoned survivors, and whether this varies between small-fragment reserves and larger areas of more continuous habitat.

We recommend that a priority aim for both studies is identification of the reasons for high residual activity: insufficient baiting frequency, insufficient bait intensity, bait offtake by non-target species, or low bait encounter in structurally complex habitats. It may well be that the reasons differ between Dryandra and Lake Magenta, and this may provide a basis for varying the prescribed baiting regime between smaller habitat fragments, and reserves comprising larger areas of continuous habitat.

We note high levels of residual cat activity at Lake Magenta. When this project considers baiting regimes that target cats, similar issues of baiting efficiency for cats may need to be explored.

We were pleased to see Keith Morris' thorough analysis of existing information on previous baiting at Lake Magenta. This analysis highlights numerous breakdowns in the application of baiting that may well have contributed to the limited effectiveness of predator control. As part of its response to observed declines in key populations, we strongly recommend that DEC develop and implement more rigorous baiting prescriptions that more strictly control (1) the maximum period between baiting operations, (2) the timing of any ground-based perimeter baiting with respect to aerial operations, and (3) the response to untimely rainfall events that may nullify previous baiting.

Security of funding for Upper Warren woylie conservation research
We were very impressed with the work undertaken so far on the declining and stable woylie populations in the Upper Warren area. While the current funding for this work will allow key demographic rates for these populations and associated changes in predator activity to be finalised, there is a clear opportunity to extend this project to formally test the role of predation by cats. In discussion with Adrian Wayne, we supported Neil Burrow's' suggestion that intensive cat control on two of the three sites where woylies are undergoing rapid decline could demonstrate one way or the other whether cats are a primary driver of mammal decline.

Given the potential that this project has to establish the role cats may play in the decline of the woylie, we strongly recommend that funding for this project be extended for three years to support the proposed experiment.

Meta-analysis
Project leaders have now recognised the common elements of their respective programmes by formulating an overarching statement and a series of associated hypotheses. However, we strongly suggest that coordination across the projects be formalised by using a meta-analysis approach to increase inferential power for a number of key questions. These include:

1. How can the frequency and intensity of baiting be varied to achieve effective and consistent reductions in fox and cat abundance on different types of reserves?
2. Does fox control increase predation on target prey species by elevating cat abundance?
3. If cats are consistently identified as a critical predator under baiting regimes that achieve effective fox control, how can these regimes be modified or enhanced to also achieve effective cat control?

Next steps
A number of specific recommendations have also been made for the individual projects being undertaken through this initiative. These recommendations are summarised below.

The review panel have agreed to assist in the development of a detailed proposal for the extension of the Upper Warren woylie conservation project if funding for the experimental phase is confirmed. The review panel will meet next in late spring/early summer 2007 to review progress on projects and provide advice on preliminary analysis and interpretation.

Project-specific comments

Mt Gibson
The project has made good progress and is tracking well against key milestones. The Advisory Panel noted that a low level of pre-baiting predator activity on the baited site (consistent with some predator control having been applied here in the recent past), may limit the conclusions that can be drawn from the experiment. However, the Advisory Panel were pleased to hear that the partial reverse design suggested (i.e. application of baiting to the non-baited control site once predator activity has been robustly bench-marked) is now likely. This approach would largely offset any issues arising from low activity on the baited site.

Dryandra
This project is progressing well, with useful data on woylie survival reported for both Dryandra and Tutanning, despite some issues with telemetry collars. Current levels of survival are disturbingly low but consistent with high apparent residual densities of predator activity within the reserves. Low survival on Dryandra was less consistent with an apparent stabilisation of woylie density as indicated by trapping success. However, the degree to which this effect was an artefact of trapping efficiency associated with the switch from "operational" to "research" monitoring is unknown. We recommend that the current baiting regime be maintained until patterns of change in survival and abundance are confirmed. If these parameters signal an ongoing decline, an experimental manipulation of the baiting regime should be considered. This would change baiting frequency and/or density, in an effort to reduce residual predator activity. Any such approach should be coordinated with experimental manipulation of baiting regime in the Lake Magenta study (see below) to address the question of how baiting regime should be tailored to reserve type (small fragment cf. large continuous area, as per our general comments above). A manipulative experiment at Dryandra would have to either split the site for comparative purposes, or use Tutanning as a "control".

The video-based work on bait fate as well as the bait weathering work will add significant value to any research focused on refinement of baiting regimes. The former will help establish whether an increase in baiting frequency or density will be more effective. The latter will help establish "rule-of-thumb" criteria for how weather factors should be considered in establishing effective baiting protocols.

The Advisory Panel was pleased that progress had been made on establishing the role wedge-tailed eagles may play in marsupial predation. The dietary studies described, along with accumulating evidence on the fate of radio-collared woylies, indicates high potential for eagles to be a key factor in habitat fragments such as Dryandra. We would like to see this work elaborated by scoping this potential more formally. This could be done by obtaining better estimates of the number of breeding pairs utilising Dryandra in any significant way, establishing the frequency with which native prey appear in the diet of a sample of these, and estimating the average biomass intake requirements of this population using published metabolic studies. Collectively, these parameters should allow the potential off-take of native prey species by the resident population to be estimated. If this appears significant, thought must be given to an experimental manipulation of eagle density.

Northern jarrah forest
Unfortunately Paul de Tores was unavailable for the Dryandra meeting. However, the Advisory Panel thought that good progress had been made in assembling the research team necessary to undertake the expansive program associated with this project. A key issue identified by the Panel was the amount of time and effort that was being expended on contact telemetry technology. Given the apparent limitations of this technology, and the number of collar deployments planned, we have serious reservations that the approach will yield useful quantitative data on predator-prey interaction. Given the effort and costs involved, the Advisory Panel would strongly encourage a scoping analysis that used guesstimates of predator and target prey densities to investigate the relationship between (1) the number of interactions that occur between each predator and each prey species, and (2) the number of collars on each predator and prey species that would be necessary to provide a robust estimate of this number. Our suspicion is that a large number of collars would need to be deployed even if the level of interaction is high. One suggestion was that contact collars were more important for attributing specific predation events rather than estimating predation interaction *per se*. While acknowledging that this is a more plausible application of the technology, a similar power analysis should be conducted (i.e. given the proportion of each predator and prey population collared, what is the probability of any predation interaction being between collared individuals).

The Advisory Panel looks forward to a more comprehensive review of this project in 12 months time.

Lake Magenta
Again, the Advisory Panel was encouraged by the progress made on this project; and was particularly impressed with the analysis of historical baiting data. Where possible, similar analyses should be considered for other project sites. The early data from this site indicates high residual levels of predator activity, consistent with the situation at Dryandra. However, in contrast with Dryandra, the spatial pattern of activity suggests that survival of predators subjected to baiting may be more important than reinvasion rate at this site. The Panel's view was that the focus of research at Lake Magenta should be on identifying the reasons for the apparent failure of the baiting regime, and evaluation of potential solutions. The size of the Lake Magenta site suggests that an experimental manipulation of baiting regimes (once robust benchmarks of predator activity have been established) could be imposed by splitting the site. Spatial analysis of subsequent predator activity (and, hopefully, abundance) will allow the role of predator survival cf. reinvasion to be investigated. This work should be closely coordinated with the Dryandra research to address the broader issue of what drives failures on reserves of different type: predator survival or reinvasion.

The other key issue which has emerged around this project is the role that fire-breaks and any associated areas of reduced vegetation density play in predator survival. It is hypothesised that while the complex understorey away from these cleared areas limits baiting effectiveness, the firebreaks and associated scrub-rolled buffers facilitate rapid reinvasion. Structural complexity could reduce baiting effectiveness because either (1) aerially deployed bait never reaches the ground, or (2) predator/bait encounter rate is reduced. This double effect could be the reason why baiting is less effective than expected. The plan to investigate the difference in bait uptake between open and closed habitat is a sensible way to proceed. However, careful thought needs to be given to how aerial baiting is simulated or an actual bait drop assessed.

Upper Warren woylie survival study
Most comments that the Advisory Panel had on this project centred on the potential that extension of the project had to rapidly demonstrate the role cats are playing in woylie decline. These are summarised in General Comments above. Additional views from the Panel focused on the need to prioritise the urgency with which predation cf. disease was treated, and to allocate resources accordingly. While we applaud the project leader's inclusive approach, we would not like opportunities to directly address the role of predation to be lost because resources were diverted elsewhere. The current involvement of disease expertise through the link with the ARC-funded program should ensure that good separation is maintained.

The suggested utilisation of "declined" woylie populations to undertake a replicated cat manipulation has been endorsed by the Panel in the strongest possible terms. In designing this experiment, it should be kept clearly in mind that the manipulation is about evaluating the effect of cats on woylie survival, **not** on establishing the most effective cat control regime…that is a subsequent step. With this in mind, manipulations of cat abundance that employ direct removal techniques (e.g. trapping, hunting, cyanide) might be preferable to broad-acre poisoning. We noted that the cat bait may deleteriously affect chuditch (field work to clarify this has yet to be finished); however, if cat baits have to be used to effectively reduce cat numbers, we urge that the possible limited effects on chuditch not be allowed to prevent this experiment being conducted. Aligning this approach with indices of cat activity or estimates of cat abundance would allow the real level of cat reduction to be estimated, as well as calibration of a number of abundance indices.

E/Professor Peter Jarman, Dr David Choquenot, Dr Andrew Burbidge
9 November 2006