OPTIMAL MONITORING STRATEGIES FOR LISTING THREATENED SPECIES

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Monitoring is an essential conservation tool used to identify, prioritise and track the population dynamics of species of concern. Information from monitoring is crucial for compiling and maintaining data on threatened species lists, such as the IUCN Red List. These lists play a key role in determining funding allocation and providing legislative protection for vulnerable species. Despite this, there has been little research into the most appropriate methods for monitoring to adequately detect population changes in order to qualify for listing.

We use a patch population model and a simulated survey process to investigate the optimal monitoring technique for a locally restricted and low density endangered species: the Chestnut-rumped Hylacola (Mt Lofty Rangers; *Hylacola pyrrhopygia parkeri*). We use a simulated decline of 80% over 10 years; this decline meets the IUCN Red List criteria for category of ENDANGERED. We compare the success of two commonly used monitoring techniques at correctly categorising the species as ENDANGERED given financial constraints. The methods we compared are the 20-minute/2-ha abundance and the presence/absence survey methods over a range of available budgets (5-200 person-days/year).

We found that the proportion of abundance surveys that correctly identified the ENDANGERED category increased with budget (Figure 1), but the pattern of results from the presence/absence survey was not as simple (Figure 2). The results from the p/a survey showed that for small to medium budgets the proportion of simulations that calculated the correct category increased with budget, but this pattern broke down for large budgets. This result occurred because the trend that was being measured at low to medium budgets was actually a trend in density rather than patch occupancy, but as budget increased, the method began to more accurately measure trend in patch occupancy.

A comparison of the proportion of simulations that correctly calculated the species as being ENDANGERED for each of the methods (Figure 3) showed that the presence-absence survey method performed slightly better than the abundance method for small and medium sized budgets and the abundance survey method outperformed the p/a method for large budgets. This demonstrated that presence/absence surveys can be very useful when budgets are small, and because we know that managers often have limited budgets the presence/absence surveys may more often than not be the most appropriate method. This counter-intuitive result illustrates the importance of explicitly incorporating economic considerations into the design of monitoring programmes.

Our results give an understanding of what pattern exists between budget and accuracy of calculating category of threat. We used these results to describe potential rules of thumb for optimal monitoring of threatened species to detect change for listing on the IUCN Red List.

FIGURES:

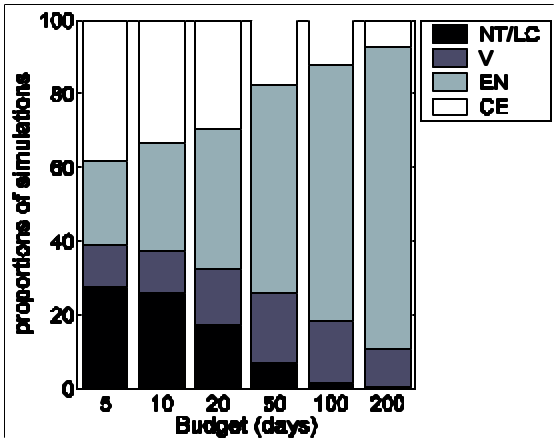

Figure 1: Results from 1000 simulations of the abundance survey. The correct category of threat is ENDANGERED (light grey).

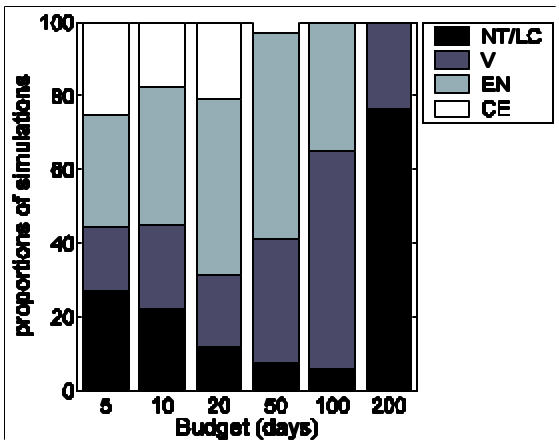

Figure 2: Results from 1000 simulations of the presence/absence survey. The correct category of threat is ENDANGERED (light grey).

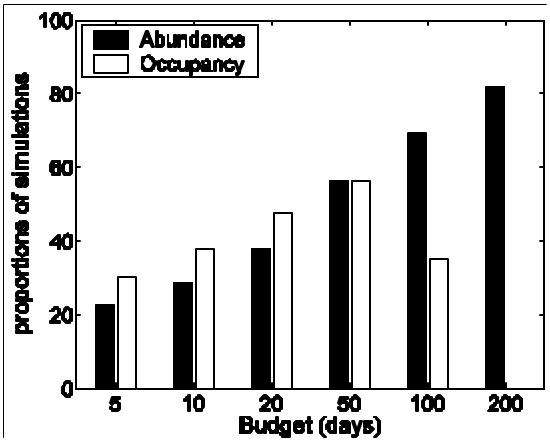

Figure 3: A comparison of the proportion of simulations that correctly calculated the species as being ENDANGERED for each of the methods.