

Save, survey or surrender?

Optimal management of a secretive species

When the numbers of an endangered species declines to a point where it becomes difficult to find, how do you prioritise your resources? Do you assume the species has gone extinct and reallocate the resources to other endangered species (surrender)? Or do you put more of your resources into monitoring for the species to find out if it's still around (survey)?

But, of course, there's also a third option; you could just assume the species is still present and keep on managing its environment as if it's there. In this third option you could do more management because you're not diverting resources into monitoring (which is resource-intensive and may not successfully detect the species in question anyway, even it is still around). Let's call this third way the 'save' option.

So how do you manage an endangered species that hasn't been seen for a while: Do you save, survey or surrender?

New research led by AEDA suggests the optimal strategy, most of the time, is the save option. That is, conservationists should carry on managing the environment as if a seemingly vanished species is still around rather than rushing to check whether it is extinct. And the researchers have demonstrated the validity of this strategy with an analysis on the endangered Sumatran tiger found in Western Indonesia.

There are many species of threatened animal and plant that have not been seen for some time. These cryptic species present a major intellectual, and in the case of the Ivory-billed Woodpecker (see *AEDA News #8*) a very public, costly and controversial challenge for managers.

"A lot of threatened species are cryptic," says AEDA's Hugh Possingham. "The question is how do you know how to best protect them?"

The research, headed by Dr Iadinè Chades from AEDA's Brisbane node, found that the most cost-effective strategy is to assume the species is still around and manage for it, even though it hasn't been seen for some time. The next big question, then, is how long you apply this strategy.

"Several factors influence just how long conservationists should wait before starting to search for a species," says Possingham. "That includes the value of the species, its detectability and its probability of extinction."

The underlying principle, however, is that money should be spent first in managing the environment to give a threatened species the best chance of survival, rather than engaging in efforts to survey for its presence. The optimal strategy is to invest in active protection.

The researchers illustrated their findings with a case study using parameters based on the critically endangered Sumatran tiger (*Panthera tigris sumatrae*). The tiger had apparently vanished from certain areas, but may or may not have become extinct.

The modelling they carried out suggests that if the Sumatran tiger is detected in the reserve, the optimal strategy is to manage it for 12 years from that time regardless of whether there are subsequent detections or not. If, however, the tiger is not observed at all during that 12-year period, then we should switch from the active management option (save) to an intensive monitoring phase (survey). In other words, all resources should be switched from managing the tiger back to surveying for it.

"I think this was a surprise that was thrown up by our analysis," says Eve McDonald-Madden, a coauthor of the study. "What was counterintuitive was the length of time

An AEDA

info sheet



The Sumatran tiger, like all the tiger subspecies, has suffered dramatic population declines as a result of a reduction in prey abundance, habitat clearance, and illegal poaching. The researchers asked: What is the optimal management strategy for this highly valued species? When is it best to invest money managing the Sumatran tiger, when should we survey to assess the status of the population, and when, if ever, should we give up?

you should keep managing the environment. We showed that often you should manage for a lot longer without seeing them."

However, if the species remains unobserved for a further 3 years of dedicated surveying, then the optimal strategy is to stop investing resources in conserving this species (surrender). Of course, this sounds a bit fatalistic (though some might say realistic) in that it might be interpreted as we're 'giving up' on a species. A more constructive way of phrasing it is: when surveys have convinced us (with a high degree of certainty) that the species is gone, we surrender resources to other conservation actions (other species, habitats and conservation causes).

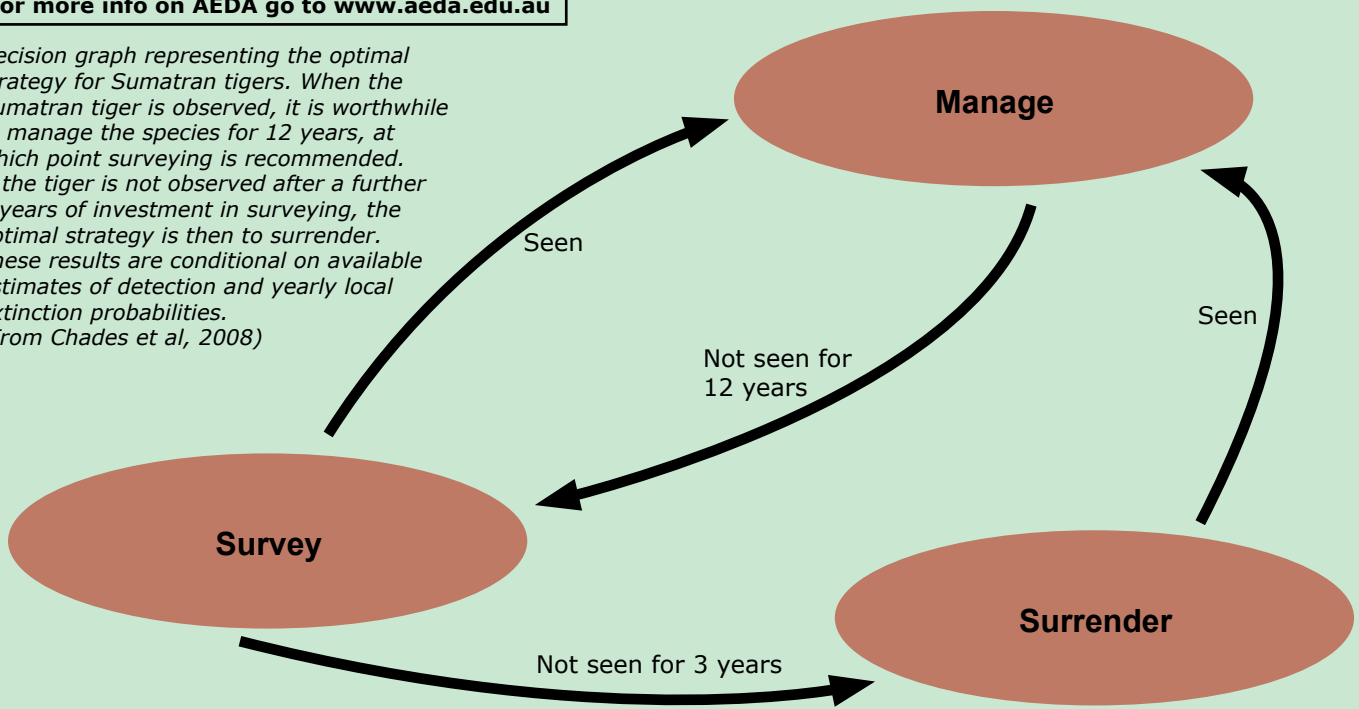
Rather than being a form of hard-hearted, soulless ecological rationalisation, decision frameworks arising from analyses such as these aim to assist conservation workers make decisions in the face of seemingly impossible options – how do you prioritise limited resources when species of high value can't even be found any more. You're damned if you do (ie, continue managing for a cryptic species in the hope that it might be around) and damned if you don't (ie, put more resources into looking for the cryptic species thereby possibly losing the species because you weren't managing for it well enough).

This decision framework provides a method for determining how you might best manage this situation. Best management involves actively managing for cryptic species for a period (regardless of whether it's detected or not). If after that period the species hasn't been spotted, switch to intensive monitoring for a further period to assure yourself

“Analyses such as these aim to assist conservation workers make decisions in the face of seemingly impossible options - how do you prioritise limited resources when species of high value can't even be found any more”

AEDA Info Sheet #1.4 (Oct 08)
 For more info on AEDA go to www.aeda.edu.au

Decision graph representing the optimal strategy for Sumatran tigers. When the Sumatran tiger is observed, it is worthwhile to manage the species for 12 years, at which point surveying is recommended. If the tiger is not observed after a further 3 years of investment in surveying, the optimal strategy is then to surrender. These results are conditional on available estimates of detection and yearly local extinction probabilities. (From Chades et al, 2008)



the species is not still around. And, finally, if you can't find it during this period, accept that the species is lost and surrender the resources that were available to saving this species to some other conservation target.

And it's easy to see that, without such a decision framework, decisions to manage species that can't be seen (or accepting a species is lost) might be politically difficult to accept. Without the support of such as framework, public sentiment would intuitively swing towards a greater effort to find the cryptic species. And no one wants to admit that a species has been lost, consequently efforts to find a cryptic species sometimes go on for years (even decades, think of the Tasmanian tiger) beyond the point where there is any reasonable chance of finding that species. And the available resources devoted to that search may well have achieved a greater good if they had gone to another species in need.

The time you allow for the save and survey periods depends on a number of factors including the value of the species, its detectability and its probability of extinction. In the case of the Sumatran tiger the researchers determined the save period is best set at 12 years and the survey period at 3 years. Of course these solutions are not perfect and can't be absolutely black and white. The 'value of the species' for example will vary from person to person.

However, applying such frameworks allows the decision to be robust and transparent and allows a clear management plan to be drawn up and implemented. The alternative is to allow *ad hoc* plans to be applied to suit short term interests. Hugh Possingham believes efforts to save the Tasmanian tiger would have been better served by their approach.

"We probably should have actively managed for them in the wild a lot longer than we did," he says. "In retrospect they should have been making sure nobody was persecuting them for at least another 20 years or so from when they were last seen."

More info: h.possingham@uq.edu.au

Reference

Chades I, McDonald-Madden E, McCarthy MA, Wintle B, Linkie M, and Possingham HP (2008), When to stop managing or surveying cryptic threatened species, *PNAS*, 105: 13936-13940.

The tale of the tiger

The Sumatran tiger is only found naturally in Sumatra, a large island in western Indonesia. It lives anywhere from lowland forests to mountain forest and inhabits many unprotected areas. Only about 400 live in game reserves and national parks and the rest are spread out in areas that are quickly being lost to agriculture. The reserves are not safe because, despite conservation efforts, many tigers are killed by poachers each year.

The Sumatran tiger is the smallest of all still existing tiger subspecies. Male Sumatran tigers average 2.3 metres in length and weigh about 135 kg. Females average 2 metres in length and weigh about 90 kg. Its stripes are narrower than those in other subspecies, and it has a more bearded and maned appearance, especially the males. It has webbing between its toes that, when spread, makes Sumatran tigers very fast swimmers, and it has been known to drive hoofed prey into the water, especially if the prey animal is a slow swimmer. Sumatran Tigers commonly prey on wild boar, tapir, deer, fowl and fish and orangutans.

Source: Wikipedia

