

# DECISION POINT

Connecting conservation policy  
makers, researchers and practitioners

Issue #88 / May 2015



## Under fire

Are state-wide percentage  
targets the best way to go?



**Connecting animal  
telemetry and spatial  
conservation**



**The impact of planned  
burning on fire-sensitive  
species**



**How Canada decides which  
species to list**

### Decision Point

*Decision Point* is the monthly magazine of the Environmental Decisions Group (EDG). It presents news and views on environmental decision making, biodiversity, conservation planning and monitoring. See the back cover for more info on the EDG. *Decision Point* is available free from <http://www.decision-point.com.au/>

### Plus

Making the most of our flagship species  
Why academics should communicate 'failure'  
The value of native bush to landholders  
Using sighting records to infer extinction

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## Contents



### Research briefs 3

- ▶ Using sighting records to infer extinction
- ▶ Alternative futures for Borneo
- ▶ Big trees for urban wildlife

### Burning issues 4

State-wide percentage targets for planned burning

### Private sponsorship of flagship species 6

Joe Bennett on private sponsorship and conservation efficiency

### Academics communicating failure 8

A reflection on rejection, imposters and how we share achievement

### Native bush and landholders 10

The private benefits of native veg on private land

### Listing species-at-risk in Canada 12

COSEWIC and the first ten years of SARA

### Telemetry and better decision making 14

Connecting animal telemetry and spatial conservation

### First dog in space 16

The sad tale of Laika and Sputnik 2



Victoria is confronting the controversial issue of fuel reduction burns. It's considering burning 5% of public land each year. Such a policy has several major limitations which we discuss on pages 4 and 5. (Photo by Lauren Brown)

## On the point

### Of fire and ice

In this issue of Decision Point we examine many of the values that surround our environmental decisions and I've categorised them here as being connected to fire or ice.

Up front it's fire with an editorial on one of the fieriest topics around – the pros and cons of percentage targets for fuel reduction burns. Victoria is reviewing the recommendation of adopting a 5% target (ie, burning 390,000 ha across Victoria every year). Is this wise? See page 4 to find out what our fire ecologists think.

On page 6 you'll find a polar bear loping over a field so you're probably thinking this is one of the 'ice' stories but you'd be wrong. Joe Bennett examines whether raising funds for flagship species such as polar bears is an efficient form of conservation. It's marketing based on passion, so I've categorising this story as 'fire'.

Page 8 turns icy with Roberto Salguero-Gómez and Nathalie Butt contemplating failure. Their survey revealed our top researchers are good at sharing success but keep failure to themselves. Is this healthy (and what should we do about it)?

Our guest contributor in this issue is Professor Rick Taylor from UBC, Vancouver. He gives us a thumb-nail sketch of how threatened species are listed in Canada (page 12, 13). It's a process involving cold hard science (ice) tempered by political reality (fire). Guess which wins? (And I get to squeeze in a second image of a polar bear!)

And then there's our workshop report on animal telemetry and spatial conservation (page 14). The fire is the passion these researchers have for their technology and their efforts to realise conservation outcomes. The ice is the blobs of frozen water floating around the elephant seals they've attached radio data loggers to.

Environmental decision scientists are sometimes accused of being all ice (rational) and no fire (passion). Hopefully this issue goes some way to dispelling that myth. ❄️

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# DECISION POINT

**Decision Point** is the monthly magazine of the Environmental Decision Group (EDG). The EDG is a network of conservation researchers working on the science of effective decision making to better conserve biodiversity. Our members are largely based at the University of Queensland, the Australian National University, the University of Melbourne, the University of Western Australia, RMIT and CSIRO.

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## Using sighting records to infer extinction

Extinction, the disappearance of the last individual of a species, is rarely observed, is very difficult to detect and therefore usually must be inferred. And getting it right is important. Listing a species as extant (still in existence) when it is actually extinct is undesirable since it can lead to misallocation of funds, incorrect reporting of current extinction rates and loss of public credibility in conservation science (see [Decision Point #38, p6-9](#) for background on the importance of this decision).

Working out whether a species is extinct or not can be hard because small populations can go undetected and often there's not much data available. However, there are many statistical methods you can use to assess extinction from scarce data. Unfortunately, choosing between these methods can be confusing.

Elizabeth Boakes and colleagues have recently reviewed the different methods that are available. They have explained their assumptions and data requirements, and the situations in which each should be used. They have also used examples from the literature to illustrate the choices they recommend. It's basically a manual for using statistical methods to infer extinction.

So, now there's no excuse for not having a quantitative measure of the likelihood of extinction. A win for transparent decision making! 🍀

### Reference

Boakes E, Rout T and Collen B (2015). *Methods in Ecology and Evolution*. <http://onlinelibrary.wiley.com/doi/10.1111/2041-210X.12365/abstract>

## Alternative futures for Borneo

Scientists have urged the three nations who share the island of Borneo to collaborate more closely to save their endangered wildlife while meeting development goals. By coordinating conservation and development efforts as well as reforming land-use, Malaysia, Indonesia and Brunei could retain up to half of the land of Borneo as forests, protect elephant and orangutan habitats, reduce carbon dioxide emissions by 50%, and possibly significantly reduce the opportunity costs by billions of dollars. The study, published in the scientific journal *Nature Communications*, is led by CEED researchers.

"Borneo is the world's third largest island – it harbours over 14,000 plant species and 1,600 land animals," says lead author Rebecca Runting. "These tropical forests regulate regional and global climate and provide food and income to millions of people."

The high rates of forest conversion and degradation over previous decades have prompted the three nations to pledge to protect their natural resources, including maintaining between 45 and 75% of the land area of Borneo as forests. At the same time, Malaysia and Indonesia have planned to greatly expand the area of oil palm and timber plantations. The study reveals that the governments' current land-use plans are inadequate, and will fall significantly short of meeting their conservation goals.

The researchers found that integrated planning between the three nations, including coordinating conservation and development plans, and allowing changes to existing land-use allocations, will achieve substantial savings while requiring less land for protected areas. It will also deliver the greatest area for reduced impact logging – logging practices that are better for the environment.

"The integrated planning scenario explores land-use planning for the entire island, rather than each state operating in isolation," says co-author Kerrie Wilson. "Our study reveals that it is much more cost-effective than the current 'business-as-usual' scenario, and also comes closest to meeting the three countries' conservation targets." 🍀

### Reference

Runting RK, E Meijaard, NK Abram, JA Wells, DLA Gaveau, M Ancrenaz, HP Possingham, SA Wich, F Ardiansyah, MT Gumal, LN Ambu & Kerrie A. Wilson (2015). Alternative futures for Borneo show the value of integrating economic and conservation targets across borders. *Nature Communications*. <http://dx.doi.org/10.1038/ncomms7819>

## Big trees for urban wildlife

Australian cities must work harder to preserve their large, old trees if we want to keep our native animals. Across Australia – and the world – the future of large old trees is bleak and yet large trees support many species such as birds and small mammals says CEED researcher Darren Le Roux.

"Studies based in Canberra – the 'Bush Capital' – show that Australia could lose 87% of its hollow-bearing trees in the urban landscape over the next 300 years," says Le Roux. "Under the worst case scenario, we could lose all large hollow-bearing trees within the next 115 years."

Le Roux explains that the loss of old trees, as well as other critical habitat structures, in urban landscapes is largely due to 'tidy-up' practices that are driven by negative public attitudes.

"Large old trees, dead trees and branches, woody debris and shrubs that support native wildlife are often removed because of fears that branches might injure people or damage property, or because structures appear untidy or pose a bushfire risk," he says. "We are far too quick to remove habitat like large trees without first considering alternative ways to retain these structures that won't risk people's lives and property."

To reverse the decline of large old trees, native trees need to remain standing for much longer than currently tolerated in urban areas, and more young trees need to be planted now for the future says Le Roux. Instead of cutting down large old trees or removing logs, landscaping techniques can be used to separate people and public facilities like footpaths, playgrounds and benches, from these so-called 'riskier' structures and ensure the safe retention of vital wildlife habitat. Surrounding dead trees with rocks, logs, litter and native shrubs can create effective safety barriers and keep maintenance costs associated with weeding and mowing down.

"We also need to change public perceptions about big old trees," says Le Roux. "Signs displaying the biodiversity values of large old trees and other key resources in public spaces will go a long way to encourage tolerance, dispel misconceptions and create an awareness and appreciation of the importance of these habitat elements." 🍀

### References

Le Roux DS, K Ikin, DB Lindenmayer, W Blanchard, AD Manning & P Gibbons (2014). Reduced availability of habitat structures in urban landscapes: Implications for policy and practice. *Landscape and Urban Planning*.125: 57-64. <http://bit.ly/1ICS0bo>

Le Roux DS, Ikin K, DB Lindenmayer, AD Manning & P Gibbons (2014). The future of large old trees in urban landscapes. *PLoS ONE*. <http://bit.ly/1390ZCq>



Retaining large trees in urban landscapes presents many design challenges. Losing these features, however, will see the loss of many other native species.



## Burning issues

### State-wide percentage targets for planned burning are blunt tools that don't work

By Luke Kelly, Kate Giljohann & Michael McCarthy (Uni of Melbourne)

Fire profoundly influences human health, the economy and wildlife. In Victoria, for instance, bushfires have burned more than one million hectares since 2009, claiming 178 lives and more than 2,300 homes, and causing more than A\$4 billion in social, economic and environmental costs. And, as highlighted by recent devastating fires in the United States and South Africa, effectively managing fire risk is a global challenge.

To reduce fire risk, the 2009 Victorian Bushfires Royal Commission recommended that the Victorian Government aim to burn at least 5% of public land as an annual rolling target. The Inspector-General for Emergency Management is currently reviewing this simple percentage target against a new risk-based approach to bushfire management.

Is a state-wide percentage target the best way to reduce risk to human life and property and maintain our globally significant biodiversity? We think not.

#### Limitations of percentage targets

Across the world, planned burning is the main tool for reducing bushfire risk. It is effective when used in key locations by reducing fuel loads, which in turn reduces fire spread rate and intensity. Appropriate planned burning can also manipulate native vegetation to benefit certain plant and animal species.

But burning 5% of public land each year (390,000 hectares in Victoria's case) has three main limitations.

**“It's time to drop the simple 5% target. It is a blunt tool, and a risk-based approach more effectively focuses fire protection where it's most needed.”**

*Large bushfires occur in the mallee shrublands and woodlands of Victoria, New South Wales and South Australia.  
(Photo by Lauren Brown)*

#### 1. It causes biodiversity to decline

Many native plants and animals rely on fire to regenerate habitat and maintain populations, but too much fire can be bad. Consider the three animals pictured in Figure 1.

Our new research, published in the journal *Ecological Applications*, shows that burning 5% of public land each year will harm biodiversity in the mallee shrublands and woodlands of north-western Victoria (Giljohann et al, 2015). We used stochastic dynamic programming to model how fire changes vegetation in the presence of both planned burning and bushfires, using an extensive data set of birds, small mammals and reptiles. We found that burning 5% of a given area increases the risk of extinction of a range of native species. This is because, while some species prefer more recently burnt vegetation, most fire-sensitive species occur in older vegetation, which is largely eliminated when burning 5% each year.

To date, this is the only peer-reviewed paper that predicts how Victoria's current burning strategy influences wildlife diversity.

#### 2. It overlooks important differences between ecosystems

Ecosystems across Victoria are not uniform. They contain different plants and animals, they have different fire regimes, they have different fuel loads, and they present different fire risks to humans. A simple, state-wide target covering such a large and diverse area inevitably misses these important details.

Put simply, what might be an appropriate fire regime for one ecosystem (such as a forest or woodland) is very different to an appropriate fire regime for another (such as a grassland or heathland).

#### 3. It is inefficient

The current percentage-based strategy does not focus enough on the most at-risk Victorian communities. Large-scale planned burning in remote areas, such as the Murray Mallee region, makes





(a)



(b)



(b)



*Forests on the urban-rural fringe contain different plants and animals to those found in the more remote woodlands. They therefore present different fire risks to people. (Photo by Freya Thomas)*

*Figure 1: Frequent planned burns will impact on many native species. Consider: (a) The yellow-plumed honeyeater is one of many birds in mallee shrublands and woodlands that prefer older vegetation with large trees. (Photo by Rohan Clarke/Wildlife Images) (b) The southern legless lizard and (c) Mallee Ningauai inhabit areas with a high cover of hummock grass that take decades to develop after fire.*

it easier to achieve the state-wide planned burning target. But it is an inefficient use of resources, and does little to reduce the risk of major bushfires to human life and property.

Research completed after the 2009 Black Saturday fires showed that the most effective way to protect houses is through burning (or clearing) vegetation in close proximity to properties (Gibbons et al, 2012; and see [Decision Point #56, p6-8](#)).

In this case, burning in more remote regions had relatively little impact on house loss after a major bushfire

A state-wide target, in contrast, encourages burning in remote locations where the benefits can be negligible and fire-management resources wasted.

### A more effective plan

The Victorian Bushfires Royal Commission also recommended that the Victorian Government develop risk-based performance measures for bushfire management. In response, the Department of Environment, Land, Water and Planning has developed sophisticated methods for mapping risks from major bushfires across the state, and predicting bushfire risk following planned burning.

We strongly support this more sophisticated, regional risk-management approach. After all, planned burning to protect human life and property should naturally focus on places where people are at most risk from major bushfires.

But what about also considering wildlife? Recent research we have undertaken offers a way to predict how planned burning influences risks to biodiversity (Kelly et al, 2015). We developed a method for determining the optimal fire history of a given area for biodiversity conservation by linking tools from three fields of research: species distribution modelling, composite indices of biodiversity, and decision science. By clearly defining fire management objectives based on the habitat requirements of fire-sensitive species in a community, this approach could be used to maximize biodiversity in fire-prone regions and nature reserves. This will allow land managers to consider the trade-off between protecting people and conserving wildlife when applying planned burning.

Just as the 5% target is an inefficient method for minimising the impact of major bushfires on human life and communities, it also has negative consequences for the resilience of natural ecosystems.

To be clear, we are not advocating a blanket approach of less (or more) planned burning. We are saying that a mix of strategic and broad-scale planned burning should be done so as to make the biggest reduction in risks to people and wildlife. That is not best achieved by a state-wide target.

It's time to drop the simple 5% target. It is a blunt tool, and a risk-based approach more effectively focuses fire protection where it's most needed: safeguarding people and wildlife. 📌

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*This article is an edited version of an editorial that appeared in The Conversation <https://theconversation.com/percentage-targets-for-planned-burning-are-blunt-tools-that-dont-work-39254>*

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Gibbons P, L van Bommel, AM Gill, GJ Cary, DA Driscoll, RA Bradstock, E Knight, MA Moritz, SL Stephens, DB Lindenmayer (2012). Land Management Practices Associated with House Loss in Wildfires. *PLoS ONE*  
<http://dx.plos.org/10.1371/journal.pone.0029212>

Giljohann KM, MA McCarthy, LT Kelly & TJ Regan (2015). Choice of biodiversity index drives optimal fire management decisions. *Ecological Applications* 25, 264–277.

Kelly LT, AF Bennett, MF Clarke & MA McCarthy (2015). Optimal fire histories for biodiversity conservation. *Conservation Biology* 29, 473–481.



# Making the most of our flagship species

## Private sponsorship and conservation efficiency

By Joseph Bennett (University of Queensland)

It's well known that some species have greater public appeal than others. The species with the greatest appeal are often furry mammals such as the koala or polar bear, or in places like New Zealand, there are large birds like the kiwi. Research has shown that people are willing to pay more for conserving these species than other species, even if the other species are also threatened with extinction. (See the box 'The Lion's share')

If people are donating their own money to help specific threatened species, and possibly ignoring other threatened species, does it really matter? If you're after the best conservation outcomes, our new analysis suggests it really does.

### Bias and distortion

The bias toward some species has been criticized by some as unfair and inefficient. It's unfair because why should a cute and cuddly animal get more money than a not-so-cute animal (like a toad). It's inefficient because focussing on a subset of threatened species may not be achieving the best overall conservation outcomes. Of course, figuring out what's fair and efficient in the conservation of threatened species is quite challenging.

But this bias has other problems. It may even be self-reinforcing. Species receiving a lot of attention often get splashy ad campaigns for their conservation, which further increases their exposure and appeal.

Even in government programs designed to conserve all threatened species, the money spent on conservation is often biased towards species that have public appeal. Politicians, after all, like to reflect the will of the people in their decision making and the bottom line is that there's never enough to meet all our conservation needs.

The net effect of this bias is that it creates 'have' and 'have-not' species. Some species have the appeal and get the money, and some don't.

It's been argued that this isn't necessarily a bad thing, that there are some advantages to this bias. Iconic species can be used as 'flagships' to galvanize public support for conservation, and can also be used to generate donations to conservation programs that may benefit other species.

**“Sponsoring flagship species does not do nearly as good a job as using sponsorship money as efficiently as possible.”**

*Iconic flagship species like polar bears might generate significant sponsorship from private donations. We can increase the benefit of these donations if the conservation of other threatened species is taken into account when making decisions on how these resources are used.*  
(Photo by Aleks Terauds)

### Measuring the value of a flagship?

Given these divergent opinions, the appropriateness of flagship species for conservation has been debated for many years. And central to this debate is the question: how effective are flagship species at helping to achieve broader conservation goals, like conserving biodiversity?

We sought to answer this question using real-life comparisons. We used a case study of New Zealand's 'National Partnerships' scheme. These are private sponsorship programs that help pay for the conservation of 10 of New Zealand's most iconic bird species. And we were able to compare this investment with a dataset that contains the cost of all the specific activities being considered to conserve all 700 of New Zealand's most threatened species.

Many of the activities that are needed for the flagship 'National Partnership' species are also needed for other species. So, if these activities are sponsored, the other species benefit as well.

We used the amounts of private money being given to the 'National Partnership' programs in a 'prioritization protocol' (see Joseph et al., 2009) designed for the New Zealand government, to see how many species can be conserved for a given budget.

We created spending scenarios that included the following:

1. Think only about the sponsored species, and find out if any activities might also help other species;
2. Think carefully about how money is spent, and try to maximize overlaps in activities between sponsored species and other species; and
3. Do not use the money on the flagship species, but rather use it as efficiently as possible among all threatened species.

We incorporated these scenarios into simulated baseline government threatened species budgets from \$5 to \$50 Million (NZ dollars).

### Best bang for buck

We found that even the scenario where we only 'care' about the flagship species (scenario 1), that there were benefits for additional species. On average, across budgets, one to two more species could



## The lion's share

When it comes to resourcing conservation, it helps if the species you're trying to save are charismatic. But should the cute and the cuddly get the lion share of available resources?

According to the IUCN, around 1,140 species of mammal are threatened around the world. According to a recent analysis (Smith et al, 2012) around 80 of those species are used by international conservation NGOs to raise funds for conservation. These so-called 'flagship' species supposedly have high marketing appeal and enable conservation NGOs to achieve considerable success with their sponsorship programs. Smith and colleagues found that existing flagship species are generally large and have forward-facing eyes.

But if money is being raised for 80 charismatic species, what happens to the other 1,060 threatened mammal species? Or, if we want to spread the net a bit further, what about the other 16,000 non-mammal species currently listed as threatened by the IUCN?

Of course the answer you'll most commonly hear is that raising money from the general public for conservation work requires a strong appeal to a broad audience. No species should be allowed to go extinct but the harsh reality is that when you use animals to raise money you need charismatic megafauna like lions, rhinos and pandas; not interesting and probably deserving species like the Moorean viviparous tree snail or the Gomera green bush-cricket, neither of which you'd want to cuddle.

### Reference

Smith RJ, D Verissimo, NJB Isaac & KE Jones (2012). Identifying Cinderella species: uncovering mammals with conservation flagship appeal. *Conservation Letters* 5: 205-212. [Plus read [Decision Point #69](#), p4,5, for a longer discussion on this issue of choice.]



*If you're heading for extinction and seeking NGO support, it helps to be big, have a spine and forward looking eyes.*  
(Photo by Bruce Doran)

be saved from extinction, thanks to overlaps in activities with the flagship species. So, even if you were only worried about doing things to save the sponsored species, one or two other species would benefit as a result.

However, if we were more careful in how we spent our money, maximizing overlaps in sponsored activities with other species (scenario 2), we could more than double these gains. In other words, even if you are running a program that targets a flagship species, you can achieve better outcomes if you focus on those actions that benefit target and non-target threatened species.

What if we used all the money raised without regard to flagship species (scenario 3)? In other words, what if our aim was simply to optimise the outcomes of all threatened species? If we had the flexibility to spend the private sponsorship money on any species, we could more than double our gains again.

What this means is that conservation for flagship species can indeed provide wider benefits to other species (non-target species),

something that is often claimed by conservation marketing efforts. These benefits can rise significantly if this work is done carefully to maximize the shared benefits. But they are not as great as the potential benefits from an objective prioritisation strategy.

## Flagships in the balance

Sponsoring flagship species does not do nearly as good a job as using sponsorship money as efficiently as possible. Nonetheless, it's important to remember that iconic flagship species like koalas, kiwis and polar bears can help to generate private donations for conservation that might not otherwise have been possible at all. So, on balance, the use of flagship species for conservation can provide general conservation benefits. However, it should be used in a flexible approach that maximizes shared activities with other species, and combined with baseline non-biased conservation funding directed towards saving as many species as possible.

One example of a conservation agency that is doing a good job at a combined approach is the World Wildlife Fund (WWF) which offers a [variety of donation options](#). The WWF uses flagship species to promote conservation, and donors can give money directly to conservation activities to help these species. However, donors can also give money to general conservation, allowing flexibility to conserve species that don't normally get public attention. 🍷

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Bennett JR, R Maloney & HP Possingham (2015). Biodiversity gains from efficient use of private sponsorship for flagship species conservation. *Proc. R. Soc. B* <http://dx.doi.org/10.1098/rspb.2014.2693>

Joseph LN, R Maloney & HP Possingham (2009). Optimal allocation of resources among threatened species: a project prioritization protocol. *Conservation Biology*, 23:328-338.

[Plus read [Decision Point #29](#), p8-10, for a user-friendly intro to the project prioritisation protocol]

## Maximising benefits from flagships

To maximise biodiversity gains from private funding of flagship species, we recommend:

**(i) Use objective criteria for baseline funding of threatened species conservation**, and use private funding for flagship species conservation as efficiently as possible to maximise shared benefits with other species. If private donors are made aware of the ancillary gains from their flagship species sponsorship, this may encourage further donations or new partners.

**(ii) Encourage donations to a broader suite of flagship species**, to maximize possibilities for efficient sponsorship through shared actions with other species. Using a relatively large 'flagship fleet' can potentially appeal to a larger pool of donors. Our results show that a 'flagship fleet' can also allow additional flexibility to increase the efficiency of allocating conservation funding. If donors wish to sponsor an individual species, they can be encouraged to sponsor species whose conservation actions result in the greatest additional biodiversity gains. If donors are willing to sponsor a 'flagship fleet' of species, the money can be used to fund the specific actions with the greatest additional biodiversity gains.

**(iii) Explore the possibility of encouraging private funding for general biodiversity goals.** Although private funding for flagship species can help to conserve biodiversity, in general, it can only supplement, not replace, funding based on objective criteria. If such supplemental funding can be used in the most efficient manner possible, the greatest biodiversity gains can be achieved.

# Why academics should communicate 'failure'

## A reflection on rejection, imposters and how we share achievement

By Roberto Salguero-Gómez & Nathalie Butt (University of Queensland)

'Failure is success in progress' – Albert Einstein

'Rejection' – what a negative, pervasive word! We are rejected from the moment we first engage with the world: So you were picked last for a team in school? And perhaps you failed that crucial exam? More recently you had a manuscript or a grant proposal rejected? Well, welcome to the club!

Rejection is the rule in academia, where individuals are exposed to criticisms and harsh revisions, and manuscripts are regularly turned down. Sometimes it seems we experience rejection every day.

### Academic success and failure

In general, we are defined and ranked by our academic success; measured mostly by our ability to publish in high-impact, peer-reviewed journals, and our capacity to attract competitive funding. Thus, we have internalised the belief that when our papers don't get through or we miss out on that grant, that we have failed. Of course there are other important measures of success, such as peer recognition, promotion applications and job success.

Yet, academia lacks a system to openly turn criticism into a constructive, learning experience, and so 'failure' is not typically communicated among researchers. At a recent CEED lab retreat, an exercise in self-reflection led to a discussion of self-appraisal. This resulted in a worrying self-assessment that we are all seemingly below the mark of 'average' success. (How is that even possible?)

The inability to internalise success often manifests itself in what is often referred to as the 'imposter syndrome': feeling like a fraud when compared to our colleagues, and believing in our lack of intelligence, skills or ability. We feel that our successes are accidental, or due to external factors such as luck, good timing, or excellent collaborators. It can be a common feeling in academics – we are constantly, especially in the early part of our career, judged on our potential, but receive little feedback on completed work.



The 2014 UQld CEED lab retreat. On (self) reflection, everyone was below 'average'!

Research in our field has recently undergone a major change in mentality, whereby access to data and scripts is not only encouraged, but often mandatory. We argue that a healthy, productive aspect of this change in mentality must include the communication of academic 'failure'. Everyone, at every stage, experiences failure, and maybe it is time we 'celebrate' it! In this context, 'celebrate' means identify, acknowledge, discuss, and learn from it. Failure is a hot topic – let's drag it out from its dark, dirty corner, and expose it as the real imposter.

### Confronting preconceptions

In order to document and confront biases and preconceptions about academic productivity, we surveyed 85 members of CEED at the University of Queensland (<http://tinyurl.com/oxdmvh3>)

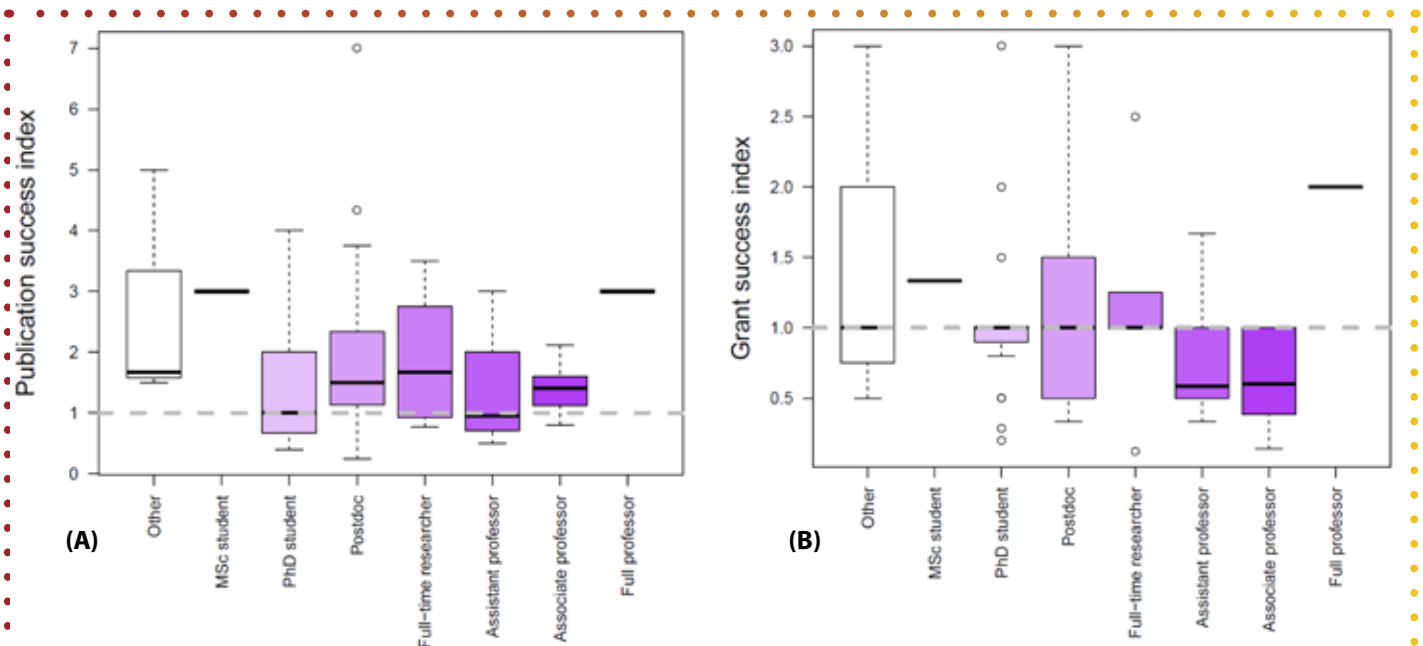


Figure 1: Success in (A) publications, and (B) grants, fellowships and scholarships for CEED lab members as a function of their academic status. The dashed horizontal dashed line shows the 'break-even' value; scores above that line represent more success than failure. Although most CEED lab members are rather successful at publishing manuscripts, grant rejection is more frequently experienced, particularly so for assistant and associate professors.



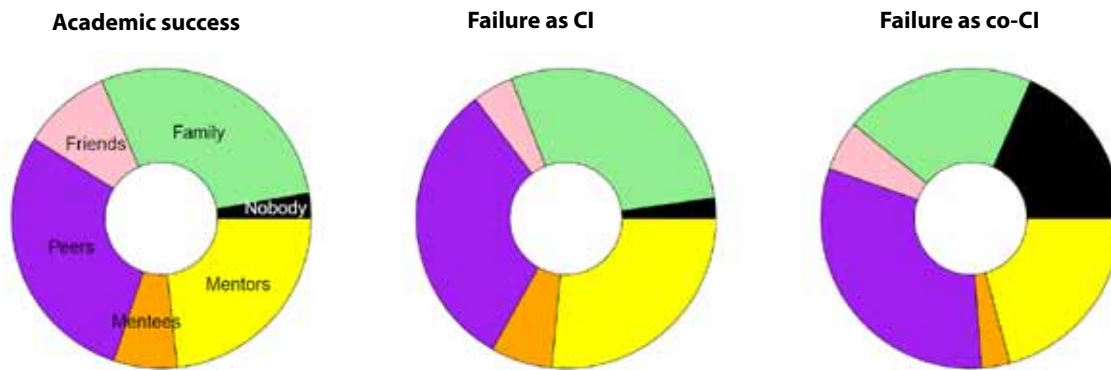


Figure 2: Researchers in CEED share success and failure differentially. Percentage with which survey participants share academic success (left), and failure as lead investigator (centre) or as collaborator (right) with family, friends, peers, mentees and/or mentors. Sharing news with mentees is the least likely response.

“Our communication of success and failure should be more balanced, and particularly with our students.”

and collected data on their demographics (gender, age, time since doctoral graduation) and number of manuscripts and grants accepted/rejected from January 2013 to October 2014. We also recorded the frequency of communication of success and failure for manuscripts and grants. The results are summarised in Figure 1.

We are a rather productive group; and our ‘success’ rates aren’t too bad. On the whole we publish more manuscripts than are rejected. From January 2013 to October 2014, each CEED member published on average  $2.31 \pm 0.21$  (mean  $\pm$  standard error) peer-reviewed manuscripts as lead author and  $3.94 \pm 0.53$  as a collaborator. That’s a total of over 500 manuscripts (as we also co-author with each other, these numbers include some overlap).

In that period, we submitted on average 8.87 manuscripts – or versions of the same manuscript – per person. Average rejections were  $1.91 \pm 0.23$  for lead authors, and  $2.46 \pm 0.41$  for collaborators.

Interestingly, neither gender, age nor academic status had significant effects on these outputs.

Rejection was greater for grants (and fellowships and scholarships). While we each obtained  $1.2 \pm 0.17$  funded grants, we experienced a nearly three-fold higher chance of grant rejection, with an average of  $3.44 \pm 0.46$  grants rejected. Grant rejections were slightly more likely among assistant professors and associate professors than among all other academic status.

### Sharing the bad news

Despite our high productivity, we are not as communicative as we could be, particularly when it comes to ‘bad’ news (see Figure 2). The vast majority of us identified family (29%) and peers (29%) as our preferred go-to targets for sharing good news, and our own mentees\* (7%) as less likely – only 3% of us do not routinely share good news. (\*Mentors are the people we look to for guidance, mentees are those people who rely upon us for guidance.)

These percentages do not change dramatically for rejections; we are less likely share with friends when we are the lead investigator (4%), and will share with peers (32%) and mentors (21%) but, again, very few share with our mentees (3%). Non-lead collaborators tend to share less overall; most frequently with family (21%) and peers (32%), and to a much lesser extent with mentees (3%). However, the fact that we share news, especially bad news, with friends and family illustrates the importance of a good work-life balance, and a strong support network.

Why do we share good news more frequently than bad news, and why do we not communicate more frequently with our students? In our opinion, only communicating success sends out the wrong image: that success is the rule, and rejection is the exception. This can be internalised by early career scientists, and result in a rather stressful, unnecessarily competitive atmosphere.

### Reframing success and failure

Our results illustrate why most of us feel like we are performing ‘below’ the average: that average is wrongly perceived, as overall rejection happens just as frequently as acceptance, and people higher up the academic ladder succeed (or fail) as much as early career CEED members. We are not suggesting that this is something to look forward to, but rather that rejection is an integral part of our profession, and a necessary process by which our work is advanced.

Maybe we could reframe our relationship with academia as what we do rather than what we are, and consider that each part of the academic process is a skill, or set of skills, that we can learn, and practise and improve. Paper or grant rejection is not ‘failure’, rather, paper submission or grant submission in itself is ‘success’. As we progress along the academic path, we submit more papers and grant applications, so we are in fact becoming more successful, and of course rejected grant applications and proposals are not lost forever, but can be improved and recycled and resubmitted.

What is clear, however, is that our communication of success and failure should be more balanced, and particularly with our students and junior colleagues. To that end, we propose the following action plan:

- **Share rejection:** Whether a paper/grant is accepted or (especially if it is) rejected, share the news not only with your supervisors, but also with your co-workers and students/mentees. We have started doing this at our weekly Morning Tea UQ lab meetings.
- **Learn from it:** When a paper/grant is rejected, talk about the positive feedback, and your plans to revise and submit elsewhere. This will be useful not only for you, but for people at an earlier stage, as they see how facing academic adversity can turn lemons into lemonade.
- **Carry it forward:** when you review a paper or are invited to give feedback on other’s work, balance the negative with the positive, and suggest ways to improve the work.
- **Spread the word:** Just as data and scripts are becoming open-access, we suggest that you face rejection with an open-access attitude too. We communicate rejection not only to colleagues, but also through Facebook and Twitter using the hashtag #rejectionIsTheRule. (Why not join us!)

It’s important to appreciate that you are not alone but also acknowledge that escaping the imposter syndrome is something that takes time. Going through annual appraisals can help you remain objective in your accomplishments and discuss ways to improve your output. Above all, as Rudyard Kipling said, “if you can meet with triumph and disaster and treat those two imposters just the same” you will succeed in life.

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# The value of native bush to landholders

## Private benefits of native vegetation can help achieve better biodiversity outcomes

By Maksym Polyakov (University of Western Australia)

A third of Australian woodland has been cleared since European settlement. This has resulted in the loss of important ecosystem services, including biodiversity. Just over three quarters of Australian land is managed by private landholders, therefore conserving biodiversity on private land is an important part of our national conservation strategy. However, conserving biodiversity on private land can be challenging because the benefits of biodiversity are enjoyed by everyone while the costs of conservation are incurred by the landholders.

In attempting to deal with this challenge, it's important to appreciate that environmental assets that support biodiversity on private land (such as native vegetation) may also provide benefits that are enjoyed and valued by the landholders. This insight is valuable for natural resource managers because private landholders who enjoy having native vegetation on their land would more likely participate in conservation programs. It also helps in the selection of delivery mechanisms for projects, as shown in the private-public benefits framework developed by David Pannell (see Pannell 2008).

### Preferences for native veg

Sensing a possible win-win situation, our team set out to better understand the preferences held by landholders for native vegetation on their land. Why do they like to have bush on their property? Is it because, for example, it creates nice views, attracts birds, protects creek, or gives shade for their animals? Or do they prefer cleared land, viewing native vegetation as a hindrance to growing crops and running livestock? Or maybe the preferences depend on the area of bush currently on the property and the goals and interests of a particular landholder?

How can we determine the landholders' preferences? One way is to conduct a survey and ask landholders whether they like having bush on their land and how would they behave in certain situations



Maksym (on the left) with landowners discussing how they value native vegetation on their land. (Photo: Geoff Park)

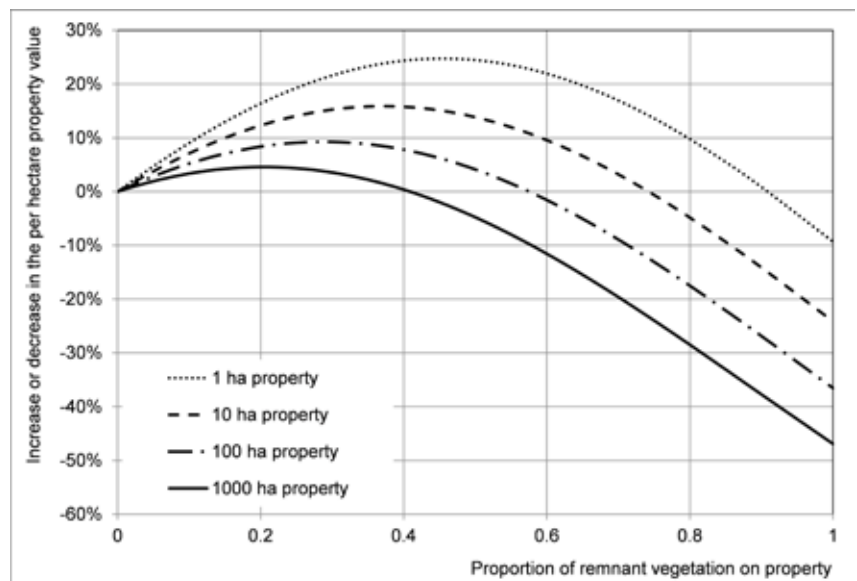


Figure 1: Effect of the proportion of native vegetation on land value by property size over time. (From Polyakov et al, 2015)

(for example, how much would they need to be paid to be willing to revegetate 10 ha of his or her land with native trees).

Another way is to learn about landholders' preferences by observing their behaviour, for example the amount they actually pay for something on the market. Unfortunately, there is no market for native vegetation, bush or environmental amenities. Luckily, there is a market for rural properties, which come in all shapes and sizes: from small 'lifestyle' properties to large production farms, from covered by bush to completely cleared, and everything in between.

Having information about the prices landholders paid for the properties as well as the property's characteristics, we can use a statistical technique called the hedonic pricing method to tease out the value of specific characteristics of the properties, including presence and extent of native vegetation.

### Diminishing returns

We analysed data from around 7,500 rural properties in North-Central Victoria that were sold between 1990 and 2011 (Polyakov et al, 2015). The area had a good mix of property sizes, which we assumed to reflect landholder types, ranging from lifestyle to hobby farmer through to major agricultural producer. We used GIS to calculate the amount of native woody vegetation for each property, soil quality, and other characteristics important to a rural property owner.

**“They value their first hectare of native vegetation a lot, but the tenth hectare might have no value at all and the twentieth hectare might have negative value by decreasing the value of the property.”**



We found that rural landholders generally value native vegetation on their land. The value diminishes as the amount of native vegetation on a property increases, and as the property size increases. For example, they may value their first hectare of native vegetation highly, but the tenth hectare might have no value at all and the twentieth hectare might have negative value. The first hectare of native vegetation on a lifestyle property is much more valuable than first hectare on a production-oriented farm. These relationships are demonstrated in Figure 1, where the predicted increase of the value of a cleared property (Y axis) is plotted against the proportion of native vegetation responsible for such an increase (X axis) for typical properties of 1 ha, 10 ha, 100 ha, and 1000 ha.

Native vegetation is indeed more valuable to the owners of lifestyle (small) properties than to the owners of large production-oriented farms. The optimal proportions of native woody vegetation for a 1 ha, 10 ha, 100 ha, and 1000 ha property come out at 45%, 37%, 29% and 20% respectively (Fig 1).

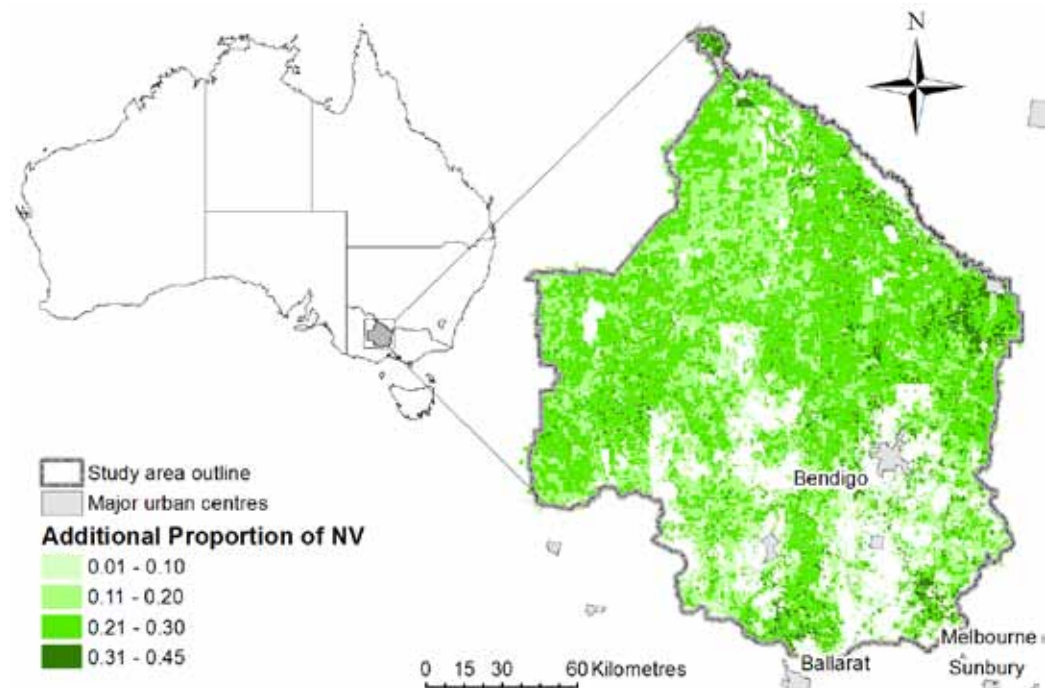


Figure 2: Additional proportion of native vegetation required to achieve predicted maximum property values. (From Polyakov et al, 2015)

These proportions would increase property values by 25%, 16%, 9% and 5% relative to the value of similar properties with no native vegetation. The study reveals that the current extent of native vegetation is lower than the extent that would maximise its amenity value to landholders and that restoring some native vegetation on cleared lands may enhance the welfare of people living in this area.

## The value of a nearby freshwater ecosystem?

Just as property prices can provide us with information on the value of native vegetation to landholders, it can also be used to determine the value of other environmental assets, and the assets don't even have to be on the land of the landholder. It might be something nearby.

We analysed prices of houses sold during the period 2000–2011 to estimate the value of stream flows in Murray River and proximity to an iconic freshwater ecosystem, the Barmah–Millewa Forest in Australia's Murray–Darling Basin (Tapsuwan et al, 2015). We found that proximity to the Barmah–Millewa Forest has positive impact on nearby house prices in Victoria and New South Wales. For example, for an average property worth \$199,000 that is 10 km away from the Barmah–Millewa Forest, moving 1km closer will increase sale price by \$2000. We also found a non-linear relationship between in-stream flow and sales price which is suggestive of homebuyer preferences for flow that is neither low (ie, drought flows) nor high (ie, flood flows).

The results provide estimates of the benefits of in-stream flow that could be used to inform freshwater ecosystem restoration policy in the Basin and are suggestive of regional benefits that accrue to homeowners who live near key freshwater-dependent ecosystems in the basin.

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## Targeting ecological restoration on private lands

Armed with the results of this study, we can predict how much landholders value additional native vegetation. This is useful information for those responsible for prioritising investments in conservation. Investments in landholders who benefit the most from an additional hectare of native vegetation would be more likely to provide high value for money, because they are likely to be willing to participate in a revegetation program at lower public cost (although other factors, such as public environmental benefits, will also need to be considered).

Figure 2 presents the map of increase in the proportion of native vegetation that would maximise property value, therefore maximising benefit to property owners. It could be used by extension professionals and natural resource managers as a decision support tool for targeting ecological restoration on private lands. 📍

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# Protecting species-at-risk in Canada

## COSEWIC and the first ten years of SARA

By Eric B (Rick) Taylor (University of British Columbia, Canada)

*Eric Taylor is a Professor of Zoology at the University of British Columbia, in Vancouver, Canada. His research examines the origins and persistence of biodiversity, principally in fishes, using molecular approaches. Professor Taylor is the Chair of COSEWIC, the Committee on the Status of Endangered Wildlife in Canada, where he has also been one of the co-chairs of the freshwater fishes specialist subcommittee since 2008. Here he describes the process by which species at risk are assessed and considered for legal listing in Canada, and reflects on the role of science and society in this process.*

After almost ten years of work, Canada joined the ranks of countries with federal endangered species legislation when the *Species at Risk Act* (SARA) achieved royal assent in 2002 (other countries with federal endangered species legislation include Australia and the USA).

At its core, SARA consists of three basic elements:

1. **Conservation assessment** of 'Wildlife Species' (a definition which allows for separate conservation of groups of populations *within* species),
2. **Legal listing** (or not) of assessed Wildlife Species, and
3. **Protection** of listed species and actions to facilitate their recovery.

Quantitative, science-based decision making is a foundational aspect of the assessment and listing steps and yet this does not guarantee that a species becomes part of the legal list.

### 1. Assessment

The assessment of Canadian Wildlife Species occurs under the purview of The Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC was established in 1977 and therefore predates SARA. The SARA, however, has given COSEWIC a legal status.

The committee consists of about 45 members representing federal and provincial jurisdictions (eg, Department of Fisheries and Oceans, Province of British Columbia), non-governmental science members, Aboriginal Traditional Knowledge members, and two members from each of ten taxonomically-based species specialist subcommittees (eg, Freshwater Fishes, Marine Fishes, Terrestrial Mammals, etc).

Key aspects of COSEWIC's operations are:

1. **It is supported by a Secretariat** from the federal Ministry of Environment (MoE). The MoE also provides a Public Registry of all assessments and government responses (see <http://www.sararegistry.gc.ca/>).
2. **COSEWIC is an advisory committee** independent of any government or non-governmental organization. Members come from government, academia, NGOs, and private consultancies, but make decisions *independent* of these affiliations.
3. **Specialist subcommittees** rank species in terms of risk of extinction. These subcommittees commission status reports and receive unsolicited reports from the public. For those species most at risk, assessments are aided by (but not restricted to) IUCN guidelines and quantitative criteria using the modified status categories Extinct, Extirpated, Endangered, Threatened, Special Concern, Data Deficient, and Not at Risk.

“The COSEWIC-SARA process of assessment and listing is a classic case where science-based advisory decisions butt up against the often counteracting socio-economic implications of protecting at-risk species.”

4. **Species assessments are based on a two-thirds majority** vote of COSEWIC members.
5. **Assessments are based on** the best scientific, Aboriginal Traditional Knowledge, and Community Knowledge available at the time of assessment. Economic or social consequences of potential species legal listings based on COSEWIC assessments *are not* considered in the assessments themselves.
6. **Assessments occur twice yearly** at species-assessment meetings which are open to the public and after extensive, multiple rounds of peer review of assessment reports.
7. **COSEWIC reports the results** of each species-assessment meeting in news releases, and to the Minister of the Environment and members of the Canadian Endangered Species Council (a group of federal and provincial/territorial Ministers of the Environment).
8. **Re-assessments occur at least every ten years** (or earlier if new information comes to light).
9. **Ranking to assessment:** From ranking of Wildlife Species to actual assessment takes about 2 years.
10. **Species assessed:** To date, COSEWIC has held 52 species assessment meetings and assessed 708 species as Extinct or at some level of risk (15 Extinct, 22 Extirpated, 306 Endangered, 165 Threatened, and 200 Special Concern).

### 2. Legal listing

Notwithstanding COSEWIC's assessments, subsequent protection under SARA will not occur unless a species is included in the 'List of Wildlife Species at Risk' in Schedule 1 to the Act – a decision that is made by the federal Minister of the Environment. Following receipt of the annual report by COSEWIC on the assessment of species, SARA requires:

1. **Minister response:** That the Minister of the Environment provide a 'response statement' within 90 days stating how the Minister 'intends to respond' to the assessments.
2. **The response is either** that the Minister intends to forward the COSEWIC recommended status to the Governor-in-council (a subcommittee of federal cabinet ministers) for listing *consideration* or enter into an extended consultation period, including with those who may be negatively affected by a federal listing.
3. **After receipt of status assessments** by the Governor-in-council, it has nine months to consider the proposed listing and either: (a) accept the COSEWIC assessment and add the species to the legal list, (b) reject the proposed listing for socio-economic reasons (eg, undue hardship would accrue to those affected by legal protection measures, often based on a consultation process), or (c) referral back to COSEWIC for further consideration owing to issues raised during the public-consultation phase of legal listing.
4. **Time limit on initial referral:** Notwithstanding the nine month period in which Governor-in-council must decide on a listing recommendation, *there is no legal time* limit for the Minister's initial referral of the species assessments. Consequently, there can be very long delays between the time COSEWIC sends its recommendations to the Minister and when the Minister refers these recommendations to the Governor-in-council (which can incorporate a protracted public consultation period).
5. **Species listed:** As of 2013, more than 85% of the species that COSEWIC has recommended for listing have received legal listing, but some taxonomic groups are much more likely to be added to the legal list than others. For instance, almost 80%



of the 63 marine fishes assessed at some level of risk have not been added to the legal list. Such non-listings are due to the above mentioned delays or involve species of commercial value such that listing would incur socio-economic costs that are deemed to be too high.

### 3. Protection: prohibitions and recovery

If a species is placed on the SARA's legal list, two key consequences arise. First, certain prohibitions come immediately into effect and, second, recovery initiatives begin.

For species that are listed as Extirpated, Endangered, or Threatened, SARA includes prohibitions against harming, collecting, or trading in the species, and one cannot destroy the species' residence. These prohibitions, however, apply only to federal lands, aquatic species, or species covered under the *Migratory Birds Convention Act*. In addition, 'critical habitats' (to the extent that they can be identified in subsequent *recovery strategy* and *action plan* documents) are also protected under SARA.

Further, species that are assessed as being of Special Concern by COSEWIC (essentially meaning that the species may become threatened in the future if factors thought to be negatively affecting it are not reversed or managed effectively) are not subject to SARA prohibitions and a recovery strategy is not required. Rather, the Act requires a *management plan* be developed for these species.

Recovery of species at risk is a central aspect of Canada's SARA. Recovery is a stated objective of the Act (although 'recovery' per se is never defined) and the mechanism by which critical habitat is identified. Recovery involves two stages and applies to all species listed under the Act as Endangered, Threatened or Extirpated.

The first stage involves preparation of a *recovery strategy* (within one year of listing for endangered species and within two years for threatened species) that outlines the overall scientific framework for recovery. The second stage involves preparation of an *action plan* that outlines the specific measures that may be taken on the ground to implement the *recovery strategy*.

The construction of recovery strategies and action plans takes many meetings and considerable time. Further, notwithstanding the writing of recovery and action plans, there are no legislative requirements under SARA to actually implement them.

### COSEWIC and SARA after 10 Years

A period of 10 years is simply too short to complete a definitive assessment of the species assessment and legal listing processes in Canada. A number of observations, however, can be made about the effectiveness of species at risk assessment and recovery in Canada.

1. The assessment process (COSEWIC) has provided a detailed accounting system for species-at-risk and the factors involved in such risk in Canada.
2. The COSEWIC-SARA process has almost surely resulted in much greater public awareness of species-at-risk and engagement in species-at-risk activities in Canada.
3. There is tremendous inter-taxonomic group variation in the information content available for assessments and in the probability of listing and recovery actions. Many non-listing decisions are made for socio-economic reasons that are *not* subject to the same level of peer scrutiny as the COSEWIC assessments.
4. COSEWIC assessments focus on single species and the alternatives of multi-species assessments or ecosystem assessments are only beginning to be explored.
5. Integration of available Aboriginal Traditional Knowledge is well ensconced within the COSEWIC process, but *gathering* of new Aboriginal Traditional Knowledge is a daunting logistical and financial challenge.

## A big country

- Canada is the world's second largest landmass and borders three oceans (Pacific, Atlantic, and Arctic). Canada was almost completely covered by ice until about 15,000 years ago. Its massive geography and its recent glacial history has resulted in a rich biodiversity heritage. Canada has about 213 species of freshwater fishes (compared to Australia's 280), 200 species of terrestrial mammals (Aust: 315), ~65,000 arthropods (Aust: 253,000), and 4,100 vascular plants (Aust: 20,000).



A polar bear and cub. Polar bears were listed as Special Concern under SARA in 2011. (Photo by Gordon Court)

6. The listing process contains considerable scope for Ministerial discretion that can extend the deadlines for listing decisions, at least in theory, indefinitely, or override certain SARA prohibitions (eg, 'allowable-harm' permits).
7. Listing decisions involve much more than just the biological rationales for listing.

Ultimately, the question becomes, is Canada's wildlife better off now after the initiation of SARA and the integration of COSEWIC within the species-at-risk process? The optimist in me says 'yes', simply because we do have a set of processes in place, warts and all, that account and suggest ways forward for species-at-risk and public awareness of species-at-risk, and engagement in the processes must surely be greater now than 10 years ago.

The pessimist in me says: 'not sure'. Accounting is not enough, where is the action for recovery, how has recovery performed, and has the process lessened the probability of species becoming at risk in the first place? These are all critical questions that we simply do not have good answers to yet although efforts to begin an assessment process have begun.

The COSEWIC-SARA process of assessment and listing is a classic case where science-based advisory decisions (ie, species X is Endangered) butt up against the often counteracting socio-economic implications of protecting at-risk species. This is perhaps inevitable because ultimately it is the politicians that are accountable for species-at-risk listing decisions.

Here, the key is public caring and engagement. A prime limitation of the listing process is not necessarily that in the end 'politics may rule the day', but that such decisions often impose little to no political cost to those who make them. This aspect of assessment and listing of species-at-risk of Canada can only be addressed by increased public awareness of the benefits of biodiversity and the potential economic, social and aesthetic costs of its loss. 📌

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## Telemetry and better decision making

### Connecting animal telemetry and spatial conservation

#### A CEED Workshop (University of Queensland, February 2015)

By Maria Beger and Ross Dwyer (University of Queensland)

The use of animal-borne telemetric devices is a powerful tool for ecologists and wildlife managers. Since the first devices were deployed back in the 1950s (see the story on Laika on page 16) advances in technology and reductions in price have led to a proliferation of telemetry technology for animal studies.

In the Australasian region alone, tens of thousands of animals have had their movements tracked (Campbell et al, 2015). This body of work has greatly enhanced our understanding of the habitat requirements of many species, particularly for migratory, wide-ranging and elusive animals.

Generating management plans for highly mobile species can be highly challenging. Many of these species experience multiple threats throughout their life cycle, often operating across large spatial scales that may span nations or regions. On top of this, movements of individuals have a high level of plasticity. This means that in order to capture species-level movements, a large number of tagged individuals will be required.

Recently, a suite of online data repositories have been established that are dedicated to hosting animal tracks (Dwyer et al, 2015) (and see the story on 'animal tracks in the bank' on page 16). This gives us an opportunity to synthesise hundreds of thousands of animal telemetry datasets and extend their value beyond their initial study objectives towards goals of informing conservation and management.

Although many studies recognise conservation and management as a potential application of telemetry data, methods to incorporate them into management decisions remain largely undeveloped. CEED recently hosted a workshop to tackle this challenge. The workshop's aim was to develop a framework that can be applied to telemetry data collected from terrestrial, freshwater and marine species with policy-relevant case studies.

CEED and researchers at the School of Biological Sciences (University of Queensland) have recently developed methods that could serve to integrate telemetry data into spatial conservation prioritization. For example, 'Marxan with Zones' can prioritise areas that are frequently traversed by GPS-tagged cassowary (see Campbell et al, 2012 and [Decision Point #60, p12,13](#)). Additionally, 'Marxan with Connectivity' was developed to incorporate asymmetric connectivity representations into a spatial planning analysis (see [Decision Point #44, p8,9](#)), from non-directional turtle migration tracks in the Coral Triangle.



UQ scientists attach satellite telemetry device to the back of an estuarine crocodile. See Dwyer et al (2015) for more info. (Photo by Ben Beaden)

“Although many studies recognise conservation and management as a potential application of telemetry data, methods to incorporate them into management decisions remain largely undeveloped.”



“I want one!” A juvenile southern elephant seal (*Mirounga leonina*) equipped with a state-of-the-art CTD- SRDL (Conductivity - Temperature Depth, Satellite-Relay Data Logger). See Roquet et al (2014) for more info. (Photo by Clive McMahon)



While these studies highlighted the potential for telemetry data being used within a spatial prioritisation framework, both studies fell short of generating a framework which could be directly applied to get the most out of telemetry data for conservation.

Our workshop brought together key experts in animal telemetry, movement ecology, spatial-conservation science and policy development from across Australia and around the world. With much deliberation and considerable enthusiasm, we crafted ideas for two (what we hope will be seminal) papers: Why has telemetry failed conservation? and How can telemetry fix conservation? These papers will be out soon; watch this space. 📌

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On your way! Tracking the movements of a rehabilitated Olive Ridley turtle which had been trapped in discarded fishing nets. (Photo by Brian Coulter)

## Dbytes

*Dbytes* is EDG's internal eNewsletter. It gets sent to members and associates of EDG each week, and consists of small snippets of information relating to environmental decision making. They might be government documents, research articles, blogs or reports from other research groups. Here are six bytes from recent issues. If you would like to receive the *Dbytes* eNewsletter, email [David.Salt@anu.edu.au](mailto:David.Salt@anu.edu.au)

### 1. 2015 Aust Environmental-Economic Accounts

The Australian Bureau of Statistics released the 2015 edition of the Australian Environmental-Economic Accounts. The publication brings together all the ABS environmental-economic accounts (environmental accounts) in one place.

<http://www.abs.gov.au/ausstats/abs@.nsf/mf/4655.0>

### 2. Bush Heritage Aust launches 10-year plan

Bush Heritage Australia has launched an ambitious 10-year plan to slow the nation's extinction crisis. As part of the plan, 50 scientists from 15 universities across the country will collaborate on 55 conservation projects.

[http://www.bushheritage.org.au/what\\_we\\_do/conservation-science](http://www.bushheritage.org.au/what_we_do/conservation-science)

### 3. The Reef 2050 Long-Term Sustainability Plan

The Reef 2050 Long-Term Sustainability Plan is the overarching framework for protecting and managing the Great Barrier Reef from 2015 to 2050.

<http://www.environment.gov.au/marine/gbr/long-term-sustainability-plan>

### 4. Thirsty Country: Climate Change & Drought in Aust

Issued by the Climate Council, this report finds:

1. Climate change is likely making drought conditions in southwest and southeast Australia worse.
2. Droughts have far-reaching impacts on health, agriculture and native species in Australia.
3. Water scarcity will become an increasing challenge as the pressure on urban water supplies intensifies.
4. Droughts are likely to worsen in severity and duration.

<http://www.climatecouncil.org.au/droughtreport2015>

### 5. Conversations about our future

The Australian Academy of Science has launched *Australia 2050: Structuring Conversations About our Future*. It is the culmination of a five-year project to find ways to foster national discussion about future scenarios for Australia.

<https://www.science.org.au/news/academy-calls-national-conversation-about-australia%E2%80%99s-future>

### 6. Citizen science and global change

The study found that volunteers already save biodiversity research huge sums of money, but that their contributions are underused.

Reference: Theobald EJ, Ettinger AK, Burgess HK, DeBey LB, Schmidt N, Froehlich HE, Wagner C, HilleRisLambers J, Tewksbury J, Harsch MA & Parrish JK (2015). Global change and local solutions: Tapping the unrealized potential of citizen science for biodiversity research. *Biological Conservation*. 181: 236–244.

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## Animal tracks in the bank

A suite of online data repositories have been established in recent years to host animal tracking records. As our workshop report (on animal telemetry) on page 14 points out, this gives us an opportunity to synthesise hundreds of thousands of animal telemetry datasets. Here are three examples of repositories.

**Movebank:** a free, online database of animal-tracking data hosted by the Max Planck Institute for Ornithology. It helps animal-tracking researchers to manage, share, protect, analyze, and archive their data. Movebank has over four thousand users.

<https://www.movebank.org/>

**OzTrack:** is a free web-based platform for analysing and visualising animal location data. It was primarily developed for the Australian animal telemetry community but can be used to assess animal movement and estimate space-use for individually-marked animals anywhere in the world.

<http://oztrack.org/>

**SEATURTLE.ORG:** As its suggests this organisation aims to organize the world's sea turtle information and make it universally accessible and useful.

<http://seaturtle.org/>



## What's the point?

### First dog in space

As our workshop report on animal telemetry suggests, animal telemetry has come of age (see p14). But the technology has a history that now extends back some fifty years. One of the first well publicised uses of animal telemetry involves the sad tale of Laika, the first dog in space.

In 1957, Laika was rocketed into orbit on board the soviet spacecraft Sputnik 2. At the time it was unknown if living creatures could survive in space.

Laika was put in a hermetically sealed chamber with food and an air-conditioning plant, consisting of a regenerating outfit and a system of heat control. Also installed were instruments to register the dog's pulse, respiration and blood pressure, apparatus to take electro-cardiograms, and sensitive elements to measure the temperature and pressure in the chamber. Radio telemetry transmitted these readings back to Earth at fixed intervals.

The 'experiment' was due to last about a week, at which time the oxygen would run out (at the time the technology didn't exist to bring the spacecraft safely back to Earth). Sputnik 2 was hailed as a historic triumph by the Soviets who announced that Laika had been euthanised just prior to the oxygen running out. Many years later, after the Soviet collapse, it was revealed that Laika had actually died hours into the flight because of equipment failure.

<http://en.wikipedia.org/wiki/Laika>

Laika, a stray dog from the streets of Moscow, was launched into outer space on November 3, 1957. She was chosen because it was assumed such an animal had already learned to endure conditions of extreme cold and hunger. (Image licensed under Fair use via Wikipedia - <http://en.wikipedia.org/wiki/File:Laika.jpg#/media/File:Laika.jpg>)



## ENVIRONMENTAL DECISIONS GROUP

The Environmental Decision Group (EDG) is a network of conservation researchers working on the science of effective decision making to better conserve biodiversity. Our members are largely based at the University of Queensland, the Australian National University, the University of Melbourne, the University of Western Australia, RMIT and CSIRO.

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To contact the EDG please visit our websites at:

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