THE VERY 1st COLLATED ISSUE OF...

KAPOW! ECOLOGY

A WEEKLY COMIC STRIP SHOWCASING ECOLOGICAL RESEARCH

FEATURING THE SCIENCE OF:
McCARTHY
NIMMO
DOHERTY
RICHARDSON
LINDENMAYER
+ MANY MORE

HI. THIS BOOK IS ALL ABOUT ALTER-NATIVE SCIENCE COMMUNICATION. WE DISCUSS BIOLOGICAL INVASION, FIRE REGIMES, SPECIES CONSERVATION & ECOLOGICAL RESILIENCE VIA COLOURFUL POP-CULTURE REFERENCES LIKE STAR WARS, T.V. SHOWS, AND ONE REOCCURRING KOALA CHARACTER WHO WEARS MANY HATS! ENJOY.

BY LUKE S. O'LOUGHLIN @OLoughlinLS

KAPOW! ECOLOGY
COLLATED ISSUE #1 JANUARY – JUNE 2016

Published independently by Luke O'Loughlin for K!E COMICS
828 Emerson St, West Albury, NSW 2640 Australia

Written, drawn, coloured and edited by
Dr Luke S. O'Loughlin

The following book contains the comics and associated blog-posts for KAPOW! ECOLOGY weekly comic strips (K!E#1 – K!E#21) originally published online at www.kapowecology.wordpress.com. Further information can be found by visiting that website and following links embedded in the blog-posts. Citation to original research used to create these comics are presented in both the art and blog.

Acknowledgements
Thanks to everyone who has thus far enjoyed these comics and shared them around. Particular thanks go to the constant 're-tweeters' and sharers of these comics on social media platforms, namely Terry McGlynn, Thea O'Loughlin, David Watson, Dale Nimmo, Tim Doherty, Euan Ritchie, Brad Farmilo, Tom Fairman, Ian Lunt, Margaret Stanley, My Little Python, and of course many many more. Final thanks to the many ecologists who have published the awesome research that this book showcases. Keep up the good science.

KAPOW! ECOLOGY is a weekly comic-strip showcasing some great ecological research. This alternative approach to science communication takes the complexity of a research paper and synthesises the key ecological message via colourful characters, pop-culture references, and engaging stories. I use the popularity of this creative medium to make big topics in conservation and ecology accessible to a broader audience. So far the comic has tackled feral predator control through the lens of a Crime Scene Investigation T.V show, altered fire regimes under climate change delivered by courier to some unimpressed Eucalypts, and even explained the concepts of ecological resilience and resistance via a scene from the latest Star Wars movie, just to name a few.

This style of scientific story telling started with me drawing some of the talks and events of the 2015 Ecological Society of Australia's annual conference It's a good story. You should check it out.

http://kapowecology.wordpress.com
http://lukeoloughlinphd.wordpress.com/esa-15-comic/
http://twitter.com/OLoughlinLS
http://facebook.com/KapowEcology

Please send any questions, queries, ideas, or comments to

l.oloughlin@latrobe.edu.au

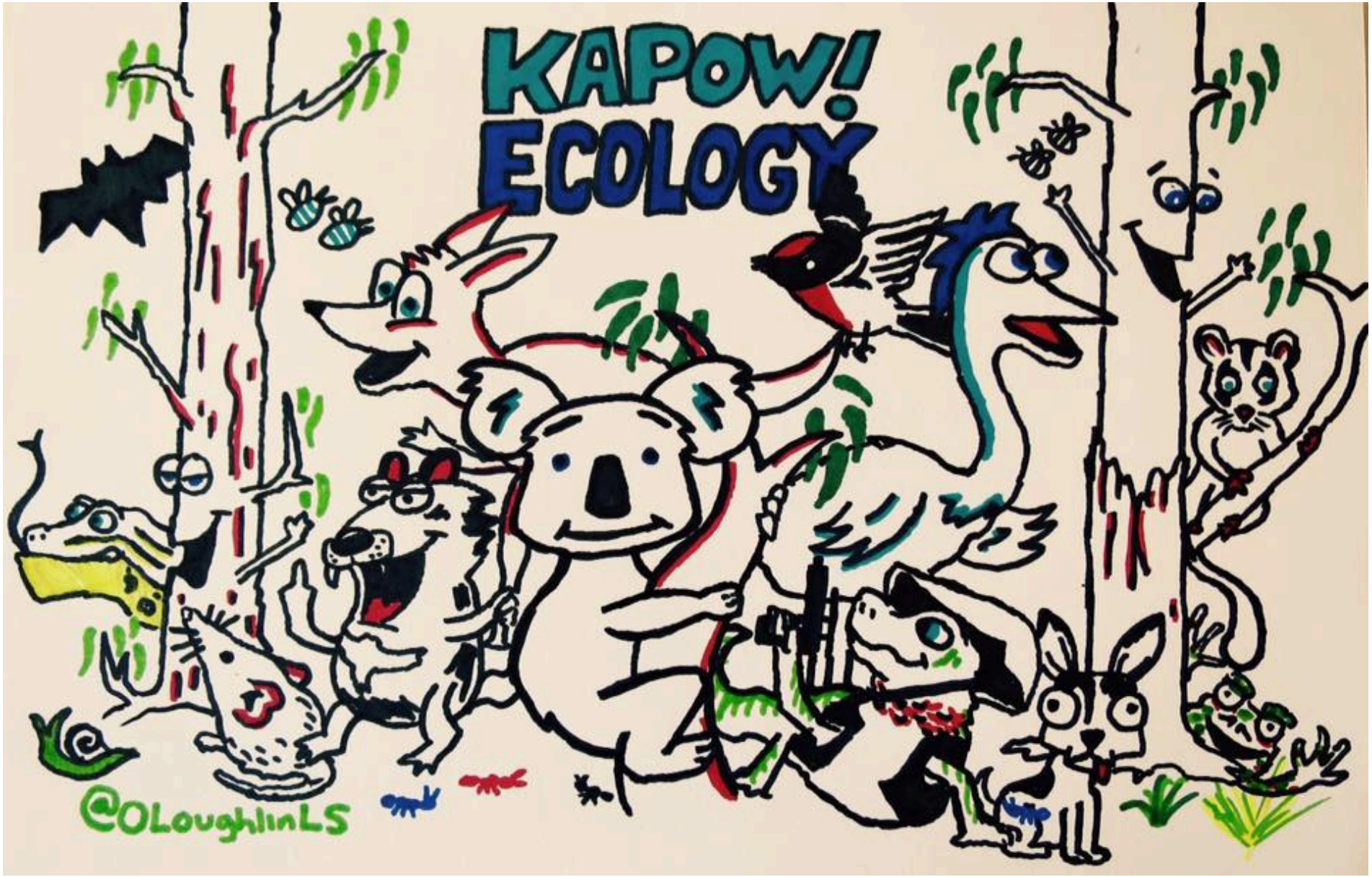

KAPOW!
ECOLOGY
@OLoughlinLS

Table of contents
2016

KAPOW! ECOLOGY #1 @OLoughlinLS

CSI:

CRIME SCENE INVESTIGATION

FLINDERS RANGES NATIONAL PARK

THE NEXT DAY...

BETTER CONDUCT A BROAD-SCALE NON-SPECIFIC PREDATOR CONTROL PROGRAM...

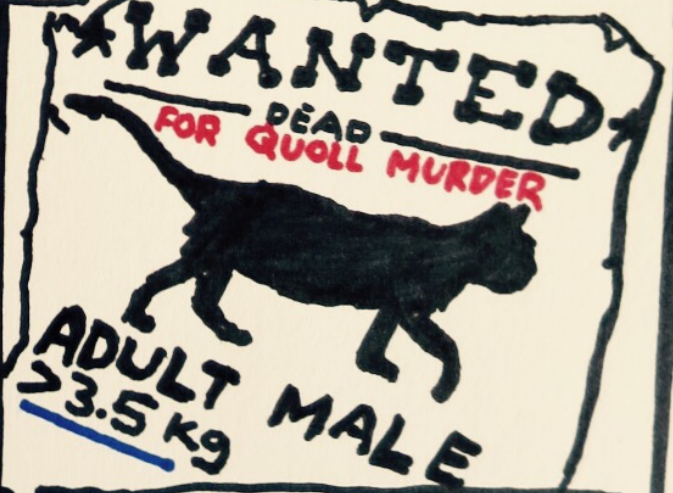
HANG ON! WE CAN BE MORE SPECIFIC AND TARGETED.....

...WE CAN USE CAMERAS...

...AND DNA...

...AND AUTOPSY...

*WANTED DEAD FOR QUOLL MURDER



ADULT MALE >3.5 kg

...TO PROFILE AND IDENTIFY THE ACTUAL CAT RESPONSIBLE!!

MOSEBY ET AL. (2015) BIOL. CONS. 191: 331-340

CSI: Flinders Ranges

WHOOOOO ARE YOU?…. WHO WHO? WHO WHO?….. I REALLY WANNA KNOW

After at least 120 years of absence, western quolls were reintroduced to the Flinders Ranges National Park in April 2014. Heaps of work had been done to get the place looking real nice, but alas, some threats remained…

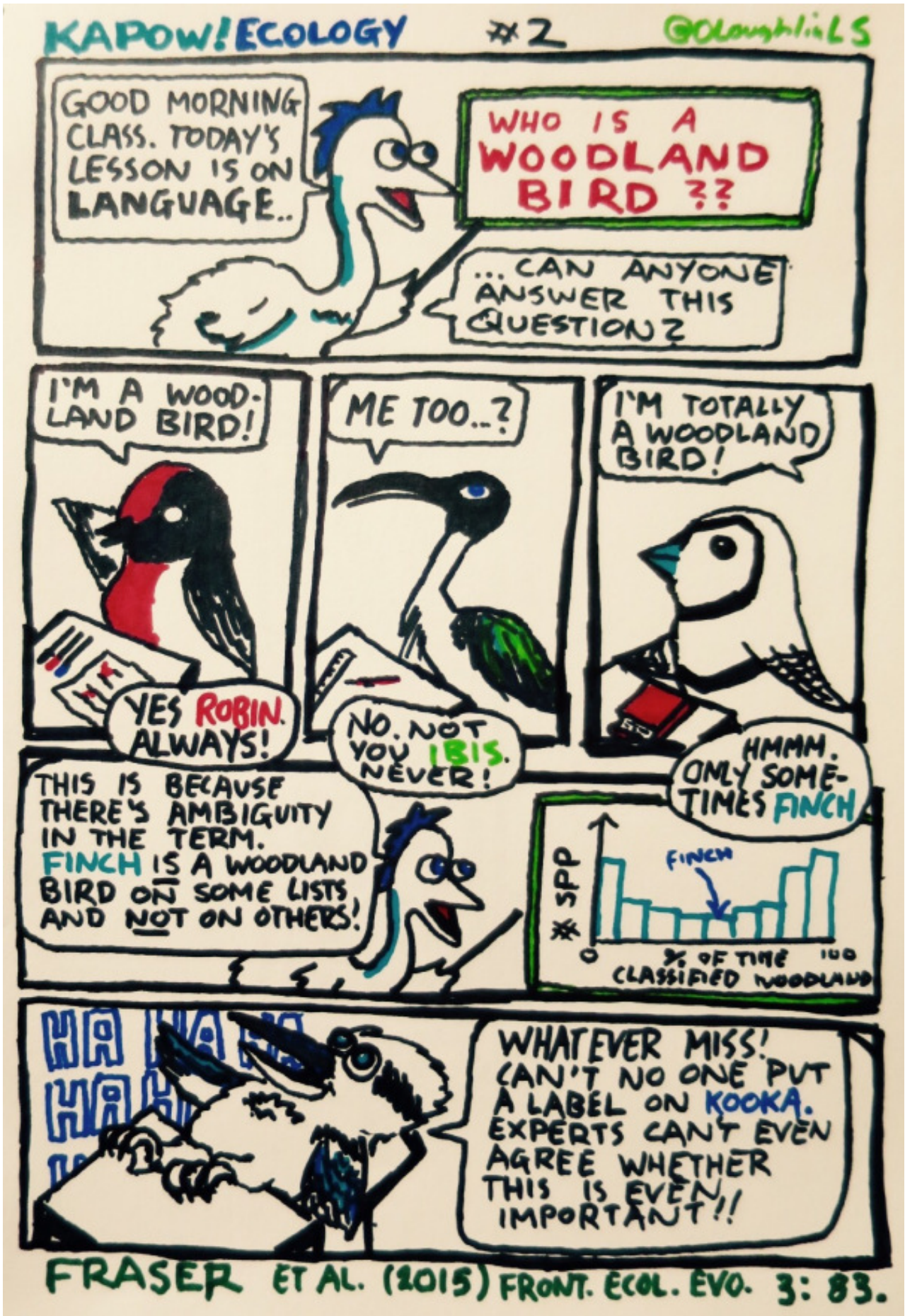
In only six months, 11 of the 41 reintroduced quolls had been killed by cats. This was not good…..

What followed was a criminal style investigation that used multiple lines of evidence to profile and identify the actual cats responsible for this catastrophic predation. Inspectors Katherine, David and John found it was the big blokes that were the culprits!

For the actual science of this story read the paper and contact the authors.

Moseby KE, Peacock DE & Read JL (2015)
Catastrophic cat predation: a call for predator profiling in wildlife protection programs. *Biological Conservation* **191**: 331-340

K!E#1


KAPOW! ECOLOGY #2 @OLaughlinLS
GOOD MORNING CLASS. TODAY'S LESSON IS ON LANGUAGE..
WHO IS A WOODLAND BIRD ??
...CAN ANYONE ANSWER THIS QUESTION?
I'M A WOOD-LAND BIRD!
YES ROBIN. ALWAYS!
ME TOO..?
NO. NOT YOU IBIS. NEVER!
I'M TOTALLY A WOODLAND BIRD!
HMMM. ONLY SOME-TIMES FINCH
THIS IS BECAUSE THERE'S AMBIGUITY IN THE TERM. FINCH IS A WOODLAND BIRD ON SOME LISTS AND NOT ON OTHERS!
SPP
FINCH
0
% OF TIME CLASSIFIED WOODLAND
100
HA HA HA
WHATEVER MISS! CAN'T NO ONE PUT A LABEL ON KOOKA. EXPERTS CAN'T EVEN AGREE WHETHER THIS IS EVEN IMPORTANT!!
FRASER ET AL. (2015) FRONT. ECOL. EVO. 3: 83.

Back to language school for ‘woodland birds’

Ok class…. How do we classify a woodland bird? Anyone, anyone…. Occurrence. But how often? Anyone, anyone…. Probably very often. Foragers or just nesters? Anyone, anyone….

Seriously though, these are kind of trick questions as there is no standardised list of what **is** and what **is not** a woodland bird. This actually highlights a more fundamental issue in ecology which is the use of vague and ambiguous terminology.

Better go back to the classroom! Principle Hannah and her colleagues did the review, re-analysed some results, and asked the experts… ‘so woodland birds, who are they?’ Turns out there is a whole bunch of species inconsistently classified…. which has the potential to change results if we change who is and isn’t….. and that experts are divided about whether this inconsistency is even an issue.

So it’s a bit messy at the moment but surely consistency and standardisation is the answer.

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Fraser H, Garrard GE, Rumpff L, Hauser CE & McCarthy MA (2015) Consequences of inconsistently classifying woodland birds. *Frontiers in Ecology and Evolution* **3**: 83.

K!E#2


KAPOW! ECOLOGY #3
@OLoughlinLS
FIRE REGIME DELIVERY
HI. I HAVE BURNS FOR AN E. REGNANS & AN E. OBLIQUA..
YEP. I'M REGNANS THE SENSITIVE. I'LL HAVE A HIGH-INTENSITY, LOW-FREQUENCY THANKS!
AND I'M OBLIQUA THE TOLERANT. I'LL TAKE THE LOW-INTENSITY HIGH-FREQUENCY! I'LL JUST RESPROUT!
UNFORTUNATELY, THESE REGIMES WERE SENT FROM CLIMATE CHANGE. EVERY-ONE GETS THE SAME.... HIGH-INTENSITY/ HIGH-FREQUENCY.
THAT SUCKS!! YOU BURN ME TWICE QUICKLY & I'M DONE. OBLIGATE SEEDER BRO!
AND IF IT'S TOO INTENSE EVEN MY SWEET BARK WONT PROTECT ME..
NEXT WEEK: RISE OF ACACIA?
FAIRMAN ET AL. (2015) INT. J. WILDLAND FIRE · early

Burn me once, mmm that's the regime, but burn me twice…

So let me stand next to your fire…. Hmmm, pretty intense but not the intensity I'm after, how about next to this fire…. Wow good intensity! Problem is that's too frequent, I think I'll go stand next to this fire…. Ah, that's the one.

Eucalypt forests of south-eastern Australia too have a preference for the kinds of fire they prefer. If you're the kind of species that is really sensitive, is killed by fire, and relies on seed germination to persist (a.k.a **obligate seeder**), then you don't mind some high intensity but it has to low frequency – give those germinants a chance to mature!

Alternatively, if you're the kind of species that is pretty tolerant, survives fire, and will regrow your vegetation (a.k.a **resprouter**), then you can handle higher frequencies, so long as it's not too intense. But what's going to happen to these forests when wildfires become both **more frequent** and **more intense** under climate change??

That's just the question Thomas and his colleagues thought to themselves and said (and this is *of course* a 100% genuine quote), "This has actually happened!
There's a whole bunch of forest that has been burnt twice by massive fires in only a couple of years. That's **frequent** and **intense**! What do we know about the responses of the different eucalypts? Let's do a review!"… and they did …..

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Fairman TA, Nitschke CR & Bennett LT (2015)
Too much, too soon? A review of the effects of increasing wildfire frequency on tree mortality and regeneration in temperate eucalypt forests *International Journal of Wildland Fire* DOI:10.1071/WF15010

K!E#3

Postscript: For this post and comic, **intense** should be replaced throughout with **severe.** That would be more scientifically accurate. I went with intense for creative reasons. Would you describe Jimi as 'severe'…..? I didn't think so.


KAPOW! ECOLOGY
#4
©Loughnan
I DON'T KNOW, BUT I'VE BEEN TOLD
NO ENTRY
M.T.A
MILITARY TRAINING AREA
M.T.As ARE WIDESPREAD, IN GOOD CONDITION, AND LARGELY UN-EX-PLORED
HIGH-QUALITY HABITAT
UNEXPLODED ORDNANCE
I DON'T KNOW, BUT IT'S BEEN SAID
M.T.As MUST BE INTEGRATED IN TO LAND MANAGEMENT POLICY TO ENSURE THAT BIODIVERSITY'S PRO-TECT-ED!
ZENTELIS & LINDENMAYER (2015) CONS. LETTERS 8: 299-305

A commando cadence for conservation

Military gotta train, and training needs a soundtrack. Should we go all full metal jacket and sing some pretty offensive rubbish….? Or should we get our soul on?!?

Or should we focus on the conservation values of the training areas…? Turns out there's probably at least 50 million hectares of military training area globally – and maybe even as much a 300 million hectares – that is largely ignored when considering biodiversity conservation.

A couple of civilians, Rick and David, came up with this estimate and thought it crazy that that much area had received so little focus! Military training areas have so much to offer. The **PROS**; extensive distribution, they feature vegetation types that are unrepresented in the current reserve system, it's all mostly in good condition (no clearing, etc),… The **CONS**; ummmmm, just some unexploded ordnance….

So looks like on balance we're all set to 1) start documenting the biodiversity of these areas, 2) integrate conservation into land management policies of these areas, 3) call up the IUCN and get some unaffiliated leadership on these matters, and 4) pay for it (which is not a problem – you know how much conservation we can get for the smallest sliver of military budget!)

For the actual science of this story you should definitely read the paper (it's open access) and contact the authors if you have any questions.

Zentelis R and Lindenmayer D (2015)
Bombing for biodiversity—enhancing conservation values of military training areas. *Conservation Letters* **8**: 299-305.

K!E#4


KAPOW! ECOLOGY #5 @OLoughlinLS
BONSOIR! WELCOME TO DOWN UNDER DINING. WE HAVE 400 SPECIES ON OUR MENU! RABBIT is OUR MOST POPULAR DISH...
WE EAT A LOT OF RABBIT. ANYTHING LESS COMMON ??
Menu
OUI, BUT OF COURSE! YOUR CHOICE OF 28 IUCN RED LIST SPECIES. MAY I RE-COMMED THE SPECIALS?
SPECIALS
WOYLIE TACOS
MALLEE FOWL STEW
PYGMY POSSUM PASTA
LETS GET THE TROPICS SHARE PLATE!
YOUR PLATE OF RODENTS WITH REPTILES. BON APPETIT!
AWESOME! THEY DIDN'T SKIMP ON THE DASYURIDS!
DOHERTY ET AL. (2015) J. BIOGEOGR. 42:964-75.

Australia: a 5-star dining experience (for felines)

Just when you thought there were no more Smorgys… or that we only had that one Sizzler left… or that Pizza Hut's 'The Works' was a thing of the past…. Well it turns out the entire continent of Australia is a regular all-you-can-eat buffet!

So there's a whole bunch of feral cats out there and we need to know what they are eating. Turns out it is a lot…. No seriously A LOT.

Head Chef Tim, together with a 5-star team, got the results of all the diet studies of feral cats from all over Australia together in one place and found some interesting patterns.

Presented here is just a snapshot- feral cats eat 400 vertebrate species, they most commonly prey on rabbits, they eat a whole bunch of threatened animals, in different areas they eat different things, and they eat way more native species when there's no rabbits. But that's just the entree – there's a whole main course of information in there.

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Doherty TS, Davis RA, van Etten EJB, Algar D, Collier N, Dickman CR, Edwards G, Masters P, Palmer R and Robinson S (2015)
A continental-scale analysis of feral cat diet in Australia. *Journal of Biogeography* **42**: 964-975.

K!E#5


KAPOW! ECOLOGY #6
@OLoughlinLS
WITHOUT THOSE DINGOES AROUND YOU AND VS RUN THIS SYSTEM
DON FOX
CREAK
WHO'S THERE?
ME! THE APEX. I WAS ONCE GONE BUT NOW I'M BACK! YOUR CONTROL OF THE MAIN-LAND IS OVER! CALL ME.....
THE DEVIL
RESTORATION
MY TOP-DOWN ROLE IS...
SUPPRESSION
FACILITATION
REWILD!
COMING SOON
THAT LOOKS LIKE AN AWE-SOME MOVIE
HOPE IT'S RELEASED SOON....
HUNTER ET AL. (2015) BIOL. CONS. 191:428-35

Rewilding the devil you know

I'm gunna make him an offer he can't refuse… I'm afraid I must insist, so please, da money… As any Mafia Boss can attest, it's an important job being at the top. You have a lot of influence in the community.

For much of mainland Australia, the apex predator that's running the show at the moment is not the species we want at the top. They're just not doing a good job – being introduced and all that. If we want to re-establish natural processes in our ecosystems, we need to get serious about re-establishing a native predator…..

Enter the Tasmanian Devil!

But they're not gunna just let devils loose on the mainland….yet. So Don Daniel and his Consigliere got together what we know and asked, 'under a bunch of different scenarios of devil re-introduction and/or control of other predators, what happens? Let's run the models'

As they say, *the devil is in the detail*, but if you want the quick run down; the best models predicted that devils would negatively influence introduced predators and over-abundant large herbivores, which in turn would positively influence endangered small-medium sized mammals.

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Hunter DO, Britz T, Jones M & Letnic M (2015)
Reintroduction of Tasmanian devils to mainland Australia can restore top-down control in ecosystems where dingoes have been extirpated. *Biological Conservation* **191**: 428–435.

K!E#6


KAPOW! ECOLOGY
#7
@OloughlinLS
RESISTANCE
EPISODE VII
THE CONCEPT AWAKENS
GO FIRST ORDER.. DISTURB! DISTURB THAT COMMUNITY
ROGER!
I'D LIKE TO SEE THEM RECOVER, FROM THIS.
IT'S A PULSE! WHAT DO WE DO?
SHOULD WE ACCEPT THE CHANGE & BOUNCE BACK?
BE RESILIENT...
NO!! OUR ECOLOGICAL UNIT WILL WITHSTAND!
BE THE RESISTANCE
NIMMO ET AL. (2015) TRENDS ECOL. EVOL. 30:516-23

RESISTANCE is more than just some STAR WARS thing

Not so long ago in a journal not so far, far away….

RESISTANCE
Episode VII
THE CONCEPT AWAKENS

Professor Lake has vanished! In his absence the sinister FIRST WORLD has arisen and is causing unprecedented anthropogenic change, and will not rest until all systems have been disturbed.

With support from RESILIENT researchers, General Nimmo leads a brave RESISTANCE. He is desperate to build on the work of Lake and gain his help in what it means to withstand disturbance.

Nimmo and his most daring collaborators are on a mission to measure ecological change, where a long-term dataset may suggest a clue to Lake's whereabouts….

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Nimmo DG, Mac Nally R, Cunningham S, Haslem A & Bennett AF (2015).
Vive la resistance: reviving resistance for 21st century conservation. *Trends in Ecology and Evolution* **30**: 516-523.

K!E#7


KAPOW! ECOLOGY
#8
@OLoughlinLS
UMM... EXCUSE ME.
SPRING ST.
HELLO!? HELLO!?
DAMMIT! THAT'S NO GOOD
SERIOUSLY! IS ANYONE LISTENING?
THERE IS SOOOOOO MUCH RESEARCH THAT SHOWS THESE POLICIES & PRACTICES ARE BAD.... AND NOW, LEADBEATER'S ARE LISTED CRITICALLY ENDANGERED!
GREAT FOREST NATIONAL PARK
THIS WAY
IF IT'S OK WITH YOU. I'D LIKE TO BE CONSERVED PLEASE..
LINDENMAYER ET AL. (2015) PACIFIC CONS. BIOL. 21:257-65

Looking out for leady – let's listen to the science

"All I want, is a place to call home…. Please don't take my tree away, it's the only place I can live" said the Leadbeater's possum to musician Danny Knox who represented the plight of this icon of Victoria's forests in a lovely little ditty. Leady has a lot of good friends that listen to science and who are working hard for Leady's conservation. But not everyone listens…..

One of the good friends is Lindenmayer. Leady and he go waaaaay back. Lindenmayer and his team have been keeping a close eye on Leady for decades, and despite best efforts, things just keep getting worse for little Leady.

There are heaps of general articles written about this major conservation issue (better than I'm going to write it here). Any quick Google will find this, this and this. It's been a long road, and there's some really great proactive groups out there.

In the end it's just really frustrating because the science is in; we know what's leading to Leady's decline and we know what is needed to lower Leady's risk of extinction. In it's most shortest form; clearfell logging and higher risk of fire in the landscape does not a good home make for Leady. So what's standing in the way?? How about a Great Forest National Park already??

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Lindenmayer DB, Blair D, McBurney L and Banks SC (2015) Ignoring the science in failing to conserve a faunal icon – major political, policy and management problems in preventing the extinction of Leadbeater's possum. *Pacific Conservation Biology* **21**, 257-265.

K!E#8


KAPOW! ECOLOGY #9
@OLoughlinLS
FIRE REGIME DELIVERY
HI AGAIN. NOW I HAVE MANAGEMENT BURNS FOR THE MALLEE
GREAT! MAKE SURE WE GET PLENTY OF LATE-SUCCESSIONAL VEG!
I NEED SOME MID-
YEAH... MID TO LATE SUCCESSIONAL IS GOOD FOR ME.
SORRY. NOT SURE WHAT MIX OF FIRE HISTORIES MANAGEMENT HAS SENT.... MAYBE "EQUAL REPRESENTATION"
BUT THAT'S NOT THE OPTIMUM ALLOCATIONS OF SUCCESSIONAL STATES!!!
SURELY OUR HABITAT REQUIREMENTS ARE ARE DEFINED OBJECTIVE??
BEST STRATEGY: JUST FIGHT THE WILD FIRES...
KELLY ET AL. (2015) CONS. BIOL. 29:473-81

Delivering optimal fire histories for fauna

Now for another fun instalment of *The Fire Regime Delivery Truck*. Old-mate Koala has his box of matches, he's got Jimi cranking through the stereo, and this time he's delivering for management….

But what is the best mix of fire histories delivered across the landscape to maximise biodiversity conservation?? It's been the sentiment for years that **pyrodiverity promotes biodiversity** and that an even mix of fire-age-classes was best. And so that's what management aimed to achieve.

Luke and his friends thought that probably wasn't best considering we know some fire-age-classes are more important than others for different species. They looked at how species respond to fire, what the optimum allocation of fire-age-classes would be, and how to go about achieving that.

It might come as no surprises that some species had strong preferences for vegetation in a mid-late successional stage. That means the optimal fire history would be a management approach that delivers a higher proportion of those older fire-age-classes. So how do we do that? Maybe just fight the wildfires….

For the actual science science of this story you should definitely read the paper and contact the authors if you have any questions.

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

K!E#9


KAPOW! ECOLOGY
#10
@OLoughlinLS
AUSTRALIA
THE INVASION IS COMING THIS WAY. YOU NEED TO BE TRAINED!
HERE.. EAT THESE BABY CANE TOADS
UMMM.. OK
CHOMP
ARGH!
YEAH... AH... NAH. I THINK THIS GOANNA IS GUNNA SKIP TRAINING!
THE NEXT SEASON
WHATCHA GUNNA DO BRO !?!?
YOU GOT NOTHIN!
I'M GUNNA EAT YOU STUPID TOAD!
R.I.P
Green eyes
REMEMBER THE TRAINING... DO NOT EAT.... SURVIVE!!!
WARD-FEAR ET AL. (2016) BIOL. LETT. 12:20150863

Conditioning a goanna – yucky cane toad!

Remember when Goanna didn't have to worry about nothin' changing, at least not in a hurry anyway… Well it's not 1982 anymore buddy! There are some serious changings a happening for old Goanna… not the least the INVASION OF THIS GUY!

We're talking cane toads – a scourge on the Australian landscape. We all know the story, no need to re-hash it here. Lets just say biocontrol has come along way since the 1935.

Problem is though, as these toxic toads spread across the landscape, more and more native species are running into this new prey item…. Hmmmm what's that? Dunno, let's eat it….DEAD. This is a serious threatening process.

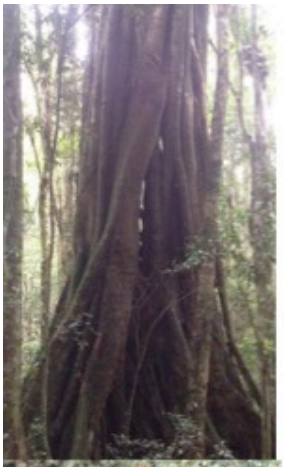
However, can we train those native species out there in the wild to say, Hmmmm what's that? Hang-on a minute. I don't think I should be eating that! That's what Georgia and her colleagues set out to find.

So up north in Kimberly, the team got out ahead of the cane toad invasion front and went about training the yellow-spotted monitors (floodplain goanna / Gundulla). They offered up juvenile cane toads (toxic but not fatal) and some took the meal (training complete) and others didn't (untrained). In short, when the toad invasion hit, those that had the training survived way better than those that did not. It's a bit of a good new story.

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions

Ward-Fear G, Pearson DJ, Brown GP, Balanggarra Rangers & Shine R (2016) Ecological immunization: *in situ* training of free-ranging predatory lizards reduces their vulnerability to invasive toxic prey. *Biology Letters* **12**: 20150863.

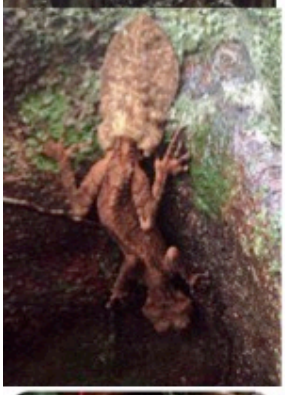
K!E#10



VOLUNTEER OPPORTUNITIES
CONNELL RAINFOREST PLOT NETWORK

Are you interested in contributing to one of the worlds longest running, plot-based study of rainforest community dynamics?

We're putting a team together



It's time to conduct another re-census of 2 long-term rainforest research plots and we need your help! It takes a team of around **8-10 people**, roughly **10-12 workdays for each plot** to get all the work done. Dates are currently being finalised, but the very likely times are as follows:

Monday 7th November – Sunday 20th November (two weeks)
Davies Creek Plot, Dinden National Park (25 km southwest of Cairns)

Monday 21st November – Sunday 4th Decemeber (two weeks)
O'Reilly's Plot, Lamington National Park (84 km south of Brisbane)

The work itself involves regular length days out on the plots, relocating and recording data for all plants tagged and mapped (up to 2,000 trees and over 10,000 seedlings).

Who are we looking for?

Any person with a strong interest in ecological research, and the scientific rigour to work hard and efficiently in the field. These positions would suit undergrads or recent graduates looking for more practical field experience, or anyone else with a strong interest in botany, being out in a rainforest, and/or contributing to important long-term research.

We take care of all flights, accommodation, transportation, and food for the field trips.

We will likely preference applicants that are able to make both trips (4 weeks commitment), but we would also like to hear from you if you are only available for one trip or the other (2 weeks commitment). Can only provide flights within Australia.

If you think you're the right person for this work, please send your expressions of interest to **Dr Luke O'Loughlin** l.oloughlin@latrobe.edu.au

Please include in your email information about yourself that addresses how you would be a great asset to the team, and a current CV (that includes your contact details). Use the subject heading "Connell plots volunteer" in your correspondence.

More info at *lukeoloughlinphd.wordpress.com/blog*

BONUS KAPOW! ECOLOGY

Watson DM, Watson MJ. 2015. Wildlife restoration: mainstreaming translocations to keep common species common. Biological Conservation 191: 830-838

KAPOW! ECOLOGY #11 @OLoughlinLS

WHAT IS AN APEX PREDATOR? ..LETS LOOK AT THE TRAITS OF THE USUAL SUSPECTS

SLOW ← REPRODUCTIVE RATES → FAST

LONG ← PARENTAL CARE → SHORT

LOW ← POPULATION DENSITY → HIGH

SO IT LOOKS LIKE US BIGGER PREDATORS HAVE THE TRAITS THAT MEAN WE SELF-REGULATE!

NOT LIKE THOSE LITTLE MESO PREDATORS THAT ARE REGULATED BY OTHER FACTORS..

WALLACH ET. AL. (2015) OIKOS 124: 1453-61

The long-slow-low road to be an APEX

What is an apex predator? Hmmm..simple enough question… Isn't it just the species on top? So depending on whether it's Yogi the Bear, Huckleberry Hound or Top Cat, so long as you're the one eating the corn flakes, you're the apex…right? Well……

It's probably really important to lock down a solid answer to that question. After all, an apex predator can influence ecosystems in massive ways – limiting prey, controlling other smaller predators. Actually, it's really the distinction of what is an **apex-** vs what is a **meso-** predator that remains mostly unclear.

So Arial and a team from across the globe decided to review the life-history traits of all the predators – literally line them up, end to end – to see if size had anything to do with how a top predator would behave and the kind of influence they would have.

What they found were some pretty strong patterns related to predator size. Bigger predators (like say a bear) tend to have relatively **slow** reproductive rates, **long** periods of parental care of young, and **low** population densities compared to smaller predators (like say a fox). Actually, an average mass of 16 kg was identified as the transition point for species, above which a carnivore population becomes self-regulated, rather than being influenced by properties of the community.

That's a definition right there. **Self-regulating apex… Extrinsically-regulated meso…** Looks like some apex predators aren't by definition apex predators

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions.

Wallach AD, Izhaki I, Toms JD, Ripple WJ & Shanas U (2015)
What is an apex predator? *Oikos* **124**: 1453–1461.

K!E#11


KAPOW! ECOLOGY
#12
@OLoughlinLS
FOR AS LONG AS THERE HAS BEEN VIRUSES... WE HAVE BEEN FIGHTING
...BUT SOME FARE BETTER THAN OTHERS...
HENDRA · SARS · RABIES ·
THE BATS KEEP TAKING THEM ON.... ... AND SURV- -IVING!
BUT WHAT ABOUT A NEW VIRUS...
...ONE THAT COULD POTENTIALLY WIPE US ALL OUT...
THUD
...HOW?
YOU KNOW THOSE INTERFERON GENES THAT FIGHT VIRUSES WHEN EXPRESSED?...
WELL MINE ARE ALWAYS EXPRESSED!!
ZHOU ET. AL. (2016) PNAS 113:2696-701

Bats v Viruses: Dawn of Interferons

How can the Bats do it? How will the Bats(man) be able to stand against the Super-Virus(man)? Kryptonite….I guess…. But what if the Bats can't get any special space rock? Ah! An armoured suit and a kryptonite arrow! A multi-facetted approach. Regardless, the whole thing will probably be pretty wicked…..maybe

Hold up one minute. I've never seen a Bat in a armoured suit hooked up to the city's power-supply, I hear you say. Well… in the case of the Australian black flying fox, what we are talking about is internal armour… genes… particularly those interferons that are associated with anti-viral activity.

Hold up another minute. I've never seen a Virus physically have a hand-to-hand fight with its host, I hear you say. Well… in the cases of hendra, SARS, rabies and ebola, what we are again talking about is that internal fight… those viruses going up against the power of the Bats 'armoured' immune system.

Because the thing is, where any other mammal would struggle, get real sick and perhaps even die when up against theses viruses, Bats are able to coexist. They have 'em but they don't get ill…..How?

That's pretty much what Peng, Michelle and a team of researchers aimed to discover by checking out Bats' genome. What they found was whereas regular humans have a high number of these interferons, that turn on and off in a complex little dance of exposure to viruses, Bats only have **three** and they are **always turned on.** Real simple like.

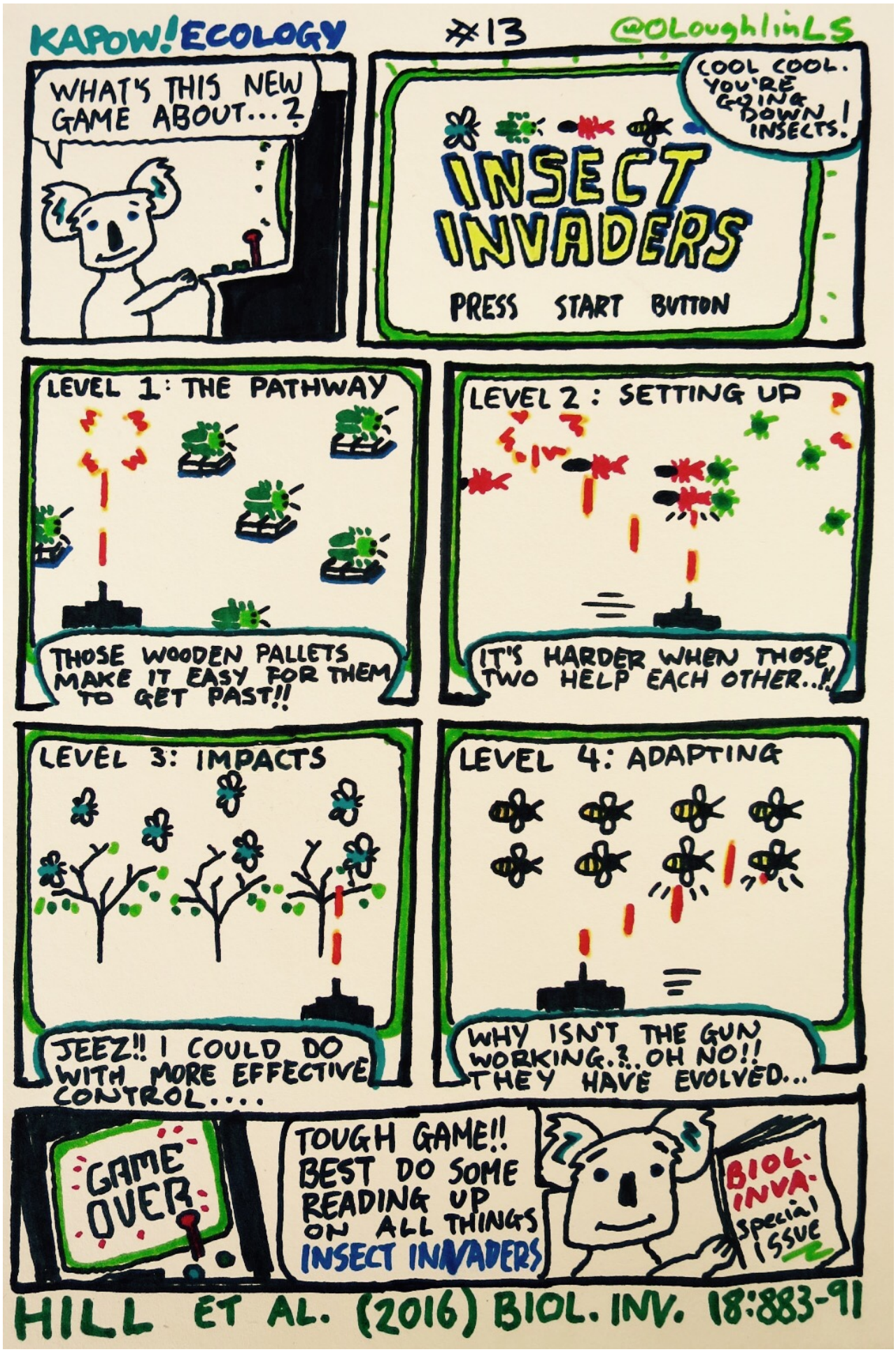
Bats defeat Virus hands-down thanks to this 'super-immunity'! In your face Super-Virus-Man!!

For the actual science of this story you should definitely read the paper and contact the authors if you have any questions (plus there is tonnes more info HERE).

Zhou P, Tachedjian M, Wynne JW, Boyd V, Cui J, Smith I, Cowled C, Ng JHJ, Mok L, Michalski WP, Mendenhall IH, Tachedjian G, Wang LF & Baker ML (2016)
Contraction of the type I IFN locus and unusual constitutive expression of *IFN-α* in bats. *Proceedings of the National Academy of Sciences* **113**: 2696-2701.

K!E#12

Postscript: So this edition of KAPOW! ECOLOGY is a little bit less ECOLOGY and little bit more an opportunity to to draw some iconic Batman and Superman imagery in the week that their movie is released – where they will no doubt punch for a bit and then be friends. However, there was another reason to do this particular paper. Besides it being good science, it is also already the subject of some comic-strip style science communication! Seriously! This format is so-hot-right-now it would seem that even the CSIRO are getting in on it. Here's the one about bats (animated) and here's another about stem cells.


KAPOW! ECOLOGY
#13
@OLoughlinLS
WHAT'S THIS NEW GAME ABOUT...?
COOL COOL. YOU'RE GOING DOWN INSECTS!
INSECT INVADERS
PRESS START BUTTON
LEVEL 1: THE PATHWAY
THOSE WOODEN PALLETS MAKE IT EASY FOR THEM TO GET PAST!!
LEVEL 2: SETTING UP
IT'S HARDER WHEN THOSE TWO HELP EACH OTHER..!!
LEVEL 3: IMPACTS
JEEZ!! I COULD DO WITH MORE EFFECTIVE CONTROL....
LEVEL 4: ADAPTING
WHY ISN'T THE GUN WORKING..?..OH NO!! THEY HAVE EVOLVED...
GAME OVER
TOUGH GAME!! BEST DO SOME READING UP ON ALL THINGS INSECT INVADERS
BIOL. INVA. Special ISSUE
HILL ET AL. (2016) BIOL. INV. 18:883-91

The INSECT INVADERS are coming!

Space Invaders – the 1978 arcade classic – can teach us a thing or two about Insect Invaders…..? Sure, why not! The space things (insect invaders) are trying to reach the bottom of the screen (enter the ecosystem). There's different types (species). At the bottom there's a gun thing (active management). And the longer it goes on the faster the space things get (an increasing problem overtime)…. Yep, analogy holds strong.

So we have a good understanding of insect invaders then? Not particularly! Even though insects are by far and beyond the most numerous and diverse group of species (seriously far and beyond), researchers tend to double-down their efforts on plants and key animal species, leaving insect invaders kind of occupying the backseat.

Of course there are some well studied species that you will know – poster children if you will – many of which you've probably run into. Argentine ant, big-headed ant, fire ant …. Also things that aren't ants! Check out what happened out the front of my house last year, it was feral honeybee madness (READ STORY v WATCH VIDEO).

So long story short, we need to know more. That's why in late 2014 an international workshop was hosted in Stellenbosch, South Africa, that got together a whole bunch of researchers to share ideas, data, and to discuss what we **do** and **do not** know about the *drivers, impacts, mechanisms and adaption* of insect invasions.

Weren't at the workshop? Not a problem! There's a **special issue** *Biological Invasions* that has just been published that covers it all. This paper by Matt and colleagues serves as a general introduction to the issue. It is a short discussion on the pathway of invasion (*drivers*), how species go about setting up (*mechanism*), the damage they can do (*impacts*) and how rapid evolution plays a part (*adaptation*). Essentially a tease of all the juicy science packed into the issue!

For the actual science of this story you definitely read the paper a contact the authors if you have any questions.

Hill MP, Crusella-Trullas S, Terblanche JS & Richardson DM (2016) Drivers, impacts, mechanisms and adaptation in insect invasions. *Biological Invasions* **18**: 883-391.

K!E13


KAPOW! ECOLOGY
#14
@OLoughlinLS
LETS CROSS TO THE FIELD FOR BREAKING NEWS....
NEWS
KUNZEA = FOE
..THANKS... KUNZEA! IT'S INV-ADING OUR FORESTS WHICH IS PROBABLY BAD
LET'S SEE HOW THE LOCALS FEEL...
KUNZEA
SIR, HOW IS KUNZEA IMPACTING YOUR LIFE?
YEAH, IT'S NOT. I JUST DO MY THING
UMM, OK... WHAT ABOUT YOU? THERE'S A LOT OF EXTRA WOOD AROUND?
IT'S COOL I LIKE WOOD.
HEY!! I HATE KUNZEA. BUT ONLY AT NIGHT. LOVE IT DURING THE DAY!!!
THANKS SWAMPY. IS THAT IT??
YEAH, SO. I GUESS WE'RE ALL GOOD HERE.. BACK TO YOU
...THANKS.. UP NEXT MANAGEMENT
EWS
KUNZEA = FRIEND
HRADSKY ET AL. (2015) AUST. ECOL. 40:611-24.

BREAKING NEWS! Animals indifferent to invading shrub

The newsroom tends to overstate things at times to play at the emotion of the audience. From welcoming insect overloads to announcing a killer storm, this kind of language often misrepresents facts and feeds the population crap disguised as news. Bloody Murdock press am I right!

But I digress…. Science is sometimes accused of doing the same thing. When referring to the expansion of a native shrub into an area it didn't previously occur, you could be forgiven for assuming there are **massive impacts** when words like *invasion* are used instead of something like *encroachment*.

But *invasion* is the accepted terminology to describe a species that has spread beyond its native range (thanks to something humans have done) and has come to dominate its new range with high numbers (and may have some impacts). Check out my paper about Coast Tea-Tree (THE SCIENCE vs THE BLOG)

Ok. So I guess the debate it about impacts…. maybe. Best measure some impacts then! Remember, we should not be assuming. Given there are some pretty significant structural changes in an area that shrubs have encroached, animals using those areas should be impacted right?

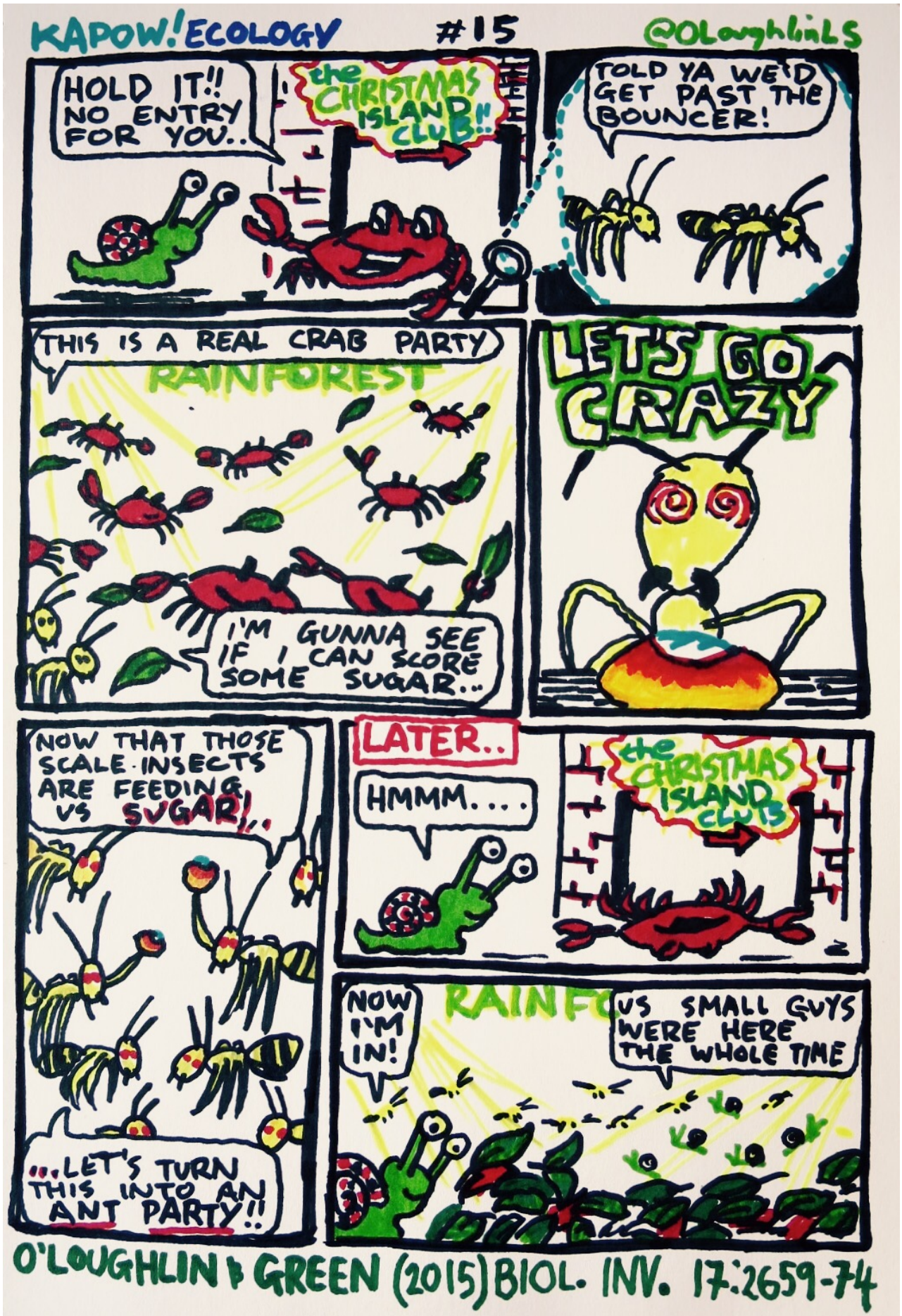
That's what Bron the reporter and her crew thought when they went into the Coranderrk Bushland Reserve – which has seen the shrub Kunzea (Yarra Burgan) encroach over the last 20 years. They set up their cameras to take photos of all the mammals. And did they find native mammals were impacted by this invasion? Well…. Nope.

Pretty much nobody cared either way. Most species were responding to other vegetation properties like the amount of grass or understory cover. Not Kunzea. Well, swamp wallabies seemed to stay out of it at night, but that was it. Everyone else just did their thing.

For the actual science of this story, you should definitely read the paper and contact the authors if you have any questions.

Hradsky BA, Loschiavo J, Hradsky M & Di Stefano J (2015)
Shrub expansion alters forest structure but has little impact on native mammal occurrence. *Austral Ecology* **40**: 611-624.

K!E14


KAPOW! ECOLOGY
#15
@OLoughlinLS
HOLD IT!! NO ENTRY FOR YOU..
the CHRISTMAS ISLAND CLUB!!
TOLD YA WE'D GET PAST THE BOUNCER!
THIS IS A REAL CRAB PARTY
RAINFOREST
I'M GUNNA SEE IF I CAN SCORE SOME SUGAR..
LET'S GO CRAZY
NOW THAT THOSE SCALE INSECTS ARE FEEDING VS SUGAR!..
..LET'S TURN THIS INTO AN ANT PARTY!!
LATER..
HMMM....
the CHRISTMAS ISLAND CLUB
NOW I'M IN!
RAINFO
US SMALL GUYS WERE HERE THE WHOLE TIME
O'LOUGHLIN & GREEN (2015) BIOL. INV. 17:2659-74

Juiced-up ants hit ‘da club’ and snails approve!

Secondary Invasion Part 2 – Getting into ‘da’ Christmas Island Club is not an easy task for some. The bouncer says something about it being Shorty’s Birthday… or something. Either way, that rainforest is a pumpin’ crab party! Invaders can come a-knocking, but those crabs just keep a-rockin’….

Christmas Island rainforest isn’t a great place for many invaders anyway. All of those super-abundant omnivorous red land crabs will either just eat you up directly, and/or limit your ability to set up a home through eating up all the leaf litter and seedlings. And these guys are really really abundant (picture one crab every square meter), which makes for one very open and simple rainforest.

But not all invaders are stopped by the bouncer… Enter the notorious yellow crazy ant! These guys get in, find themselves a good sugar-dealer (read: form a mutualism with a number of exotic honeydew-producing scale insects), and turn what was a crab party into an ant party! That’s right, they kill all the red land crabs.

This deletion of a highly-influential species causes some massive changes in the rainforest. A potential predator is removed, you get the build up and persistence of leaf litter, as well as a pulse recruitment of seedlings…. creating a very different looking rainforest. So what about those invaders that were previously excluded? What are they doing now?

That’s exactly what myself and Pete set out to find by looking at a whole community of exotic land snails. As you would expect, these previously unsuccessful invaders were advantaged by the new rainforest community created by the yellow crazy ants but it wasn’t as straight-forward as simply letting them in. There were a whole bunch of very small species that were present in intact rainforest (this whole time!), but 10-fold more abundant once the ants have done their thing.

So this suggests two pathways of facilitation. Primary invaders (ants and scales) will facilitate secondary invaders (snails) to either **enter** (big species) or **establish** (small species) – both key steps along the invasion pathway

For the actual science of this story, you definitely read the paper and contact the authors if you have any questions.

O’Loughlin LS & Green PT (2015)
Invader-invader mutualism influences land snail community composition and alters invasion success of alien species in tropical rainforest. *Biological Invasions* **17:** 2659-2674.

Postscript
This comic is a direct sequel to **Secondary Invasion Part 1** which was published as part of #ESA15comic – the unofficial comic of the 2015 Ecological Society of Australia conference in Adelaide. You can read that 31 page comic HERE. Stay tuned, **Secondary Invasion Parts 3, 4 & 5** are all currently in review; comics will follow


KAPOW! ECOLOGY #16 @OLoughlinLS
OINK! OINK!
OINK! DISTURB. OINK!
CAN YOU DEAL WITH THIS PIG PROBLEM? HERE'S SOME MONEY
OINK OINK OINK OINK
BANG BANG
GOOD RESULTS!! HERE'S THE SAME MONEY. DO IT AGAIN
OK
OINK!
BANG
YOU DIDN'T KILL NEARLY AS MANY!!
DENSITIES ARE WAY LOWER SO I'LL NEED WAY MORE MONEY TO KILL THE SAME AMOUNT
OINK. OINK.
BUT DOES IT MATTER? DISTURBANCE IS PRETT LOW
KRULL ET AL. (2016) PLoS ONE 11. e0146765.

New Zealand's pig problem!

It's a story about pigs and takin' money – get down girl, go ahead get down… And this is all going down across the Tasman; are you picking up their problem??

We talking managing feral pigs. This particular story comes from New Zealand where they know that feral pigs cause serious damage to rainforest ecosystems (see here) through their 'rooting' behavior (read: soil disturbance – not *that* kind of 'rooting').

Problem is – control is expensive, eradication impossible, control is expensive, pigs are difficult to count in dense vegetation, control is expensive, thresholds unknown…. Oh, and did I mention control is expensive?

Of course, it's not really expensive relative to some other things governments invest money in, but in a world where funds are limited, you need to make sure you are maximizing the benefits for every dollar spent.

That's what eco-economic-ologist Cheryl and her team were aiming to do by monitoring a feral pig control program near Auckland. They looked at how many pigs were killed, ecological benefits (how much soil disturbance), and total costs to inform a model that would predict the most cost-effective approach.

Their main conclusion was that *How many feral pigs did we kill?* was the wrong question to ask, and we should instead be focussing on the ecological outcomes. Feral pigs were reduced by over one-third. Great! But the assoicated ground disturbance was more than halved! Awesome.

For the actual science of this story, you should definitely read the paper (it's open access) and contact the authors if you have any questions

Krull CR, Stanley MC, Burn BR, Choquenot D & Etherington TR (2016) Reducing wildlife damage with cost-effective management programmes. *PLoS ONE* **11:** e0146765.

K!E#16

Postscript
This comic was made after Margaret Stanely won a re-tweet competition thingy on Twitter that I ran to promote KAPOW! ECOLOGY's Facebook page. Check out this video to watch the draw as it happened and remember you can always get in contact with me if you have a paper you think would work well as a KAPOW! ECOLOGY comic!


KAPOW! ECOLOGY
#17
@OLoughlinLS
GOOD EVENING. WELCOME TO "AT THE MOVIES"
THIS WEEK WE SAW REWILD, WHICH REINTRODUCES AN APEX.... THE DEVIL
TO TAKE DOWN DON FOX AND RESTORE THE SYSTEM
A GOOD OL' ROMP BUT FAR TOO MANY PLOT-HOLES!
AGREE. THE PLOT GOT MESSY WHEN THEY KEPT SHOWING US ALL THE INDIRECT CHARACTER RELATIONSHIPS
YEAH. AND THERE WAS A WEIRD POSITIVE SUB-PLOT BETWEEN PREDATOR + PREY.
Kiss Kiss
?!?
OVERALL. THERE WAS TOO MUCH CONFIDENCE!! I DIDN'T LIKE IT... 3 STARS
WELL I FOUND THE FICTION FUN.. I LIKED IT! ...3 STARS
BAKER ET AL. (2016) BIOL. CONS. 196:211-12.

Rewilding the devil: a movie review (SPOILERS)

Oh, how we have missed Margaret and David, sitting in their armchairs, giving every movie that hits our screens the what-for! Those 28 years of banter, all the disagreement, so many stars given or not given. When will we get another *At The Movies*?

Let's not get too sad. As we wait, we might as well talk about rewilding; in particular, the possible maybe one-day re-introduction of the Tasmanian devil to mainland Australia. The point of which would be to replace all those pesky introduced apex predators with a native one, hopefully leading to some ecosystem-level restoration.

Last year Daniel ran the models and concluded that devil reintroduction would have a tonne of benefits. The models received some good reviews, which resulted in the publication receiving a general release. But now that all the critics have had a look at it, the rotten tomatoes score has decreased somewhat.

One group of reviewers – headed by Chris – didn't like the models and wrote a detailed response letter to the authors. In it, they pretty much point out how many of the things included in Daniel's model were not the best or most robust approaches. For example, they reckon you shouldn't be including indirect interactions, your model will sort them out for you!

The overall conclusion was that uncertainty in the model wasn't maybe the best. Ecosystems are inheriently complex and predicting the strength of species interactions is difficult – especially in the case where you are modelling interactions that **do not** happen in nature (how do we know how devils and foxes will interact??). A little less confidence next time maybe….

For the actual science of this story, you should definitely read the paper and contact the authors if you have any questions.

Baker CM**,** Bode M & McCarthy MA (2016)
Models that predict ecosystem impacts of reintroductions should consider uncertainty and distinguish between direct and indirect effects. *Biological Conservation* **196:** 211-212.

K!E#17

Post-scirpt

This comic is a sequel to a comic posted earlier this year *Rewilding the devil you know* (K!E#6). There is of course a reply article to this reply article. I suggest you read it to hear Daniel and his co-authors valid arguments against the points made by Baker et al. (2016). Unfortunately, I have not gotten around to the third instalment of the *Rewilding the devil* comic yet

Hunter DO, Britz T, Jones M & Letnic M (2016)
Reintroduction of Tasmanian devils to mainland Australia can restore top-down control in ecosystems where dingoes have been extirpated: a response to Baker et al. (2015) and Fancourt & Mooney (2015)
Biological Conservation **196**: 20-21.

KAPOW! ECOLOGY #18 @OLoughlinLS

Presents...

KOALA JOHNSON

CROSSROAD BLUES

WENT DOWN TO THE CROSSROADS...
... SAW WOODLAND BIRD SPECIES

MORE BIRDS AT THE CROSSROADS...
... IF THERE WERE LARGER TREES

BUT WHAT HAD THE MOST INFLUENCE OF ALL...
... WAS IF THOSE MINERS WERE NOISY

HALL ET AL. (2016) PLoS ONE 11:e0155219

Woodland birds went down to the crossroads

Whether you've fallen down on your knees, tried to flag a ride, or simply been standin' there (baby) watchin' the risin' sun goin' down….there's heaps to do at the crossroads! Anyone up for some good-ol-fashioned soul selling? Devil said he'll make ya play guitar real good.

You could also go down to the crossroad to check out the birds. See how they're using these patches of vegetation in an otherwise cleared landscape. Linear strips of vegetation along roadsides are likely to be important habitat, and there's a lot more going on at crossroads compared to any old point on the road. Should promote some threatened woodland bird species right?

That's what Mark and the other delta blues singers thought. They packed up their guitars and binos, stratified their observations by site location (crossroads vs linear strips), and counted some birds (they also collected a whole bunch data on other variables – tree size, amount of vegetation close to sites, presence of aggressive birds).

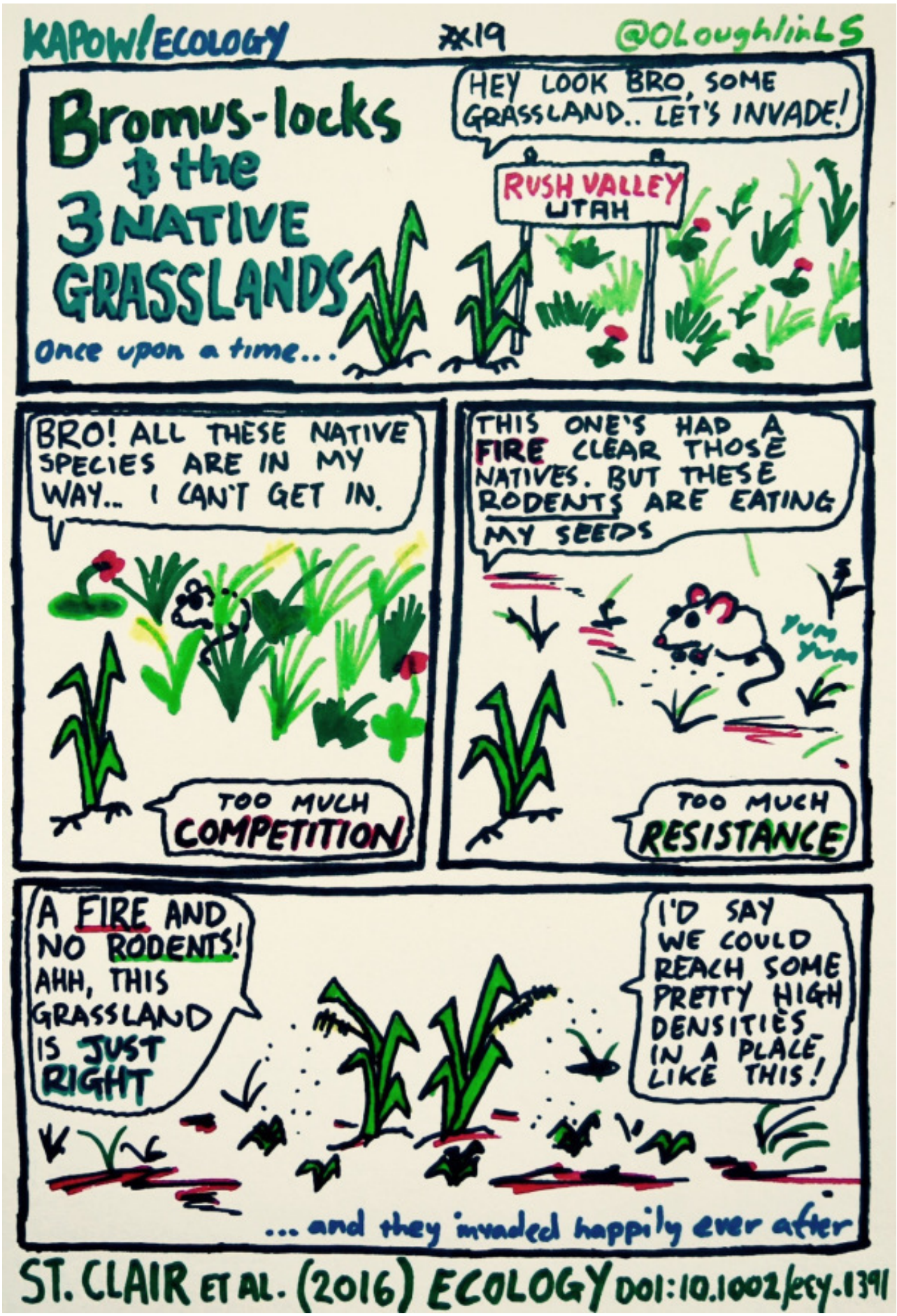
So here's the short answer to the question a*re woodland birds selling their souls at the crossroads?* Hell Yeah! – especially when larger trees were present. However, what was really determining where woodland birds were occurring in the landscape was …. *drumroll please* …. that's right, you guessed it, everybody's favourite, the **noisy miner**

The aggressive brats of the avian community. Nevertheless, those woodland birds still dig those crossroads as they facilitate movement and offer greater means of escape.

For the actual science of this story, you should definitely read the paper (it's open access) and contact the authors if you have any questions

Hall M, Nimmo D & Bennett AF (2016)
At the crossroads: does the configuration of roadside vegetation affect woodland bird communities in rural landscapes? *PloS ONE* **11:** e0155219.

K!E#18


KAPOW! ECOLOGY
#19
@OLoughlinLS
Bromus-locks & the 3 NATIVE GRASSLANDS
Once upon a time...
HEY LOOK BRO, SOME GRASSLAND.. LET'S INVADE!
RUSH VALLEY UTAH
BRO! ALL THESE NATIVE SPECIES ARE IN MY WAY.. I CAN'T GET IN.
TOO MUCH COMPETITION
THIS ONE'S HAD A FIRE CLEAR THOSE NATIVES. BUT THESE RODENTS ARE EATING MY SEEDS
YUM YUM
TOO MUCH RESISTANCE
A FIRE AND NO RODENTS! AHH, THIS GRASSLAND IS JUST RIGHT
I'D SAY WE COULD REACH SOME PRETTY HIGH DENSITIES IN A PLACE LIKE THIS!
... and they invaded happily ever after
ST. CLAIR ET AL. (2016) ECOLOGY DOI: 10.1002/ecy.1391

Exotic grass will only invade when a grassland is JUST RIGHT

Goldilocks and the Three Bears is a surprisingly informative story about biological invasions. A little girl breaks into a house (*invades* if you will) and she would have just cleared off if only hot porridge and hard furniture were offered. But instead she found food and a bed that were **just right**….so she stuck around.

Similarly, when an exotic species rocks up to a new area they are confronted with a recipient community that will have both favorable and unfavorable conditions. Invasion will be either facilitated or inhibited by properties of that ecosystem.

But ecosystems are complex, and communities will have many properties that have direct and indirect effects of varying strengths. For example, what if Goldilocks found the appropriate porridge but there wasn't any chairs or beds in the whole house that were **just right**. Would she still stick around (read: successfully invade)?

That's kind of what Pappa-bear Sam and his family of researchers were interested in determining within the context of grasslands in Rush Valley, Utah. In this full-factorial experiment, *Bromus tectorum* (exotic annual grass) plays the role of Goldilocks, with disturbance and biotic resistance being those properties of the grassland (food and furniture of the house) that need to be **just right.**

In short, what they found was *Bromus* was unable to invade unburnt grassland (disturbance was required to remove those competitively dominant natives), and even if a grassland was burnt, invasion was still inhibited if there were abundant rodents (these consumers were providing the community with biotic resistance).

However, where a grassland had been burnt, and these rodents experimentally removed, *Bromus* invasion was a go! Densities increased exponentially to more than 1200 stems per square meter. These findings clearly demonstrate the importance of the interaction between disturbance and biotic resistance in facilitating or inhibiting invasion of this community.

For the actual science of this story, you should definitely read the paper and contact the authors if you have any questions.

St. Clair SB, O'Connor R, Gill R & McMillan B (2016)
Biotic resistance and disturbance: rodent consumers regulate post-fire plant invasions and increase plant community diversity. *Ecology* DOI:10.1002/ecy.1391 [early view]

K!E#19


KAPOW! ECOLOGY
#20
@OLoughlinLS
THE MAJOR PARTIES ARE SUPPORTING EITHER FIRE OR HERBIVORY
NEWS
ELECTION 2016
THATS RIGHT, DISTURBANCE!!
BUT WHAT'S IMPORTANT? ONE... THE OTHER... OR BOTH?
LET'S SEE HOW THE VOTERS FEEL....
BOODEREE NAT. PARK
SIR, SURELY BOTH DISTURBANCES ARE IMPACTING YOUR LIFE?
FIRE... WHATEVER!! I ONLY RESPOND TO HERBIVORE EXCLUSION.
OK... WHAT ABOUT YOU?
HERBIVORE EXCLUSION... WHATEVER!! I ONLY RESPOND TO FIRE.
HEY!! I RESPOND TO BOTH! BUT ONLY INDEPENDENTLY NOT TOGETHER..
THANKS PESTY IS THAT IT?
SO LOOKS LIKE NO MULTI-PARTY SUPPORT. NO INTERACT-IVE EFFECTS HERE.
...INTERESTING.. THIS DESPITE A STRONG INTERACTIVE EFFECT OF FIRE & HERBIVORY ON VEGETATION.
NEWS
ELECTION 2016
FOSTER ET AL. (2016) ANIM. CONSERV. 19: 15-25

BREAKING NEWS! Animals only respond to single disturbance

Election 2016 is heating up! The major parties are presenting some opposing policies (and one has finally released a policy for threatened species conservation), but are the voters really that bipolar? Surely they might respond, at least in part, to multiple policies across party lines….?

I'm using this analogy to try and say something about ecological disturbance (stay with me). One 'party' advocates for herbivory and another 'party' advocates for fire as the key important disturbance that the 'voters' (read: small vertebrates) will respond to. But these two disturbances interact with each other, and animals might respond to these interactive effects….So it might not be as simple as one or the other, but a combination of both?

That's what investigator Claire and her team thought, so they packed up their gear, went down to Booderee National Park, and set up a full-factorial field experiment that manipulated herbivory (fenced / unfenced) and fire (burnt / unburnt) in combination.

Perhaps not surprisingly, there was a strong synergistic effect of herbivory and fire on vegetation – those sites that were burnt had poorer vegetation recovery where large herbivores were not excluded….. Same story with the small animals?

Nope. Some were more active where herbivores were excluded, regardless of whether or not the site was burnt, while others were more active where there had been a fire, regardless of whether or not herbivores were excluded.

So looks like animals are sticking to the policies of just one party. Both disturbances are important overall, but individual species were only responding to one or the other.

For the actual science of this story, you should definitely read the paper (it's open access!) and contact the authors if you have any questions.

Foster CN, Barton PS, Sato CF, Wood JT, MacGregor CI & Lindenmayer DB (2016) Herbivory and fire interact to affect forest understory habitat, but not its use by small vertebrates. *Animal Conservation* **19**, 15-25.

K!E#20

KAPOW! ECOLOGY #21 @OLoughlinLS

FIRE REGIME DELIVERY

HI AGAIN, THIS TIME I HAVE BURNS FOR CALLITRIS GROVES..

YEP. WE'RE AN INTACT GROVE

A LOW-INTENSITY PATCH BURN WOULD BE FINE.

WE'RE PRETTY FIRE SENSITIVE

WAS THIS SENT BY THE ABORIGINAL COMMUNITY ??

UMMM.. NOT SURE. WOULD IT BE COOL IF IT WAS REPEATED HIGH-INTENSITY, UN-CONTROLLED WILDFIRES??

NOT COOL! THAT'LL LEAD TO LESS CLOSED GROVES AND MORE SINGLETON TREES!

AND IT'S ONLY US CLOSED GROVES THAT ARE GROWING THE POPULATION

MANAGEMENT: SUSTAIN 'NATURAL' MOSAICS?

TRAVERNICHT ET AL. (2016) ECOSYSTEMS [early]

How are you still here fire sensitive conifer?

Now for the third instalment of *The Fire Regime Delivery Truck*. Old-mate Koala has his box of matches, he's got Jimi cranked up to eleven, and this time he's heading north to look at some real sensitive trees…..

Callitris intratropica to be precise – Arnham cypress pine. So let's head to Australia's tropical savannas – a very flammable landscape – and let's see what this very very fire-sensitive species can tell us about how fire regimes have changed in this landscape.

Now this species is in a little bit of strife, and we think its decline is due to a shift in the fire regime – from patchy mosaic burning to large unmanaged wildfires.

By looking at the population dynamics of this species, Clay and his colleagues were testing the hypothesis that population stability of *Callitris* depends upon a regime of frequent, low-intensity fires maintained by Aboriginal management.

Now this crew did the lot – demographic surveys of a large study area, analysed vital (growth, survival, etc.) rates, modelled population behaviour, modelled patch dynamics relative to fire, combined that with condition of *Callitris* grove, and predicted change under different fire scenarios….. So after all that, did they find support for their hypothesis?

Yep. Put most simply, closed-canopy groves of *Callitris* were essentially where all recruitment (population growth) was taking place. Degraded groves and singleton trees were where all the mortality was occurring. So population persistence and growth is all dependent on the ability of these closed-canopy groves to exclude fire.

Under current fire conditions (repeated high-intensity unmanaged wildfires) this is not going to happen and the models predicted significant declines if this was to continue. However, under an Aboriginal managed, low-intensity patchy fire regime, *Callitris* persistence and growth is a go!

For the actual science of this story, you should definitely read the paper and contact the authors if you have any questions.

Trauernicht C, Murphy BP, Prior LD, Lawes MJ & Bowman DMJS (2016) Human-imposed, fine-grained patch burning explains the population stability of a fire-sensitive conifer in a frequently burnt northern Australian savanna. *Ecosystems* DOI: 10.1007/s10021-016-9973-2 [early view]

K!E#21


KA
EC
@OLoughlinLS

KAPOW! ECOLOGY is written, drawn, coloured and edited by
Dr Luke S. O'Loughlin

COLLATED ISSUE #1
JANUARY – JUNE 2016

Published independently by
Luke O'Loughlin for
K!E COMICS
828 Emerson St, West Albury,
NSW 2640 Australia