

DESIGNED FOR GOOD

BY PHILIP CLEAVER



“That’s it!” Has the answer to a problem ever hit you out of the blue? It once happened to designer Craig Bond. He’d been thinking about ways to power a new pest trap and was stuck. One day, he was out biking and got a flat tyre. A stranger offered to pump up the tyre using a small canister of compressed gas. Within seconds, the tyre was inflated ... and Craig had his idea.



THE PERFECT TRAP

Craig had studied **industrial design** at university. This was where he met Stu Barr and Robbie Van Dam. All three classmates enjoyed the outdoors and had seen the damage caused by possums and other pests. Around 2007, they began to talk about designing a new kind of pest trap – one that would work better than traditional models. “We had high hopes,” says Craig. “We wanted our trap to be a big leap for conservation.”

Along with the use of poison, traps have always been an important part of pest control in New Zealand. But traditional traps are heavy and difficult to use in rugged country. They are also powered by springs, which have to be reset by hand. This involves a lot of extra work. To be truly efficient, the three designers knew that their model had to be self-setting. They had other goals too. They wanted their trap to be lightweight, durable, affordable, and reliable. Most important of all, the trap had to be humane. Pests had to die quickly, with little pain.

industrial design: the design of products that will be made in large numbers, usually in a factory

THE PEST PROBLEM

Our ancestors didn't come to Aotearoa alone. They came with rats, kuri, mice, ferrets, cats, stoats, possums, deer, pigs, and goats ... to name just a few. Some of these species, such as deer, were brought for sport. Possums and ferrets were brought for their fur. Ship rats and mice were stowaways.

These introduced creatures have had a huge impact on our environment. The kiore or Pacific rat, which was brought to New Zealand by the East Polynesians around 1300, contributed to the extinction of some native bird species before Pākehā arrived. Bird numbers declined further when Europeans came with their species, such as stoats. These are especially dangerous predators because they can climb trees and swim.

Then there are possums. New Zealand is said to have around 30 million. Like stoats, possums prey on baby birds and birds' eggs – although the most serious damage they cause is to native trees. Possums eat a huge number of leaves. This can stress a tree so much it will eventually die. Some forests have lost all of their rātā and kāmahī, two of the possum's favourite species. Possums also eat flowers, berries, and seedlings. This prevents regrowth. It also means less food for native birds.



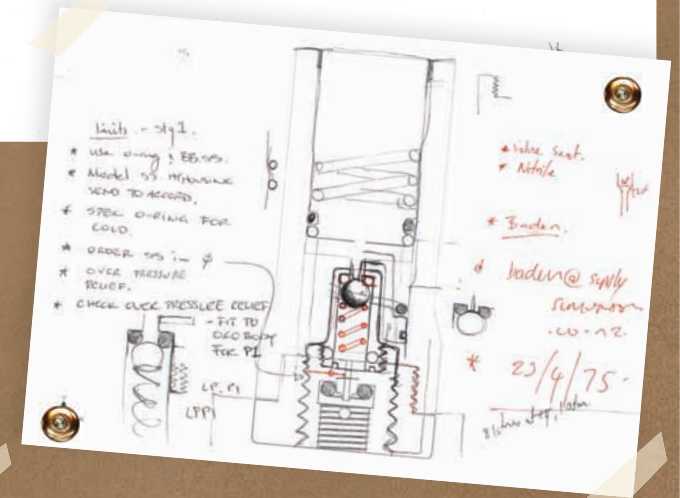
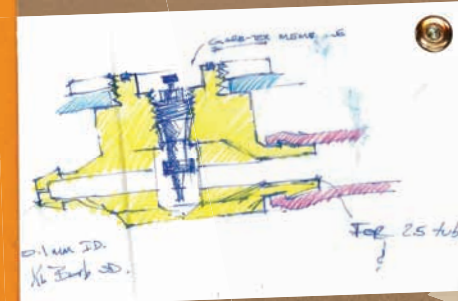
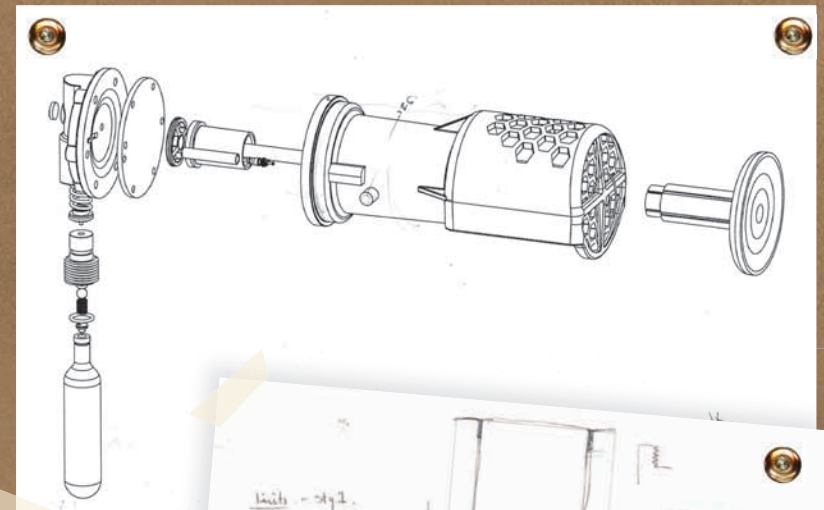
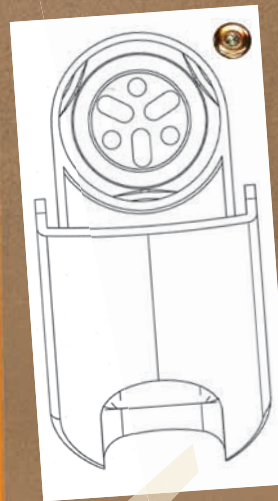
Kiore



Stoat



Possum



A HUNDRED IDEAS

Craig, Stu, and Robbie decided to brainstorm a hundred different ways a trap could reset itself. "It was a big number," says Stu, "but we wanted to explore all our options." There was an idea for a solar-powered trap. There was one inspired by a mechanical system used in old watches. Designs with the most promise were taken to the next stage: the **prototype**. "An idea could only be taken so far on paper," Stu says.

"The best way to figure out if a trap design would work was to make it and test it. The idea had to be made real."

Then the stroke of luck: Craig got his flat tyre. Compressed gas was cheap and accessible – it might be a great way to power a trap. But the big question was how exactly would this system work? The friends didn't know it, but finding the best design would be a long way off.

prototype: an early version of a product that can be tested and improved

DESIGN AND REDESIGN

Designing a self-setting trap that used gas became the team's focus. There were a lot of false starts. "At first we took a traditional trap for smaller pests and tried to modify it," Stu remembers. "These traps trigger when a rat or stoat steps on a steel plate." There were problems with this design. The trap sometimes misfired, and it didn't kill quickly enough. "We decided to try again with a possum trap," says Stu.

To get the best result, the team needed to know more about possums. How did they behave around traps? What did they like to eat? To learn the

answers, Robbie had a great idea: filming possums in the bush. From watching the footage, the friends learnt that possums used their paws to hold on to the trees. They also poked their heads into the traps. Learning things like this limited the need for guesswork when it came to refining the design.

To attract possums, the team also researched the best **lure**. "In the end, we decided to employ a **biochemist**," Stu says. "Again, we found out things we'd never have learnt on our own – like possums are attracted to cinnamon. They can smell it a long way off."

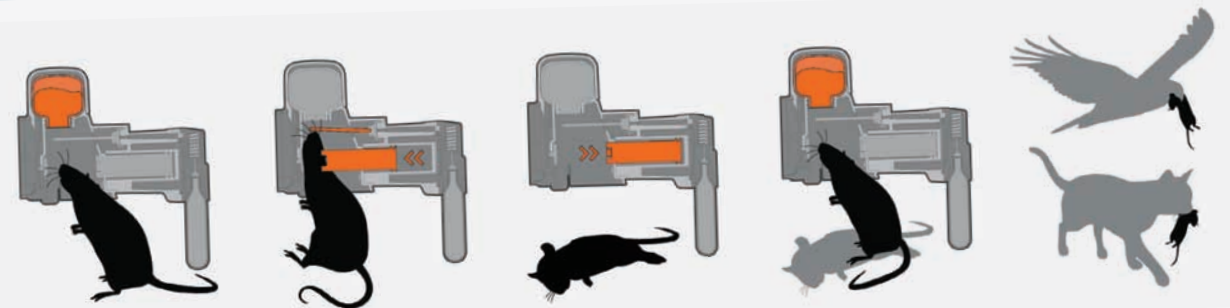
THE FINAL MODEL

After three years, in 2010, the friends finally had a trap they were happy with. Their new model was self-setting and gas powered – and designed to fire when a possum bit on a trigger. This meant the animal's head was in the right place to be killed instantly. The trap was humane, and it was also efficient. A small canister of compressed gas was enough to kill twelve times.

Early feedback from users was positive. The traps were easy to use and reliable. Best of all, data from the

field showed that the new traps worked better than the traditional traps, even when the old ones were regularly cleared and reset. These findings were backed up by the trappers themselves. One trapper said the same trap killed three possums in one night. But for the three designers, the ultimate proof was the recovery of native species in the places where their traps were being used. Spurred on by success, the team went on to design a smaller self-setting model to catch rats and stoats.

THE (RAT) TRAP



1. The rat smells the lure.

2. The trigger is moved by the rat, firing the striker.

3. DEAD!
The trap resets itself.

4. A new rat smells the lure.

5. The dead bodies are scavenged.

biochemist: a scientist who studies the chemical processes in living things
lure: something that is used to attract an animal

ROOM TO IMPROVE

Today, around thirty thousand of Craig, Stu, and Robbie's traps are in use in New Zealand. Most are the smaller model, although their possum trap is still popular. In recent years, the small trap has even been used in Hawai'i and Puerto Rico, where there are problems with rats. The traps have also been adapted to use with pests that aren't found in New Zealand, such as mink.

To keep up with demand, the initial team of three has grown. The friends now employ seventeen people, all of whom have different skills and ideas.

When it comes to design, there's always room for improvement. "We're satisfied with our traps," says Robbie, "but we still look ahead." The new slow-release lure dispenser is a great example of recent innovation. "It means the lure now lasts for six months instead of one."

Now the team is talking about using drones. Could they be used to drop the traps in the bush or even to replace the gas canister and lure? At the moment, trappers have to do this work.



PEST FREE?

The self-setting traps are an exciting development for pest control in New Zealand. The three friends hear amazing stories all the time. In one part of Fiordland National Park, it took only two months to reduce a large rat population to zero.

In 2016, the government announced the goal of making New Zealand pest-free by 2050. The plan is to start with our three "worst" pests: rats, stoats, and possums. "Eliminating these three pests – and all the others – is possible," Craig says, "although my guess is we'll need completely new technology, maybe something we can't yet imagine. But a pest-free New Zealand ... it's definitely worth aiming for."

Designed for Good

by Philip Cleaver

Text copyright © Crown 2017

The photograph on page 11 (tape) by Jodi Wicksteed is copyright © Crown 2017

The photographs on the following pages are used under a Creative Commons licence (CC BY 2.0):

10 (kiore) by Dan Davison from <https://goo.gl/fGEVBU>

10 (stoat) by Steve Childs from <https://goo.gl/d1hIIP>

10 (possum) by G =] from <https://goo.gl/1x6jic>

11 (cork board) by net_efekt from Oxford, UK from <https://goo.gl/EgEpD9>

11 (pencil) by Charm2010 from <https://goo.gl/eqDFE4>

The images on the following pages are used with permission:

8–9, 11 (sketched trap prototypes), 13, 14, and 15 copyright © Goodnature

The images on the following pages are in the public domain:

10 (background fern image) from <https://goo.gl/EVm2fv>

10 (magnifying glass) from <https://goo.gl/GUPjrN>

11 (drawing pins) from <https://goo.gl/L9AKq3>

For copyright information about how you can use this material, go to: <http://www.tki.org.nz/Copyright-in-Schools/Terms-of-use>

Published 2017 by the Ministry of Education
PO Box 1666, Wellington 6140, New Zealand.
www.education.govt.nz

All rights reserved.
Enquiries should be made to the publisher.

ISBN 978 0 478 16943 0 (online)

Publishing Services: Lift Education E Tū
Editor: Susan Paris
Designer: Jodi Wicksteed
Literacy Consultant: Melanie Winthrop
Consulting Editors: Ross Calman and Emeli Sione



SCHOOL JOURNAL LEVEL 3 MAY 2017

Curriculum learning areas	English Technology Science
Reading year level	Year 5
Keywords	conservation, design, ecological sustainability, ecology, environment, ideas, innovation, introduced species, native bush, pest control, pests, possums, predator-free New Zealand, predators, prototypes, technology, traps