Sustainable Solutions: financial strategies for safe alternatives to poison.

Context: After Lockdown: An Holistic, Sustainable Reset

The international crisis caused by the Covid19 pandemic has led to New Zealanders calling for a new and genuinely sustainable future for our environment, not a return to 'normal'. This is because the 'normal' from consecutive New Zealand government policies often runs contrary to known scientific evidence about the harmful consequences of contaminating our environment with toxic chemicals. This has been argued by some to be because the philosophies underpinning those policies are outdated. These long-standing policies go against the growing global movements that promote the precautionary approach and more ethical, sustainable strategies, such as organic and regenerative agriculture.

For the past 65 years New Zealand government's wide-spread use of toxic chemicals and inhumane poisons in conservation, agriculture and weed management has become part of a harmful legacy of greenwashing. Those out-dated, harmful and unethical strategies must end if we are serious about our sustainable future. However, rather than embracing positive change, the current Government's 'recovery' budget plans to invest $1.1billion into "Green jobs" involving the use of environmental toxins. This will inevitably result in higher levels of environmental contamination and increased rates of occupational poisoning that cause chronic and acute illness and death.

International scientific evidence confirms how exposure to toxic chemicals often occurs through occupational use. As our knowledge of pesticides, testing methods, and technologies has advanced, we now know that many of these toxic chemicals have links to infertility, premature death and also high rates of certain cancers and neurological disease. To be successful in rebuilding our economy after the Covid19 crisis, and to reach our goals of well-being, it is essential to have a healthy population. It would be unacceptable, if from this so-called 'sustainable reset', we see a whole new generation of New Zealanders harmed and further contamination of our air, land and waterways. Any new jobs created must be sustainable and must not put people's health and lives at risk.

We propose the following key overall objectives in the creation of all future environmental policies:

1. Cease all investments in the toxic chemical poison industry, reduce the conflicts of interest and increase the accessibility for the open market to tender for sustainable methods of conservation such as trapping.

2. Invest in safe, non-toxic conservation and weed management strategies – lessons can be learned from overseas.

3. Create a national pesticide risk reduction programme, which is firmly based on the Precautionary Principle to protect public health.

Introduction

This document presents a comprehensive investigation of an alternative to aerial 1080 poisoning as a method of pest control in New Zealand. It is fully explained, both logistically and financially, how the government and other interested parties could more effectively control those wildlife labelled as pests without the use of aerially applied poisons. Alternatives to the controversial regime of 1080 poison operations do exist. The 2008 ERMA (Environment Risk Management Authority) Reassessment of 1080 stated in the Chair's introduction that:

> *''…many who support the aerial use of 1080 do so only because of the [perceived]* need to manage the threats to the environment and the economy posed by possums and the absence of any better options at the present time. These people view aerial application of 1080 as something of a ''necessary evil'' pending the development of a suitable alternative.'' *[our edit]*

With the recently announced 'Nature Jobs', it follows that 1080 and other eco toxic chemicals are no longer the 'necessary evil' they have purported to be because their use will no longer be needed as we work together to create a better, more sustainable future. With the need for 'true Green jobs' and Nature jobs, we will deliver positive biodiversity outcomes without the harm and food security risks that come with the use of toxic chemicals.

We will also look more deeply into the debate into invasion biology and the interpretation of the word 'predator'. There is a better way forward and a real chance here for New Zealand to do something truly significant in the current climate of conservation management.

Why we need to look for an alternative

It is an accepted view that 1080 poison is not perfect and only being used until some other alternative to killing large numbers of unwanted 'pests' comes along. Simultaneously, it is also accepted in the current climate of environmental sustainability that we must use what we have in a finite world and not waste resources. Although evidence can be put forward to argue that some of the introduced animals on the list of 'most wanted' pests may not be the predators that we are told they are, there is still an accepted scientific argument that supports a need to try to reduce numbers of mammals to potentially benefit some of the endangered native species that we value more highly. But we urgently need to do so without contaminating the ecosystems and without secondary poisoning (by-kill).

The development of ''pest control'' as a major industry and export opportunity for New Zealand is a double-edged sword. Over the past two decades there has been a significantly increased emphasis on persistent poisons within this industry. These poisons include pindone, brodifacoum, sodium fluoroacetate (1080), phosphorous, diphacinone, neonicotinoids, chlorpyrifos and many others. It has now become commonplace to find various bait stations and warning signs on most farms and roadsides, as well as public reserves and national parks. The unknown 'cocktail effect' from the complexities of mixing our exposure to these chemicals is a serious concern. There is a very real risk that New

Zealand's escalating pesticides reliance is leading us down the path towards ecocide. We need to take note of changes in popular thinking and scientific research globally and find a better path forward.

The ability to harvest wild animals for meat, fibre, fur, and the rapidly growing and lucrative pet food markets is seriously compromised by the proliferation of poisons across our land. There are restrictions with buffer zones and 'stand-off periods', and many potential markets simply do not want potentially toxic products, especially in an economic market where consumers have a growing awareness of the importance of provenance and sustainability of their food. There are few areas where animals can be harvested safely due to the high possibilities of risk of harm from secondary poisoning. There is real concern that the public are exposed to misinformation about 'safe poisons', and that there is a casual attitude towards use of pesticides and other poisons in NZ. For instance, 1080 poison is repeatedly claimed in 'Factsheets' published by the Dept of Conservation as a 'safe, natural toxin' which 'biodegrades into harmless substances like water and Co2'. These statements are scientifically incorrect. In some cases, buffer zones are simply being ignored by many poison contractors where private and public boundaries are concerned. Even the accessibility of harmful poisons by livestock is often dismissed as a risk by agencies like the NZ EPA, which should be protecting public health. But paradoxically, it is the potential unintended consequences of many of these poisons on native species themselves, which have not even been assessed in many instances. This situation is a highly sensitive subject for both the industry, the agencies authorised to use these poisons, and the members of the public who witness and experience the damage caused by these control methods which are seen as inhumane and ineffective. Long term and intergenerational damage to biological systems like fertility and longevity have already been well established in the literature as a consequence of endocrine disrupting chemicals such as glyphosate and 1080.

History of 1080 Poison

The United States EPA Reregistration archives reveal that this chemical case pertains to a large "family" of chemicals which are metabolized in the manner of fluoroacetic acid and which, consequently, are very toxic

Poisons in the fluoroacetic acid "family" occur naturally in Western Australian and South African plants that have been implicated in the poisoning of livestock (Aplin, 1979; Pattison, 1959). The gifblaar plant (Dichapetalum cymosum) of South Africa arises as small tufts of leaves and flowers from long and extensively branched underground stems. Africans have used extracts of gifblaar (which means "toxic leaf") and related plants as arrow poisons. The active substance in gifblaar was extracted as its potassium salt, potassium fluoroacetate, in 1943 or 1944 (Marais, 1944 cited by Pattison, 1959). By that time, research had already been undertaken on synthesized fluoroacetic acid and related compounds.

In the U.S., research on compounds related to fluoroacetic acid led to several developments, including the development of sodium fluoroacetate as a rodenticide and mammalian predacide and fluoroacetamide as a rodenticide. The names 1080 and 1081 for sodium fluoroacetate and fluoroacetamide, respectively, came from the invoice numbers that these materials were assigned in U.S. Government laboratories (Peacock, 1964).

Extensive research on this family of chemicals after World War II led to a general understanding of the mode of toxic action and the development of analytical methods which, if not extremely sensitive by present standards, were at least able to detect the use of compounds related to fluoroacetic acid in certain homicides (Pattison, 1959). However, the problem of poor recovery of sodium fluoroacetate in or on animal tissues remained until the mid 1980s (Kimball and Mishelanie, 1993)

Pattison (1959) reports that the Monsanto Corporation produced about 5 tons of sodium fluoroacetate in 1948. In 1955, Monsanto's 90% sodium fluoroacetate product was transferred to Tull Chemical Company of Oxford, AL (Tull Allen was a chemical engineer employed by Monsanto and it is his grandson, Charles Wigley, who now runs this company.)

By the early 1970s, Tull Chemical Company was the only firm legally producing sodium fluoroacetate for pest control purposes in the U.S. Tull's registered product at the time, EPA Registration No. 5217-1, was a 90% sodium fluoroacetate concentrate which was labeled for mixing baits that could be applied to control a variety of rodents and predatory mammals.

Sodium fluoroacetate has been placed in Toxicity Category I, which indicates the highest degree of acute toxicity, for acute oral toxicity; Toxicity Category II, moderately toxic, for acute dermal toxicity; Toxicity Category III, slightly toxic, for primary eye irritant; and Toxicity Category IV, practically non-toxic, for dermal irritation. The requirements for acute inhalation toxicity and dermal sensitization studies were waived due to the severe acute toxicity of the compound.

...leaching and metabolism are the major routes of dissipation. However, undegraded fluoroacetate is considered mobile and consequently has a high potential to move downward in the soil and reach ground water. The Agency (US EPA) has adequate data to assess the hazard of sodium fluoroacetate to nontarget organisms. Sodium fluoroacetate is very highly toxic to the mallard duck, chukar, ring-necked pheasant, widgeon, golden eagle, black vulture and the black-billed magpie on an acute oral basis. Substantial chronic exposure to birds is not expected with the use of the sodium fluoroacetate livestock protection collar.

New Zealand has used 1080 in aerial operations since 1954, and it is now known that 1080 poisoned carcasses do not break down quickly.The agencies involved will often keep signage up in 1080 poisoned areas, where cool temperatures or lack of rainfall prevail, for up to 13 months after a poison drop. 1080 can kill both the microbial life and invertebrates which break down a dead body. Poisons in the fluoroacetic acid family are insecticidal, sodium fluoroacetate was first patented as a moth proofing agent in 1928 in Europe but was found to be too dangerous. In the USA, the Nixon administration banned the poison outright in 1972, then under Reagan it was brought back for controlled use in sealed collars under federal control.

In New Zealand, as well as its registration as a Vertebrate Toxic Agent (VTA), sodium monofluoroacetate (1080) is licensed as an insecticide and has been used to kill wasps. It can also kill or poison invertebrates (native or introduced) which are food for many of our native species by entering the food chain or through the dust formed during aerial 1080 operations, or when baits land in puddles of water for example. Those poisoned invertebrates then become toxic baits in turn. [1]

These quotes were taken from the study book for those applying for a controlled substance licence:

> "In New Zealand there have been anecdotal reports (E.B. Spurr pers. Comm) of extensive bird kills from both primary and secondary poisoning after the use of pindone for rabbit

[1] Fluoroacetamide as a Systemic Insecticide, David AL & Gardiner BOC, Nature (1958); Vol 181: Page 1810

control, but there has been no monitoring to determine whether or not pindone has any long-term effects on the local abundance of bird populations." 1

"Phosphorus is known to kill birds that feed on carrion. Although the non-target effects on indigenous birds in New Zealand have not been assessed, it is expected that morepork, New Zealand falcon, black-backed gull, skua, weka, and harriers will be at some risk from secondary poisoning."2

It is concerning that the effects of these poisons on native birds have "not been assessed", when the primary reason given for the use of these poisons is to control pests with the aim of benefiting native birds.

"After large-scale poisoning, significant numbers of rats often appear within a few months (Innes et al.,1995; Powlesland et al., 1999;department of conservation (DOC),2008)."3

Verified examples of native birds poisoned by 1080

"Weka are known to eat both carrot and cereal-based baits (Spurr 1993) and to scavenge on the carcasses of dead animals. They have been found dead occasionally after 1080-poisoning operations" (Spurr 1994a).

Kaka are known to eat carrot and cereal-based baits (Lloyd & Hackwell 1993; Spurr 1993). One was found dead, and contained 1080 residues, after a possum control operation using 1080 in unscreened carrot baits in 1977 (Spurr 1994a).
Kea known to eat carrot baits (Spurr 1979, 1994a). Kea also eat cereal-based baits. Dead kea were found after a 1080-poisoning operation using unscreened carrot bait (30 kg/ha, 0.08% 1080) in the Dobson Valley in September–October 1964, and residues of 1080 were found in the carcasses (Douglas 1967). More recently, since about 2007 they have radio tagged 150 keas and officially say they have poisoned 20 (13%) but at Okarito it was 77%.

One kokako was found dead after a 1080-poisoning operation using cereal-based baits for possum control and fishmeal baits for cat control in Rotoehu Forest in October 1994, and the carcass contained residues of 1080 (H. Speed pers.comm.).
Moreporks have been found dead after 1080-poisoning operations using carrot and cereal-based baits (Warren 1984; Spurr 1991; M. Frank pers. comm.; C. Speedy pers. comm.).

Robins are known to eat carrot and cereal based baits, and have been found dead after 1080-poisoning operations to control possums, especially in the 1970s when the poison was applied in unscreened carrot bait (Harrison 1978a, b; Spurr 1991, 1994a). Although baits have since been modified by screening out small pieces and the addition of cinnamon oil,robins still eat baits and are still found dead after 1080-poisoning operations."13

"A wide range of bird species (e.g. saddleback, silvereyes, paradise shelduck, morepork, skua, robin, and weka) have been found dead from poisoning after field use of brodificoum in New Zealand (e.g. Taylor 1984; Taylor & Thomas 1993; Towns et al. 1993; Williams et al. 1986, b, Stephenson et al. 1999)."

It's clear that these poisons carry many risks and dangers, both to native biota, domestic animals, and human health. Poisons are not desirable methods by any means. The question then needs to be asked:

Is there a better way?

That's the big question. The public often hears that ''there are no alternatives'' or that they are ''too expensive'' or it's simply ''too labour intensive''. But is this true, or a symptom of the poison pest control industry tail wagging the conservation dog? Anyone who has grown up in a rural environment trapping and harvesting the NZ brushtail possum's fur for pocket money, or harvesting these animals as a full time job will tell you that they simply don't understand why government departments and regional councils spend so much money on killing wildlife with persistent poisons. Such methods used by those public bodies make it impossible to recover the possum meat, fur and fibre. The bodies are left to rot in the bush and become a big toxic bait for other wildlife. It is a little known fact that, despite its previously heavily marketed 'Clean Green, 100% Pure' image, New Zealand is one of the few OECD countries to have no pesticide risk reduction policy.

There are two very different industries involved in killing wild animals labelled as 'pests' in New Zealand. The control industry, which involves vertebrate toxic agents such as 1080, brodificoum, (also a serious and highly persistent toxin), is almost 100% funded by public funds from taxes, rates, etc. And the recovery industry, which includes private operators harvesting possum fur, wild caught meat, etc. The recovery industry costs the taxpayer nothing and makes something. The control industry costs hundreds of millions every year and it can be argued that it not only wastes valuable resources but contaminates the environment with consequences that are being ignored as far as the public knows. There is such a stark contrast between the two.

It is paradoxical and tragic that there are private trappers and hunters harvesting animals for local consumption and export (such as possum, eel, venison, wild boar), whilst simultaneously, public funded departments are applying persistent poisons in the same areas, making those areas illegal for wild meat harvesting. So, what we have is a public-funded industry competing with, and in some cases destroying, an industry which costs the public nothing and yet does the same job AND with potentially substantial economic benefits.

> "The New Zealand possum fur industry as a possum control mechanism needs more recognition says the New Zealand Fur Council and textiles NZ.''

By actively seeking to strengthen trade deals and overseas markets for possum fur, we would realise both economic and environmental benefits.

> "The possum pelt and fibre industry harvests 2 million possums annually. It already has an economic value of $100 million per year and employs over 1200 New Zealanders."

It is extraordinary that New Zealand has a recovery industry and a poisoning industry that wastes resources which are so far apart, and yet we have nothing in between. We need something in between.

Yes, there is a better way

The possum industry we have now is stable and the demand for possum meat for pet food, and possum fibre for its physical qualities like fine wool, is different to the previous fashion for fur coats. There is still a world market for ecologically harvested fur, as opposed to artificial fur with its environmental impacts. There was even a global resurgence in fur skins in recent years, but there are numerous animal welfare issues with farming animals for their fur.

The insulating properties of possum fibre (mixed with merino wool) are far superior to any other readily available animal product (sheep wool, duck down, etc.). Possum fibre continues to command a return over 100x that of quality sheep's wool in 2020 and it is highly unlikely that the demand for this product will drop.

There is a very real and viable opportunity, not only to further reduce possum numbers, but to use this industry as a bridge to a nationwide 'pest control' programme WHERE THIS IS DEEMED NECESSARY.

The Department of Conservation is promoting individual species silos, whereas, in reality all the trapping can take place at the same time along the same trap-lines, with the rat trap-lines being the key infrastructure except where possums are at higher densities, at which point, there will be more work required. In effect, there will be two separate operations happening, however, the additional possum work will be fully funded by the recovery of possum products.

The fact that the targeted species are also influencing other targeted species may also inform how future management can become more effective, with these relationships including:

- Where there are higher possum densities the rat densities are lower;
- Where the rat densities are lower, the stoat densities are lower;
- Where there are stoats are present the rat numbers are slower to rise.

We do not necessarily recommend a bounty system for fast breeding animals like rats and even mustelids. Reasons for this are complex, however, to summarise, for a bounty system to be effective the value of a resource must be high enough to provide an incentive for the hard work involved in trapping in the forests. But that same incentive also risks exploitation by those who could breed captive rats for financial gain. (See Graduated Bounty Management option)

Slower breeding animals, such as possums, as opposed to fast breeding rodents and rabbits, can be managed by guaranteeing a minimum price for possum products i.e. minimum prices for fibre and the best fur-skins. This would have the same effect as a bounty and encourage possum harvesters to work fulltime and, in times of higher possum product prices, there would be no additional payment needed. They would still be able to sell

possum meat on an open market. This is already happening in some plantation forests, where a possum density is specified and if possum product prices fall below a certain price, the forest owner tops up the trapper's income. There has been analysis work carried out on marsupial possum DNA to look also at the chemical makeup of teeth and bones, which has shown that where possums come from can be determined. This could be used to offer additional incentives to trappers being asked to work in more remote and rugged areas, or where possum numbers need to be lower than normal.

If the price guarantee was only put on fibre and the best fur-skins, then these products could be stored and held onto if the market price was low and realised when it goes up again. This should not cause any trade type disputes because, apart from Tasmania, New Zealand is the only place that brush-tailed possums can be harvested from, which means there is a finite resource that NZ can control. Our marketing and distribution would be able to command prices well above what other similar products are fetching on the strength of a sustainability enterprise.

If bounties were to be used, they should not be a fixed amount, and would need adjustment as supply and demand criteria change. The extinction of animals, by human hunters, always has a risk/reward factor built in by the market, with the risk factors being things like the likelihood of catching an animal, which goes down as the population is lowered. Bounties will only work so long as the reward rises as the risk factors/efforts rise.

Money and earning power

To put earning power into perspective, a good contract trapper will be covering 5,000ha after the infrastructure is set up (see below). The estimated figures we are looking at are $20/ha/yr x 5,000ha = $100,000/trapper/year. This is the sort of coverage contract trappers are getting now, even with all the obstacles being put in their way. The reality will be that contract trappers will become more efficient and will probably be covering up to 50% more area per year. This is already happening, where fit young people are paid on a per hectare rate and are covering twice the area of older trappers (who will be needed for the trapper training camps).

At $20/ha/yr an average trapper should be earning $80,000+/year, but with a successful trapper, working hard, they could be earning close to $200,000/year. These incomes have the potential to be boosted by 50% as trappers start to get real experience under their belts. It is hard physical work in the great outdoors, and those who make it will earn their income.

Until there are enough new contract trappers trained, the per hectare financial benchmark is the cost of aerial 1080, but this will change as the numbers of trappers grow and they start competing for tender opportunities.

This trapper income only deals with the direct wild animal contract payments and does not include other opportunities that will become available as trappers establish themselves in their contracted areas, with semi-permanent camps and facilities, and could include game hunting and fishing guiding as well as meat hunting, which could all be done in conjunction with a wild animal control contract.

The Department of Conservation (DoC) tells us that it is spending $20-30 million/year on aerial 1080 and covering 1.8 million hectares. DoC also indicates it is spending around $34/ha/operation, which on their own figures equates to $11-$12/ha/year if the average pulsed control cycle is three years. These figures however are the bait and flying costs only and is really only the money that is paid to the state-owned enterprise and poison factory, Orillion, and the application contractors. The rest of the money is paid to DoC employees to do whatever they do planning and implementing an aerial 1080 operation, as well as all the costs incurred immediately afterwards and the years between operations, with these amounting to 2-3 times what the $34/ha covers. And then there are marketing and PR costs, security, legal costs, etc.

If you double DoC's claimed direct costs, then the Department is spending more money on aerial 1080, than output trapping contractors would cost. The reality is that DoC is correct that the direct costs of the bait and flying external aerial 1080 payments, on the face of it, are cheaper than output contractors, however, the output contractors do more than just control the animals and the output contractors also do much of the planning and other things DOC employees are doing for 1080 operations.

The employment of output contractors will also mean that at least $20 million worth of DoC salaried jobs would need to be repurposed. This is why there is real fear within the department itself of any change towards a more sustainable management programme. It is important to name this fear, because it is infecting the biodiversity outcomes and the ability to utilise resources in a better, more environmentally sound way in this country. It goes even further and can be seen within other interested parties within the 1080 programme such as OSPRI, Regional Councils, MPI and some scientists working for Landcare, Massey and Lincoln Universities from our research.

Financial help for new trappers

Even before the COVID19 stimulus packages were announced, there were transitions to self-employment packages that should have been available to new trappers. Work and Income NZ (WINZ) has the ability to support new trappers. The key financial help enables the new contractor to buy traps and other essential equipment, as well as financial support for the months leading up to the first contract pay cheque. This current economic stimulus package will only make it even easier to get the sort of financial support needed.

We can make no absolute claims as to what can be expected for the wild animal recovery industry, in terms of results and costs, until the Department of Conservation is prepared to sit at the table and have a realistic conversation about the expectations of managing our public land for all New Zealanders. Experienced contract trappers know what they can realistically expect to accomplish, and trappers know what sort of costings would be needed, however, trappers can make no definite claims without a commitment to details that can then be used to create a firm output proposal.

What we are outlining here is a conversation starter. Any firm proposals are off the table until the DoC is committed by giving definite details that we can use to work together to reset the economy of our rural communities and conservation estate.

We believe our sustainable reset proposal is heading in the right direction and with the stimulus our economy needs for a truly sustainable future. This is one where New Zealand adopts a pesticides reduction policy in line with other OECD nations, where we can achieve economic growth, new jobs, and boost the industries that are currently ham-strung by the poison pesticides use our country has suffered under for too long. This reset will also bring us into alignment with the desired image of being a truly clean and green New Zealand.

Outline of a Proposed Basic Financial Summary for a New Zealand wide recovery-based control operation (RBC)

Please note: this summary is only a BASIC recovery document and it is structured around the recovery of possums only (being the most viable animal for recovery at the current time). It does not include the financial benefits involved in the recovery of deer, pigs or other wild animals which are also worth recovering.

(All final costs for each heading have been rounded up to the nearest $100,000.)

Training courses- $5 million

The employment of trapping instructors who would manage areas of around 5000 ha would be put in place. Course participants would work with trapping instructors for around two weeks to one month. This would give them an idea of what a professional trapping operation looks like. It also has the benefit of fast tracking the learning process. Those participating in the course would work on previously set up trap lines. They would get 50% of the fur they plucked. The other 50% would go back into the training course, thereby offsetting operational costs (traps, instructors' wages, etc). This would be the first stage of training a nationwide cooperative of trappers.

Cost: $5 million per year. (After off-sets from fur harvesting) This would pay around 100 full time trapping instructors all over the country ($50,000 per annum). It would also pay for traps (each training camp having 800 traps) which would cost around $14,000, for each camp. NB: this would only be a cost in the first year (traps can last for 50 plus years) so it works out cheaper in the long run.

Start-up costs - $12.3 million

Following on from the training course, students would be ready to become self-employed trappers. It's important that trappers operate on a self–employed basis and take responsibility for their own safety. Hundreds of trappers are currently operating as self-employed, i.e. sole traders.

The biggest hurdle for people starting out is start-up costs, which are not cheap and for this reason they would be kitted out following training. (See above for advice on WINZ sole

trader assistance and other financial assistance) Here is a rough breakdown of what each trapper will be supplied with:

150 traps-$2250; Boots-$120; Pack-$300; one helicopter trip-$450; Sleeping bag-$150; Tent fly-$50; GPS-$600; Locator beacon-$300; Lure-$5, Trapping hand book-$20 (estimated); Native tree hand book-$30.

Set up cost per trapper approx. $4,275.

This would be provided to the trapper, post apprenticeship, prior to being flown into a remote area and following harvesting of a certain amount of possum fur in one month's time (which would be specific to each area, due to a range of reasons). Approx. 35kg (around $4200 worth). Once completed, individuals could retain the equipment and the fur, and keep on working. If they didn't have enough fur, or didn't like the job after a certain period of time (eg 6 weeks trial), then they would have to return any equipment in good order, and it would be lent to the next trapper. This ensures that the money is spent only on serious people, who are prepared to work hard.

Commented [1]: would have to be a bond of some kind?

Commented [2]: Yes
Ideally. But these are details for later on.

Examining DoCs own estimate of areas where pesticide are used, we estimate that each trapper would work an area of around 5000 hectares and theoretically it would only take 2,866 FTE (fulltime equivalent0 trappers to intensively trap the entire conservation estate, which is around 8.6 million hectares.

Evidence suggests that much of our public land does NOT have the high possum populations that the DoC claim to try to justify the aerial poisoning operations. Assuming those numbers, however, it would take around 3 years for each trapper to bring their entire 5000 ha block down to well below 10% residential trap catch (RTC) and consistently keep it down. It would cost around $12.3 million to supply all those trappers with a start-up package.

Trapper Training Camp

Training needs to be both well thought out and tailored to the trainees needs and knowledge base. Last century, everyone, including city people, knew a hunter. Barry Crump was one of the most popular authors and real bushmen were characters that people wanted to know about. There were permanent deer culler/government shooter training camps set up, where, would-be hunters went to test themselves. These camps were set up to train as well as weed out those who weren't going to make the grade.

It is vital now to harness the knowledge that is still out there in the remaining old school trappers and hunters. Deep learning comes from watching and being with the experts.

Today's initial training stages need to be structured because most kids don't have the outdoors experience that was normal for the previous generation. The first stage needs to be nothing more than a simple introduction to the outdoors, which can then be built on for people that want to take it further.

The second stage will be more involved and include things like spending time on a hill country station, forestry work, fishing boat, 2-3 day tramps etc, where the trainees will start testing their physical capabilities. There are more benefits to this than simply turning out trained trappers; for many trainees the experience of Nature, and the connection that comes with this will be a turning point in their lives.

Following on from this initial stage, the trainees could start earning certificates such as the Duke of Edinburgh awards or basic bushcraft/farming/forestry/fishing/very basic primary industry type certificates. It is at this stage the trainees will start to get an idea of what area they are interested in and this is where budding trapper/hunters can then move onto more comprehensive bushcraft and mountain safety training, where trapping and hunting will be a bigger part of the training programme.

The trainees that move past this stage and want to become full time trappers, can then team up, one-on-one, with a working trapper, in an apprenticeship to finish their initial training. This will bring them on to the point where they can be relied upon to be able to do the job required.

The reason why, in the past, a high percentage of people did not used to go on to be full time trapper/hunters, has very little to do with the actual job of trapping/hunting or the physical toughness needed. It has more to do with mental toughness and the ability to work alone, most of the time even when sharing a camp, and be able to work through the short periods of time when nothing seems to be going right and the weather is miserable. The first winter can often be where most new contract trappers will hit a wall. However, many of these people will still go on to be effective possum harvesters. It is critical, because we know that only a percentage will make the grade, that the balance of these recruits will be offered other opportunities to work outdoors, if they are inclined to do so and use their skills.

We need to ensure that these trainees are well educated in all aspects of this vocation, and that they can perform well once they have completed their internship.

We envisage that Trapper Training School will also be a fantastic opportunity for a reality TV experience of the New Zealand bush that many have never seen. Following young people on this educational pathway would make an interesting series that could also help to eventually recoup some of the costs that will be incurred at the start.

Note: It is acknowledged that for some people it may be challenging to live in isolated areas with no social company for weeks at a time. Therefore, trappers could be given the option of working joint blocks with other trappers and be provided with technology that has been proven to support those in isolation over the recent global shutdown during the pandemic crisis. This would also be beneficial for health and safety legislation. Agricultural land is a known drawcard for possums and farmers will usually welcome trapping over the risks of poisons close to their stock.

Mountain radios could also be used to enable communication between people in, and out of the bush. Also, having trappers in every block would benefit other industries as well as each individual trapper. The aviation industry would see a boom not seen since the venison recovery days and without the difficulties of working with poisons. This would make costs cheaper for trappers as choppers could do more jobs for less flying time (for example flying one trapper's food in and flying another nearby trapper's fur out on the same trip.)

GRADUATED BOUNTY MANAGEMENT SYSTEM

This system is based upon two primary and historically proven concepts.

1. Should a certain human behaviour be incentivised then that is what will manifest.
2. That if a certain species becomes commensurately more valuable as its population declines through hunting pressure then it will be hunted to extinction (if hunting is allowed to continue unchecked).

Bounty systems have been used in the past to try and control or reduce pest species populations but with little real long term success as the structure of the system used was to pay a flat rate per animal killed which was verified by a token presented (such as a tail or set of ears from the target species). This practice actually encouraged “farming” of the target species population to a level where it remained viable to make a living off the available resource. That was the behaviour which was incentivised and as such was what manifested, with the end result being a system that failed to deliver the desired results due to the incorrect structure.

A graduated bounty system uses an increasing payment scale per kill of the target species as the population declines due to hunting pressure.

Where initially one verified kill during the high population phase might be worth for instance a few dollars, in the low population density end of the scale a verified kill could be worth several hundred to several thousand dollars. As such the human behavioural incentive would be such that any target species that appeared would be relentlessly hunted down in order to claim the ever increasing bounty. Of course there is still the potential for “gaming” of the system but that is addressed further down in the section relating to methods and the use of technology to administer the system.

One of the key points of a graduated bounty system is that it puts the funding for protecting our native species and environment back in the hands of the people who live and recreate in said environment as well as further negating the argument for the use of aerial 1080 or Brodifacoum toxin use. This has immense benefits for the economic and social well-being of the local communities involved and promotes a feeling of buy in for individuals and communities as a whole, hence a sustainable long term culture of environmental care and awareness that people in general want to be a part of. This contrasts starkly to the current climate of anger, fear and division within communities both directly and indirectly affected by the use of aerial 1080 and Brodifacoum and/or their use in general. The destruction of trust and support of the current system due to the rogue actions of some within the authorities tasked with its implementation has done much damage to the credibility of both.

Implementation and administration of a graduated bounty system is now much easier than ever before with the technology available today. Utilising GPS tracking, video footage and DNA testing, target species kills can be traced to exact locations and verified before any payment is made for the kill. Population monitoring is done in areas where a bounty is in operation in order to verify population density and thereby set the level of the bounty (note while it is obvious that population monitoring is needed to quantify both the initial population before control and also during/after control to validate performance, this is not being done on some aerial 1080 operations in NZ, hence no accountability for the use of public money or those spending it).
Funding for the graduated bounty system would be sourced from existing and future public funds earmarked for pest control and also through corporate sponsorship from companies who recognise that the promotion of a truly clean and green way of protecting our native species and environment is a great cause to be associated with.

Said system has a defined and provably achievable goal that through the tenure of its implementation will be far more effective on every level than the current system.
Rather than the current costly multi-tiered bureaucratic system needed to administer the current methodology, the graduated bounty can be administered through the use of the methods and technology previously mentioned at a fraction of the cost of the existing archaic model, which leaves more money for incentive based targeting of the pest species.

Under the current system the cost per individual target species killed may be cheaper or it may be more expensive than the equivalent bounty cost in the short term but over the long term the bounty cost becomes cheaper (even if one kill is worth several thousand dollars) because there are continually less of the target species to kill until potential extinction, thereby the overall cost of the system actually reduces over time as both the reduction in overall pay outs and diminishing administrative load translate to lower overall cost.

The cost per kill under the current system goes on forever, in perpetuity and ever increasing with inflation but never achieving its proclaimed goal and in the process damaging our nation socially, economically and environmentally while enriching and empowering a select few at the expense of us all.

Throughout history the world has seen the total or near extinction of certain species due to the increasing high value of their horns, tusks, skins, meat or blubber. This concept transferred to the control of pest species is self-evident in its simplicity and effectiveness and one might ask why it has not been implemented here in New Zealand before today.

The answer to that question comes back to incentivising human behaviour.
Despite the advertised goal of a predator free NZ by 2050, the incentives within the current structure of the system are counter-productive to the proclaimed objective in much the same way that the previous bounty system was a failure. The current nature of both the funding and operational models fosters the “farming” of the target species at a certain “acceptable” level.

Government departments/bureaucracies and increasingly large corporates rely on this funding to not only justify but entrench and empower their existence while using techniques that impose a negative cost on us as a nation through fiscal, social, moral and environmental corruption all while being unable to achieve their own stated goal. This is the embodiment of the definition of insanity!

This is nothing new, simply just an historical human behavioural pattern repeating itself. Such behaviour if left unchallenged will end with literally billions of dollars wasted on a system that from its very inception (irrespective of its architects honourable or otherwise intentions) could never deliver on its proclaimed goals while causing great harm to us all as a nation.

There is a growing public consciousness of the situation particularly around the use of both 1080 and brodifacoum based toxins, their effects on the environment, non-target species, inhumane nature, the public health and negative social consequences. Along with these concerns comes an increasing disquiet and unease around the burgeoning totalitarian nature of the system involved and the methods it implements to silence dissent and evade accountability. As always, the concentration of power in the hands of a few corrupts and leads to tyranny. We are well on the way down that road in this instance. There is a better way!

"You never change the existing reality by fighting it. Instead, create a new model that makes the old one obsolete."

--R Buckminster Fuller

Other species of interest

Ferrets are more suited to bush edges where they can hunt rabbits and hares which is their preferred diet and a form of natural pest control. Wild cat populations are patchy, though high concentrations do occur in some areas largely due to both domestic and wild cats breeding. There are 'true' wild cat populations in such places as the Te Urewera ranges, where known populations have been established for 50 plus years and they are, of course, a natural rodent and rabbit control. The Te Urewera National Park is known for its abundant kiwi and other native bird populations.

Any bounty system is an unknown quantity simply because it is hard to predict the results. Stoat populations fluctuate seasonally and follow the rodent populations and it is also known that 1080 poison operations do no more to control stoats than natural attrition alone.

There are two main wild species of rat which live on the mainland of New Zealand; the ship rat, and to a lesser extent, the largely ground dwelling Norway rat. 10 Mice are also present in places and are considered to be the Achilles Heel of conservation efforts to eradicate them. They are also food for a high percentage of wild species including native raptors. Rodents are probably the hardest animal for humans to control. They are prolific breeders and so control needs to be on going, in order to keep numbers down. Rats are predominantly vegetarian, but depending on the population present, the birds which are at risk from rats are those of the smaller variety; Mohua, Kokako, Rifleman, etc. because their eggs can be broken by rats and eaten, and their chicks are also small enough for rats to kill. Studies into their diets however have not found evidence of rat predation of anything other than invertebrates across varied habitats. Humane self-resetting traps would be an effective tool to set in any sensitive areas to target areas where rat control will have the most beneficial effect with the understanding that rats already do have their own predators.

Those areas where remnant populations of Mohua, and Kokako, and other endangered small birds live. Areas would be selected in order of ecological significance. Perhaps one of the best examples of effective ground control of rats in large forested areas is the Te Urewera mainland islands.

"In parallel to the gains in ecosystem quality, there has been a large amount of knowledge gained about ecosystem restoration methods in a large forested area. Perhaps the most notable achievement has been developing the use of traps as a principal control method for animal pests. In many mainland ecosystem restoration projects in New Zealand there is a significant reliance on the use of various toxins, and in large, backcountry areas the aerial distribution of toxins (e.g. 1080) is a commonly used method. Within Te Urewera Mainland Island a strong emphasis has been placed on the use of traps for the control of possums, stoats and rats. This emphasis has provided an invaluable learning opportunity as to the effectiveness of various traps and trapping regimes for controlling pest animals to acceptable levels. Many lessons, especially those associated with using trapping as a principal control

method, have been passed on to other conservation managers, and many of the findings have been absorbed into DoC best practice methods, especially for rat trapping."

In the wild, stoats have an inbuilt mechanism that only allows breeding to happen when the resources are available. Wild stoats only have one litter a year and the size of the litter is dependent on the availability of food. Female stoats are actually impregnated before they leave the nest and the fertilised eggs sit and wait for the right time, with the first trigger being lengthening daylight hours and second the availability of food. If food is scarce most of the eggs are absorbed, if there is some food some of the eggs are absorbed and if there is an abundance of food, none of the eggs are absorbed and there will be maximum sized litters. In the wild, mustelids only have one litter/year, however, in a farmed situation, conditions can be created so that two litters will be born. This is how NZ Fitch (ferret) numbers were quickly built up when NZ started farming Fitch skins. The same thing could happen if the bounty was high enough for stoats.

"Rats and invertebrates were major components of stoat diet, occurring in 41% and 52% of guts respectively; birds were found in 19%. Changes in these percentages with time indicated that stoats shifted their diet from rats to birds and invertebrates as rat abundance (as indexed by tracking tunnels) decreased. The greatest impact on native species is therefore likely to be when rat abundance is declining after major irruptions, [eg 1080 poison drops] as the increased consumption of birds and invertebrates overlaps with the periods of highest stoat abundance."

"Rodents (both rats and mice) were the most important prey of 57 stoats collected from three habitat types (forest, forest/pasture and coastal) in Northland, followed by invertebrates and birds (Gillies 1998). Lagomorphs (rabbits) were absent from the guts of stoats from forest habitat but were an important component of the diet in the forest/pasture habitat."

[NB: An unofficial bounty has also been placed on cats, which made life dangerous for domestic cats. The Moscow fur-skin auction house used to sell, and might still sell, "house cat" fur-skins, with these cat skin prices rising and falling, along with all other skins. When "house cat" skin prices were high, NZ domestic cats would start to disappear and more bales of possum skins would start to be sent to Moscow, with some of these bales, when searched because of tip-offs, there were found cat skins mixed in with the possum skins. The same thing is likely to happen if a bounty was put on cats.]

Footnotes

The government has been poisoning NZ aerially with 1080 for the last 66 years, or since 1954. An independent scientific review by US scientists qualified to undertake such an evaluation (for the 2008 ERMA submission) shows there is no credible evidence of native 'gains'. (Q. and P. Whiting O'Keefe) Yet in the '50s when there was a bounty dollar value on possums, over 12.5 million were recorded as taken for the fur industry.

There has never been successful eradication of species on a mainland via poisoning, and to even think to attempt such a thing would be ecocide and harmful to public health and safety (that's without going into the animal welfare issues at stake). Moreover, we are an

international political economy. We bring in containers, cars, aircraft, ships come to our ports along with yachts, bringing in more than human visitors. Eradication is an impossible pipedream without harming the very ecosystems we are seeking to protect..

There have, in the past, been extinctions caused through human hunting. The Moa, Passenger Pigeon, American Bison, North American Gray Wolf, Tasmanian Tiger, etc.

Poisoning via broad landscape aerial sowing of 1080 merely dilutes all the aerobic species in the native forest ecosystems, and it impacts on the whole structure of ecological balance, including the invertebrates necessary for the forest to sustain itself. This poison is indiscriminately lethal both via primary (bait), or secondary poisoning (by-kill).

OIAs and questions in parliament reveal TBFree ignorance and tactics over the true numbers of this so-called bovine TB possum vector which does not exist.

The truth of the matter is that habitat loss, pollution, and other human activities since the first people came here are responsible for damage to the NZ ecosystems. The blame is being passed to non-native wildlife resulting in an almost religious fervour and hatred of wild animals which pervades our culture and promotes violence towards animals that can be seen transferred in cases of interpersonal violence (the link). And it's not to our advantage. We can be better than this.

Sodium fluoroacetate (1080 poison)

Pesticide Information Review, Published 2013

Authors/Compilers: A. A. C. Fairweather & K.G. Broome

Department of Conservation Science and Capability Group

P. Fisher, Landcare Research, PO Box 69, Lincoln

This is a selective cut and paste presentation from the above review document that summarises many of the monitoring programmes by the Department of Conservation where these do in fact exist (we find too often that no monitoring occurs to justify aerial poisoning).

“In summary there are records of a range of native bird species found dead after aerial poisoning operations and many of these individuals have contained residues of 1080. [At this date] 20 out of 145 radio tagged kea have died during aerial 1080 operations. About 25 of 93 colour banded robins disappeared following poisoning. Mortality of tomtits was estimated to be 10-40% in one study.

Birds are generally less susceptible to 1080 than mammals but introduced birds such as blackbirds and chaffinches are found dead after aerial poisoning operations.

Mice exhibit a marked avoidance of 1080 which is likely to result in control operation failures.

1080 RESIDUE LEVELS RECORDED IN CARCASSES IN NEW ZEALAND DURING PEST CONTROL OPERATIONS.

Blackbird Muscle 0.014–5.9 1; 2; 3

Chaffinch Muscle 0.14–3.3 1

Hedge Sparrow Muscle 0.03 1
Kea Muscle 0.46 – 3.44 1
Keruru / Kukupa Muscle 0.01 1
Morepork Muscle 0.01 1
California Quail Crop 18 - 76 4
Rifleman
NI Robin Muscle 0.37–3.80 5
Tomtit Abdominal cavity
Tui Muscle 0.012 1
Waxeye Muscle 0.68 1
Weka Muscle 0.012–4.3 1
Fernbird Muscle 0.14 – 0.75 6
Also 1080 residues have been measured in carcasses of deer, possums, pigs, goats, dog, cattle, ferrets, cats and mice.

NON-TARGET NATIVE SPECIES DEATHS REPORTED DURING AERIAL & HANDLAID OPERATIONS USING 0.15% or 0.08% 1080 PELLETS.

Birds:

Silvereye, Morepork, Tomtit, Weka, Weka, Kakariki, Kakariki, Kereru, Kiwi, Kea, Tui, Fernbird

Frogs: Hochstetter's

Kakariki (parakeet) (Cyanoramphus spp.) nests have been monitored during two aerial cereal 1080 operations. Fifteen nests were monitored during the October 2007 Hurunui Valley operation and a further seven nests were monitored during a 1080 operation in the Dart Valley. Dead chicks in a failed nest in the Hurunui Valley operation contained 1080 residues and the female was not seen after the nest failed.

All the monitored nests in the Dart Valley operation were successful, however two unmonitored Kakariki were found dead with 1080 residues in their tissues.

Bats ….....short-tailed bats are possibly vulnerable to secondary poisoning because they are known to feed on arthropods that have been recorded feeding on 1080 baits and residues in these prey can in theory be enough to kill a bat (Lloyd & McQueen 2000).

In pen trials at Orana park, Christchurch, kaka, brown kiwi, weka, kea, kereru and kakariki were offered BB13 and BB16 paste (Pestoff Professional Possum Paste (0.08% and 0.15%)for two days. Kaka, brown kiwi,weka and kea all ate appreciable quantities (greater than 5.1 g of at least one of the paste types) (Morgan 1999)."