Should 1080 be used to control forest pests in new zealand?

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Introduction

1080, *Sodium Fluoroacetate,* is a pesticide used in New Zealand to control forest pests such as, possums *Phalangeriformes sp.* [1], rats *Rattus sp.* [2]and stoats *Mustela erminea sp* .[3]These pests are a large threat to New Zealand's native plants and birds, therefore, it is essential that they are controlled in some way to ensure the survival of our native species. 1080 offers this solution, however it also creates a debate about whether or not it is the most effective and safe option available.

The issue New Zealanders face is whether to use 1080 to control pests, knowing all the risks and benefits or to spend money on finding a safer or more effective option.

Biological Concept

As New Zealand native wildlife had many years without mammalian predators they have evolved with defence purely against birds.[4]This means that they have evolved with the defence of camouflage to protect themselves, but many of our native birds including Kiwi and Takahe are unable to fly. Therefore once new animals were introduced, such as the rats, possums and stoats, the native species were unable to defend themselves against them[5]. Because of this many of New Zealand's native species are becoming endangered1. This means that these species are threatened with extinction[6]. However pests are not the only threat to the survival of native species, with forests being chopped down the native species habitats are being taken away2. Thus the native birds are forced to compete for habitats

with the pests, in particular the possums. Hence it is even more essential that pests are controlled so there are not as many dangers being presented to the native birds and trees.

Biological Process

1080 works by entering an enzyme that is necessary in the Krebs cycle. The Krebs cycle (or Citric Acid cycle and Tricarboxylic Acid Cycle) is a process within the body that converts proteins, fats and carbohydrates into energy[7]. This means that the production of energy is slowed dramatically, which causes muscles to slow, therefore the heart and eventually leads to the death of the animal that consumed the poison[8].

Biological Implications

This leads to the implication that 1080 is extremely toxic to all air breathing organisms[9]. This means that the poison is not limited purely to the pests it is targeting. Because of this 1080 is also a threat to the native birds it is aiming to protect along with pets and humans. Native birds have been affected by 1080 droppings, with 20 0f 150 monitored Keas being killed throughout the use of 1080[10], However 10 times less 1080 is being used than when it first began use9 therefore the accidental killings of native species has been greatly reduced. The Department of Conservation (DOC) has also stated that the pellets they currently use are less enjoyable for the birds, and avoid open areas to lessen the by-kill of native species[11].

Secondary poisoning is also possibility that could affect carnivorous birds and dogs that eat the bodies of animals that have already died of consumption[12]. Secondary poisoning is another biological implication of

using 1080 as it has the possibility of passing the poison through the food chain. However the benefit to having 1080 remaining in the bodies of those it has killed is that stoats-which are one of the big threats to native species-eat the bodies rather than the pellets it is distributed in11. Tests completed in New Zealand regarding the survival of stoats after an aerial 1080 drop revealed that only one of the 13 stoats that died had an empty stomach, compared to the 12 that died of secondary poisoning from rats, birds and insects11.

Economic Implication

Many experts have stated that 1080 is extremely cost effective, including Dr Jan Wright, the Commissioner for the environment11, who said that 1080 is more cost effective and constant than ground methods of controlling pests, which can vary in cost. 1080 costs $17 per hectare, which DOC state can be up to three times cheaper than ground control methods10. Alternate methods of pest control include trapping and bait stations, other poisons and biological control11.

However opposing groups such as Peter Dunne, Leader of the United Future party have stated that DOC and the Government would be smarter to invest more money than what they currently do ($2million/year) into finding better ways to control pests than 108014. The research currently in progress by DOC, The Animal Health Board and universities, involves having better control over 1080, looking into other poisons such as *para-aminopropiophenone* (PAPP) which is a poison that has a low secondary poison risk, is very effective and more humane than 1080[13]. DOC is also

working on getting self setting traps which would reduce the labour involved with trapping[14].

Environmental Implication

An environmental implication is that 1080 is able to break down naturally in the environment[15]. This is because it is a naturally occurring toxin that is found in plants in Australia, South America and South Africa12. Because of this the effects on New Zealand's environment will be minimal. It has been said that with wet, warm conditions 1080 can break down within 2 weeks15. In water 1080 will break down, a test completed by the National Institute for Water and Atmosphere revealed that after 72 hours in water the pellet will begin to break down, after 5 hours only 50% of the toxin is in the water and after 24 hours it is down to 10%[16]. Despite this 1080 is not able to be used within 50m of waterways[17]to minimise any effects on the environment.

It has also been said that 1080 is the best option of pesticide to use in the New Zealand environment. This is because our only native mammals are bats, the long tailed bat and the short tailed bat, so the risk is low, whereas other countries such Australia and the United States cannot use the 1080 poison at a large scale due to a threat to native land mammals[18].

Differing Opinions

There are many competing opinions regarding the use of 1080. Dr Jan Wright the Commissioner for the Environment believes that 1080 should be put into use as soon as possible, she has considered many different possibilities and has evaluated many of the risks and benefits to draw this conclusion. DOC

shares this opinion with Dr Wright and has also worked with many experts to complete tests regarding the risks.

Many of the groups that oppose the use of 1080 are small organisations, these include Farmers Against 1080 (FATE) and Karameans Advocating Kahurangi Action (KAKA). These groups share the opinion that 1080 has far more risks than benefits when we consider the threat that 1080 brings to native species. They therefore believe that 1080 should not be used to control forest pests and money should instead be put into finding better ways to control them.

Personal Position and Proposed Response

I believe that 1080 should be used to control forest pests in New Zealand as I believe that the benefits are stronger than the risks. With this in mind I understand that there are risks to using this poison that include the risks to native species and pets, however I think that with a higher education and warning about the placement of 1080 the risk can be minimised. I also think that the poison may be able to be further refined to reduce the possibility of by-kill. I think that the benefits of using the poison that include saving our native species are very strong. Therefore with the information I have found I believe that 1080 is currently the best pest controller for the New Zealand environment.

I plan to help educate the public about the use of 1080 to ensure the population is completely informed of the risks and benefits to understand how the poison will work in protecting New Zealand’s native wildlife. I also

hope to have the public fully warned of where the poison has been dropped to ensure the threat to humans and pets is completely reduced.

Evaluation of Resources

- http://en. wikipedia. org/wiki/Stoat, http://en. wikipedia. org/wiki/Possum, http://en. wikipedia. org/wiki/Rat. These wikipedia pages provide accurate information regarding the species of Stoats, Possums and Rats with references to many articles written by experts. All of these pages are up to date with them all being updated in 2014. This is an organisation however the purpose of the website is to provide detailed information on specific topics, because of this I can conclude that this information in unbiased.
- http://www. nzfalcon. org. nz/native-bird/all-about-nz-native-birds. html. This page is specifically on the native birds of New Zealand so I am able to trust that it is without bias. It is also fairly recent with the website being created in 2008-2014.
- http://www. biodiversity. govt. nz/picture/biodiversity/state/pests. html. This website is a government organisation so I believe I am able to trust that the information provided is correct. However it does not provide a date so I am unable to confirm the recentness.
- http://dictionary. reference. com/browse/endangered. As this is a dictionary reference I can only deduce that it provides correct information, despite this I have completed further research and many other sources confirm that this is the correct definition.
- http://simple. wikipedia. org/wiki/Krebs_cycle. This wikipedia page was last updated on 30. 01. 2014 so the information provided is very up to

date. The information provided is also very similar to that on other pages.

- http://www. southlanddeerstalkers. org. nz/documents/1080-rprt. pdf. This document is provided by the deerstalkers organisation, however I believe that the information provided is without bias as the article compares both the benefits and risks of the 1080 poison. It also makes reference to many experiments and scientific articles regarding 1080, therefore I can presume that the information is accurate. The problem with this document is that does not provide a date so I am unable to discover how recent the information is.
- http://www. scoop. co. nz/stories/SC1105/S00067/1080-poison-science-and-facts. htm. This article was written by Dr Jo Pollard who is an expert regarding 1080 and its effects, therefore the information provided is accurate. However the article is not completely without bias. It was written in 2011 so the information is relatively recent.
- http://www. forestandbird. org. nz/saving-our-environment/native-plants-and-animals-/protecting-native-forests-1080/1080-frequently-ask. The Forest and Bird article is written by a series of experts so the information should be accurate. I was unable to find a date so I am unable to confirm how recent this is.
- http://newzealandecology. org/nzje/free_issues/NZJEcol23_2_175. pdf. This article is based on a series of experiments and is written by experts so I can conclude that the information is provided. I am once again unable to determine the date of the article so cannot conclude the relevancy for today.

- Wright, J (2011). Evaluating the use of 1080: Predators, pests and silent forests. This document was written by Dr Jan Wright the Commissioner for the Environment for the Government, therefore I am able to confidently say that the information she has provided is accurate and without bias. It was written in 2011 so the details are still relatively recent.
- http://www. envirolink. govt. nz/PageFiles/786/1035-NLRC140%20PAPP%20for%20stoat%20and%20feral%20cat%20control. pdf. This is a Government document so the information I have gathered from this should be accurate.
- Chug, K & Levy, D. (08. 06. 2011). 1080 report ‘ kick in the guts’ – Dunne. This is a news report and is based on what United Future leader Peter Dunne has said regarding Dr Jan Wright’s report on 1080. However as this is only a news article I cannot conclude that the information is completely accurate. This was written in 2011 so the information is recent.
- http://www. waikatoregion. govt. nz/PageFiles/3949/QandA. pdf. This article was provided by the National Possum Control Agency and is supported by the Animal Health Board. Because of this I have concluded that the information should be fairly accurate.
- http://www. doc. govt. nz/conservation/threats-and-impacts/animal-pests/methods-of-control/1080-poison-for-pest-control/managing-impacts/#environment. This is a DOC link so I will presume that the information is accurate as DOC is a Government agency so they would provide accurate information for the public.

- http://www. 1080facts. co. nz/upload/download_files/Effects%20of%201080%20on%20invertebrates%20and%20fish. pdf. I believe this information is accurate as it has gained data from all regions to learn about waterway buffers. This was written in 2004 so is still relatively recent
- www. 1080facts. co. nzI believe that information provided on this page is accurate as it is run by scientists and is supported by organisations such as Forest and Bird and the Animal Health Board, which are organisations expected to provide accurate information.

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[1]http://en. wikipedia. org/wiki/Possum (20. 02. 2014)

[2]http://en. wikipedia. org/wiki/Rat (20. 02. 2014)

[3]http://en. wikipedia. org/wiki/Stoat (20. 02. 2014)

[4]http://www. nzfalcon. org. nz/native-bird/all-about-nz-native-birds. html

[5]http://www. biodiversity. govt. nz/picture/biodiversity/state/pests. html

[6]http://dictionary. reference. com/browse/endangered

[7] href=" http://simple. wikipedia. org/wiki/Krebs_cycle"> http://simple. wikipedia. org/wiki/Krebs_cycle (26. 02. 2014)

[8]http://www. southlanddeerstalkers. org. nz/documents/1080-rprt. pdf

[9]http://www. scoop. co. nz/stories/SC1105/S00067/1080-poison-science-and-facts. htm

[10]http://www. forestandbird. org. nz/saving-our-environment/native-plants-and-animals-/protecting-native-forests-1080/1080-frequently-ask

[11]http://newzealandecology. org/nzje/free_issues/NZJEcol23_2_175. pdf(25. 02. 2014)

[12]Wright, J (2011). Evaluating the use of 1080: Predators, pests and silent forests

[13]http://www. envirolink. govt. nz/PageFiles/786/1035-NLRC140 PAPP for stoat and feral cat control. pdf(26. 02. 2014)

[14] Chug, K & Levy, D. (08. 06. 2011). 1080 report ‘ kick in the guts’ -Dunne

[15]http://www. waikatoregion. govt. nz/PageFiles/3949/QandA. pdf(27. 02. 2014)

[16]http://www. doc. govt. nz/conservation/threats-and-impacts/animal-pests/methods-of-control/1080-poison-for-pest-control/managing-impacts/#environment(28. 02. 2014)

[17]http://www. 1080facts. co. nz/upload/download_files/Effects of 1080 on invertebrates and fish. pdf(28. 02. 2014)

[18] 1080facts. co. nz (01. 03. 2014)