

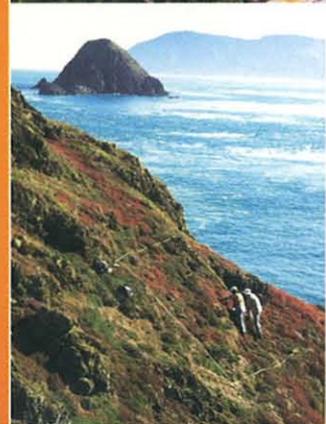
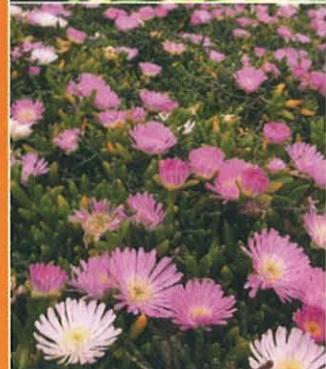
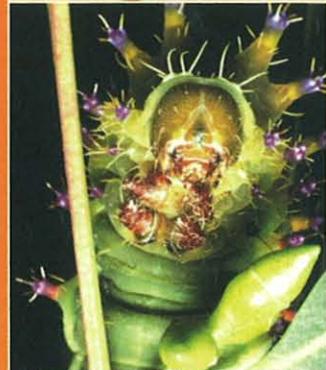
Bio-Protection & Ecology Division

Creating and publicising a web-based database of 1080 and taonga species information

by

S.C. Ogilvie, J.M. Ataria, J. Waiwai, J. Doherty

Lincoln University Wildlife Management Report No. 43



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Creating and publicising a web-based database of 1080 and taonga species information

Final Report

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Executive Summary

1.1 Project and client

Research was undertaken for the Animal Health Board Inc. (AHB) under Contract R-80667-01 “Creating and publicising a web-based database of 1080 and taonga species information” to Lincoln University. This project was an extension of the 2005/06 project, (Contract R-80667) “Overcoming barriers to Maori inclusion in the appropriate use of 1080”.

The research was aimed at producing a web-based database of information on 1080 impacts on non-target species, identified as important by Maori. The research reported here was carried out between August 2006 and June 2007, and was undertaken by a collaborative team of researchers from Lincoln University, Landcare Research Ltd, Lake Waikaremoana Hapu Restoration Trust, and Tuhoe Tuawhenua Trust.

1.2 Objectives

- To revise an earlier version of a 1080 database, in a manner advised by the Animal Health Board, TAG reviewers and by an independent peer-reviewer;
- To obtain authorisation to allow potentially copy-righted photographs and PDF files to be used on the database;
- To launch a website of the database, to make information on 1080 non-target impacts readily available to Maori communities and other interested end-users;
- To undertake a series of hui (meetings) throughout the country to introduce a wide range of Maori communities to the database;
- To update the database with new information; and
- To complete a final report by 30 June 2007 (this is that final report).

1.3 Methods

- The 1080 database was given to Alastair Fairweather for peer review.
- All existing photographs and PDF files in the database were scrutinised for copyright status, and where possible permissions for use obtained, otherwise files were omitted or replaced with non-copyright alternatives.
- The database was launched on the Lincoln University website.
- At six different meetings, the database was presented to Maori resource managers and community members, and a questionnaire was used to record their feedback.
- Two popular articles about the database were published and sent to a wide range of end-users and interested parties including Maori.
- A presentation on the database was made at the Australasian Wildlife Management Conference, in Auckland.
- The scientific literature was searched, and potential new references were identified, and added to the database where appropriate.

1.4 Results

- Peer review of the database was received from Alastair Fairweather, and the database revised accordingly.
- A total of 13 new references were added to the database.
- Of 39 photographs in the original database, 12 were replaced with photos that didn't have copyright issues associated with them, and a number of the other photographs were approved for use.

- Of 43 PDF files in the original database, 5 copyrighted items had to be removed, but source information was given.
- The database was launched on the Lincoln University website (www2.lincoln.ac.nz/1080/1_Header file.pps) on 1 December 2006.
- Maori community feedback was positive, was a consensus among hui participants that the website was a useful tool for Maori communities .

1.5 Conclusions

- The pictorial food web database has been confirmed as an appropriate means of organising information on 1080 in a manner that can be readily accessed by community end-users, especially Maori.
- Both peer-review and update of the database information were appropriate and was undertaken.
- Issues of copyright infringement on photographic and literature material were able to be overcome without making significant changes to the information available in the database.
- The database was suitable for making available on a website, and was launched accordingly.
- The database was given strong support by Maori communities, and is an effective approach for a Maori audience.
- The database is now generally available to Maori communities, and is likely to play a key role in informing these communities about 1080, subsequently allowing their appropriate inclusion in the informed use of 1080.

1.6 Recommendations

- The Animal Health Board Inc. can consider that the database allowing Maori communities access to 1080 information on non-target taonga species is now complete.
- Consideration should be made to allow regular updates of the website for addition of new information as it is published; given that we were unable to find any work published in the last six months, this process may only need to occur annually
- Consideration could be made to extending the database beyond the original mandate of information on non-target species, ultimately filling all the boxes in the central foodweb hub of the database.
- Further means to inform Maori communities of the availability of the website, such as Maori media, should also be explored.

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Introduction

The brushtail possum (*Trichosurus vulpecula*) is New Zealand's Number One vertebrate pest because of negative impacts on agriculture, through the spread of bovine tuberculosis to cattle and deer (Livingstone 1994). It also has detrimental impacts on indigenous forest ecosystems (Cowan 2001), including causing compositional changes in forest communities (Nugent et al. 2000), negatively affecting some native bird populations (Sadleir 2000), and predation of eggs, nestlings and adult birds (Brown et al. 1993, Innes, 1995).

The pesticide sodium fluoroacetate (Compound 1080) is a key tool for the control of possums. Methods of deployment include aerial application of 1080 cereal or carrot baits, a cost-effective means of reducing possum populations by greater than 90% (Eason et al. 1994, Veltman and Pinder 2001).

Despite the efficiency of aerial 1080 application for reducing possum population numbers, support amongst Maori is mixed, and many Maori organisations outwardly oppose the practice. A lack of Maori input in determining strategies for pest control and research priorities, and general distrust of available research data have been suggested as reasons for Maori opposition (Horn and Kilvington 2002).

In earlier work presented in Ogilvie et al. (2006), the authors of the present study were involved in many meetings on 1080 with Maori organisations all over New Zealand. At many hui (meetings), a recurring theme that was being voiced by Maori was that "most of the research on 1080 is done by the same people that are dropping 1080, we can't trust it". Furthermore, the absence of Maori involvement in developing research priorities and monitoring 1080 operations continues to frustrate Maori, often leading to criticism of existing research data.

Therefore, the aim of the research presented here was to extend the earlier development (Ogilvie et al. 2006) of a 1080 database where high-quality literature on 1080 non-target impacts could be made readily available and easily understood by Maori communities.

This is the final report of a research programme aimed at empowering Maori to access research information on the impacts of 1080 on non-target species, ultimately allowing Maori to have a greater role in the appropriate use of 1080. The research reported here was undertaken between August 2006 and June 2007.

Objectives

1. To revise an earlier version of a 1080 database, in a manner advised by the Animal Health Board, TAG reviewers and by an independent peer-reviewer;
2. To obtain authorisation to allow potentially copy-righted photographs and PDF files to be used on the database;
3. To launch a website of the database, to make information on 1080 non-target impacts readily available to Maori communities and other interested end-users;
4. To undertake a series of hui throughout New Zealand to introduce a wide range of Maori communities to the database;
5. To update the database with new non-target species information; and
6. To complete a written report (this document is that written report).

Methods and Results

Objective 1: Peer review of the 1080 database

In work leading up to the present project, Ogilvie et al. (2006) had discussions with Maori stakeholders on approaches to reviewing 1080 literature items in a form appropriate to and readily accessible by Maori communities. Arising from these discussions was the idea that many Maori relate easily to complex information presented in an holistic manner, ideally in pictorial format. With this in mind, a database was created based on an ecological foodweb (Fig. 1) as described by Innes & Barker (1999).

The original approach was therefore to collate available literature on 1080 non-target impacts, to review this literature, and then to place this literature, and review material, within the context of the foodweb, using hyperlinks to the relevant ecological compartments (Figure 1).

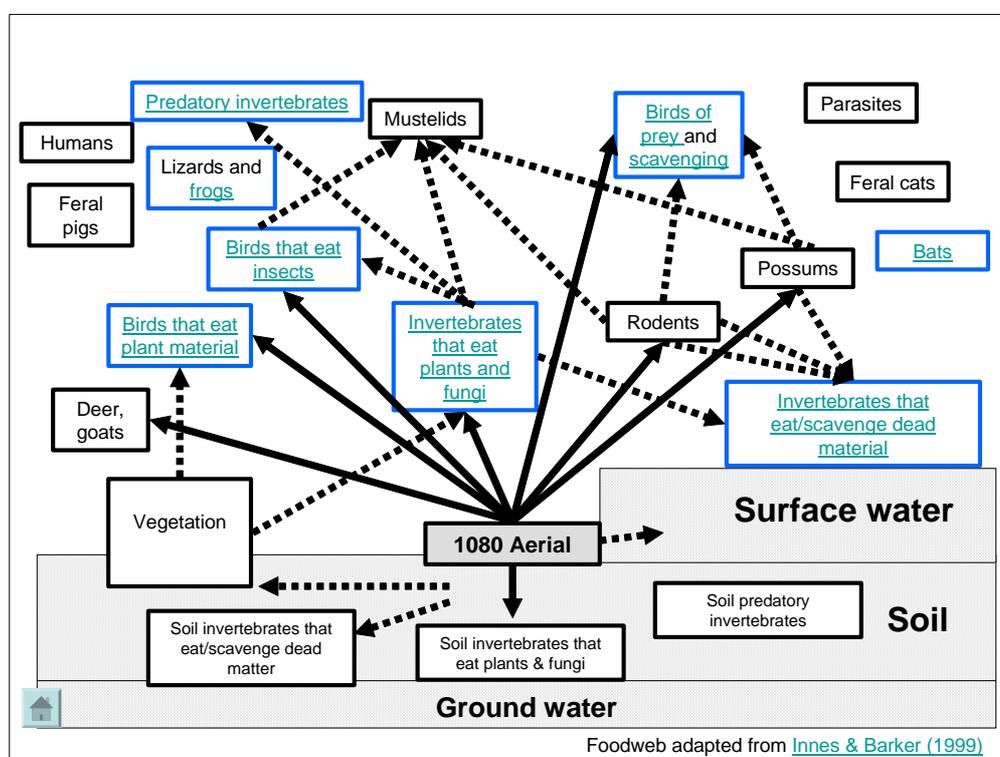


Fig. 1. Foodweb representation of aerially-applied 1080 in a forest ecosystem. This foodweb forms the conceptual starting point of the database, and users can click on hyperlinks to access further information.

In an extension of the existing database, the AHB organised for Alastair Fairweather to thoroughly review the information in the 1080 database. Alastair was satisfied that there were no errors or misinterpretation of the data/studies that were already included. He did however note a number of references (mostly bird ones) that needed to be added, and all of the following items were added to the database:

- Van Klink, P.A., Tansell, A.J.F., 2003. Western weka (*Gallirallus australis australis*) monitored before and after an aerial application of 1080 baits in the Copland Valley, Westland National Park. DOC Science Internal Series 108.
- Powlesland, R.G., Wills, D.E., August, A.C.L., August, C.K., 2003. Effects of a 1080 operation on kaka and kereru survival and nesting success, Whirinaki Forest Park. New Zealand Journal of Ecology 27, 125-137.
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- Alastair Fairweather also noted a paper by “Fluxton & Innes, 2001, NZ Journal of Ecology” which didn’t seem to exist so wasn’t added to the database. A number of freshwater references, namely eel work by Dr Phil Lyver, and koura, fish, and invertebrate stream work by Dr Alastair Suren were also raised as possible additions to the database. We didn’t add these items as they were considered to be outside the agreed scope of the database: non-target species that would be responsible for noise in the forest, and that could be involved in any perceived “silencing” in the bush as a result of 1080 use.

Objective 2. Removing potentially copyrighted items from the database

The original Version 1.1 of the database (Ogilvie et al. 2006) contained photographs and literature items (in PDF format) that could potentially be restricted for public dissemination by copyright law. In this objective, the source of every photograph and literature file was determined, and where necessary items were either replaced with non-copyright items, or removed from the database. The completion of this process was necessary before the database could be launched on a website for public use (Objective 3).

The database has a total of 39 photographs of different non-target species. Of these 39 photographs, 12 were replaced with new photographs that were confirmed as not having any copyright issues. Most of the replacements were from the personal collections of the authors, or colleagues of the authors who gave permission for their use. Consent to use a number of

the invertebrate photographs was obtained from Trevor Crosbie (Curator of the New Zealand Arthropod Collection, Landcare Research) and Leonie Clunie (Landcare Research).

Of a total 43 PDF literature files, 5 (1.2%) had to be removed from the database because of potential copyright issues. Fortunately, a large majority of literature items were already publicly available from sources such as The New Zealand Journal of Ecology and the Department of Conservation, therefore meaning that most of the original items in the database were able to remain available for the launching of the website without risk of copyright infringement.

Objective 3. Launching the database on a website

The database was launched on the Lincoln University website on 1 December 2006. The URL for the website is:

[www2.lincoln.ac.nz/1080/1_Header file.pps](http://www2.lincoln.ac.nz/1080/1_Header_file.pps)

In the URL there is a space between the words “Header” and “File”. The website homepage (Fig. 2) contains information on the team that created the database, acknowledgements, and a link to the foodweb (Figure 1) that is the central hub of the database.

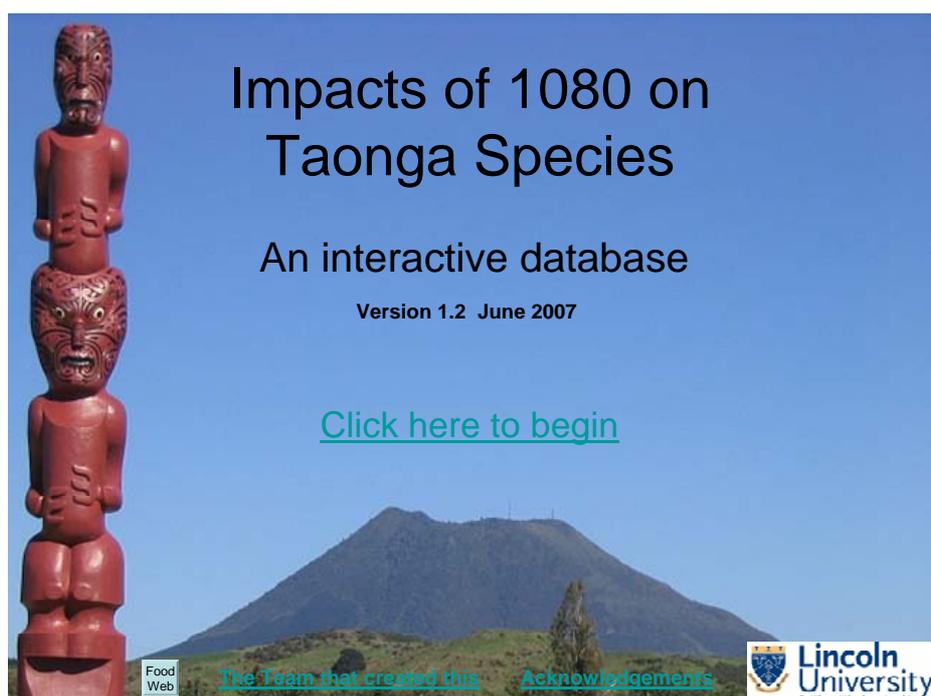


Fig. 2. Website Homepage. From here users click on hyperlinks to access 1080 non-target information. For example if they click on the “Food Web” button on the bottom-left-hand corner, they are taken to the foodweb seen in Fig. 1 above.

Objective 4. Disseminating the database to Maori communities

As a means of introducing the 1080 database to a wide range of Maori communities, hui were undertaken as follows:

- November 2-3, 2006. At Te Puea Memorial Marae, Auckland, at a 1080 generic issues hui convened by the Environmental Risk Management Authority (ERMA);
- November 29, 2006. With representatives of Ngati Kahungunu Iwi Incorporated, Hastings;
- December 12, 2006. At Pohara Marae, Hamilton, with representatives of Te Mana Taiao Environmental Trust;
- March 10, 2007. At Takahanga Marae, Kaikoura, with representatives of Ngati Kuri, the local Maori;
- June 21-22, 2007. At Terenga Paraoa Marae, Whangarei, with ERMA's Maori National Network, which included representative from all over New Zealand; and
- June 27, 2007. At Te Wananga o Raukawa, a Maori tertiary education institution at Otaki (Fig. 3).

At all but the Whangarei hui, the research team began with a general presentation giving background information about 1080, and a summary of previous 1080 research experience. The 1080 non-target impact database was then presented and participants were offered the opportunity to use it to explore key questions they had about 1080. This was followed by open discussion, which allowed participants to give feedback on the database, and also ask any general questions about 1080. By the time the later four hui were run, the website had been launched, and representatives were given the URL.

Due to time constraints at the Whangarei hui, the full process described above could not be undertaken, and instead a hand-out was made available to participants. The handout contained a background on 1080, a description of the 1080 database, and the URL address.

At four of the hui a questionnaire (Appendix 1) was handed out to each participant, allowing them to give written feedback on the database.

A total of 110 people attended the six hui (Table 1), with a majority being Maori who fulfil roles as resource managers for their marae, hapu or iwi. The survey return rate was 88% and as many of the respondents answered questions in a similar manner (Appendix 2), clear conclusions could be made about opinions on the 1080 database and research approach.

Ninety-seven percent of respondents considered the database to be a good initiative. Similarly, 95% of participants thought that the use of a visual database to summarise 1080 information was a good idea. Ninety-seven percent considered the database as something they would find useful although a small number of respondents reserved their final judgement until they had the opportunity to use the database more fully.



Fig. 3. Powhiri (welcome) to Te Wananga o Raukawa, 27th June 2007. A total of 18 people participated in this hui.

A majority (71%) of respondents strongly agreed that the team who created the database did a good job of explaining how it works. According to the survey one reason for the high level of confidence in the database findings was the composition of the research team (Maori scientists and tangata whenua representatives). In particular the presence of tangata whenua representatives as project team members and who had ‘on the ground’ experience of 1080 was appreciated by participants. This perhaps highlights a desire from Maori communities for more research on Maori specific issues carried out by Maori researchers. There was also general agreement (75%) that the database information was balanced and 97% of respondents considered that the database was a good vehicle for presenting this information.

Table 1. Number of attendees at the six hui, and number of Survey Questionnaires returned.

Hui Location	Number attending	Questionnaires Returned
Auckland –Te Puea Marae	40	-
Hastings –Ngati Kahungunu Iwi Incorporated	8	5
Hamilton –Pohara Marae	9	9
Kaikoura –Takahanga Marae	7	6
Whangarei –Terenga Paraoa Marae	28	-
Otaki –Te Wananga o Raukawa	18	17
TOTAL	110	37

Whilst the survey results and written comments indicated considerable support for the approach taken, many felt there was more information that could be included in the database. A number of written and verbal suggestions were received and are summarised as follows:

1. The database needs to include more information on locally-significant species and this may require more research.
2. The database shows data on species where research has been conducted – more research is needed on those that are not included.
3. The database needs to be able to demonstrate the long-term effects, if research has been conducted.
4. The ability to include information on the transfer of 1080 through the foodweb (i.e. secondary and tertiary effects on the forest ecosystem).
5. The database could be made more ‘friendly’ by including more pictures and increasing the Maori language content.

There were also specific comments around increasing the dissemination of this database through a range of Maori media in addition to making this available to Kura Kaupapa Maori and mainstream secondary schools.

The project team are also aware of other feedback on the database that occurred independently of the 1080-database hui. During the public hearing process on the reassessment of 1080, Ngati Kuri (of Kaikoura) gave a verbal submission expressing their desire to see more 1080 information made available using the 1080 database model.

In addition to the six hui outlined above, the following dissemination activities were undertaken:

- A presentation titled “New Approaches to Risk Communication” at the Australasian Wildlife Management Society Conference in Auckland, December 2006;
- An article titled “Accessing Scientific Information On 1080” in Issue 10 of Te Putara, March 2007, page 4; and
- An article “1080 Information that Maori can Access Easily” in Issue 10 of Kararehe Kino Vertebrate Pest Research, June 2007, pages 8-9.

Objective 5. Updating the database with new literature

A thorough literature search was undertaken to find any new items that could potentially be added to the database. A total of 93 items were found, and these are listed in alphabetical order by primary author, in Appendix 3. Of these 93 items, 13 were found to be appropriate and were added to the database. These 13 items are highlighted in Appendix 3. While 13 new items were added to the database, a notable aspect of the literature search was that no relevant items had been published in 2007, although some items may have been in press.

Discussion

The original reason for producing the database was to allow Maori communities access to published scientific literature on 1080, with a focus on non-target animal species of inherent value to Maori (Ogilvie et al. 2006). In the extension of the database presented here, a number of key ideas from the previous research were reinforced:

- The foodweb concept giving an holistic picture of 1080 in the environment aligns well with Maori conceptualisation of natural systems;
- The interactive database model allows easy access to information, using hyperlinks to move through information layers; and
- Users are able to gain a level of understanding suitable to their requirements, they can gather simple information from the review, or access source information where PDF files are available.

Building on the foundation of the original database (Ogilvie et al. 2006), important improvements have been made. The peer-review by Alastair Fairweather has meant that a number of important literature items have been added, and some improvements made on navigational links between sections of the database.

One of the key factors restricting the release of the database on a website was the potential copyright infringement associated with some of the original photographs and literature items. It was fortunate that all copyrighted items were able to be removed without making any significant reduction in the utility of the database, or to the volume of information available. This meant that the database could be launched on a website, therefore making it publicly available, and most importantly, vastly increase the size of the audience that could access it.

The feedback received from Maori participants on the database has been very positive. In practice, the value of the database was demonstrated by Ngati Kuri who used it to gather information for the production of their submission on the ERMA reassessment of 1080. During their verbal submission for the reassessment of 1080, they also emphasised their desire to see more information on 1080 presented to iwi using the 1080 database model.

In summary, the database concept, available on the web, is a tool that has been readily adopted by Maori communities.

Where to from here for the database?

In a general sense, the objective of producing a means for Maori to readily access non-target information on 1080 has been achieved. Any further work on the database will fall within the following areas:

- Extending the information in the database to go beyond the original mandate of information on non-target species. This would ultimately mean filling all the boxes (and subsequent sub-levels) in the central foodweb hub of the database (Figure 1). As described above, there has been a lot of feedback from Maori that this would be a very useful addition.
- Improving technical aspects of the website. At present, and while it generally works well, the database is within a PowerPoint environment. It would be an improvement to reformat it into a programme specifically designed for web application, such as Microsoft FrontPage®.
- Regular updates of the website information should be undertaken, to allow the addition of new information as it is published. Given the fact that we were unable to find any publication from the last six months, this process may only need to occur on an annual or even two-yearly basis.

While these steps will improve the database, it is pertinent to remember that the database in its current state is of itself a very useful tool for Maori, that is readily available, as attested in the feedback from Maori. Having the database generally available to Maori communities, is likely to play a key role in informing these communities about 1080, subsequently allowing their informed and appropriate inclusion in the appropriate use of 1080.

Conclusions

- The pictorial food web 1080 database has been confirmed as an appropriate means of organising information on 1080 in a manner that can be accessed by community end-users, especially Maori.
- Both peer-review and update of the database information were appropriate and was undertaken.
- Issues of copyright infringement on photographic and literature material were able to be overcome without making significant changes to the information available in the database.
- The database was suitable for making available on a website, and was launched accordingly.
- The database was given strong support by Maori communities, and is an effective approach for a Maori audience.
- The database is now generally available to Maori communities, and is likely to play a key role in informing these communities about 1080, subsequently allowing their appropriate inclusion in the informed use of 1080.

Recommendations

- The Animal Health Board Inc. can consider that the database allowing Maori communities access to 1080 information on non-target taonga species is now complete.
- Consideration should be made to allow regular updates of the website for addition of new information as it is published; given that we were unable to find any work published in the last six months, this process may only need to occur annually
- Consideration could be made to extending the database beyond the original mandate of information on non-target species, ultimately filling all the boxes in the central foodweb hub of the database.
- Further means to inform Maori communities of the availability of the website, such as Maori media, should also be explored.

Acknowledgements

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Charles Eason is thanked for his advice on new 1080 literature, and James Ross is thanked for improving an earlier version of this report.

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Appendix 1. Questionnaire About the Interactive Database

Please indicate your choice with a tick (✓) in the box that most fits your answer

1. Did you feel that the research team responsible for creating this database did a good job of explaining how this database works?

Strongly agree Agree Neutral Disagree Strongly disagree

2. Is this database something you would find useful?

Very useful Useful Neutral Difficult Very Difficult

3. Do you feel that this database gives a balanced view of the available knowledge on 1080 impacts?

Very balanced Balanced Neutral Biased Very biased

4. Are there other things that you feel should have been included in this database?

Yes No (if yes please comment on the issues that you would like to see in the presentation)

5. Do you think that this interactive database is a good idea?

Strongly agree Agree Neutral Disagree Strongly disagree

6. Do you think that this database is a good way to summarise current information on 1080 impacts on the forest?

Yes No

7. Would you support using this idea of a visual database to represent all of the information about 1080?

Yes No

8. Does the fact that this research has been carried out by an independent research team consisting of Ngāi Tūhoe representatives and Māori scientists give you confidence in the findings about the effects of 1080 on the ngahere?

Yes No

9. Do you think that this database should be shown to other iwi and interested Māori organisations?

Strongly agree Agree Neutral Disagree Strongly disagree

10. If so are there changes or alterations that you would suggest?

11. Any other comments?

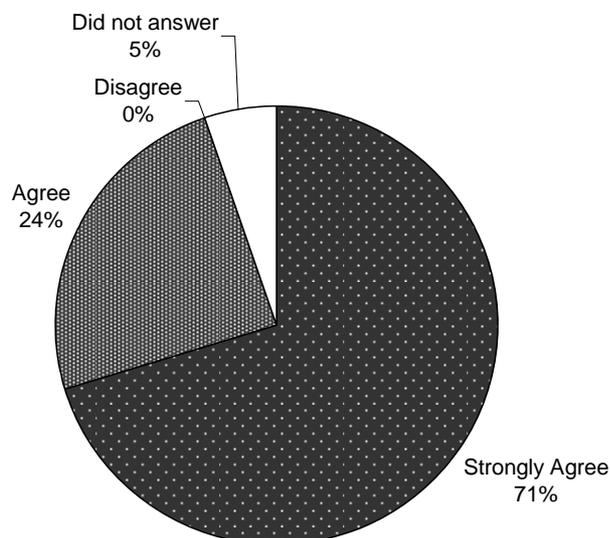
Kāti rā, he mihi nui tēnei ki a koe mō ōu whakaaro. Ka noho ōu whakautu i runga ake nei hei āwhina, hei tohutohu i tēnei mahi rangahau. Kia mutu tēnei hui, ka wehewehea ngā pepa uiui, kātahi ka whakahoki kōrero ki te Animal health Board. Mā rātou te whakataunga whakamutunga, mena ka whaia tēnei huarahi, kāore rānei.

Thank you for taking the time to answer this survey. Your responses above will assist and guide this research project. At this end of this meeting all the responses will be collated and sent through to the Animal Health Board. The Animal Health Board will make the final decision whether to, or whether not to, pursue this database.

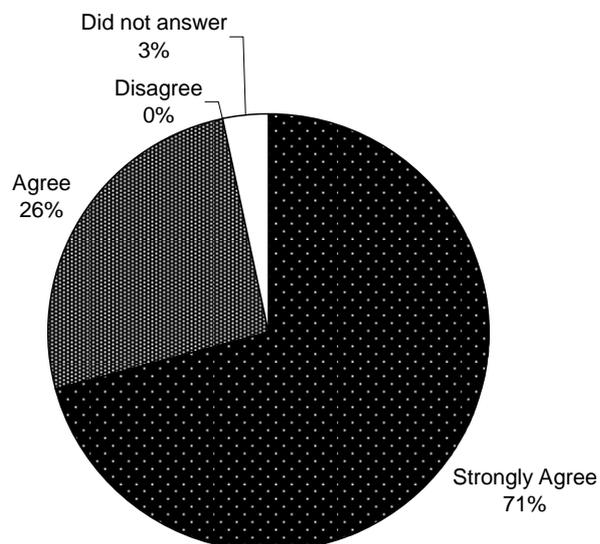
Noho ora mai rā i runga i ngā manaakitanga katoa, nā
 Te hunga rangahau

Appendix 2. Summary of Questionnaire Responses

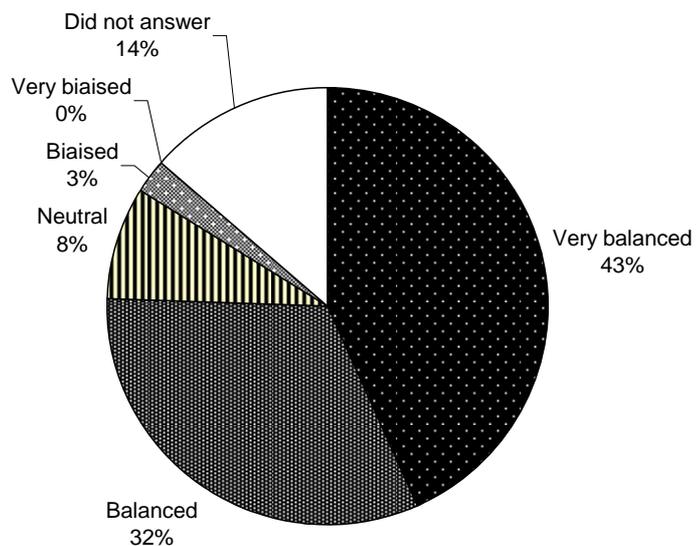
Question 1: Did you feel that the research team responsible for creating this database did a good job of explaining how this database works?



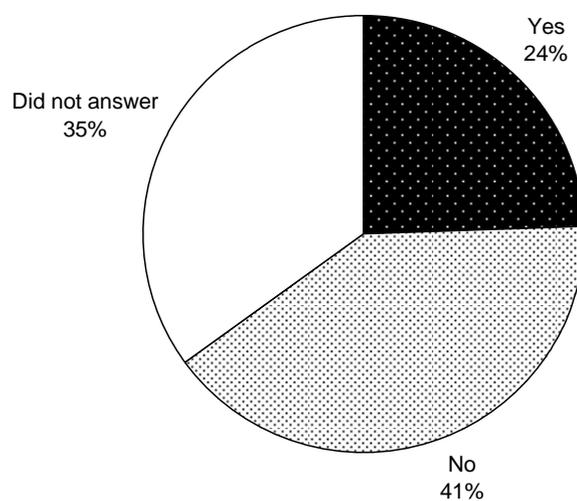
Question 2: Is this database something you would find useful?



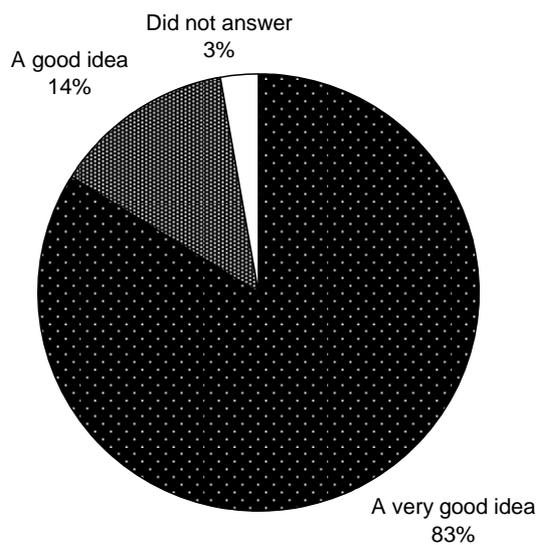
Question 3: Do you feel that this database gives a balanced view of the available knowledge on 1080 impacts?



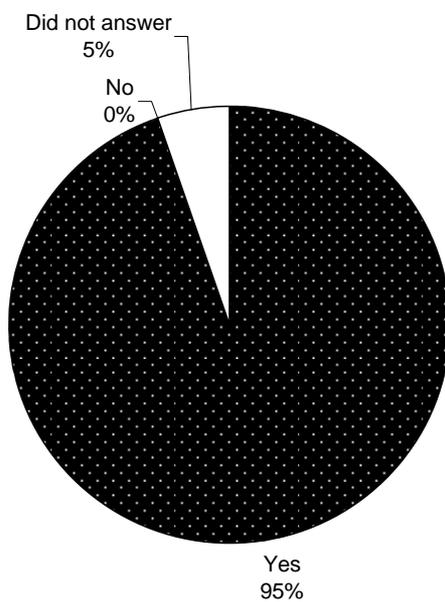
Question 4: Are there other things that you feel should have been included in this database?



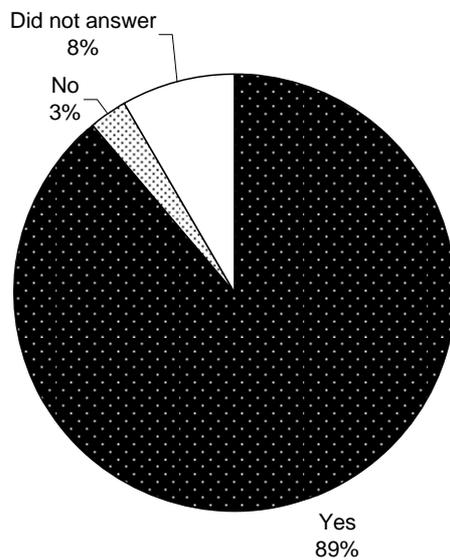
Question 5: Do you think that this interactive database is a good idea?



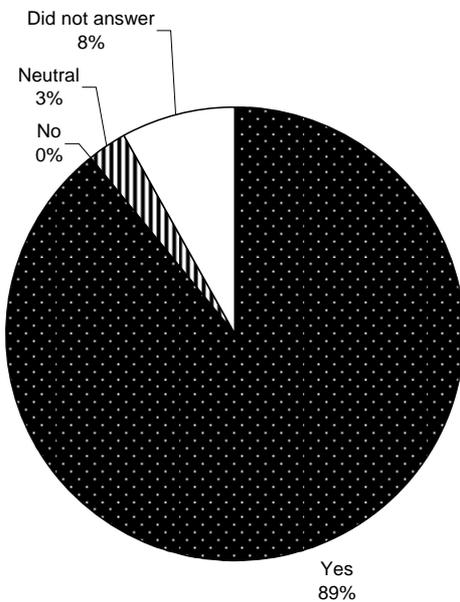
Question 6: Do you think that this database is a good way to summarise current information on 1080 impacts on the forest?



Question 7: Would you support using this idea of a visual database to represent all of the information about 1080?



Question 8: Does the fact that this research has been carried out by an independent research team consisting of Ngai Tahu representatives and Maori scientists give you confidence in the findings about the effects of 1080 on the ngahere (forest)?



Appendix 3. New literature considered for addition to the database

Items highlighted with grey fill were added to the database.

AUTHORS	TITLE	PUBLICATION	DATABASE STATUS
Alterio N, Brown K, Moller H. 1997	Secondary poisoning of mustelids in a New Zealand Nothofagus forest	Journal of Zoology (London) 24 (3): 863-869	Not relevant: Brodifacoum
Annisson E F, Hill K J, Lindsay D B, Peters R A. 1960	Fluoroacetate poisoning in sheep	Journal of Comparative Pathology 70: 145-155	Not relevant: outside of database scope
Aspin P, Stringer I, Potter M. 1998	Invertebrate abundance in pitfall traps before and after aerial sowing and bait station presentation of 1080.	Institute of Natural Resources, Massey University(also meeting Christchurch 9-10 July 1998 , -17. 1999).	Potentially valuable for future update
Atkinson I A E. 1992	Effects of possums on the vegetation of Kapiti Island and changes following possum eradication.	DSIR Landcare Resources Contract report 92/95, Lower Hutt: DSIR	Potentially valuable for future update
Atkinson I A E, Campbell D J, Fitzgerald B M, Flux F I C, Meads M J. 1995	Possums and possum control: Effects on lowland forest ecosystems: A literature review with specific reference to the use of 1080.	Science for Conservation Series 1. Wellington: DOC	Obtained a soft copy
Balcomb R, Bowen C A, Williamson H O. 1983	Acute and sublethal effects of 1080 on starlings.	Bulletin of Environmental Contamination and Toxicology 31: 692-698	Not relevant: outside of database scope
Basse B, Flux I, Innes J. 2003	Recovery and maintenance of North Island kokako (<i>Callaeas cinerea wilsoni</i>) populations through pulsed pest control	Biological Conservation 109: 259-270	Obtained a soft copy
Beath A, Thorne J, Robertson A W. 2004	Evaluating the attractiveness of post-control baits and lures to captive short-tailed bats, <i>Mystacina tuberculata</i> .	Science Internal Series 189. Wellington DOC.	Obtained a soft copy. Added to database.
Bong C L, Cole A L J, Walker J R L, Peters J A. 1979	Effect of sodium fluoroacetate (compound 1080) on the soil microflora.	Soil Biology and Biochemistry 11(1): 13-18	Not relevant: outside of database scope
Bong C L, J, Walker J R L, Peters J A. 1980	Effect of sodium fluoroacetate (compound 1080) and fluoride upon duckweeds	New Zealand Journal of Science 23: 179-183	Not relevant: outside of database scope
Booth L H, Eason C T, Spurr E B. 2001	Literature review of the acute toxicity and persistence of brodifacoum to invertebrates.	Science for Conservation Series 177. Wellington: DOC.	Not relevant: Brodifacoum
Booth L H, Wickstrom M L. 1999	The toxicity of sodium monofluoroacetate (1080) to <i>huberia striata</i> , a New Zealand native ant.	New Zealand Journal of Ecology 23: 161-165	Obtained a soft copy

Bosakowski T, Levin T T. 1986	Serum citrate as a peripheral indicator of fluoroacetate and fluorocitrate toxicity in rats and dogs.	Toxicology and Applied Pharmacology 85: 428-436	Not relevant: outside of database scope
Brown K P and Urlich S C, 2005	Aerial 1080 operations to maximise biodiversity protection.	DOC Research & Development Series 216. DOC, Wellington, NZ 36p	Obtained a soft copy. Added to database.
Burns R J, Connolly C E. 1992	Toxicity of compound 1080 to magpies and the relationship of dose rates to residues recovered.	15 th Vertebrate Pest Conference, University of California.	Not relevant: outside of database scope
Caithness T A, Williams G R.1971	Protecting birds from poisoned baits	New Zealand Journal of Agriculture 122: 38-43	Potentially valuable for future update
Calver M C, McIlroy J C, King D R, Bradley J S, Gardner J L. 1989	Assessment of an approximate lethal dose technique for determining the relative susceptibility of non-target species to 1080 toxin.	Australian Wildlife Research 16: 33-40	Obtained a soft copy. Not relevant.
Campbell S, Beavers J, Grimes J. 1994a	Sodium fluoroacetate: A dietary LC ₅₀ study with the northern bobwhite.	Unpublished study prepared by Wildlife International. Lab Project 247-101B: QA-297: 94-021	Not relevant: outside of database scope
Campbell S, Beavers J, Grimes J. 1994b	Sodium fluoroacetate: A dietary LC ₅₀ study with the mallard	Unpublished study prepared by Wildlife International. Lab Project 247-102B: QA-298: 94-021	Not relevant: outside of database scope
Casper H H et al. 1984	Sodium fluoroacetate levels in canine tissues	Proceedings of the Annual Meeting American Association of Veterinary Laboratory Diagnosticians 26 (1983 meeting): 155-160	Not relevant: outside of database scope
Clapperton B K, Morgan D, Oates K E, Beath A M, Matthews L R. 2005	Field testing the efficacy of bird repellent treated 1080: Carrot baits		Potentially valuable for future update
Cooke J A. 1976	The uptake of sodium monofluoroacetate by plants and its physiological effects.	Fluoride 9 (4): 204-212	Not relevant: outside of database scope
Cottral, G. E., Dibble, G. D., and Winton, B. (1947).	The effect of sodium fluoroacetate ("1080" rodenticide) on white leghorn chickens.	<i>Poultry Science</i> 26 , 610-613.	Not relevant: outside of database scope
Eason C T, Turck. 2002b	A 90 day toxicological evaluation of compound 1080 (sodium monofluoroacetate) in Spargue-Dawley rats	Toxicological Sciences 69: 439-447	Not relevant: outside of database scope

Eisler, R. (1995).	Sodium monofluoroacetate (1080) hazards to fish, wildlife, and invertebrates : a synoptic review	Fish and Wildlife Service, U.S. Dept. of the Interior: Washington,D.C.)	Keep focus on NZ systems, but could be some useful information here for future reference
Flux I and Innes J, 2001	Kokako management folder.	Threatened Species Occasional Publication 19. Biodiversity Recovery Unit, DOC, Wellington	Not relevant: outside of database scope
Fraser K W, Sweetapple P J.2000	A comparison of the effectiveness of two toxic loadings (0.08% and 0.15%) for control of deer during aerial 1080 poisoning using carrot baits	Landcare Research Contract Report LC9900/84 for Animal Health Board	Not relevant: outside of database scope
Freeman A B, Hickling G J, Bannock C A. 1996	Response of the native skink <i>Oligosoma maccanni</i> to two pest control baits.	Wildlife research 23, 511-516	Obtained a soft copy
Freeman A B, Hickling G J, Bannock C A. 1997	Responses of the native skink <i>Leiopisma maccanni</i> to two pest control baits.	Conservation Advisory Science Notes 139. Wellington: DOC	Potentially valuable for future update
Green W, 2003	Benefits to Forests of 1080 operations		
Greene T G, 1998	The effects of compound 1080 on populations of specific non-target species, Waihaha Ecological Area, Pureora Forest Park, winter 1994.	Science for Conservation 69. DOC, Wellington 55p.	Obtained a soft copy -large document of 14 files
Hamilton B, 2004	Effects of an aerial 1080 carrot bait operation on South Island tomtit (<i>Petroca macrocephala macrocephala</i>) populations within the Hampden possum control operational area of Otago.	Ecological Networks Ltd, Dunedin.	Potentially valuable for future update
Hartley L, Waas J, O'Connor C, Matthews L. 2000	Colour preferences and coloured bait consumption by weka <i>Gallirallus australis</i> , an endemic New Zealand rail.	Biological Conservation 93: 255-263	Obtained a soft copy. Added to database.
Heyward R P, Norbury C G. 1999	Secondary poisoning of ferrets and cats after 1080 rabbit poisoning.	Wildlife Research 26: 75-80	Not relevant: outside of database scope
Hornshaw, T. C., Ringer, R. K., Aulerich, R. J., and Casper, H. H. (1986).	Toxicity of sodium monofluoroacetate (Compound 1080) to mink and European ferrets	<i>Environmental toxicology and chemistry</i> 5 , 213-223.	Not relevant: outside of database scope
Howard, W. E., Marsh, R. E., and Palmateer, S. D. (1973).	Selective breeding of rats for resistance to sodium monofluoroacetate.	<i>Journal of applied ecology</i> 10 , 731-736.	Not relevant: outside of database scope

Hunt M, Sherley G and Wakelin M, 1998	Results of a pilot study to detect benefits to large-bodied invertebrates from sustained regular poisoning of rodents and possums at Karioi, Ohakune.	Science for Conservation 102, DOC, Wellington. 17p.	Obtained a soft copy. Of limited value
Innes J, Nugent G, Prime K, Spurr E B. 2004	Responses of kukupa (<i>Hemiphaga novaseelandiae</i>) and other birds to mammal pest control at Motatau, Northland.	New Zealand Journal of Ecology 28: 73-81	Obtained a soft copy. Added to database.
Innes J, Warburton B, Williams D, Speed H, Bradfield P. 1995	Large scale poisoning of ship rats (<i>Rattus rattus</i>) in indigenous forests of the North Island, New Zealand.	New Zealand Journal of Ecology 19: 5-17	Not relevant: outside of database scope
King D R, Kirkpatrick W E, Wong D H, Kinnear J E. 1994	Degradation of 1080 in Australian soils.	In AA Seawright, CT Eason (eds) Proceedings of the science workshop on 1080. Miscellaneous Series 28. Wellington: Royal Society of New Zealand, pp 45-49	Not relevant: outside of database scope
Lloyd B D. 1994	Evaluating the potential hazard of aerial 1080 poison operations to short-tailed bat populations.	Conservation Advisory Science Notes 108. Wellington: DOC	Potentially valuable for future update
Lloyd B D. 1997	Evaluating the impact of 1080 on invertebrate food sources for bats.	Report from the possum and bovine tuberculosis control National Science Strategy Committee, October 1997. (Ed. D E Wright.) p35 Wellington, NZ	For future reference
Lloyd B D and McQueen S M, 2003	Measuring mortality in short-tailed bats (<i>Mystacina tuberculata</i>) as they return from foraging after an aerial 1080 possum control operation	NZ Journal of Ecology 26 (1): 53-59	Already in database
Lowe, M.	1080 in honey from possum baits, Rahotu - Taranaki. -17. 1994.		Potentially valuable for future update
McIntosh, I. G., Bell, J., Poole, W. S. H., and Staples, E. L. J. (1966).	The toxicity of sodium monofluoroacetate (1080) to the North Island weka (<i>Gallirallus australis greyi</i>)	<i>New Zealand journal of science</i> 9, 125-128.	Potentially valuable for future update
McNaughton A and Greene B. 1994	The effect of 1080 on the Hochstetter's frog (<i>Leiopelma hochstetteri</i>) population in the Hunua Ranges.	ARC Parks Technical publication series, No 7. Auckland Regional Council.	Potentially valuable for future update

Middendorf, P. J. and Dusenbery, D. B. (1993).	Fluoroacetic acid is a potent and specific inhibitor of reproduction in the nematode <i>Caenorhabditis elegans</i>	<i>Journal of nematology</i> 25 , 573-577.	Not relevant: outside of database scope
Moller H, Showers J and Wright M. 1996	Sodium monofluoroacetate (1080) poisoned jam bait laid for brush tail possums (<i>Trichosurus vulpecula</i>) also kills ferrets (<i>Mustela furo</i>)	New Zealand Journal of Zoology 23, 135-141	Not relevant: outside of database scope
Morgan, D. R. and Goodwin, M. 1994	Field trials of 1080 paste treated with a bee repellent.	[LC9394/101], -15. 1994. Christchurch, Manaaki Whenua - Landcare Research. Landcare Research contract report..	Not relevant: outside of database scope
Morgan, D. R. and Eason, C. T. 2002	1080: A review of its properties, usage, lethal and sublethal effects, environmental fate, and non-target poisoning risks in New Zealand.	Advances in Vertebrate Pest Management III.	Not relevant: outside of database scope
Murphy, E. C., Clapperton, K., Bradfield, P., and Speed, H. (1998).	Effects of rat-poisoning operations on abundance and diet of mustelids in New Zealand podocarp forests.	<i>New Zealand journal of zoology</i> 25 , 315-328.	Not relevant: outside of database scope
Murphy E C, Robbins L, Young J B and Dowding J E. 1999	Secondary poisoning of stoats after an aerial 1080 poison operation in Pureora forest, New Zealand.	New Zealand Journal of Ecology 23, 175-182	Not relevant: outside of database scope
Oates K E and Beath A M, 2005	Non-target impact assessment of aerial possum control operations on bird populations in Lake Taupo Forest using the 5-minute bird count method.	Independent study report 10173. Enviro Research Ltd, Ohakune. 25p	Not available in time -leave for next update
O'Connor, C. E., Milne, L. M., Arthur, D. G., Ruscoe, W. A., and Wickstrom, M. (1999).	Toxicity effects of 1080 on pregnant ewes	<i>Proceedings of the New Zealand Society of Animal Production</i> 59 , 250-253.	Not relevant: outside of database scope
O'Halloran K, Jones D, Booth L H. 2003	Reproductive ecotoxicity of 1080 to earthworms	AHB Project R-10608. Landcare Research Contract Report LC0304/046 for Animal Health Board	Not relevant: outside of database scope
O'Halloran K, Jones D, Booth L, Fisher P. 2004	1080 and potential risks to soil organisms.	In Kararehe Kino: Vertebrate Pest Research (vol 5), pp3-4	Not relevant: outside of database scope
O'Halloran K, Jones D, Booth L, Fisher P, 2005	Ecotoxicity of sodium fluoroacetate (compound 1080) to soil organisms	Environmental Toxicology and Chemistry, vol. 24, n° 5, pp 1211-1218, 2005	Not relevant: outside of database scope

O'Halloran K, Jones D, Fisher P, 2003	Ecotoxicity of 1080 to soil microorganisms and plants.	Project R-10581. Landcare Research Contract Report LC0304/057. Lincoln: Landcare Research	Not relevant: outside of database scope
Ogilvie S C, Ataria J M, Waiwai J, Doherty J, Lambert N, Lambert M. 2004	Uptake and persistence of 1080 in plants of cultural importance.	Lincoln University for Animal Health Board	Not relevant: outside of database scope
Ogilvie S C, Ataria J M, Waiwai J, Doherty J, Lambert M et al. 2006	Uptake and persistence of the vertebrate pesticide, sodium monofluoroacetate (compound 1080), in plants of cultural importance.	Ecotoxicology 15(1): 1-7	Not relevant: outside of database scope
Ogilvie S C, Booth L H, Eason C T. 1998	Uptake and persistence of sodium monofluoroacetate (1080) in plants.	Bulletin of Environmental Contamination and Toxicology 60: 745-749	Not relevant: outside of database scope
Orr, M. and Bentley, G. (1994).	Accidental 1080 poisonings in livestock and companion animals.	<i>Surveillance</i> 21(1), 27-28.	Not relevant: outside of database scope
Palmer-Jones, T. (1958).	Laboratory methods for measuring the toxicity of pesticides to honey bees.	<i>New Zealand journal of agricultural research</i> 1, 290-300.	Potentially valuable for future update
Parfitt R L, Eason C T, Hoff H, Heng L K. 1995	Sodium monofluoroacetate (1080) leaching through soils.	Bulletin of Environmental Contamination and Toxicology 55: 162-169	Not relevant: outside of database scope
Parfitt R L, Eason C T, Morgan A J, Wright C R, Burke C M. 1994	The fate of sodium monofluoroacetate (1080) in soil and water.	In AA Seawright and CT Eason (eds) Proceedings of the science workshop on 1080. Miscellaneous Series 28. Wellington: Royal Society of New Zealand, pp 59-66	Not relevant: outside of database scope
Parton, K.	Toxicology Update: Sodium monofluoroacetate (1080) poisoning.	Vetscript New Zealand September 2002, -1. 2002.	Not relevant: outside of database scope
Perfect A J and Bell B D, 2005	Assessment of the impact of 1080 on the native frogs <i>Leiopelma archeyi</i> and <i>L. hochstetteri</i> .	DOC Research & Development Series no 209. DOC, Wellington. 58p.	Already in database
R. G. Powlesland, J. W. Knegtmans and A. Styche 1999	Impacts of aerial 1080 possum control operations on North Island robins and moreporks at Pureora in 1997 and 1998	Science for Conservation Series 133. Wellington: DOC	Obtained a soft copy. Added to database.
Powlesland, R.G., J.W. Knegtmans and I.S.J. Marshall 1999	Cost and benefits of aerial 1080 possum control operations using carrot baits to North Island Robins (<i>Petroica australis longipes</i>), Pureora forest park	New Zealand Journal of Ecology (1999) 23(2): 149-159	Obtained a soft copy. Added to database.

R. G. Powlesland, J. W. Knegtmans and A. Styche 2000	Mortality of North Island tomtits (<i>Petroica macrocephala toitoi</i>) caused by aerial 1080 possum control operations, 1997-98, Pureora Forest Park	New Zealand Journal of Ecology (2000) 24(2): 161-168	Obtained a soft copy. Added to database.
Powlesland R G, D.E. Wills, A.C.L. August and C.K. August, 2003	Effects of a 1080 operation on kaka and kereru survival and nesting success, Whirinaki forest park	New Zealand Journal of Ecology (2003) 27(2): 125-137	Obtained a soft copy. Added to database.
Powlesland R G, Knegtmans J W, Marshall I S J. 1998	Evaluating the impacts of 1080 possum control operations on North Island robins, North Island tomtits and moreporks at Pureora: Preliminary results.	Science for Conservation Series 74. Wellington: DOC	Obtained a soft copy *this a key reference to include
Robison W H. 1970	Acute toxicity of sodium monofluoroacetate to cattle.	Journal of Wildlife Management 34: 647-648.	Not relevant: outside of database scope
Ross J G, 2006	Monitoring mohua status in the Maclennan Forest Range, Catlins state Forest Park.	Unpublished report for AHB. Project number: \$-80600. Landsdowne Ventures Ltd, Christchurch 13p	Potentially valuable for future update
Sherley, M. (2004).	The traditional categories of fluoroacetate poisoning signs and symptoms belie substantial underlying similarities	<i>Toxicology letters</i> 151, 399-406.	Not relevant: outside of database scope
Speedy C, 2005	The Non-target Effects of Aerial 1080 Carrot Baiting on Australasian Bittern	AHB report R-80633, AHB, Wellington	Potentially valuable for future update
Spurr E B. 1988	Bird populations before and after 1080-poisoning of possums in Westland National Park.	Unpublished, Forest Research Institute contract report.	Potentially valuable for future update
Spurr E B, 1993a	Review of known effects of 1080 in possum control operations using carrot and cereal batis on non-target species in New Zealand.	Landcare Research Contract Report LC9394/35. Unpublished.	Potentially valuable for future update
Spurr E B. 1999	Are insectivorous birds killed by primary or secondary 1080 poisoning?	Landcare Research Contract Report LC9899/57 for Animal Health Board	Potentially valuable for future update
Spurr, E. (2000).	Impacts of possum control on non-target species.	impact and management of an introduced marsupial'. (Ed. T. L. Montague.) pp. 175-186. (Manaaki Whenua: Lincoln.)	Have a hardcopy. outside of database scope

Spurr E B, Anderson S H. 2004	Bird species diversity and abundance before and after eradication of possums and wallabies on Rangitoto Island, Hauraki Gulf, New Zealand.	New Zealand Journal of Ecology 28:143-149	Obtained a soft copy. Added to database.
Spurr E B and Berben P H, 2002	Are weta populations affected by 1080?	ConScience. Vol 45. Pp 1-3	Potentially valuable for future update
Spurr E B and Berben P H, 2004	Assessment of non-target impact of 1080-poisoning for vertebrate pest control on weta (<i>Orthoptera: Anostomatidae and Rhabdophoridae</i>) and other invertebrates in artificial refuges.	NZ Journal of Ecology 28 (1): 63-72	Obtained a soft copy. Added to database.
Spurr E B, Berben P H, McGregor P G, Arnold G C. 2002	Impacts of simulated aerial application of 1080 poisoned baits on ground-dwelling invertebrate populations	Landcare Research Contract Report LC0102/094 for Animal Health Board	Potentially valuable for future update
Spurr, E. B. and Porter, R. E. R. (1998).	Cinnamamide as a bird repellent for baits used in mammalian pest control	In '11th Australian Vertebrate Pest Conference, Bunbury, Western Australia, 3-8 May 1998.	Potentially valuable for future update
Spurr E B, Powlesland R. 2000	Monitoring the impacts of vertebrate pest control operations on non-target wildlife species.	Technical Series 24. Wellington: DOC	Obtained a soft copy. Not relevant as only covers methodology
Spurr E B, Powlesland R, Livingstone P. 2003.	Roles, risks and benefits of poisons for control of brushtail possums in New Zealand.	Symposium: Use of Pesticides for Wildlife Management.	Potentially valuable for future update
Sweetapple P J, Fraser K W. 1997	Assessment of red deer and possum kills during an aerial 1080 control operation in the Rangitoto Range.	Unpublished, Landcare Research Contract Report LC9697/139	Potentially valuable for future update
Tomplins D, Veltman C J. 2006	Unexpected consequences of vertebrate pest control: Predictions from a four-species community model.	Ecological Applications 16(3): 1050-1061	Not relevant: outside of database scope
Van Klink P A and Tansell A J S, 2003	Western weka (<i>Gallirallus australis australis</i>) monitored before and after an aerial application of 1080 baits in the Copeland Valley, Westland National Park.	DOC Science Internal Series 108. DOC, Wellington. 12p.	Obtained a soft copy. Added to database.
Westbrooke I M, Nicola D. Etheridge and Ralph G. Powlesland, 2003	Comparing methods for assessing mortality impacts of an aerial 1080 pest control operation on tomtits (<i>Petroica macrocephala toitoi</i>) in Tongariro Forest	New Zealand Journal of Ecology (2003) 27(2): 115-123	Obtained a soft copy. Added to database.

Westbrooke I M and Powlesland R G, 2005	Comparison of impact between carrot and cereal 1080 baits on tomtits (<i>Petroica macrocephala toitoi</i>).	NZ Journal of Ecology 29 (1): 143-147	Obtained a soft copy. Added to database.
Wright, G. R., Booth, L. H., Morriss, G. A., Potts, M. D., Brown, L., and Eason, C. T. (2002).	Assessing potential environmental contamination from compound 1080 (sodium monofluoroacetate) in bait dust during possum control operations.	<i>New Zealand journal of agricultural research</i> 45 , 57-65.	Obtained a soft copy. Outside of database scope.