

**Annual Report on
the aerial use of 1080**
For the year ended
31 December 2016

1080



**Environmental
Protection Authority**
Te Mana Rauhi Taiao

Contents

Executive summary	02
Background	04
Organisations that use aerial application of 1080 for pest control	04
Application information	05
Aerial pest control operations	06
Post-operational reports	06
Communication	09
Monitoring	10
Incidents and public concerns	10
Incident summaries	12
Research	14
References	16

Executive summary

This is the Environmental Protection Authority's (EPA) tenth annual report on the aerial use of sodium fluoroacetate (1080) in New Zealand.

1080 is an important weapon in the current armoury of measures to combat the impact of animal pests – mainly possums, rats and stoats – on our environment and economy. There is nationwide acceptance of the need to protect our native birds from predators and the ability of those same predators to carry tuberculosis and spread it among our dairy and deer herds.

The use of 1080 is strictly controlled under the Hazardous Substances and New Organisms Act 1996 (HSNO). It is one of the most closely monitored and controlled hazardous substances in New Zealand.

The EPA must be sure the current use of 1080 remains in the best interests of the environment and economy and its application is carried out according to the Act's rigorous requirements for the handling of a hazardous substance. The EPA receives post-operational reports for all aerial 1080 pest control operations, and publishes this report annually, from the information provided by the operators.

Current views and concerns

Many groups and individuals hold understandable concerns about the use of 1080. The EPA acknowledges those concerns and respects the views of those who express them. However, it is the EPA's current view that the positive benefits of the use of 1080 far outweigh any negative aspects and that, when applied under the provisions of HSNO, its use will not compromise public safety.

This is a view shared by many conservation groups and internationally regarded scientific experts. For example, earlier this year in a major report to Parliament, the Parliamentary Commissioner for the Environment, Dr Jan Wright, noted that the aerial application of 1080 “remains essential for the foreseeable future.”¹

That said, it is acknowledged that there are limitations to such current predator-eradication methods, and this raises the question as to whether 1080 should be seen as the sole solution to predator eradication in New Zealand.

While the application of 1080 has resulted in successful reductions of rats and stoats on the mainland to date, it is acknowledged that current methods are not target-specific, and may result in undesired effects on non-target species. The EPA suggests that to achieve sustainable pest eradication in New Zealand, alternative solutions should also be discussed.

In light of the potential of novel genetic technologies to offer an alternative approach to pest management, the Parliamentary Commissioner also recommended that the Minister for the Environment, the Minister of Conservation and the Minister of Science and Innovation, direct officials to begin developing a programme of staged engagement with New Zealanders on the potential uses of genetic techniques to control predators.

¹ The Parliamentary Commissioner for the Environment, Taonga of an island nation: Saving New Zealand's birds, (Office of the Parliamentary Commissioner for the Environment, May 2017) p. 49

Consult and communicate

This tenth report highlights the important factors applicants must meet for their applications to be successful. In particular, applicants must demonstrate they will consult and communicate widely and be prepared to amend their operational plans in response to any concerns or other issues identified in the consultation process.

In the year under review, consultation with iwi/Māori resulted in changes to nearly half of the aerial operation plans. Generally, significant changes to operational plans following consultation included boundary changes, changes in timing and changes from aerial to ground application.

Extensive monitoring of water quality and any impact on plant and animal species is an important part of the aerial programme.

Following a major reassessment of 1080 in 2007, major changes were made to operating practices. The management of incidents, public concerns and complaints continues to be an important part of the process.

This report contains a summary of incidents and complaints and the action taken as a result. In 2016, 13 incidents and two complaints were reported to the EPA. These came mostly from operators or funding agencies rather than from members of the public or other government agencies. All the reported incidents were breaches of HSNO. All breaches were investigated and no evidence of adverse effects on the public's and operators' health, waterways or land were identified.

This report also details the aerial operations and land area covered in 2016. The 2016 aerial operations focussed on the protection of significant ecosystems, indigenous species and their habitats. These included at-risk populations of birds such as the mohua, whio, kea, kaka, rock wren, bush robin, rifleman, morepork (ruru) and kiwi (several species including tokoeka), at-risk populations of long-tailed bats, and vulnerable plant species such as fuchsia, Hall's totara, and kamahi.

The targeted species were possums, rodents, and wallabies. Stoat populations were also anticipated to be impacted because of the suppression of rodents². In 2016, EPA received a list of 60 proposed operations, and 36 final reports relating to a total of 1,051,204 hectares, DOC covered 619,185 hectares, and TBfree covered 432,019 hectares. In 2015, reports of 45 operations covering 374,227 hectares were received.

The distribution of 1080 across a wider area in 2016 was due to the DOC programme 'Battle for our Birds' being undertaken to control an expected increase in rodent and stoat populations driven by a significant beech mast (flowering and seeding event) during the 2015/2016 summer. Masting occurs when favourable climatic conditions encourage excess seed and flower production, feeding both predators and native species alike. The 2015/2016 masting event was predicted to affect most of New Zealand's beech forests. Operations to target rodents and suppress stoats were carried out across large areas of beech forest mostly in the South Island. The 2016 operations covered an area similar to that covered for the 2013/2014 mast event.

In conclusion, this report summarises nearly 30 ongoing research projects on 1080 and on alternative pest control methods. While the search for a cost-effective alternative to 1080 continues, the New Zealand public can be confident EPA will continue to exercise its legislative responsibilities in respect of the aerial use of 1080 competently and in the best interests of New Zealanders, the New Zealand environment and the New Zealand economy.



Ray McMillan
Manager HS Compliance
Hazardous Substances and New Organisms Group

² Scavenging pests such as stoats are controlled by secondary poisoning when they feed on the dead or dying primary targets of 1080 operations (rodents and possums).

Background

A reassessment of 1080 for use in pest control was completed by the then Environmental Risk Management Authority (ERMA – known since 2011 as the EPA) in August 2007.

The reassessment process found that the benefits of using 1080 outweighed the adverse effects. A decision was made to continue using 1080 with additional controls.

As a result, and to ensure best practice and a consistent approach nationwide, ERMA outlined a management regime for 1080 operations, which required operators to report on all aerial 1080 operations. The EPA has since reported on the outcome of those operations.

Organisations that use aerial application of 1080 for pest control

Control of pests such as possums, wallabies, rabbits, rats, and stoats is done using ground-based and aerial application of poisons. Ground-based operations may include trapping, shooting, or placing various toxins in bait stations. The toxins, or vertebrate toxic agents, may include 1080.

Aerial application is considered by users to be more efficient and effective, particularly over remote or rugged land. The organisations that applied 1080 aerially in 2016 are:

- TBfree New Zealand
- Department of Conservation.

TBfree New Zealand

TBfree New Zealand (a wholly-owned subsidiary of OSPRI New Zealand) is responsible for managing and implementing the National Pest Management Plan for Bovine Tuberculosis (TB Plan) in New Zealand, under the Biosecurity Act 1993.

The TB Plan was approved by the Government in 1998, then amended in 2004 and again in 2011. It provides for measures to control and eradicate TB in cattle and deer herds, and in wildlife populations that act as vectors and reservoirs for the disease. The plan operates in two ways:

- disease control – aiming to control and contain the spread of the disease within and between cattle and deer herds, leading to eradication of TB from herds
- vector control – aiming to control and contain the wild animal species (in most cases possums) responsible for spreading the disease to cattle and deer, with the aim of eradicating TB from wildlife.

TBfree uses a combination of ground-based methods and aerially applied 1080 in its strategy for containing and controlling possums. In 2016, TBfree treated 432,019 hectares of land using aerial application of 1080 (including two joint operations with DOC), which is about 41 percent of the total area covered in 2016.

Department of Conservation

DOC manages approximately 8.6 million hectares of conservation land and a combination of ground-based methods and aerial application of 1080 to:

- improve the health of ecosystems by reducing the impact of browsing, competition, and predation by possums, rats, and other introduced pests
- protect threatened species from predators through direct control and secondary poisoning³
- control rabbits to meet Regional Pest Management Commitments.

In 2016, DOC treated 619,185 hectares for possums or rats using aerial application of 1080, which is about 59 percent of the total area covered in 2016. This significant increase, compared with 2015, was due to the DOC ‘Battle for our Birds’ programme carried out to control an expected rodent and stoat plague driven by a significant beech mast during the 2015/2016 summer. The masting event was predicted to affect most of New Zealand’s beech forests. Operations to target rodents and suppress stoats were carried out across large areas of forest with almost 50 percent (300,000 hectares) of DOC’s programme undertaken in Kahurangi National Park.

Application information

Individual pest management operations are usually singular events that are the annual component of a pest management programme, designed to deliver or sustain a desired management outcome over time, for a particular place.

Where such a programme is underway, with an intention to continue, the areas included are described as being “under sustained management”. The pest management interventions for such areas will occur as required. The period between treatments is designed to minimise the number of operations while still achieving the desired biodiversity outcomes, and is dictated by the population ecology and dynamics of the target pests.

In some cases, large areas may be divided into smaller units and pests managed over time by rotating operations around those smaller units.

Table 1, on page 7, shows treatment areas for different land managers from 2008 to 2016. Apart from 2014 and 2016, when DOC intervened to address risks of predator populations, it shows that the area of land treated with aerial application of 1080 has been relatively consistent since 2008, when monitoring began.

³ Scavenging pests such as stoats are controlled by secondary poisoning when they feed on the dead or dying primary targets of 1080 operations (rodents and possums).

Aerial pest control operations

The controls for 1080 require operational managers to submit information to the EPA after an aerial 1080 operation.

The information must include:

- who undertook the operation and reasons for conducting the operation
- the 1080 formulations used and the application rates
- the location and size of the area covered during the operation
- monitoring information, including any water or species monitoring, if carried out in conjunction with the operation
- an assessment of the operation's outcomes
- an overview of the communication activities (consultation and notification) and outcomes
- an overview of any incidents and complaints related to the operation, and actions resulting from those
- a map of the operational area.

Individual post-operational reports are available on the EPA website.

Post-operational reports

Operation management

The 1,051,204 hectares covered by aerial operations during 2016 were treated by DOC (59 percent) and TBfree (41 percent including two joint operations with DOC). The reported operations included:

- 16 funded by TBfree
- Two jointly funded by DOC and TBfree
- 18 funded by DOC.

Formulations and application rates of 1080

All of the aerial operations to control possums, rats, mice, or stoats, used 1080-laced cereal baits with a 1080 concentration of 1.5 to 2.0 grams (just over ¼ teaspoon) per kilogram of bait. Cereal baits coated with deer repellent were used in nine of the 36 operations.

Bait application rates for possum and rodent control operations varied between 1.5 and 4.5 grams of bait per hectare (a hectare is roughly the size of a rugby pitch).

The average application rate was approximately 2.5 gram of 1080 per hectare for possum control. This application rate is significantly below the maximum allowable rate of 30 grams of 1080 per hectare, set by the 2007 reassessment conditions.

Location of operations

The number of aerial 1080 operations in each region and the sectors using 1080 vary according to the purpose of the operation, topography and land cover. The number of operations in 2016 also reflects the distribution of beech forest, the distribution of birds and snails at risk of local or national extinction, and the current distribution of farms infected with bovine TB.

The regions with the largest number of aerial 1080 operations were Southland with seven operations; Otago and West Coast with six operations each; and Waikato with four operations.

The nature of the area treated also differs by location. For example, the Waikato is highly pastoral with most operations being for TB control. The West Coast has 37 percent coverage with indigenous forest, and aerial application of 1080 is considered a key tool in possum and rodent control programmes.

Table 1: History of treatment areas (thousands of hectares) for 1080 aerial applications

Year	No. of Operations	TBfree (000 ha)	DOC (000 ha)	Regional Councils (000 ha)	Private land (000 ha)		Total area (000 ha)
					Rabbit	Possum	
2008	75	425	107	5	14	13	564
2009	64	314	167	17	17	–	515
2010	45	254	171	5	9	–	439
2011	49	344 ⁴	127	5	10	5	491
2012	48	279 ⁵	136	5 ⁶	12	–	432
2013	57	298	126	16	7	–	447
2014	58	307	645 ⁷	12	2	–	966
2015	45	239 ⁸	104	28 ⁹	2 ¹⁰	1 ¹¹	374
2016	36	427	619	-	-	5	1051

A dash (–) indicates that no operations were reported.

Figures are rounded to the nearest thousand hectares.

4 Includes combined TBfree and DOC operations of 31,500 hectares.

5 Includes combined TBfree and regional council operations of 27,084 hectares.

6 Includes combined council-led and DOC co-funded operations of 2,428 hectares.

7 Includes a joint TBfree and DOC operation of 5,629 hectares.

8 Includes TBfree and DOC co-funded operation of 5,617 hectares.

9 Includes public and private land for combined operations by Auckland Council, Waikato Regional Council and DOC.

10 Includes operation co-funded by a private landowner and DOC of 630 hectares.

11 Operation designed to control populations of wallabies, possums, mustelids and rats.

Size of operations

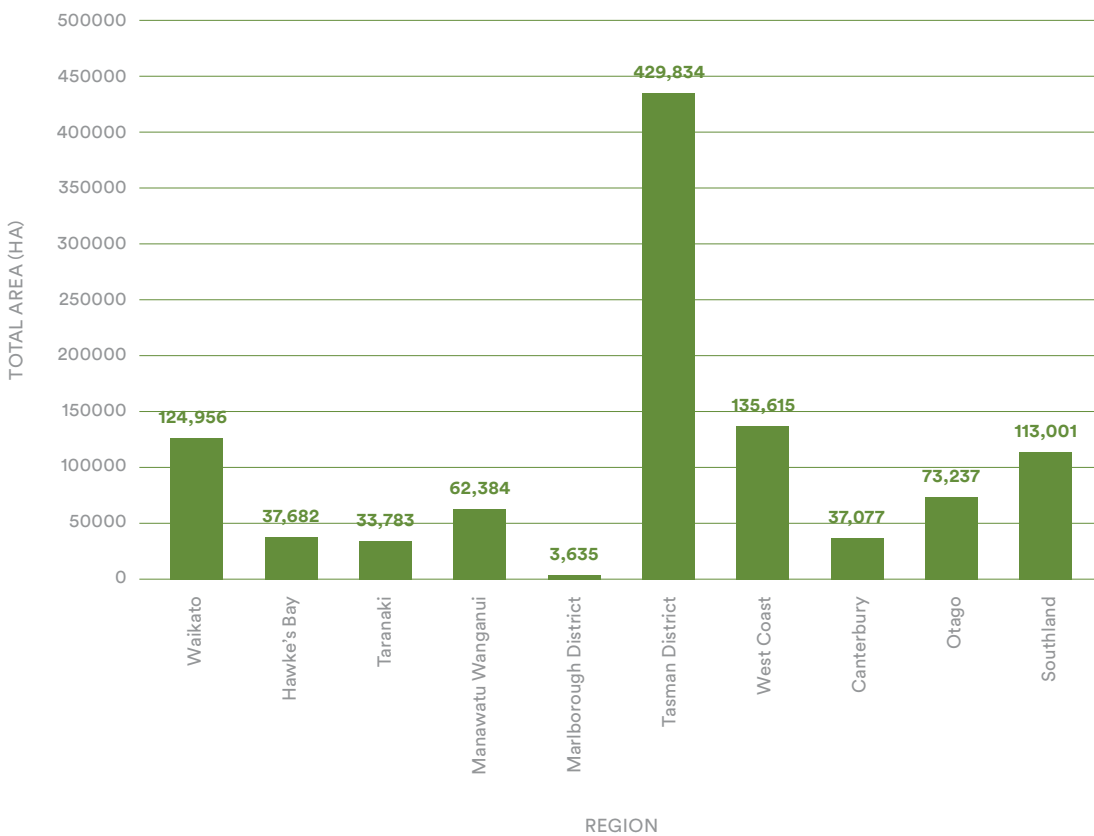
In 2016, the total land area to which 1080 was applied aurally was 1,051,204 hectares. The average size of the area of aerial application was 29,000 hectares, with the largest application covering just under 297,000 hectares and the smallest covering 2,006 hectares. DOC and TBfree carry out operations to control possums and other predators over larger tracts of land where aerial application of 1080 is more efficient and effective than using ground-based methods.

Larger operational areas can delay the recovery of pest numbers in core areas, as it takes longer for pests to migrate into the heart of treated areas.

The average size of the area of aerial 1080 applications was about 34,000 hectares for DOC and about 24,000 hectares for TBfree.

The following graph shows the total number of hectares per region treated aurally with 1080 in 2016. The largest area of application was the Tasman Region, followed by the West Coast and Waikato regions.

Figure 1: Total area (in hectares) per region, for aerial applications of 1080



Communication

The EPA expects operators to consult with and notify neighbours, affected groups, and communities to an extent that is appropriate for each operation.

Consultation with iwi/Māori

The *Communications Guideline for Aerial 1080 Operations* (2009)¹² states that Māori groups should be engaged as early as possible in the planning process when an aerial 1080 operation may be carried out on public land or in an area where the public may be affected. Māori should also be engaged in discussions, with the aim of establishing a good relationship with relevant hapū and iwi.

In 2016, Māori stakeholders were consulted and notified for all 36 aerial operations on public land. Changes as a result of consultation with Māori occurred in 16 operations, as listed below:

- removal of some areas from the aerial programme and boundary changes
- exclusions of some sensitive boundaries and roading networks in use on some properties
- exclusions were placed on some waterways, and high points
- minor boundaries adjustment to ensure stock were not able to access baits
- reduction in the original treatment area due to grazing areas of local farmers
- addition of deer repellent to the bait used within the consented area

Consultation with iwi/Māori resulted in changes to 16 of the 36 aerial operations (44 percent). Conversely, consultation in 20 cases (56 percent) did not result in changes to aerial operations. This indicates that iwi/Māori participation in 1080 operations is valuable and operators are consulting with iwi/Māori.

Consultation with hunting groups

Hunting groups are generally consulted and notified when an aerial 1080 operation is to be carried out on public land where hunting is likely. Hunting groups were consulted in 34 of the operations on public land in 2016 via letters, emails, meetings, and public notices.

Changes to operations as a result of consultation

In 2016, 19 post-operational reports identified one or more changes to the operational plan following consultation as listed below:

- boundary changes were reported for 17 operations
- five operations had boundary changes due to the exclusion of sensitive sites (which can include areas like water supply, huts, and stock that may be at risk from accessing baits)
- the timing was changed for four operations to allow stock rotation or hunting
- 11 operations changed from aerial to ground application of 1080 for parts of the treatment area
- two operations added deer repellent.

Communications guideline for aerial 1080 operations

Before granting permission for an aerial 1080 operation, HSNO enforcement officers of Public Health Units (PHU) assess the consultation carried out against the *Communications Guideline for Aerial 1080 Operations*. The Ministry of Health (MoH) reports the results of these assessments to the EPA.

MoH reported that PHUs received and assessed 70 applications for aerial 1080 operations against the communications guideline. All applications met the requirements in 2016. Eight of these permissions were revoked due to changes in operational details, with replacement permissions being issued.

Not all of the 70 applications for 1080 operations resulted in completed operations due to weather and other site-specific conditions (four operations were cancelled, and others deferred or merged).

¹² Available on the EPA website.

Monitoring

Water monitoring

If an aerial 1080 operation is within the catchment of a drinking water supply, the local PHU HSNO enforcement officers may require water monitoring before intakes are reconnected. This ensures drinking water does not contain 1080 residues that breach the tolerable exposure limit (TEL) of 3.5 micrograms (0.0035 milligrams) per litre of water (3.5 parts per billion). The TEL is set at a level that protects human health and is based on the Provisional Maximum Acceptable Value (PMAV) in drinking water (*Drinking Water Standards for New Zealand, 2005, revised 2008* MoH-set MAV 0.0035 mg 1080/ litre water): www.health.govt.nz/system/files/documents/publications/drinking-water-standards-2008-jun14.pdf

Water monitoring may also be required in other water catchments as part of environmental monitoring for resource consents or for research purposes. It may also be used to provide evidence where a PHU is investigating concerns about alleged water contamination. Water testing can detect levels above 0.1 micrograms of 1080 per litre of water (0.1 parts per billion).

Post-operational water monitoring was carried out for 20 of the aerial 1080 operations in 2016, with 95 samples taken. None of the 95 samples contained 1080 above the level of detection. Hence the TEL (0.0035 mg) was not exceeded in any of the sampled operations.

Since the reassessment in 2007, more than 1,235 water samples from drinking water catchments and other water bodies have been analysed for 1080 (including the 2016 water samples). Of these samples, 15 were above the method detection limit of 0.1 parts per billion, and all were below the human health TEL. Operators and regulatory bodies are likely to continue to test water to verify that specific operations pose no risk to water supplies.

Species monitoring

Plant and animal species are monitored to determine the need for pest control operations and the success of operations. Species monitoring is not a mandatory requirement for 1080 operations, but where monitoring is carried out operators must report the results to the EPA.

Pre-operational monitoring of pest species was carried out for 15 (41 percent) of the aerial 1080 operations undertaken in 2016.

Eleven out of 15 (73%) operators reported meeting or partly meeting their stated target for pest control in 11 operations.¹³

In 13 operations, species that benefit from 1080 applications were monitored for the effects of 1080. These species included kokako, tui, kaka, tokoeka (kiwi) chicks, whio, mohoua, pateke, kārearea, pōwhaitere, kakariki, kotukutuku, large land snail and other threatened invertebrates, local indigenous vegetation, domestic cattle and deer stock.

Monitoring for species and/or ecosystem benefit and for TB presence/absence requires a long-term approach. Because operators must submit reports within six months of completing the application of bait, monitoring in most cases will not have been completed.

Incidents and public concerns

Incidents related to specific operations are described in post-operational reports. The reports for operations undertaken in 2016 are available on the EPA website.

Industry practices, as well as available enforcement methods, have largely improved since 2008:

- operators are now subject to greater accountability when conducting aerial 1080 operations
- permissions are granted with clearer conditions
- industry has developed standard operating procedures and better mapping of boundaries and exclusion zones
- enforcement and funding agencies have more resources for responding to public concerns
- the majority of the complaints and incidents are now reported to the EPA by operators.

Overview of incidents and complaints

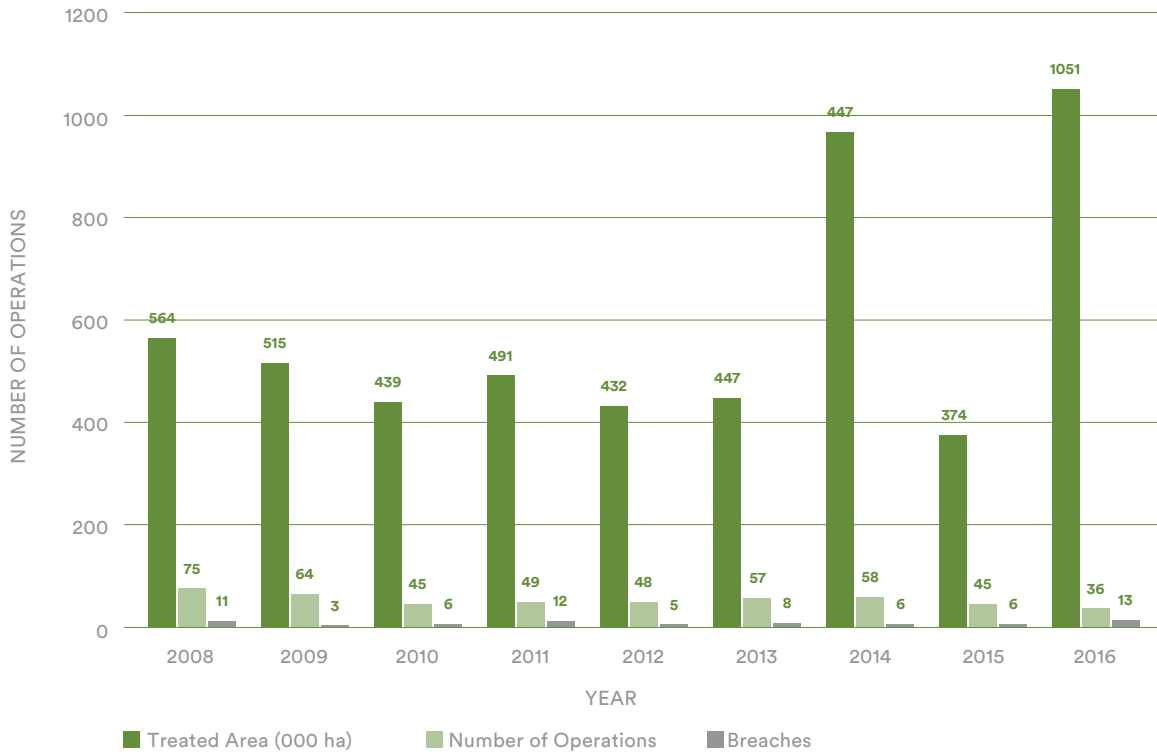
Incidents involving 1080 are defined as any breach¹⁴ of HSNO controls imposed on the hazardous substances under the HSNO Act; any event resulting in an increased risk to public, operator, and environmental safety; and any event that causes significant public risk. A complaint could be reported on matters not relevant to the HSNO controls.

There were 13 breaches reported to the EPA in 2016 (see Figure 2). Figure 2 shows a comparison between total number of operations per year and total reported incidents for the past nine reporting years.

¹³ Target results vary according to monitoring method and are included in post-operation reports available on the EPA website.

¹⁴ A breach is a non-compliance with HSNO controls, or any other legal requirement associated with a 1080 aerial-application operation.

Figure 2: History of breaches reported to the EPA¹⁵



¹⁵ For 2016 Incidents included: misapplication, accidental release, overflight, breach of signage condition.

Incident summaries

This section outlines a brief description of incidents reported to the EPA in 2016, including any compliance issues from operators or members of the public (listed by region, north to south). Four out of the 13 reported incidents were the result of technical malfunction in the baiting buckets.

Waikato region

Operation: Hauhungaroa

Type: Misapplication

Date occurred: 2/7/2016

While completing the operation the operator noticed that baits had been laid in the exclusion area around the Hauhungaroa Hut. Staff checked the hut and surrounding area and found bait 30 metres away from the hut. These were removed at the time. The hut roof and gutter were checked and no bait was found any closer. The incident was internally investigated and compliance advice was provided to the operator.

Type: Overflight

Date occurred: 2/7/2016

Helicopter pilot flew outside the treatment area, not using the approved flight zones. Area flown over was checked for bait, none was found. Incident internally investigated, and compliance advice was provided to the operator.

Hawkes Bay region

Operation: Kaweka East

Type: Misapplication

Date occurred: 31/8/2016

Confusion with PHU consent conditions arose and toxic bait was applied to an area of private land that the PHU had considered to be excluded from the operational area. Two breaches were advised by PHU, one for misapplication in the area to be excluded and one for not checking the area within 24 hours of application date. The PHU investigated the incident and issued a warning to the operator.

Taranaki region

Operation: Taranaki

Type: Overflight

Date occurred: 1/12/2016

Near the end of the day, due to cloud, a helicopter pilot could not return back to the Pembroke Road loading site. He had to fly over a no-fly zone of the Dawson Falls water intake and land at the contingency landing site. The aircraft was not sowing and was carrying an empty bucket at the time. The PHU investigated and considered the safety of the pilot took precedence over a minor technical breach.

Manawatu/Wanganui region

**Operation: Horopito/
National Park/Ruapehu**

Type: Accidental release

Date occurred: 17/11/2016

While a helicopter was being loaded with bait a switch malfunctioned opening the trap door and releasing bait at the loading site. Two ground crew were struck by baits, and received first aid. The incident was internally investigated, and a recommendation was made to install clutches to broadcast buckets.

Tasman District

Operation: Matiri

Type: Accidental release

Date occurred: 18/8/2016

Due to a mistake being made when repairing one of the buckets, the switch that controls the bucket slide was reversed. While the aircraft was starting up, the bucket slide opened while the switch was in the "on" position resulting in bait being spread from the bucket for approximately 5-7 seconds. Due to air hoses on the bucket being accidentally attached in reverse the bucket had to be manually turned off.

The misapplication was on private land and contained within a paddock which was not stocked until the 1080 had detoxified. The area was ground searched and temporary fencing erected.

The contractor provided the farmer with supplement feed to compensate him for the additional loss of grazing that this misapplication caused.

Operation: New Creek/Mokihinui

Type: Accidental release

Date occurred: 22/9/2016

Baiting bucket malfunctioned at loading site and spilt bait on and around the loading site, within DOC land but outside the consented treatment area. Bait was collected and removed, and additional warning signage erected in the area. The incident was internally investigated, and authorities notified. Changes were made to the bucket design to prevent further occurrences.

Type: Signage

Date occurred: 31/10/2016

During a signage inspection by a PHU enforcement officer insufficient warning signage was identified in the Lyell Campsite. The operator rectified this once notified. The issue was that the contractor had positioned the original sign 40m further away from the location identified in the permission. The contractor changed processes to capture these learnings.

Operation: Kahurangi**Type: Misapplication****Date occurred: 8/11/2016**

DOC workers found 1080 baits within 50m of the Sopers Shelter, Waingaro Forks and Anatoki Forks Hut. The baits were removed from within the exclusion zones. The helicopter GPS download shows that the helicopter company breached the legal exclusion zone surrounding Sopers Shelter Hut. However at Waingaro and Anatoki Forks huts the exclusion zones were not breached. It appears that wind drift caused the bait to fall within the exclusion zone.

As a result of this incident three improvements were recommended: to increase the exclusion zone around huts to 200m; increase communications among pilots and operation leader; reiterate to pilots that when applying bait around huts they must remain at a low altitude where practical to ensure wind drift cannot occur. Police were notified.

West Coast region**Operation: Te Maruia****Type: Overflight****Date occurred: 21/11/2016**

A overfly breached the PHU Permission Conditions. The area was checked and the PHU enforcement officer was satisfied that actions taken were sufficient. No further action was needed.

Otago region**Operation: Berwick Forest****Type: Complaint****Date occurred: 2/7/2016**

A landholder was promised notification of the impending aerial operation but was not provided with the requisite notification. The contractor was advised and asked to check their records. They confirmed they had notified the landholder. However, further information supplied from the complainant in subsequent internal investigations showed that notification had not been completed correctly: the wrong phone number was used. The contractor contacted the complainant directly to apologise and has updated system to avoid the scenario being repeated.

Operation: Mount Gold**Type: Complaint****Date occurred: 18/8/2016**

Adjoining land owner was not contacted. The land changed ownership and this appears to have been missed by OSPRI / TBFree, MOH and DOC. As the operation had already taken place, remedial action was not considered necessary other than to make sure the adjoining land owner is not missed in future operations.

Operation: Telford**Type: Overflight****Date occurred: 31/8/2016**

1080 bait was applied outside the consented treatment area. The areas involved were very remote DOC land within the Takitimu Mountains, well away from public access. The PHU was notified, no public health risk was identified.

Operation: Dart Routeburn Caples**Type: Misapplication****Date occurred: 21/10/2016**

The incident occurred as a result of the helicopter pilot turning sharply while laying 1080 bait, combined with the altitude of the flight and a breeze, which caused the bait to go over the excluded area surrounding the Routeburn Falls Hut. The PHU investigated the incident.

Southland region**Operation: Kepler****Type: Incident****Date occurred: 21/9/2016**

As the helicopter took off, the aperture in the bait bucket opened, or was already open, allowing bait to drop on to the spinner which is continually running during operations. This spread bait across the loading site, the adjoining paddock, and the neighbouring shrub land, outside the consented areas. Personnel present were immediately aware of the spill and began collecting the bait almost immediately with both DOC staff outside the loading area and helicopter contractor staff inside the loading zone. Signage notifying presence of bait on the ground in the area was established as soon as practicable. DOC investigated and a warning to the helicopter company was issued.

Shortly afterward, a local resident was hunting in the vicinity of Balloon Loop, adjoining the operation area, he found baits on the track. DOC staff were informed, investigated the site and recovered 206 baits from a 400m stretch of the track.

Research

The reassessment of 1080 in 2007 identified the need for more research on 1080, and on alternative predator-control methods. The 1080 research that has been undertaken in the past year can be broadly categorised into that undertaken by the Department of Conservation and TBFree, the product manufacturers (Orillion and Pest Control Research), or into the categories of Optimising the Use of 1080, Investigating Alternatives to 1080, and Other Related Research.

Department of Conservation

DOC has continued to work on projects that have previously been reported, and has provided updates as pertains to each project's progress and planned future work. These updated projects were:

- Achieving multi-pest control by pre-feeding with non-toxic baits
- Mast stoat control – does aerial 1080 control stoats above the treeline?
- Mast large 1080 block – does aerial 1080 control over large areas slow re-population by predators?
- Operation Ark
- Safety of use of pre-feed in aerial 1080 possum control for tomtit populations
- Ecological outcomes for birds of aerial 1080 baiting for pest control
- Does rock wren nesting success improve as a result of mast-driven predator control above the tree-line?
- Does productivity and survival of whio through a breeding season differ before and after aerial 1080 predator control?
- Mast Kea: Is nesting success and survival improved by aerial 1080 pest control?

- Does mast-driven predator control maintain mohua populations at treated sites?
- Mast Bats - Outcome for long-tailed bats with and without aerial 1080 pest control
- One new project has commenced, which will compare the survival of chicks in a kiwi population within an area regularly treated with 1080 in Kahurangi National Park to survival in an untreated area in the Paparoas.

TBFree

TBFree has continued to work on projects that has previously been reported, and have provided updates. These updated projects were:

- Optimal size of cereal pellet baits for aerial control of possums: A field study
- Ecological outcomes for birds of aerial 1080 baiting for pest control
- Maintaining low possum and rat densities
- 100% Possum Kill.

Field work has been completed on one new project, which is focussed on investigating the effect of a deer-repellent treated-1080 bait on a Sika Deer population.

Manufacturers

The manufacturers of 1080, Orillion and Pest Control Research, have also undertaken research relating to 1080. Some of this research is commercially sensitive. Orillion reports it has made significant progress in the last 12 months in improving its bait quality (including reducing non-target risk and improving efficacy). This work has also resulted in eliminating dust from finished pellets at the time of packing (which reduces the amount of dust that is visible during operations).

Pest Control Research has only recently registered a 1080 bait. It is undertaking in-house research to improve the quality of its product, including work on repellents, and also methods to initiate and promote contact with community groups who undertake vertebrate pest control.

Optimising the use of 1080

There were three papers identified for optimising the use of 1080:

- using a short pulse of 1080 to target untrappable stoats was found to have a positive effect on kiwi survival in the study area
- aerial strip-sowing of toxic baits was concluded to have potential to decrease the amount of toxin used and cost of rabbit control, relative to normal broad-scale bait sowing
- a review was undertaken of the current practices (i.e. the visual and taste cues of baits) used to minimise native bird interactions with 1080 baits. Evidence was not found to be sufficient to recommend changing the colour of baits from green to blue.

Alternatives to 1080

There were three papers identified on alternatives to 1080:

- trials were conducted to investigate encapsulated sodium nitrite. It was determined that sodium nitrite could be suitable as an additional tool for possum control
- the stereoisometric composition of norbormide was investigated, but a clear relationship between this and its palatability was not found
- a derivative of norbormide, pro-toxicant 3d, was found to be more palatable and have a higher efficacy than norbormide. Pro-toxicant 3d was therefore selected for further product development.

Other 1080 research

Six papers were identified relating to other 1080 related research, many of which made recommendations or identified areas for future research:

- the Battle for our Birds operation that was undertaken in 2014 was summarised, and three issues that should be the focus of future research were identified
- a comprehensive review of the trends in the development of mammalian pest control technology in New Zealand was undertaken, and a three-pronged future research strategy was recommended
- the benefits for native biodiversity from vertebrate pest control (nb: control operations were varied; no operations used only 1080) were reviewed, and it was found that possum control benefits vegetation. It was identified that the measurement and monitoring of biodiversity response could be improved; subsequent recommendations were made
- current mammal pest management in New Zealand was summarised, and recommendations/potential opportunities for improvement to the current system were discussed. The goal of predator-free NZ was also investigated and it was concluded that it is not currently feasible. The presented core/halo model of pest management was suggested to be the present best way to improve pest-management outcomes
- long-tailed bat survival was found to be significantly higher in years when ship rat and stoat populations were managed using bait stations, as compared to non-treatment years
- the survival of lesser short-tailed bats during an aerial 1080 operation was monitored and it was concluded that the population of bats was likely to be enhanced as a result.

References

- 1 Latham, A. D. M., Latham, M. C., Nugent, C., Smith, J., & Warburton, B. (2016). Refining Operational Practice for Controlling Introduced European Rabbits on Agricultural Lands in New Zealand. *PLoS ONE*, 11(6), 1-17. doi:10.1371/journal.pone.0158078
- 2 Cowan, P., & Crowell, M. (2017). Visual and taste cues for minimising native bird interactions with toxic 1080 baits – a review of current practices. *New Zealand Journal of Ecology* (41)2, 1-8. doi:10.20417/nzj ecol.41.19
- 3 Shapiro, L., Eason, C., Bunt, C., Hix, S., Aylett, P., & MacMorran, D. (2016). Encapsulated sodium nitrite as a new toxicant for possum control in New Zealand. *New Zealand Journal of Ecology*, 40(3), 1-5.
- 4 Jay-Smith, M., Murphy, E. C., Shapiro, L., Eason, C. T., Brimble, M. A., & Rennison, D. (2016). Stereoselective synthesis of the rat selective toxicant norbormide. *Tetrahedron*, 72(35), 5331-5342. www.dx.doi.org/10.1016/j.tet.2016.07.014
- 5 Choi, H., Conole, D., Atkinson, D., Laita, O., Jay Smith, M., Pagano, M., Rennison, D. (2016). Fatty Acid Derived Pro Toxicants of the Rat Selective Toxicant Norbormide. *Chemistry & Biodiversity*, 13(6), 762-775. DOI: 10.1002/cbdv.201500241
- 6 Elliott, G., & Kemp, J. (2016). Large scale pest control in New Zealand beech forests. *Ecological Management & Restoration*, 17(3), 200-209. doi: 10.1111/emr.12227
- 7 Eason, C. T., Shapiro, L., Ogilvie, S., King, C., & Clout, M. (2017). Trends in the development of mammalian pest control technology in New Zealand. *New Zealand Journal of Zoology*, 1-38. www.doi.org/10.1080/03014223.2017.1337645
- 8 Byrom, A., Innes, J., & Binny, R. (2016). A review of biodiversity outcomes from possum-focused pest control in New Zealand. *Wildlife Research*, 43(3), 228-253. www.dx.doi.org/10.1071/WR15132
- 9 Parkes, J.P., Hugent, G., Forsyth, D. M., Byrom, A. E., Pech, R. P., Warbuton, B., & Choquenot, D. (2016). Past, present and two potential futures for managing New Zealand's mammalian pests. *New Zealand Journal of Ecology*, (41)2, 151-161. Doi:10.20417/nzj ecol.41.1
- 10 O'Donnell, C. F. J., Pryde, M. A., van Dam-Bates, P., & Elliott, G. P. (2017). Controlling invasive predators enhances the long term survival of endangered New Zealand long-tailed bats (*Chalinolobus tuberculatus*): Implications for conservation of bats on oceanic islands. *Biological Conservation* (214), 156-167. www.dx.doi.org/10.1016/j.biocon.2017.08.015
- 11 Edmonds, H. F., Pryde, M., & O'Donnell, C. (2017). Survival of PIT-tagged lesser short-tailed bats (*Mystacina tuberculata*) through an aerial 1080 pest control operation. *New Zealand Journal of Ecology*, 41(2), 1-7. Doi:10.20417/nzj ecol.41.20
- 12 Edmonds, H. F., Pryde, M., & O'Donnell, C. (2017). Survival of PIT-tagged lesser short-tailed bats (*Mystacina tuberculata*) through an aerial 1080 pest control operation. *New Zealand Journal of Ecology*, 41(2), 1-7. Doi:10.20417/nzj ecol.41.20

Level 10, 215 Lambton Quay
Wellington 6011 New Zealand
+64 4 916 2426

www.epa.govt.nz

ISSN 1174-9873 (Online)

New Zealand Government