Water monitoring recommendations for Hunua Ranges pest control project, 2015

Prepared by Penny Fisher, Landcare Research.

Purpose:

To describe a water sampling and and testing regime appropriate to determine whether drinking water drawn from reservoirs in the operational area contain detectable concentrations of the vertebrate toxic agent sodium fluoroacetate (1080) as the result of proposed aerial application of 1080 pellet baits in the Hunua ranges for rat and possum control.

These recommendations are supplementary to the regulatory monitoring requirements that will be determined by the Regional Public Health Service. These recommendations were prepared in recognition of likely community concerns and perceptions of risk around contamination of drinking water with regard to the aerial application of 1080, and as such describe a water monitoring regime 'over and above' what is likely to be recommended by the Regional Public Health Service.

Background:

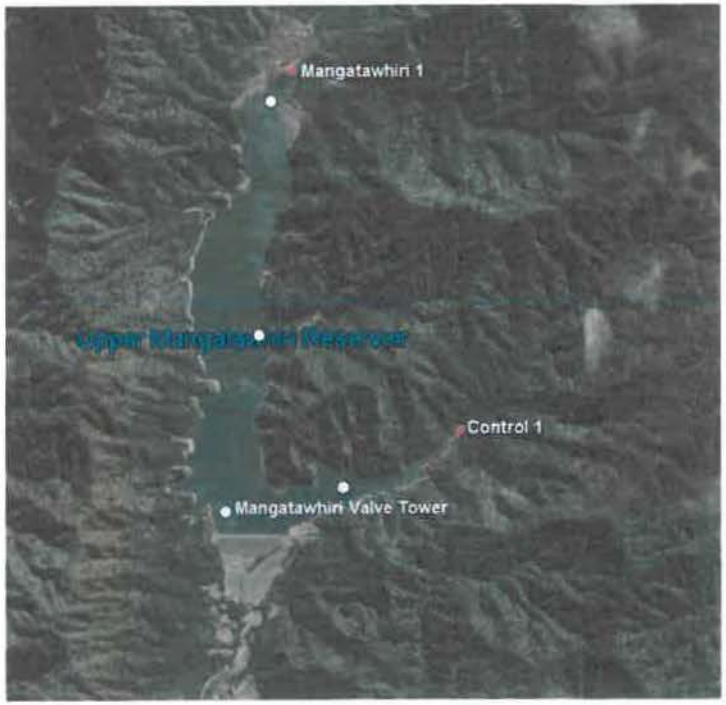
The four reservoirs in the operational area were regarded as two pairs; Mangatangi / Cosseys and Mangatawhiri / Wairoa, water monitoring from one pair of reservoirs will be undertaken simulataneously, before monitoring in the other pair of reservoirs is undertaken simultaneously.

For each of the four reservoirs, suggested water sampling locations are shown as white dots (four in each reservoir). These 'minimum' locations were selected to represent runoff from each of four quarters of the catchment surrounding the reservoir. We recommend that water samples from a minimum of four sampling locations be tested in each reservoir, with the valve tower sampling locations being the most important.

Mangatangi/Cooseys


Cosseys 1
Cosseys 3
Cosseys 2
Cosseys 4
Cosseys Reservoir
Cosseys VT
Cosseys 6

Mangatawhiri/Wairoa



Number / timeframe of sampling from each site:

Pre-operational monitoring of water samples is not considered necessary. The approval for the aerial bait applications from the Medical Officer of Health is expected to specify the general timeframe in which water samples will need to be taken post-baiting; this is usually within 48 hours.

Water samples taken within 8 hours of bait application are expected to provide the greatest likelihood of detecting any residual 1080 - if bait has entered the water. While in this instance buffers around the reservoirs are expected to prevent this occurrence, we recommend (if practical) that water sampling is undertaken within 6-8 hours once all of the aerial bait application around the buffered perimeter of the relevant reservoir is completed (see Table below). However, the 6-8 hour recommendation may not be practicable if it means sampling would not be undertaken in daylight, or undertaken in other hazardous conditions, so if samples cannot be undertaken within 6-8 hours they should be undertaken as soon as practical and ideally within 12 hours of completion of bait application in the catchment.

To allow estimates of when water samples were taken, relative to completion of aerial bait application in nearest locations, the time each water sample was taken should be recorded alongside GPS location and date. This will allow, in the event of detection of 1080 in a water sample, the precise sampling time to be matched to the bait application and location data from the helicopter.

As a conservative 'trace back' measure, we also recommend taking and archiving (i.e. not immediately analysing) water samples from a larger number (up to 10) of GPS-ed sites around each reservoir on each sampling occasion - if it is practical they could be approximately evenly spaced around the perimeter of each reservoir. These additional samples should be stored frozen at -80°C, rather than transferred to the analysing laboratory for testing. If any of the tested samples from the four 'minimum' sites come back with any detectable concentrations, then these stored samples from corresponding reservoir / nearest sample locations could be tested in turn to provide more information about the extent or point source of the discharge. These archived samples can be stored at -80°C for a maximum of four weeks, before being discarded. In this time they will provide a relatively low-cost back-up that can be tested in the instance of any positive results from the 'minimum' sample sites, or to address community concerns about water quality.

Sample location	Sampled when after bait application	Fate of samples
Four minimum points in each reservoir	Between 6-8 hours (or as soon as practical) after bait application	Chill / transfer to testing laboratory for rapid analysis
Perimeter points around each reservoir	Between 6-20 hours after bait application	Store frozen -80°C as archive*
Four minimum points in each reservoir	Between 20-24 hours after bait application	Chill / transfer to testing laboratory for rapid analysis
Perimeter points around each reservoir	Between 24-48 hours after bait application	Store frozen -80°C as archive
Four minimum points in each reservoir	Between 40-48 hours after bait application	Chill / transfer to testing laboratory for rapid analysis
Four minimum points in each reservoir	Approx 72 hours after bait application	Store frozen -80°C as archive
Four minimum points in each reservoir	One week after bait application	Store frozen -80°C as archive
Four minimum points in each reservoir	Two weeks after bait application	Store frozen -80°C as archive

* -80°C recommended to ensure any 1080 present does not degrade, storage life no more than four weeks.

Consideration also needs to be given to another round of minimum & perimeter water sampling and testing of the 'minimum' samples, if bait monitoring plots show that baits may still be present on the ground in either of the catchment areas, during a significant (>25 mm) rainfall. This is to address perceptions of 1080 leaching from uneaten bait and entering waterways in runoff, or carcasses of poisoned animals washing into reservoirs.

Water sampling procedures:

It is vital that water samples are taken from each site in a way that ensures that samples are not contaminated by the sampler, sample containers, or subsequent handling.

The limit of detection in water samples for the testing method is some 15 million times lower than the typical concentration in possum baits (the method limit of detection is 0.1 ng/mL (ppb)). Hence the method for testing the sample is extremely sensitive and even minute amounts of 1080 will be detected. Sample containers must not therefore become contaminated in any way, even externally.

- Containers must be absolutely clean and thoroughly flushed inside and out several times with water during filling.
- No 1080 bait or other contaminated material, such as bait containers, should be in vehicles used in the transport of water samples.
- It is essential to isolate the process of sample collection from the baiting operation and the personnel involved in it.

Samples should be taken, whenever possible, 30 cm below the water surface and in the case of the reservoirs (rather than streams or rivers) ideally samples should be taken from points where the water depth is at least 1 metre. Sample bottles should be rinsed two or three times in the water source before collecting the sample. However, this practice should not be used when the waterway being sampled has high contents of suspended solids.

Because 1080 is known to degrade in biologically active water more rapidly at higher temperatures water samples should be analysed as soon as practicable and until analysis, kept frozen to ensure that any 1080 in the sample does not degrade. Polypropylene plastic sample bottles should be used and these need to be able to withstand freezing to −20°C. Each sample should be at least 200 mL in order to provide sufficient water for repeat testing; sample bottles should be no more than 80% full to allow for expansion when freezing.

- Samples should be frozen as soon as possible if they are not to be tested within 24 hours.
- Urgent samples for 24-hour turnaround testing may be sent unfrozen to the testing laboratory, but they must be chilled to 4°C and placed on ice as soon as possible after collection.
- Samples should be stored at a temperature as close to −20°C as practical and certainly below 0°C and sent to the laboratory as soon as practical after collection.

It is important to include the following submitting / label information for each batch of water samples submitted for analysis:

- Definitive name for the area of the operation and map reference (GPS) for the treatment area
- Date for the start of the operation
- Bait type and concentration of 1080 (e.g. 0.15% pellets)

- Sowing rate
- Number of samples taken before poisoning
- Number of samples taken from the treatment area after poisoning
- Number of samples taken from the treatment area after a significant amount of rainfall, e.g. 25 mm
- Number of samples taken from drinking water supplies
- Time and date sample was taken

If the water samples are to be tested by Landcare Research, a 24-hour service for critical samples is also offered for which the following are required:

- Notification 1 week in advance for possible samples
- Warning of 1 day before sample arrival
- Samples must be received at the laboratory by 10.30 am. on the day of testing
- The service will be available on a Friday only if a client representative will be available on Saturday to receive results
- No more than 10 samples can be tested on a 24-hour basis
- Results will be available no later than 9.30 a.m. on the following day.