Assessing Feasibility and Interest of a Community Based Predator Detector Dog Programme in Upper Hutt

An Interactive Qualifying Project submitted to the faculty of the Worcester Polytechnic Institute.
In partial fulfillment of the requirements of the Degree of Bachelor of Science

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Abstract

Predator detection dogs are a method of locating invasive predators that threaten New Zealand's endemic species. We assessed the feasibility of a community-based detector dog programme for Pest Free Upper Hutt. We observed and interviewed expert dog handlers and trainers, surveyed Upper Hutt dog owners and PFUH coordinators, and created a short film to motivate and inform the public about detector dogs. Experts informed us of difficulties the programme may encounter. We created a "good fit" classification for potential handlers based on dog age, time, and money. We found there is a considerable amount of interest and support, however, only 9 of 140 respondents were a "good fit." We provided alternatives to detector dog handling to respondents that were not a "good fit."

Executive Summary

Aotearoa New Zealand's isolation in the Pacific Ocean fostered a land free of mammalian predators, leading to a unique biodiversity of species found only on the country's numerous islands. Unfortunately, the land's first settlers brought non-native species, including rats, possums, stoats, and other predatory species capable of disrupting and endangering the island's sensitive ecosystem. As of 2022, one-third of New Zealand's native land species are threatened or on the brink of extinction. With such a drastic statistic and a rapidly deteriorating ecosystem, the country has established a shared commitment to local and national restoration goals. The Department of Conservation and its Predator Free 2050 programme aims to mobilize, innovate, and accelerate efforts to eliminate the three most dangerous invasive predators: rats, possums, and stoats.

Upper Hutt on the North Island is one region of focus for this conservation effort. Upper Hutt is home to native bird species such as the tui and the kererū. Invasive predators, including rats, possums, and stoats, are feasting on native bird eggs, chicks, and endangered plants. Pat van Berkel is the Programme Coordinator of Pest Free Upper Hutt (PFUH), a subgroup of the Royal New Zealand Forest and Bird Society. Forest and Bird is a well-respected national organisation dedicated to defending nature by protecting native animals and their habitat. This subgroup utilizes trapping initiatives, grants, and community outreach to fight invasive species in the region. Community involvement is critical to its success. One novel detection method of interest to our sponsor is the effective use of pest-detector dogs. As Upper Hutt moves into the latter stages of a pest eradication programme, detector dogs may become essential in finding the remaining inhabitants that cannot be caught using conventional trapping and baiting methods.

Through the reviewing of literature about conservation measures, detector dog training methods, and the importance of preserving the natural balance of Upper Hutt, we have identified key aspects to keep in mind while completing our project. By working closely with Pat van Berkel, Pest Free Upper Hutt, and members of the Upper Hutt community, our team hopes to encourage community support for native wildlife while also controlling pests within the region. In relation to the programme opportunities for residents, prospective participants need to understand that dog traits do not matter as much as the dog-handler connection and the willingness to put time into dog and handler training. Next, we will discuss our goals and objectives for the project.

Project Goal and Objectives

Our goal was to assess the feasibility of a community-based detector dog programme in Upper Hutt and motivate the eligible percentage of Upper Hutt citizens to consider a detection dog career. To achieve this, our team planned to accomplish the following objectives:

1. Observe existing training protocols and interview expert detector dog handlers as well as obedience and scent trainers.
2. Assess community interest in a detector dog programme.

3. Develop community detector dog awareness media for Pest Free Upper Hutt's use.

Methods

Our team conducted our first two objectives simultaneously. Field observation of a detector dog and handler in the field allowed us to understand the traits necessary for the handler and dog. Interviews further advanced our knowledge of dog and handler traits required for success, as well as time commitments and financial commitments. We observed scent and obedience classes in the Wellington area (Upper Hutt Dog Training Club, Lower Hutt ACE Dog Training LTD, and Wellington Canine Obedience Club). These observations allowed us to understand existing recreational training programmes for scent work that could be translated into either scat detection or live pest detection. The surveys allowed us to assess community interest in a detector dog programme and interest within PFUH Coordinators. We based our survey questions on background information gathered from reviewing various literature about existing detector dog training methods. Our first survey was a targeted dog owner survey. This allowed us to assess a sample of dog owners in Upper Hutt and gauge their opinions on the potential programme. We distributed the surveys throughout the Upper Hutt community in public parks, vets, pet stores, the library, and the town hall. We also posted the survey on Upper Hutt community Facebook pages. We published the survey for two weeks, and roughly 140 responses were collected. We distributed the second survey via email to PFUH Coordinators. This survey allowed our sponsor to understand the coordinators' opinions about the potential programme. Without their support, the programme may not have the traction it needs to succeed. The third objective involved creating a film to spread awareness of detector dogs and inform interested community members of the recommended dog and handler traits necessary for detection work. Our team completed the project's third objective following the conclusion of the interview and survey analysis, although we collected videos for the film while on field observations. We developed the film for our sponsor to promote a variety of applications as the programme progresses.

Results

After analysis of observations and interviews, we determined a list of six traits to consider for the successful training of a detector dog handler. These six traits were as follows: knowledge of training and canine body language, suitable dog age, time available, finances available, balance of obedience and independence, and separating praise for a detector dog from a pet dog. Due to time constraints and making sure the survey was palatable to possible respondents, we determined the three most important characteristics that classify a respondent as a "good fit" for the programme. These are: the age of the dog, time commitment, and financial commitment. Based on the information given in the targeted dog owner survey, nine out of the 140 respondents qualified as a "good fit." We concluded there were multiple additional traits essential to successfully training a detector dog, but not included in the "good fit" classification. The interviewees brought up these traits, and we regrouped them into barriers to success. These

barriers to success include the dog's balance of obedience and independence, separating praise for a detector dog from a pet dog, and understanding the legalities and safety risks detection work poses. Experts agree that if a volunteer is willing to put the same commitment to the role as a professional by overcoming these barriers, there is room for success.

Conclusions & Final Recommendations

To provide recommendations to Pest Free Upper Hutt on whether or not to proceed with creating a community-based detector dog programme, we compared the results of surveys, interviews, and previous research. Nine survey respondents were deemed a "good fit" for the programme. These respondents were willing to commit time, money and own a dog under two years of age. Our team concluded that a small-scale, widespread, community-based detector dog programme could work but has several barriers to success. Based upon the data collected and our key findings, our team determined that to have a successful programme, it takes specific qualities of both dog and handler to be fit for pest-detection training. The list below details recommended traits and considerations for the dog and handler to have the most success at training.

Dog Traits
- The dog should have a high drive and energy to get a treat or play with the toy. If the dog is not very motivated for the reward, it will not perform the action.
  - This is even more important than having a dog with a prey drive.
- The dog should be under two years of age. The younger the dog, the easier to train. It is also preferred for the owner to know the dog's history to understand how the dog may react to training.
- The dog should be very obedient and able to be recalled for the dog's safety. Ex. working near a road, cliffs, or other dangerous environments.
- The dog should also be independent enough to go and look for the scent without direct human guidance.
- The dog must not be a "Bully" breed if certification through the Department of Conservation, Conservation Dogs Programme is desired.
- The dog should be trained in one scent type to give the most accurate cues.

Handler Selection Criteria
- The handler should be well versed in their dog's body language. They must be able to understand what their dog's cues mean and their dog's feelings.
- The handler must be willing to spend at least an hour on training per day. Detector dogs need to be trained for four 15-minute sessions per day to be confident in scent work and aversion from native species.
- The handler must be willing to pay for training classes or materials to train the dog at home or willing to purchase a pre-trained dog.

- There are options for grants from the government for training, though funding is limited.
- The handler should be active, particularly enjoy hiking/walks, as a lot of detection work is through thick bush.
- The handler must refrain from constantly exposing the dog to its target scent in the home environment, or it will be desensitized.
- The handler needs to be willing to devote a separate form of praise to pest detection, as it is very easy to undo training by rewarding the dog for actions that do not have to do with scent work.
- Ideally, the handler must be living in a home with no children or members who are unwilling to follow strict guidelines of care.
  - This includes during vacations, as the dog should be kept with someone who understands detection training.
- The handler must understand the risk of pest detection, including the following risks:
  - Insurance liability
  - Injury from target species, other dogs, or environment
  - If the dog is not DOC certified and kills a native species, it may be required to be euthanized and the owner may be fined or imprisoned.

In addition, we compiled a series of alternative options for our sponsor to promote to individuals who are not fit for detection work but still want to help pest eradication efforts:

1. Taking scent classes and attempting scat detection
2. Hiring a live detection or scat dog
3. Avian aversion training
4. Responsible dog ownership

Based on the recommendations above, our team is confident that a future team could further progress a uniform scent programme that introduces household dogs to scent work with pests or scat. This would expand PFUH's efforts in pest control and get the community more involved and engaged with detection efforts.

Acknowledgements

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Glossary of Abbreviations or Acronyms

DOC - Department of Conservation
PFUH - Pest Free Upper Hutt
WCOC - Wellington Canine Obedience Club
UHDTC - Upper Hutt Wellington Training Club
NZD - New Zealand Dollars

Predator detection and pest detection refer to the same activity.

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1. Introduction

Aotearoa New Zealand's isolation in the Pacific Ocean fostered a land free of mammalian predators, leading to a unique biodiversity of species found only on the country's numerous islands. Unfortunately, the land's first settlers brought non-native species, including rats, possums, stoats, and other predatory species capable of disrupting and endangering the island's sensitive ecosystem. As of 2022, one-third of New Zealand's native land species are threatened or on the brink of extinction. With such a drastic statistic and a rapidly deteriorating ecosystem, the country has established a shared commitment to local and national restoration goals. The Department of Conservation and its Predator Free 2050 programme aims to mobilize, innovate, and accelerate efforts to eliminate the three most dangerous invasive predators: rats, possums, and stoats.

Upper Hutt on the North Island is one region of focus for this conservation effort. Upper Hutt is home to native bird species such as the tui and the kererū. Invasive predators, including rats, possums, and stoats, are feasting on native bird eggs, chicks, and endangered plants. Pat van Berkel is the Programme Coordinator of Pest Free Upper Hutt (PFUH), a subgroup of the Royal New Zealand Forest and Bird Society. Forest and Bird is a well-respected national organisation dedicated to defending nature by protecting native animals and their habitat. This subgroup utilizes trapping initiatives, grants, and community outreach to fight invasive species in the region. Community involvement is critical to its success. One novel detection method of interest to our sponsor is the effective use of pest-detector dogs. As Upper Hutt moves into the latter stages of a pest eradication programme, detector dogs may become essential in finding the remaining inhabitants that cannot be caught using conventional trapping and baiting methods.

This project has aided Pest Free Upper Hutt initiatives and, more broadly, contributed to New Zealand's Predator Free 2050 target. The goals of this project were to:

1. Assess the feasibility of a community-based detector dog programme in Upper Hutt.
2. Motivate the eligible percentage of Upper Hutt citizens to consider a detection dog career.
3. Provide alternative recommendations for community members who cannot commit the time, money, or suitable dog for the detector dog programme, furthering community involvement.

The success of a potential detector dog programme was determined through expert interviews and observing training protocols. We assessed community interest through a survey. We classified a "good fit" for the programme as a survey respondent who owns a young dog and is willing to make significant time and financial commitments. We created a promotional film to advertise the optimal handler and dog fit for the Pest Free Upper Hutt Community and distributed it to those survey respondents. By assessing community interest in a detector dog programme and creating a film to advertise the optimal handler and dog fit for the programme, we were able to further motivate the Upper Hutt Community in widespread pest detection efforts. Additionally, we provided a list of alternative methods that would contribute to pest detection and eradication methods, re-motivating Upper Hutt's backyard trappers.

2. Background

This chapter examines some of the ways we leveraged community engagement to be effective in detecting invasive wildlife. Throughout this chapter, we discuss the existing environment and historical development of Aoetearoa's non-native predators, various pest detection methods, and introduce literature about detection dog training methods and programmes. Additionally, we will present key stakeholders at play in this process.

2.1: The Fragile Ecosystem of Aotearoa

Aotearoa has a rich biodiverse ecosystem with native species ranging from lizards to the national bird, the flightless kiwi. Early settlers from around the world traveled to island nations beginning in the 1200s (Joseph, 2009). Subsequent waves of settlers arrived primarily from Europe in greater numbers with ships and a motivation to treat the land as rich in resource consumption opportunities. Māori and European settlers cut down many trees to build farmland for crops and livestock, changing the landscape across the country for the native species. Additional species, such as rats and mice, were accidentally introduced to the island through ship traffic. These rats had a detrimental effect on many bird species since they prey on ground-dwelling birds' vulnerable chicks and eggs. Settlers brought other species to the country on purpose. In the 1800s, Possums were introduced to New Zealand from Australia in the fur trade industry. They now reside in the country, taking up many arboreal resources from other native species. Stoats were brought to Aotearoa from Britain in the 1870s to kill rabbits. Along with rabbits, these stoats began feasting on chicks and eggs. Britain brought cats onto ships to control rat populations. These cats were accidentally released on land, continuing to add to the invasive species population that disrupted the native species and their ecosystem. Even large mammals such as deer were purposely brought for recreational hunting and released into the wild. Due to these introduced pests, 43% of the native bird species are endangered or extinct, including moa, owls, hawks, eagles, quails, and wrens. Non-bird species were also significantly reduced, including native lizards, frogs, and bats (Brockie, n.d). There have been an estimated 33 extinctions in New Zealand over the last 100 years (Joseph, 2009).

Several programmes have been introduced in New Zealand at the federal and local community council level to reduce pests. However, protection and conservation can be inconsistent. Often, conservationists overlook some threatened species because there are more urgent concerns for species on the brink of extinction. These species require more focus as the threat of their extinction poses risks to the rest of the ecosystem they inhabit (Joseph, 2009). Community organisations started to take the problem seriously in 2012, with the Apollo programme to offset mammalian predators on the island. This programme used methods such as traps, lures, and hunting in a multi-dimensional effort to reduce the invasive pest species. In the case of offshore islands, communities, and conservation organisations successfully removed predators from these smaller ecosystems. Unfortunately, only 0.5-10% of invasive pest species have been eliminated on the main islands (Russel, 2015). To counter the impact of these invasive pest species, the Department of Conservation (DOC) enacted the Predator Free 2050 initiative,

which gives native species legal protections to aid their survival (New Zealand Government, 2020).

Figure 1: The Hutt River flowing through Upper Hutt Valley (Up the Creek, n.d.)

Many communities around New Zealand have started their predator eradication programmes and plans based on the Predator Free 2050 initiative. One of these communities with interest in preserving the fragile ecosystem is Upper Hutt. Pictured above (figure 1) is the Hutt River flowing through the Upper Hutt Valley. Upper Hutt is a prominent region of New Zealand located about 26 kilometres northeast of Wellington. In collaboration with Forest and Bird New Zealand, Pest Free Upper Hutt aims for success in pest control over all bush areas and bird corridors throughout Upper Hutt. They also hope to welcome the repopulation of native birds, bats, and insect species to the region by motivating community members to set up backyard traps that help eliminate rats, possums, and stoats (Predator Free Hutt Valley, 2016). Along with backyard traps, people use many other pest elimination methods throughout New Zealand.

2.2: Pest Detection and Elimination Methods

Detection and elimination methods conducted by humans are currently the primary strategies for pest eradication in New Zealand. Human-conducted detection and elimination methods include using cameras, monitoring cards, searching for scat, trapping, hunting, and setting poisonous bait. Among these detection and elimination methods, trapping is one of the most common and has been used since the 1920s to trap possums (Joseph, 2009). Traps range from a claw-bite system to devices that electrocute the pest. The New Zealand Government regulates traps to ensure that trappers across the country use a standardized system for ethical purposes and an easy method to keep track of eliminated pests (Warburtin, 2022). However, trapping requires upkeep and frequent monitoring to ensure the trap is baited or if predators have been caught (Predator Free NZ, 2022).

In addition to traps, poison is another prevalent method. 1080 poison is the most common poison used. The most frequently used delivery methods include aerosol sprays over remote areas, setting poisoned bait in traps, and dropping 1080 bait from helicopters (Department of Conservation, 2022). The poison is biodegradable and able to return to the environment 24 hours after usage without polluting waterways. 1080 poison only affects mammals, which allows it to selectively kill invasive species, as the only native mammal to New Zealand is one species of bat. Despite its effectiveness, 1080 poses risks to domestic mammals (Department of Conservation, 2022). Another method is hunting, where hunters seek out pests and shoot them with guns. However, hunting only accounts for a small fraction of pest elimination, and accuracy is limited. Many hypothetical solutions are being studied nationwide, such as genetic modification and more advanced traps, but they have yet to pass through government vetting and public support.

As New Zealand continues with pest eradication methods, there have been breakthroughs in a new and exciting method of pest detection, not by humans, but by dogs. The Department of Conservation in New Zealand has a well-established, professional "Conservation Dogs Programme." The programme consists of dog handlers and detection dogs specifically trained to find either native, protected, or pest species or their scat. Professionals deemed that setter and pointer dog breeds are most suitable for finding protected species, while they typically use terriers for pest detection (Conservation Dogs Programme, n.d.). Individuals interested in becoming a handler or conservation dog trainer must become fully certified to legally detect on DOC-protected land. Training must be completed independently from DOC as the organisation does not offer training through the Conservation Dogs Programme. To become fully certified, one must complete a handler application and attend a selection interview. The handler will receive an interim certificate assessment for their team, issued for six months before the full certificate assessment is required. Handlers must renew the certification every three years but DOC recommends regular ongoing work to maintain the proficiency and competency of the dog (Conservation Dogs Programme Procedures, n.d.). A Standard Operating Procedure exists to help guide users in topics such as "accessing protected species and pest detection dog services" as well as "obtaining certification for handlers and dogs" (Conservation Dogs Programme Procedures, n.d.). The photo below (figure 2) pictures a detector dog who was able to complete certification by DOC. However, DOC's Conservation Dog Programme is not the only way to get involved in protecting native species.

Figure 2: Department of Conservation detection dog in the field (Conservation Dogs Programme, n.d.)

A second training protocol for dogs currently practiced in New Zealand focuses on preventing household dogs from interacting and potentially injuring kiwi and other ground-dwelling birds. This awareness effort is known as Kiwi Avoidance Training. In this case, dogs are fitted with an electronic collar and guided to walk past kiwi or other ground-dwelling bird props. If a dog decides to show interest and approach the bird prop, trainers execute negative reinforcement through a shock from the collar. Training continues until the dog avoids the bird prop and shows no interest. DOC requires dogs to be retrained every year or two to keep the aversion method relevant (Kiwi Avoidance Training, Home, 2021). Kiwi Avoidance Training can be applied to species other than kiwis and is required by DOC (under the term non-target/avian aversion training) for detector dogs to become certified successfully (Department of Conservation, 2022).

2.3: Community Participation and Buy-In

New Zealand Government's Predator Free New Zealand 2050 plan employs a national strategy that requires citizen efforts. This plan was deemed essential to the country's future of a restored ecosystem. Our project will focus primarily on the 'mobilize' aspect of the Pest Free strategy. We worked to expand the pest-free community buy-in to gauge the feasibility of a potential community-based detector dog programme. Lincoln University publishes a report every three years that compiles public perceptions involving aspects of New Zealand's environment. The 2019 report included a case study as well as general survey questions about the presence of pests in residential areas. The "Big Four" classification is given to the most prevalent predator species: rats, possums, stoats, and ferrets. One of the main points of interest found through the

survey was that residents had experienced an increase in predators close to their dwellings. With larger populations of pests flocking to residential areas, the problem now lies with the residents to find ways to control them. Community perception from this study and others have shown that residents do not mind killing pests. However, they would appreciate more organized efforts that could lead to a steady decline in predator populations (Hughey et al., 2019).
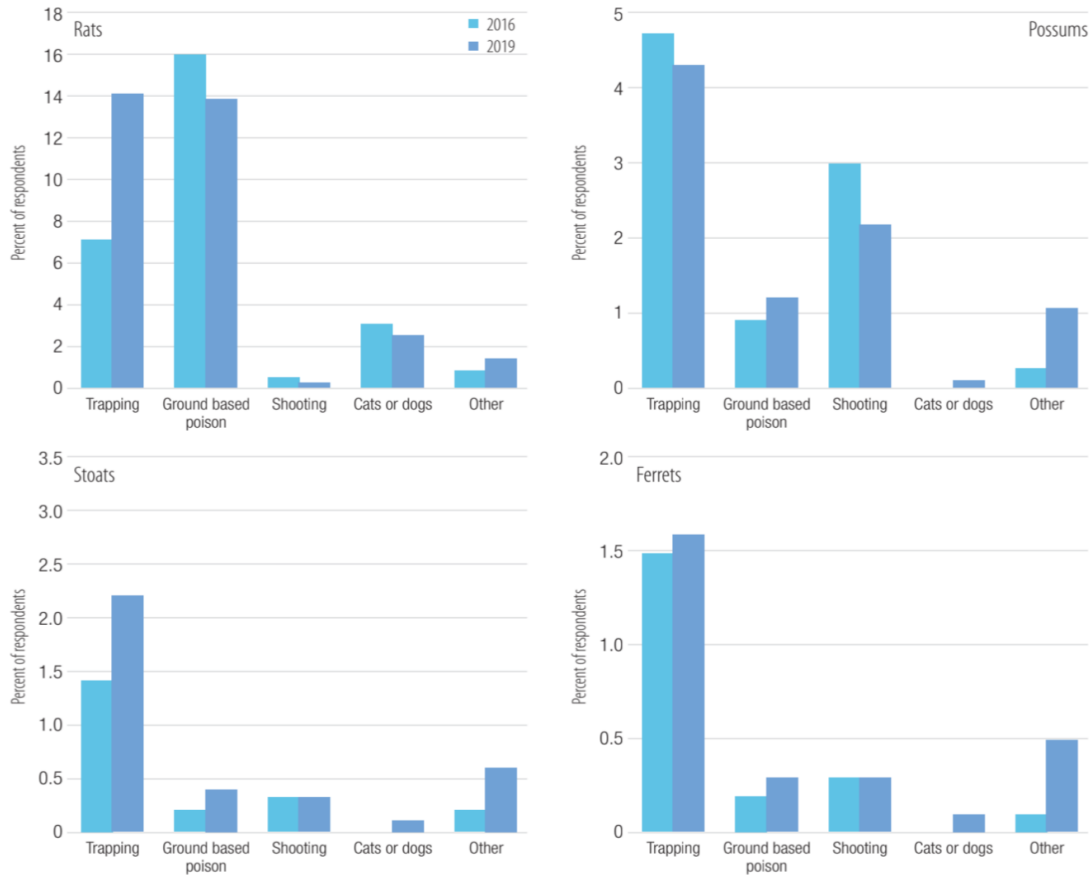
Figure 3: Big Four Species control methods (Hughey et al., 2019)

The Lincoln University survey also displays the methods citizens use to eliminate pests. Figure 3 depicts the percentage of respondents that used a specific pest control strategy for each of the Big Four Predators (Hughey et al., 2019). The "cats and dogs" category is often nominal, except for rat elimination methods. This suggests that there is room to expand efforts to eliminate pests by leveraging household dogs and cats.

2.4: Dog and Handler Best Practices

For an effective and accurate detector dog, the traits of the dog and the traits of the handler, along with their connection, are essential. Prospective detector dogs must be able to correctly identify and track a specific odor and alert their handler of its presence (Jamieson et al.,

2018). In addition, researchers have found their problem-solving abilities, strong motivation for learning, boldness, and coping strategies to stressful stimuli to be crucial traits for how effective the dog's work is in the field (Jamieson et al., 2018: Troisi et al., 2019). These traits apply themselves in various ways on detecting missions, as the dog needs to stay on task and not become afraid of predator pests. Essentially, they need to be able to work and regulate themselves without the instruction of a handler or owner. Additionally, the dog's age affected the ease of training, and most trainers preferred to start obedience, agility, and search training before six months of age (Alexander et al., 2011). However, the traits of dogs are only one factor when examining the capabilities of a detector dog team.

Researchers found skills and knowledge to be most important in handlers. A survey covering 31 Australian and 4 New Zealand detector dog handlers identified some of these traits and skills. Rated highest was the ability to read their dogs' body language and to be knowledgeable on dog behavior. By recognizing and trusting their dogs' signals, accuracy rates of detecting missions grew due to fewer missed cues on the handler's fault (Jamieson et al., 2018). Skills related to navigation and knowledge of ecology were also rated very highly, and accuracy among handlers with these skills increased (Jamieson et al., 2018). Handlers must also be prepared for a significant time commitment to train their dog. One study found a correlation between dog performance and time training, with 4 hours a week resulting in a higher chance of certification success (Alexander et al., 2011).

The traits of dogs and handlers are essential and can aid the efficacy of the duo, however, the connection between the two is critical. Multiple studies have shown that poorly connected pairs do not perform as well (Jamieson et al., 2018: Troisi et al., 2019: Browne et al., 2015). The handler's traits greatly influence the dog's traits and detecting abilities. Without influence and connection from a capable handler, the detector dog's performance will suffer and possibly render the training programme ineffective. From this, we can deduce that the knowledge and skills of the handler and the handler-dog connection are of utmost importance. This raises some concerns about the feasibility of the potential programme.

2.5: Relevant Case Studies Surrounding Community-Led Detector Dog Programmes

Throughout our literature investigation, we found two existing programmes that use scent-detection dogs in conservation. By analyzing these programmes, and noting points of success and improvement, our work in the Upper Hutt is more likely to succeed.

The flora and fauna of Hawaii, much like Aotearoa, are valuable and native to the island. Conservation Dogs of Hawaii (About - Conservation Dogs of Hawaii, n.d.) is a nonprofit group that uses volunteer-trained detector dogs to seek out the invasive plant species, Devil Weed, or Chromolaena Odorata (Devil Weed (Chromolaena Odorata) – Conservation Dogs of Hawaii, n.d.). In order to test the feasibility of training the inexperienced dogs, trainers introduced them to samples of a similar plant, and a 90% pass rate was observed (Johnson & Bitzer, 2022). Dogs in this study were optimal for detecting targets up to 90 metres away and could detect targets that

were not visible. This made their work paired with a handler much more successful than cameras or a person alone (Johnson & Bitzer, 2022). An international collaboration of primatologists and the Chinese Ministry of Public Security trained a scat detection dog to help seek out three species of free-ranging primates. They chose to train the dog themselves due to the high costs of purchasing a scent detection dog and the logistical challenges of hiring a scent detector dog team. They were able to train the dog for under $5000 NZD and ended up having a 92% success rate at identifying the proper scat associated with the endangered primate target species. The dog was also more effective than humans at identifying scat samples (Orkin, 2016).

From both of these case studies, we can take away essential information to help guide and direct recommendations made to Pest Free Upper Hutt on the creation of a detector dog programme. Conservation Dogs of Hawaii's Devil Weed project was a vital example of a successful programme using volunteer dog detection teams with significant community interest. Some areas of improvement included training handlers on various wind conditions and learning how to keep dogs away from downwind areas. From the primate scat detection dogs, the dogs could identify even arboreal primate species living 10-30 metres above the ground. This is important as possums are one of the main pests in the Upper Hutt, and they prefer to spend time high in trees. The Chinese Ministry case study was a prime example of the associated costs of training a detection dog. Even though it was cheaper to train a dog rather than purchase a fully trained detector dog, it still cost around $5000 NZD. This could be a significant financial commitment for individuals in Upper Hutt interested in participating in the potential programme. Both case studies feature immobile target scents. A moving target such as a rat, stoat, or possum adds an additional challenge. If trainers find pest detection too challenging for a pet dog, it might be beneficial to consider training in scat detection or hiring a scat detection team, as mentioned in these case studies.

2.6: Prominent Partners and Stakeholders

A community-based detector dog programme for the greater Upper Hutt Community has the potential to make some progress on behalf of the endangered native species. Pat van Berkel is committed to prioritizing conservation practices in the region. He is involved in various conservation programmes, and holds positions for groups such as Friends of the Hutt River, Upper Hutt Forest and Bird, and Pest Free Upper Hutt (van Berkel, 2022). Through his work in these groups, he participates in activities that help the Upper Hutt ecosystem heal. So far, Pest Free Upper Hutt has been running strong for four years with a network of 450 backyard trappers and 2000 traps that have eliminated 15,000 predators since 2018 (van Berkel, 2022). Along with van Berkel, 33 project coordinators lead regional trapping initiatives. With conservation dogs having the potential to be accurate detectors for many species, a community-based programme including dogs could aid Pest Free Upper Hutt in its mission while reinvigorating the greater community's interest.

Members of the Upper Hutt community will benefit from a detection dog programme. Dog owners in the area would have the chance to enroll in a training or educational programme

that includes direct action. In addition, creating a programme could bring community members closer together and build local support for shared goals.

Aotearoa observes and acknowledges the rights of environmental systems to keep with the Māori value of kaitiakitanga, a responsibility of guardianship and stewardship of the land (Dwyer, 2017: Roy & Jong, 2017). As an extension of the land, the native species can also be given advocacy in the future of their habitat, placing them as one of our key stakeholders. Many of these species are endemic and cannot be found elsewhere (Robertson, 2022a: Robertson, 2022b). Although some individuals may have personal concerns involving the ethics of killing these species, the New Zealand Government has declared that possums, stoats, rats, and other non-native predator species are not protected (Animal Pests and Threats A - Z, n.d.). These non-native predators consume these species' young and disrupt their natural food supply. This threatens their survival by decreasing their chances of raising the next generation successfully. Some methods of pest control may not be as widely accepted, but detector dogs and trapping is a significantly more humane way to get rid of these non-native predators.

2.7: Summary

Through the reviewing of literature about conservation measures, detector dog training methods, and the importance of preserving the natural balance of the Upper Hutt, we have identified key aspects to keep in mind while completing our project. By working closely with Pat van Berkel, Pest Free Upper Hutt, and members of the Upper Hutt community, our team hopes to encourage community support for native wildlife while also controlling pests within the region. It is crucial for prospective participants to understand that dog traits do not matter as much as the dog-handler connection and the willingness to put time into dog and handler training. In the next chapter, we will discuss the methodologies to assess the feasibility and interest of a community-based detector dog programme for Upper Hutt.

3. Methodology

This project aims to investigate the feasibility and lay the groundwork for a community-based detector dog programme in Upper Hutt. This chapter will outline the methodologies to complete our goal through the following objectives:

Objective 1. Observe existing training protocols and interview expert detector dog handlers as well as obedience and scent trainers.

Objective 2. Assess community interest in a detector dog programme

Objective 3. Begin to develop community detector dog awareness media for Pest Free Upper Hutt's use.

As detailed below, we achieved these objectives through observations, interviews, surveys, and filming.

3.1: Observe Existing Training Protocols

In order to understand the feasibility of training household dogs in detection methods, our team observed and interviewed existing training protocols with specialized dog trainers and handlers. We observed five different training programmes. First, our team observed a demonstration of police substance dog training at the National Police Dog Academy to understand what a highly regulated government training programme entails. During this observation, one team member recorded field notes while another took photographs of training police dogs. Figure 4 below is a picture from the NZ Police Dog Training Centre. Our team documented the breeding of the dogs through decommissioning of senior dogs.

Figure 4: Drug detector dog in training signals for methamphetamine at the Police Dog Training Centre.

For our second observational study, we shadowed Sally Bain, a detector dog handler working with the Department of Conservation, and her dog, Rapu, on a field demonstration. One

team member recorded field notes, documenting information such as the date, time, and location; conversations between Sally and the researching team; and important events during the observation (Berg, 2007, p. 198). For the remaining three observational studies, our team observed training classes conducted by professional dog trainers to see how household dogs are trained in obedience and scent detection. Among these classes were; Wellington Dog Training Club with Donna Jackson, Upper Hutt Dog Training Club with Judith Parkinson, and ACE dog training. One team member documented field notes for each observation, while the other recorded clips of dog training in action. Participants filled out and returned consent forms to allow filming for project purposes. Consent forms can be found in Appendix A. In addition to the participant observation, we conducted three interviews with professional dog handlers and four with dog trainers. We will discuss these interviews further in Chapter 4: Results & Analysis. In our interviews with the professional dog handlers, we discussed the feasibility of developing a community-based detector dog programme, the process and experience of becoming a certified dog handler, and the time and money commitments required to train and maintain a detector dog. Sample interview questions can be seen in Appendix B. For our interviews with the dog trainers, we discussed the difficulties of dog training, the cost of each training programme, and the time needed to thoroughly train a household dog. Sample interview questions can be seen in Appendix C. One team member asked questions for each interview while the other recorded the handler's/trainer's responses. Interviewees completed and returned consent forms to participate in our interviews.

3.2: Assess Community Interest

In order to determine the level of interest in a potential community-based detector dog programme, we conducted two surveys over a two week period. The first survey was a targeted survey towards Upper Hutt dog owners. It aimed to gauge community interest and see if anyone in Upper Hutt might want to participate in a detector dog training programme. The Targeted Dog Owner Community survey presented questions about interest, time commitment, and money for a potential community-based programme. A complete list of questions asked in the targeted dog owner survey is shown in Appendix D. We distributed the second survey to Pest Free Upper Hutt Project Coordinators. This survey was created and distributed by request of our sponsor, Pat van Berkel, to understand if his organisation would be interested in such a programme for Upper Hutt. Coordinators were able to voice any additional ideas contributing to the programme's success through an open response section. A complete list of questions asked in the PFUH Coordinator survey is shown in Appendix E. Figure 5 illustrates how these surveys were distributed, with the green row showing the two types of targeted survey groups and the blue row showing the distribution method for each survey. We distributed fliers that contained a QR code linked to the Qualtrics survey for the targeted dog owner survey. We posted these fliers in locations likely to attract dog owners, such as dog parks, veterinarians' offices, pet stores, and local Facebook groups. Some examples of Facebook Groups included Upper Hutt Dog Owners, Upper Hutt Professional Dog Walkers, and the Upper Hutt Community Facebook page.
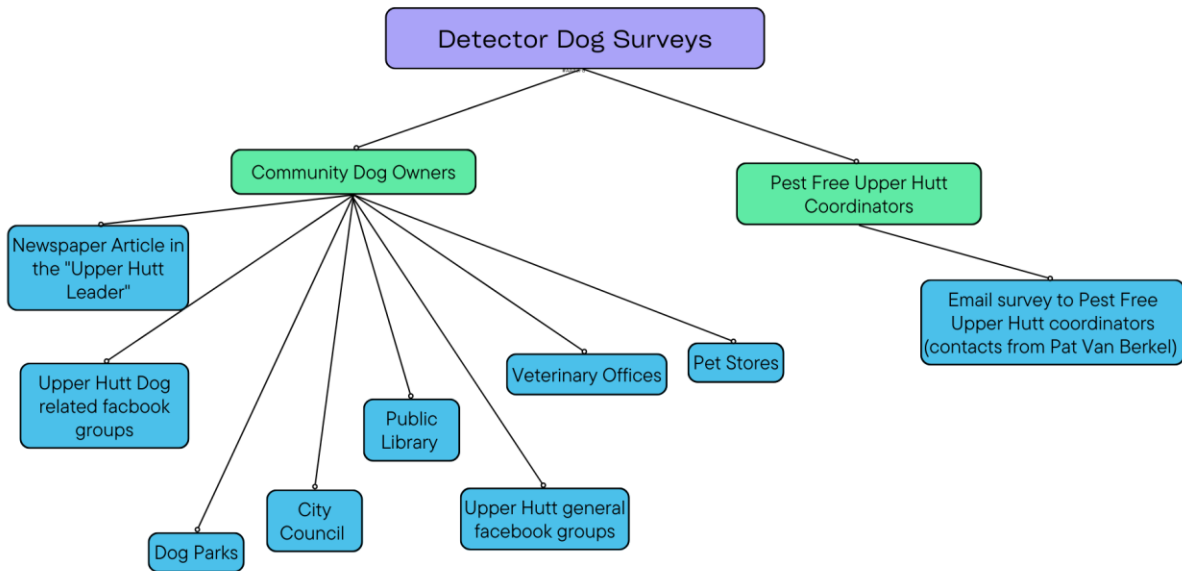
Figure 5: Flow chart illustrating community surveys.

3.3: Begin to Develop Community Detector Dog Awareness for Pest Free Upper Hutt

Media outreach was essential in informing the public about a possible Upper Hutt community detector dog programme. Through a presentation to the Upper Hutt branch of Forest and Bird, we were able to display our findings and recommendations to the committee. Topics of discussion included existing volunteer dog training programmes, findings from the targeted dog owner interest survey, and awareness of the importance of pest eradication. We created a short outreach film that emphasized the opportunity for community efforts and motivated dog owners to train their dogs in pest-detection methods. We provided this to our sponsor for use by both Forest and Bird Upper Hutt and Pest Free Upper Hutt. Our four-minute film features the ideal traits for a detector dog handler to educate, spread awareness, and inspire potential detector dog handlers. The film featured recorded clips of a detector dog in action, scent training classes, and protected native wildlife such as kākā, kea, takahē, and tuatara. After each filming session, we uploaded the recorded clips to a computer with online backups to ensure the data was saved. In addition, we created a spreadsheet to catalog the clips. We included the file name, runtime, date filmed, location, format, a brief description of the content, and any issues with the clip to allow for a uniform organisation of data (Gutierrez, 2021). In pre-production and production, we created a storyboard outlining the order of clips, visual effects or transitions, and voice-overs (Gutierrez, 2021: Tomlinson, 2017). The storyboard remained fluid throughout the filming process and was rearranged as needed. In the post-production stage, we used iMovie editing

software, with [audio software], to record the voice-overs (Tomlinson, 2017). We developed the film to be used by our sponsor in a variety of applications in the future as the programme progresses.

3.4: Summary

By establishing our methods for observing existing training protocols and assessing community interest, our team has developed a plan to collect data on the feasibility of a community-based detector dog programme. Additionally, we hope our short outreach film provided to PFUH will educate dog owners about the importance of using detector dogs for pest eradication. The next chapter will provide our results and analysis from observational studies and community interest surveys.

4. Results & Analysis

During the process of analyzing the data collected through the project, two main research questions guided our analysis:

1. Is it possible for community members to train their dogs in pest detection?
2. Are community members interested in training their dogs in pest detection, and how much commitment are they willing to give to the programme?

Finally, we reviewed and compared the data for both research questions to triangulate the overarching goal of determining if our sponsor should continue pursuing a community-based detector dog programme. We compared three different sources to determine the feasibility of a potential programme:

1. Previous research in detector dog programmes and training.
2. Opinions from professional dog handlers and trainers.
3. Community interest in a potential detector dog programme.

Through our research, we found that there are many barriers to success when training a detector dog. Many community members are interested in training, but only a few are considered a "good fit" for the programme.

4.1: Expert Discussion on Detection Training Challenges and Barriers

The responses from professional handlers and trainers, provided us with the information needed to determine if a potential detector dog programme would be successful. All experts agreed that training is difficult due to age requirements and time and financial commitments. Additionally, knowledge of canine body language, the role of obedience training, lifestyle differences between detector and pet dogs, and other risks such as legality, safety, and volunteer compliance can make training a challenge. However, if a volunteer is willing to put the same commitment to the role as a professional, there is room for success. For simplicity and community involvement, we will focus on three main factors: age requirements, time commitment, and financial commitment. Table 1 features the experts interviewed and their qualifications as to why they were chosen to interview.

Table 1: A list of experts interviewed and the qualifications they possess.

Expert	Qualifications
Alan Campbell	Officer and Trainer at the NZ Police Dog Training Centre
Sally Bain	Live rat detection dog handler, DOC certified
Max Hoegh	Possum scat detection dog handler, DOC certified

Donna Jackson	President of the Wellington Canine Obedience Club (WCOC)
Stephen "Billy" Barton	"The Ferret Man" Detector Dog Trainer working with Pest Free Banks Peninsula
Wayne Turner	President of Upper Hutt Dog Training Club
Judith Parkinson	Scent trainer at Upper Hutt Dog Training Club

Professionals had differing opinions when asked about dog age and choosing a detector dog but agreed that the younger the dog, the higher the retention rate. Bain prefers to know the dog's complete history, starting bonding and training as early as ethically possible. Handler Bain's dog, Rapu, was bred for detection work from two previous successful detector dogs and began training at ten weeks old. Bain explained the young age as critical to understanding her dog, "I really want them from as young as possible so they bond with me, [...] I kind of question how you can read a dog if you don't know its entire life." Handler Hoegh said he is looking for a shelter dog younger than two years old with a strong drive and high energy level. Then, he can redirect these qualities into detector training by focusing on these traits. The WCOC President suggested that, in her experience, it becomes increasingly difficult to train dogs as they age and recommends that they should be younger than two years old. Despite these differing opinions, all agree that dogs must be reasonably young to increase training success.

All interviewees agreed that detection work requires extensive time and financial commitments. Handler Bain said, "I would do a minimum of four 15-minute sessions daily." Handler Hoegh states, "it takes a ton of effort to train these dogs," he continues, noting barriers to entry, "my training is such a patchwork of taking every detection course I can online and just going to every seminar I can. And it's not that streamlined. It's not efficient what I did." Even with extensive training over multiple months full time and breeding for detection work, the police academy averages a 50% success rate for passing the certification test. The WCOC president shared that members in her most advanced competition class train for 15 minutes daily, a significant commitment for many people. Both handlers discussed the cost of training and equipment for the dog and the handler. Without the mentor programme, Hoegh mentioned, "$16,000 is what a [trained] detection dog is sold for," while Bain stated, "I bought the [untrained] dog for 500 bucks." The exact cost of training a detector dog is unclear, but volunteers should be ready to commit ample time and money to train.
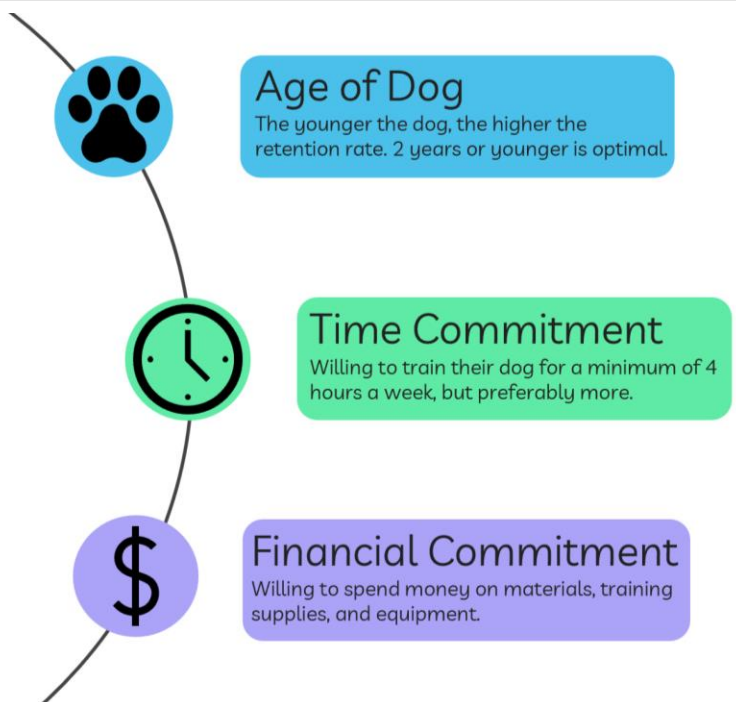
Figure 6: Handler and dog traits synthesized from interviews

Figure 6, above, displays the three primary traits our team selected to be favorable characteristics for detection dog training. In addition to the age of the dog, time commitment, and financial commitment, another difficulty to detection training is the quality of the dog and handler relationship. Donna Jackson said handlers must be confident and knowledgeable about training and the dog's body language. She continued, explaining that without fully understanding the training process, it can cause burnout for both the owner and the detector dog in training from incorrect cues, confusing the dog. The Upper Hutt Dog Training Club noted that many of the biggest training struggles come from an unclear handler. All interviewees heavily emphasized knowledge of the handler, and Bain shared, "handler support is what determines how good the dog is."

The handlers disagreed on the role of obedience training. Hoegh commented, "so much of detection is just the backwards way of dog training because you want this dog to be paying attention to this odor rather than attention to you [...] You're going to have to reverse what is traditionally taught in obedience school." Bain thought the opposite, disclosing, "we just have to have a massive level of obedience, really." The Upper Hutt Dog Training Club noted that students in the scent work class complete agility and obedience training classes before progressing to scent work. From these differing statements, we can deduce that it is a balance of obedience and independence connected with the dog's ability to know when it is time for one or the other.

All professionals interviewed also raised concerns about the lifestyle differences between a pet dog and a detection dog. All voiced the difficulty of having a pet and detector dog in the same house, let alone a detector dog also being a pet. This is due to how people train their dogs, with the reward for a successful find being a ball thrown, receiving pats, or playtime. If handlers give the dogs rewards without completing the desired task, previous conditioning may be disrupted. The WCOC President recalled her time at illicit substance detection dog kennels, describing the strict guidelines for treating dogs at the risk of undoing training. Bain confirmed this, specifying, "You can't leave them with anyone. You have to be particular about who you leave them with and the controls that they have. If I go away, I generally try and find another dog handler to look after him because they understand. If he's around somebody who doesn't understand all the ins and outs and they're constantly slapping their thighs to get the dog to jump up on them, that's undoing all your training."

In addition, both handlers mentioned challenges a potential detector dog programme may face, such as legalities, safety risks, and volunteer compliance. Hoegh mentioned, "if you're working on DOC land, you need to be part of the DOC conservation dog programme." Bain expanded on this, voicing that even off of DOC land, if an uncertified dog were to kill a native species, animal control may request that the dog is euthanized. Bain expanded on the risks regarding their dog, "That's my other risk. ... any dog could have rushed up to him and just grabbed him and killed him. Because we're working on an off-leash area, you know, working by dog parks and stuff like that ... So yeah, my biggest concern is other dogs, really. And my next biggest concern is that he hurts himself." She continued, informing us that dogs often get injured on the job by other dogs or the environment. Billy Barton noted that some of his dogs had suffered injuries from the rough terrain in which detection work can occur. Bain noted the physical fitness level required for the job. She reports walking "I think on average 20 to 25 kilometers a day." While members of a potential group would not necessarily carry out searches all day as professionals do, the distance traveled may be a hefty amount for many people. Without direct questioning, Bain and Jackson commented on difficulties with volunteer compliance. Bain brought up her experiences with a trapping volunteer programme she created, describing stubbornness, noncompliance, disregard for directions, and lack of regard for safety. These caused a cascade of issues due to tasks being incomplete or incorrectly done, preventing further steps from being taken. She suspects this is due to volunteers taking more risks since their profession is not at stake. Volunteer noncompliance in training detection dogs could lead to unsafe situations, such as a dog not being refreshed on aversion training and hurting a native species.

Though the experts agreed that there is a lot to consider when deciding if community members should train their dogs in detection work, volunteers can be suitable candidates if they fit the description of an ideal handler. Handler Hough shared the option of potentially training dogs in scat detection, allowing for a non-moving target that would be easier for beginner training. Scat detection only works in areas with very low pest rates, as an abundance of scat will leave the dog alerting constantly. From scent work observation at ACE dog training school and

The Upper Hutt Dog Training Club, a non-moving target was much easier for the dogs to follow. Though success rates were not consistent, there is room for community members to train their dogs to detect the scat of pests with a lower accuracy rate than the professionals. In addition to the opinions from professional dog handlers and trainers, the responses from Upper Hutt dog owners were also crucial in determining the program's potential success. In the next section, we will discuss the Targeted Dog Owner Community Survey results.

4.2: Community Interest and Feasibility of Training Pet Dogs for Pest Detection

Four dog owners completed the Pest Free Upper Hutt Coordinator survey, and 135 dog owners completed the targeted dog owner community survey. Results from both surveys added up to 139 total dog owners. Upper Hutt has roughly 5,500 registered dogs, meaning our survey only accounted for a small sample of the total dog-owning population. 88% of community members found the survey through the social media platform Facebook. 54% of the respondents were 41-60 years old, and 36% were 21-40 years old. Our target population was between 21-60 years old, as the age group has the most potential to be physically fit for the role. See figure 7 below for a breakdown of owner demographics.
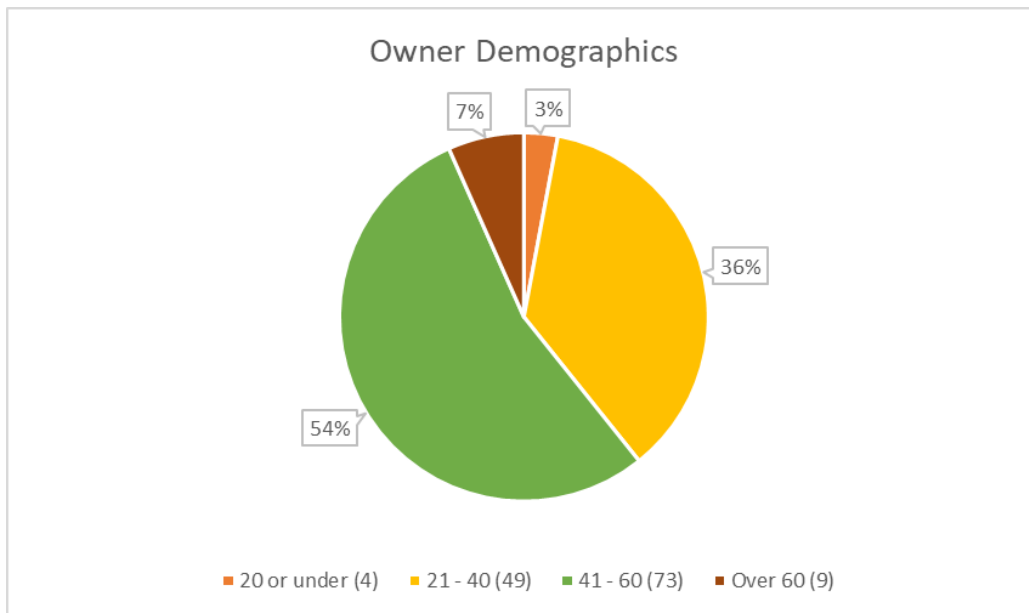
Figure 7: Targeted dog owner survey respondent demographics

To create a community detector dog programme in Upper Hutt, we had to assess how respondents felt about using dogs to locate non-native species to aid eradication efforts. The targeted dog owner respondents' opinions varied along the full spectrum of responses available, but the overwhelming majority supported using dogs to detect non-native species. Figure 8 below depicts respondents' programme opinions. Ninety-eight respondents strongly supported

the use of dogs, and 37 respondents somewhat supported the use of dogs. A small minority of only ten dog owners total reported indifference or opposition.
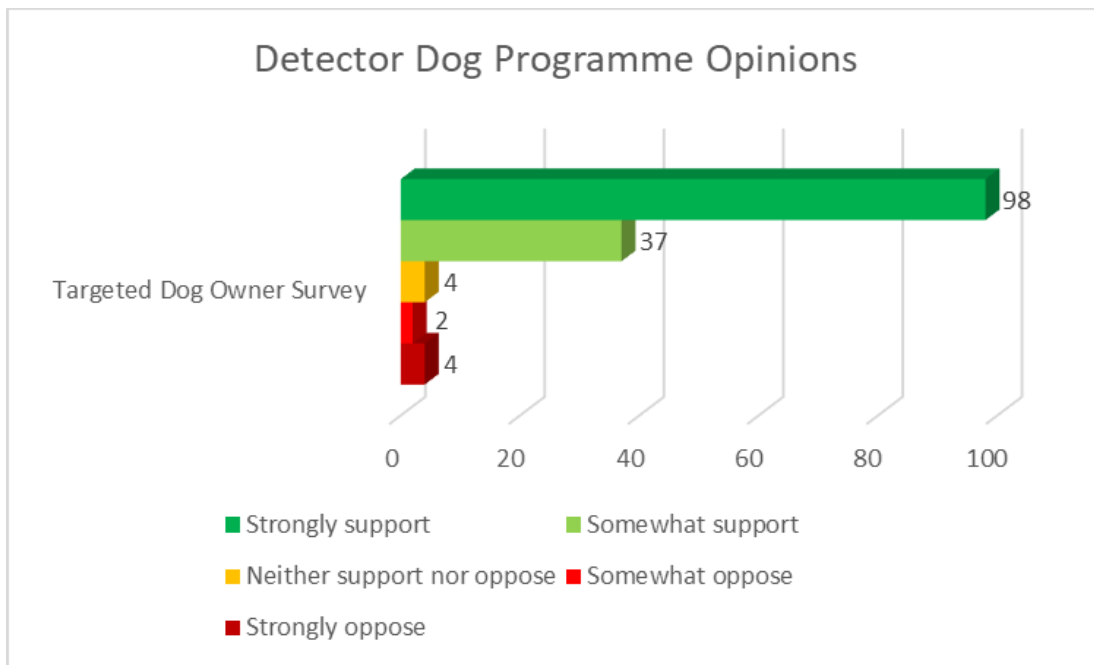
Figure 8: Targeted Dog Owner Opinions on Detector Dogs

Although 65% of respondents expressed interest in a potential community-based detector dog programme in Upper Hutt, we prioritized three main factors for simplicity of community involvement: age of the dog, time commitment, and financial commitment. Therefore, we captured participants' dog's ages and willingness to invest time and money into training through survey questions to determine if an owner and their dog are considered a "good fit" for the programme. A flowchart depicting the qualities needed to be fit for the programme can be seen in figure 9.

Thirty-nine respondents reported their dog was "under a year" or "1-2 years." These respondents were deemed a good fit for the programme based on dog age classifications. The total age breakdown of all survey respondent's dogs can be seen below in figure 10. Respondents also addressed trends of concern in the dog's age when they were asked to give additional feedback. Multiple respondents expressed having a dog that was "too old to train" or "too old for such a programme." One respondent said, "If my dogs were younger, I'd be interested in training." These comments re-emphasize that younger dogs are easier to train.
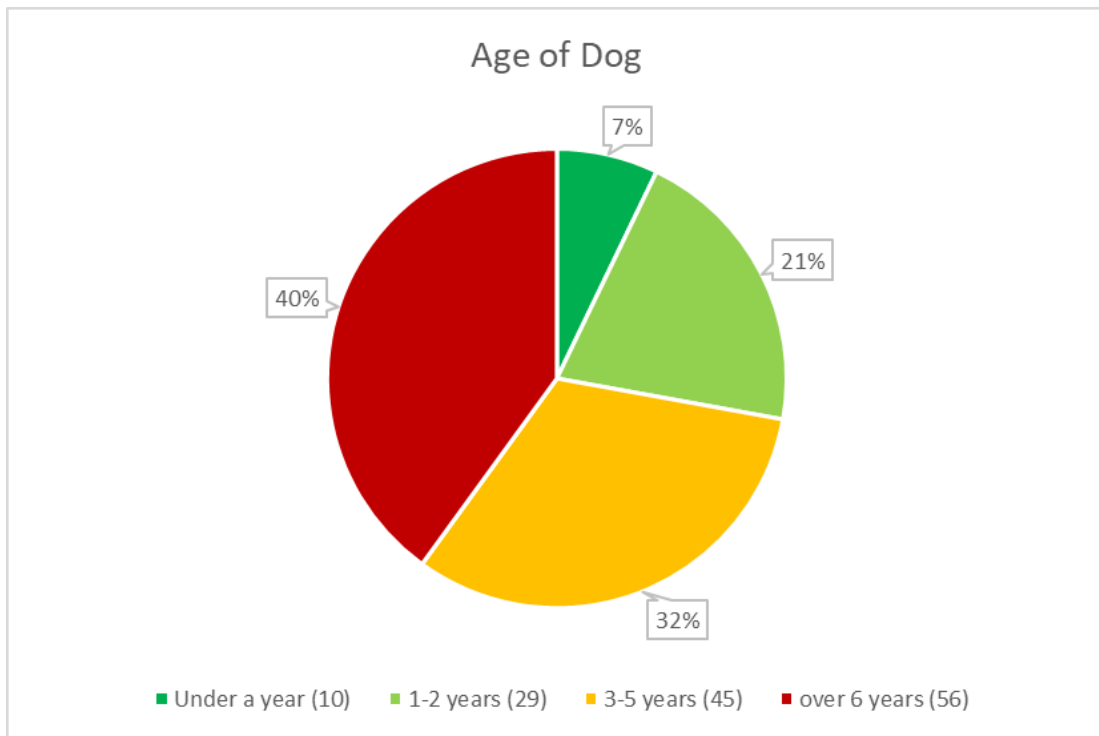
Figure 9: All survey responses for the age of dog

The Targeted Dog Owner Community Survey also allowed us to observe how much time dog owners were willing to allocate to train their dogs thoroughly. Collected responses on owner time commitment are shown in figure 11 below. Of the 78 respondents who answered the survey question about the time commitment, 53 were only willing to attend weekly sessions or train their dogs for less than 4 hours a week. Based on responses from professional dog handlers, a fully trained dog would require daily or multiple training sessions over a week. If the community is unwilling to commit the necessary time, it would impose challenges in creating a potential community-based detector dog programme, as dogs may not be fully trained before they pass the optimal age level. The comment section also demonstrated time concerns as one respondent stated, "as much as I would love to, I don't have the time." The 25 respondents that said they would be interested in either a "training camp that meets every weekday over a couple of weeks," "on my own, more than 4 hours per week," and "weekly sessions for four or more hours per week" will be considered a "good fit" for the training programme.
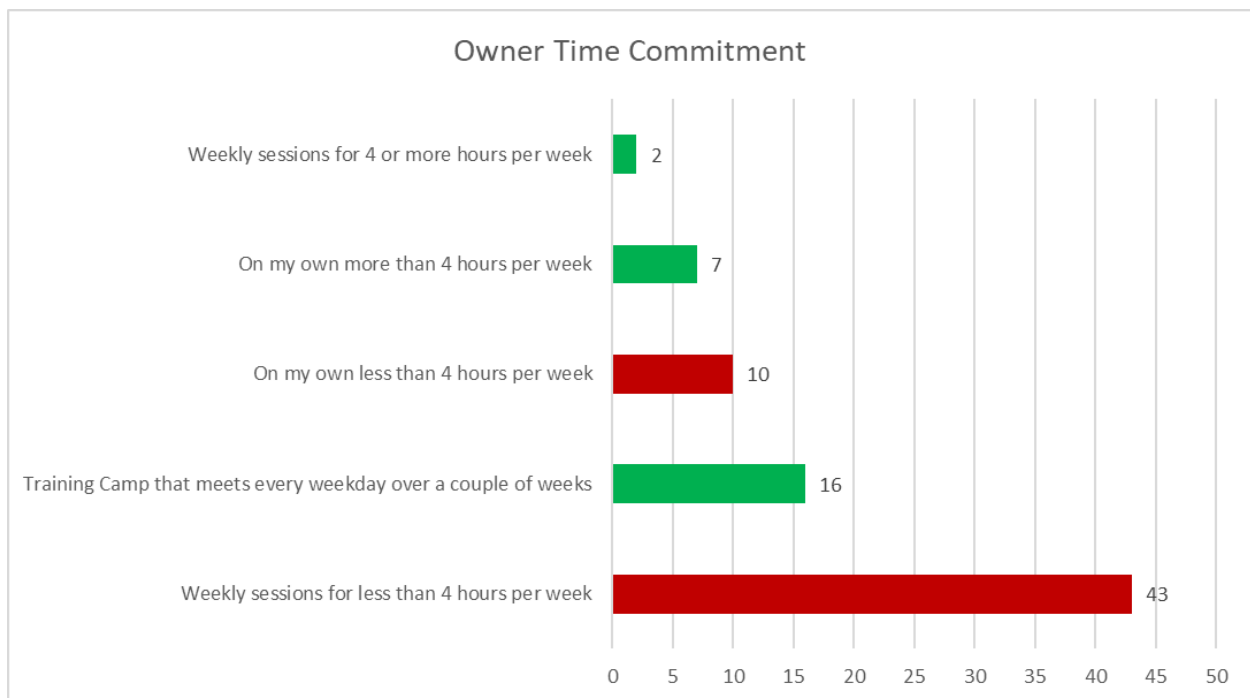
Figure 10: Owner Time Commitment

The third factor in determining owner interest in training a dog for detection work involves the money required to spend on associated training costs. Although there are ways to spend small amounts of money on training, most programmes involve purchasing materials, supplies, and equipment. There are also the associated costs of owning a dog used for detection work, such as insurance liability and injury of the handler or the dog. Collected responses on owner willingness to make a financial commitment are shown below in figure 12. 21 respondents said they would be willing to spend money on training their dog, while 15 respondents said they would not be willing to spend money on training their dog. Most respondents (42) said they would consider spending money on training their dogs. Grants for costs associated with training can be made available through the government, but funding is not always available. The strongest potential candidates will be the respondents who are willing to put money into training, therefore, the 63 respondents who said "yes" or "maybe" will be given the classification of a "good fit" for the training programme.
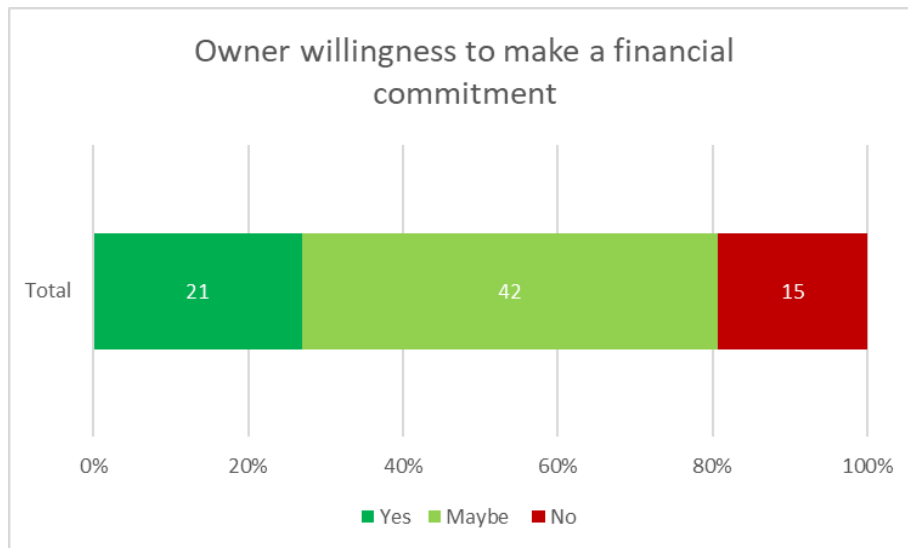
Figure 11: Owner Financial Commitment

We filtered the Qualtrics survey responses into three questions asking about the respondent's age of their dog, how long they would put into training, and if they are able and willing to make a financial commitment to the programme. From the community interest survey, nine respondents matched the classification of a "good fit" for the programme. The Venn Diagram below (figure 13) depicts the number of respondents who were fit for each category: age, time, and money, as well as the number of respondents who fit all three categories and are a "good fit" for the programme.
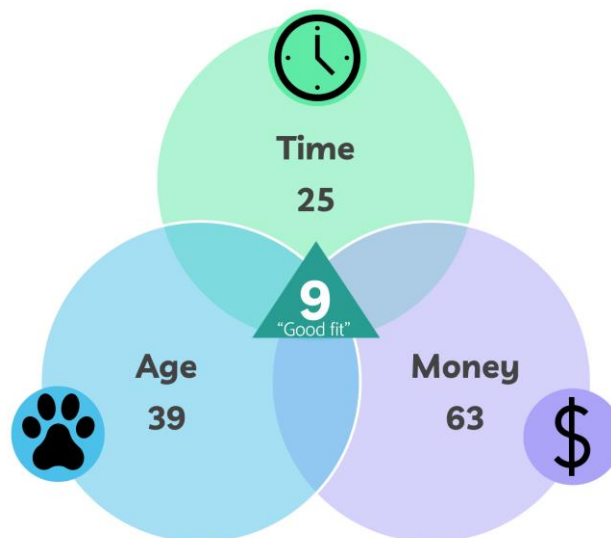
Figure 12: Venn diagram depicting qualities of a "Good Fit" for a potential handler

Along with support and interest from the community, Pest Free Upper Hutt coordinators were another important stakeholder to take into account when determining interest in the programme. The following section will discuss the results of the targeted Pest Free Upper Hutt Coordinator survey.

4.3: Pest Free Upper Hutt Coordinator Interest in Programme

We were able to better understand the thoughts and opinions of the coordinators through the PFUH Coordinator Survey Without coordinator support, the programme cannot happen even if there is community interest. When asked about their opinions on using detection dogs to aid New Zealand's pest detection efforts, eight out of nine PFUH Coordinators said they would strongly support the use of dogs, while one coordinator said they would somewhat support the use of dogs. Coordinators are aware of the innovative developments being made with detection dogs, as they provide strong support in their survey responses.

Figure 14, below, depicts the responses of PFUH Coordinators when asked about their opinions of if such a programme would be successful, especially in Upper Hutt. 5 of the coordinators believed that the programme would be successful in reducing the number of pests. One of the coordinators somewhat agreed that the programme would be successful, while the other three coordinators were neutral in their opinions on the potential success of the programme.

PFUH Coordinator Opinions on Program Success

| 33% Neither agree nor disagree | | 56% Strongly agree |

Strongly disagree (0)　Somewhat disagree (0)　Neither agree nor disagree (3)　Somewhat agree (1)　Strongly agree (5)
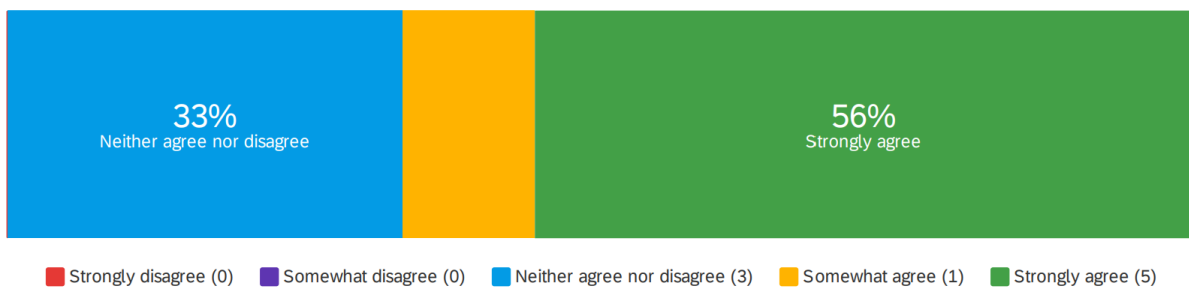
Figure 13: PFUH Coordinator Opinions on Programme Success

PFUH Coordinators were able to address any comments, questions, concerns, or recommendations for the programme in the survey. One of the coordinators expressed optimism about the potential success of the programme when they stated, "It's a great idea, good you folks are looking into it." Another coordinator was more skeptical but still demonstrated satisfaction in creating community engagement when they commented, "I think this programme's success would be dependent on it being part of and supplemental to a larger predator control programme that includes trapping / poisoning of pest species. I also think there could be a good opportunity to use the programme as a means for community engagement." With the support of the coordinators, our project will have the traction it needs, especially in a community as large as Upper Hutt.

4.4: Summary

Through the analysis from the interviews of professional dog handlers and trainers as well as the responses from the surveys, our team determined the level of interest and barriers associated with a potential community-based detector dog programme. Based on the interview responses from dog experts, we discovered many challenges and risks associated with detector dog training and work. In addition, the dog experts agreed that a fully trained detector dog takes significant time and financial commitment. The Targeted Dog Owner Community Survey responses indicated strong support for the potential programme. However, we discovered that only a small fraction of respondents were willing to invest the time and money, as well as own a dog under two years of age, to be deemed a "good fit" for the programme. The PFUH coordinators also demonstrated optimism in the creation of the potential programme. In the next chapter, we will provide conclusions based on our key findings and discuss alternative recommendations to give to our sponsor.

5. Conclusions & Recommendations

5.1: Conclusion

This project aimed to assess the feasibility and community interest in a potential detector dog programme. Detector dogs are a great tool to decrease the population of invasive predators consuming the eggs and chicks of native ground-dwelling birds in the Upper Hutt region. The programme would also re-motivate backyard trappers while helping to contribute to New Zealand's Predator Free 2050 goal. In order to provide recommendations to Pest Free Upper Hutt on whether or not to proceed with creating a community-based detector dog programme, we compared the results of surveys, interviews, and previous research. Nine survey respondents were deemed a "good fit" for the programme. These respondents were willing to commit time, money, and own a dog under two years of age. Our team concluded that a small scale widespread community-based detector dog programme could work, but has several barriers to success. Based on the data collected and our key findings, our team determined that to have a successful programme, it takes specific qualities of both dog and handler to be fit for pest detection training. We made a film to discuss some of these specific qualities and better inform the Upper Hutt community about the role of detector dogs. A link to the video can be found in Appendix F. The list below details recommended traits and considerations for the dog and handler to have the most success at training.

Dog Traits
- The dog should have a high drive and energy to get a treat or play with the toy. If the dog is not very motivated for the reward, it will not perform the action.
    - This is even more important than having a dog with a prey drive.
- The dog should be under two years of age. The younger the dog, the easier to train. It is also preferred for the owner to know the dog's history to understand how the dog may react to training.
- The dog should be very obedient and able to be recalled for the dog's safety. Ex. working near a road, cliffs, or other dangerous environments.
- The dog should also be independent enough to go and look for the scent without direct human guidance.
- The dog must not be a "Bully" breed if certification through the Department of Conservation, Conservation Dogs Programme is desired.
- The dog should be trained in one scent type to give the most accurate cues.

Handler Selection Criteria
- The handler should be well versed in their dog's body language. They must be able to understand what their dog's cues mean and their dog's feelings.

- The handler must be willing to spend at least an hour on training per day. Detector dogs need to be trained for four 15-minute sessions per day to be confident in scent work and aversion from native species.
- The handler must be willing to pay for training classes or materials to train the dog at home or willing to purchase a pre-trained dog..
    - There are options for grants from the government for training, though funding is limited.
- The handler should be active, particularly enjoy hiking/walks, as a lot of detection work is through thick bush.
- The handler must refrain from constantly exposing the dog to its target scent in the home environment, or it will be desensitized.
- The handler needs to be willing to devote a separate form of praise to pest detection, as it is very easy to undo training by rewarding the dog for actions that do not have to do with scent work.
- Ideally, the handler must be living in a home with no children or members who are unwilling to follow strict guidelines of care.
    - This includes during vacations, as the dog should be kept with someone who understands detection training.
- The handler must understand the risk of pest detection, including the following risks:
    - Insurance liability
    - Injury from target species, other dogs, or environment
    - If the dog is not DOC certified and kills a native species, it may be required to be euthanized and the owner may be fined or imprisoned.

5.2: Alternative Recommendations

In addition, we compiled a series of alternative options for our sponsor to promote to individuals who are not fit for detection work but still want to help pest eradication efforts. We distributed fliers containing alternative recommendations to attendees of the Forest and Bird Meeting. See Appendix G or the list below:

1. Taking scent classes and attempting scat detection
2. Hiring a live detection or scat dog
3. Avian aversion training
4. Responsible dog ownership

Participating in Scent Classes and Attempting Scat Detection

When observing scent classes, it was a fun activity for both dog and owner to do recreationally together. There are scent classes at ACE dog training in Lower Hutt and the Upper Hutt Dog Training Club. From our interviews and literature review, we found that it is essential for a handler to read a dog's body language and understand if their dog enjoys scent work. If owners and dogs excel in their scent training classes, they can switch the target scent from clove

to various types of scat and begin training their dogs in scat detection, as it is more straightforward than live detection training. However, this recommendation requires an individual to be willing to spend money to attend the scent training classes. Additionally, owners must ensure that once they begin scat training, they do not constantly expose their dogs to scat in the home. Scat detection is only effective in areas with very low pest numbers.

Hiring a Live or Scat Detection Dog

Another option that reduces the time to train a detection dog is to hire a live or scat detection dog team. The team will come into allotted areas to sniff out pests and inform trappers where to set up traps. Since this is professional work, volunteer compliance, liability, and the standard of training are not a concern. The drawbacks of this option are that it can be expensive, as hiring a team cost around $130 per hour of land coverage, and the cost of traveling depends on where the team is based. Considering that much land has to be covered, the cost of hiring a dog adds up. In addition, for scat detection work to be effective, the pest populations must already be reasonably low. Most dogs are species-specific, so PFUH must determine which pests are most important to target. Both Max Hoegh, Sally Bain, and Billy Barton expressed being able to be hired for a job such as this.

Avian Aversion Training

As discussed in the literature review, Kiwi Avoidance Training, a type of avian aversion training, is an option for dog owners to help their pets to avoid harming native species. Since kiwi are not currently found in Upper Hutt, trainers can use the same training method for other ground-dwelling bird species. It is the preliminary procedure in training a detector dog. Drawbacks of this option are that trainers often use shock collars, and it does not directly lower the pest population. Training classes can be found on *kiwiavoidancetraining.nz*, and they occur year-round all over the country.

Responsible Dog Ownership

Another low-time commitment option for those willing to put in limited time is to practice responsible dog ownership. Owners should always watch their dogs outdoors and use a leash to prevent them from disturbing native species. In addition, owners should limit letting their dogs out to roam at night as this is when many nocturnal species are active.

5.3: Summary

Based on the recommendations above, our team is confident that a future team could further progress a uniform scent programme that introduces household dogs to scent work with pests or scat. This would expand PFUH's efforts in pest control and get the community more involved and engaged with detection efforts. Our team successfully assessed the feasibility of a community-based detector dog programme and outlined recommendations and steps for Pest Free Upper Hutt to take with the pilot programme.

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Appendices
Appendix A: Informed Consent Agreements and Consent Forms
Research Consent Form

WPI

We are a group of students from Worcester Polytechnic Institute (WPI) in the United States. We are conducting interviews to learn more about perceptions of a community detector dog programme in Upper Hutt. Your participation is voluntary and is further outlined in the informed consent form. If you would like to view results at the completion of this research, please provide your email below.

Do we have your permission to record this interview?

Yes ☐ | No ☐

Do we have your permission to include your photo?

Yes ☐ | No ☐

Will you allow us to include your name and other identifying information?

Yes ☐ | No ☐

_____   _____
Participant Signature   Date

_____   _____
Participant Name (Please print)   Email (for results, not required)

_____   _____
Researcher Signature   Date

Informed Consent Agreement for Participation in a Research Study Interview

Investigators: Matt Cochran, Holly Galvin, Natalie Gonthier, Eva Petschek
Contact Information: gr-WellingtonDetectDog22@wpi.edu
Title of Research Study: Community Detector Dogs for a Predator Free Upper Hutt
Sponsor: Pat van Berkel

Introduction:
You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study:
The purpose of the film is to inform the Upper Hutt community about what predator detector dogs are, what they and the handler do, the importance of the dog/handler relationship, and who would be applicable for such a program. Ideally this will also spark interest and excite the community.

Procedures to be followed:
Interview participants will be briefed on their consent and rights as a participant, the approximate number of questions, and how semi-structured interviews generally work. Video and audio recording devices will be turned on, and participants will be informed when devices start recording. The interviewer will be one of the researchers asking questions from a predetermined list along with topics related to the questions dependent on information brought up in the interviewee's responses. This procedure should take approximately 30-45 minutes in total. Researchers may ask for verbal consent to extend the interview by increments of 15 minutes or an amount of time discussed with participants at their discretion. Notes will be taken by hand by the interviewer.

Risks to study participants:
While participating in this study, there is very minimal to no risk involved to participants. If any, it would be similar or less than posting on social media.

Benefits to research participants and others:
This study will provide participants with the opportunity to express their interest and personal opinion about the community detector dogs program. Participants who have been detector dog handlers will also get to share their experience and expertise.

Alternative procedures or treatments available to potential research participants:
Interview participants who do not wish their interview recordings (audio or video) to be used in the video will have several alternative options. For participants who do not want to show their physical identity (face or body), through the video editing process it is possible to either blur, block, or use audio over a separate video or various pictures. For participants who do not want their voice to be identifiable, their voice will be distorted through the video editing process. Alternatively, a voice over by researchers can be recorded quoting their words. Names in the lower third will not be used if consent is not given.

Record keeping and confidentiality:
Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. During the interview and filming process, the participants will have the option to keep their identity anonymous through a separate consent form.

Compensation or treatment in the event of an injury:
There is minimal risk of injury or harm, and none further than standard every-day experiences. You do not give up any of your legal rights by signing this statement.

For more information about this research or about the rights of research participants, or in case of research related injury, contact:

Contact information of the researchers can be found at the top of this document. Worcester Polytechnic Institute's Institutional Review Board Manager, Ruth McKeogh, can be reached by telephone at +1 (508) 831-6699, or by email at irb@wpi.edu. The Human Protection Administrator, Gabriel Johnson, can be reached by telephone at +1 (508) 831-4989, or by email at gjohnson@wpi.edu.

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

_____   _____

Study Participant Signature   Date

_____   _____

Study Participant Name (Please print)   Email (for results, not required)

_____   _____

Researcher Signature   Date

Media Consent Form

WPI

We are a team of undergraduate students from Worcester Polytechnic Institute (WPI) in the United States. We are participating in a project to assess the interest and perceptions of a community-based detector dog programme in Upper Hutt. If you are willing to participate in this project, please read and note your preferences on this form. The final results will be made public. If you would like to view results at the completion of this research, please provide your email below.

Do we have your permission to audio record an interview?

Yes ☐ | No ☐

Do we have your permission to video record an interview?

Yes ☐ | No ☐

Will you allow us to use your words and image for use on public website platforms?

Yes ☐ | No ☐

I understand that these interviews will be published at WPI for educational purposes and made available to the public. Images and film clips may also be shared to social media platforms including Instagram and other outlets designed to amplify community interest in a detector dog pest control program.

_____   _____
Participant Signature   Date

_____   _____
Participant Name (Please print)   Email (for results, not required)

_____   _____
Researcher Signature   Date

Appendix B: Predator Dog Handler Participant Observation Talking Points

1. Where did you first hear about a detection dog? Why did you decide to train your dog in detection? What motivates you to continue working in a dog/handler pair?
2. What has been your most rewarding moment with your dog during the training or detection process?
3. What did the training process look like for your dog? How long did it take to train your dog? Were there any certifications that you needed to complete?
4. Can you give an estimate of the cost you put into training and equipment? What are some challenges and/or difficulties you faced while training or during pest detecting missions?
5. We are looking into creating a community based detector dog program, where community members can train their dogs to detect pests in the Upper Hutt. Looking back to the process it took you to train your dog, do you think it is feasible for members of the general public to be part of a programme like this?
   a. If they say yes, ask: What would the programme need to be successful? Do you think this programme would add value to the community?

Backup Dialogue
- Most rewarding moments / Stories (question before/ send info before interview)
   - Are there any stories you would like to share?
   - Overcoming a big challenge, PR setting, funny moments
- Bring up some typical traits of detector dogs and ask if their dog presents these traits.
   - Great problem solving abilities, strong motivation for learning, boldness, coping with stressful stimuli
   - Not in literature review but in sources: cooperative with handler, obedient but has enough independence to make own decisions

Appendix C: Dog Trainer Interview Questions

1. What are some typical difficulties dogs have with training, especially puppies?
2. What are some typical difficulties your dog parents have with training?
3. Do you find it harder to train certain ages or breeds of dogs?
4. What type of rewards are typically used in classes, any verbal queues?
5. How much do you typically charge for classes? Does it defer based on level or type of class?
6. How many weeks do the programs run for?
7. Does your training club do any scent-detection training with dogs? If so, what training methods do you use and how successful are dogs at detection?
8. We have found through our research that in order to train a detector dog, it takes a very large time commitment of at least an hour per day. Do you think there are members of your training club or the public who would be willing to commit to that level of time commitment?
9. Could you see a detection/scent work class being popular at your training school?
10. Have any of your clients gone on to become professional detection dogs and handlers? Or other working fields?

Appendix D: Targeted Dog Owner Community Member Survey

1. What age group do you fall within?
   a. 20 or under, 21-40, 41-60, over 60
2. How old is your dog?
   a. Under a year, 1-2 years, 3-5 years, 6 and above
3. What training has your dog been through?
   a. Open response (long format)
4. Detector dogs are being used throughout New Zealand to detect non-native species such as rats, possums, and stoats by smell. The diet of these animals includes the eggs of many native ground-dwelling birds. How do you feel about the use of dogs to locate these non-native species in efforts to eradicate them?
   a. Scale from strongly disagree to strongly agree
5. Would you be interested in training your dog to become a detector dog through a potential community based training programme?
   a. Yes or no
   b. If no, skip to question 9
6. What is the ideal way you would like to train your dog?
   a. On my own less than 4 hours per week.
   b. On my own more than 4 hours per week.
   c. Weekly sessions for less than 4 hours per week.
   d. Weekly sessions for 4 or more hours per week.
   e. Training camp that meets every weekday over a couple weeks.
7. Would you spend money on training and equipment to successfully train your dog to be a detector dog?
   a. Yes, no, maybe
8. If there were competitions where you could win prizes for the performance of your detector dog, would this increase your interest in the potential programme?
   a. Scale from not increasing at all, to increasing majorly
9. Do you have any other comments, concerns, or suggestions about this programme?
10. Where did you hear about this survey?
    a. Drop-down menu with locations survey will be displayed
       i. City Council/ Library, Dog Park, email, Newspaper, Social Media, Vet / Pet Store, Other

Appendix E: Pest Free Upper Hutt Coordinators Targeted Survey

1. As you know, There are many native species that have been harmed by invasive mammals including rats, stoats, and possums. Detector dogs are being used throughout New Zealand to detect invasive species to help conserve the native populations. How do you feel about the use of dogs to help find invasive pests?
   a. Scale from strongly do not support to strongly support
2. As a project coordinator, could you see a programme like this being successful in reducing the presence of pests in the Upper Hutt Region?
   a. Scale from strongly disagree to strongly agree
3. What are some factors that would guide the success of such a programme?
   a. Open-ended response (long response)
4. Do you own a dog?
   a. Yes
   b. No (if no skip to question 11)
5. How old is your dog?
   a. Under a year, 1-2 years, 3-5 years, 6 and above
6. What training has your dog been through?
   a. Open response (long format)
7. Would you be interested in training your dog to become a detector dog through a potential community based training programme?
   a. Yes or no
   b. If no, skip to question 11
8. What is the ideal way you would like to train your dog?
   a. On my own less than 4 hours per week.
   b. On my own more than 4 hours per week.
   c. Weekly sessions for less than 4 hours per week.
   d. Weekly sessions for 4 or more hours per week.
   e. Training camp that meets every weekday over a couple weeks.
9. Would you spend money on training and equipment to successfully train your dog to be a detector dog?
   a. Yes, no, maybe
10. If there were competitions where you could win prizes for the performance of your detector dog, would this increase your interest in the programme?
    a. Greatly decrease
    b. Somewhat decrease
    c. Interest is same
    d. Somewhat increases
    e. Greatly increases
11. Do you have any other comments, concerns, or suggestions about this programme?
    a. Open response (long format)

Appendix F: Detector Dogs for Pest Free Upper Hutt Video

Youtube Link to Video: https://youtu.be/KjfjTk5Ud6Q

Appendix G: Deliverable of Alternative Recommendations

STILL WANT TO CONTRIBUTE TO THE PEST FREE 2050 GOAL WITHOUT THE FULL COMMITMENT OF TRAINING A DETECTOR DOG?

Alternatives Recommendations

Scent Training Classes

Beginner level scent work classes can be found at both the Upper Hutt Dog Training Club and Ace Dog Training If your dog excels at these classes, the target scent can be switched to scat of pests.

Hire a Detector Dog

Professional detector dog teams can be hired to search designated land areas and give information as to where to set traps. This removes the time commitment of training.

Avian Aversion Training

The first step in training a detector dog is to teach them how to avoid interacting with native wildlife. Classes are held year round all over New Zealand and can be found at kiwiavoidancetraining.nz

Responsible Dog Ownership

Everyone with a dog should practice responsible dog ownership. Protect native species by keeping your dog away from their habitats and always watching them closely and using a leash.