

Project Title: Investigation into error rates for distance estimation work

Principal Investigator: SallyAnn Harbison (The Institute of Environmental Science and Research Ltd., & School of Chemical Sciences, The University of Auckland)

ESR Supervisor: Leah Tottey (The Institute of Environmental Science and Research Ltd.)

Student Researcher: Skye Gallagher (MSc Candidate in Forensic Science, School of Chemical Sciences, University of Auckland)

Funding: The Institute of Environmental Science and Research Ltd.

ORGANISATIONAL PARTICIPANT INFORMATION SHEET (PIS)

Practicing firearm examiners have been invited to participate in a University of Auckland Master of Science research project, in collaboration with the Institute of Environmental Science and Research Ltd. (ESR) in Mount Albert, Auckland. You cannot decide on behalf of your employee to participate or withdraw their data. This project entails fully voluntary participation, but the participant may require permission from their employers to partake during work hours and use their organisation's facilities and resources.

This PIS should inform you about your employees' participation in the study. It outlines the purpose of this project, what participation entails, what the benefits and risks may be, and what may result when the project is concluded. You may wish to consult with other people before you make your decision.

If you do wish to approve your employees' participation in this research, you will be asked to sign the consent form (CF) attached to the invitation email. You will be given a copy of the PIS and CF for your safekeeping.

This document is 4 pages long. Please ensure you have read and fully understood the content of this document before you make your decision.

Background

Scene reconstruction is an important role for firearm examiners. It can provide valuable evidence for the Court, such as the range, position, and orientation of a firearm when it was fired, and the position of a victim upon impact of the shot. In New Zealand, shotguns are amongst the increasingly popular type of firearms as they are permitted for sporting and hunting with a firearms license.

The cartridge of a shotgun, a shotshell, contains many metal pellets and upon discharge, these pellets spread in a cone-like fashion which makes it possible to estimate the muzzle-to-target distance based on the size of the pellet spread. There are several factors that may vary the spread such as barrel length, shot size, and the choke design on the shotgun. Firearm examiners may carry out distance estimation work by making experimental shots at known distances to provide an estimated range of distance.

Approved by the University of Auckland Human Participants Ethics Committee on 28/03/2025 for three years.
Reference number UAHPEC28965.

The shortfall of distance estimation work using pellet patterns is that firearm examiners currently do not have reference data, such as published literature, which acknowledges the examiner error rates for this type of distance estimation work. This project aims to provide those error rates based on the distance estimations of firearm examiners at ESR and internationally, which can be used when presenting expert evidence in Court. Error rates are important for measuring the validity and reliability of a scientific method, and several publications have recognised the lack of such documentation within forensic science.

For your interest, this project also aims to investigate the behavioural differences between lead and steel shot. The very general rule of thumb, being that a pellet pattern spreads one inch for every one yard of muzzle-to-target distance, is based on lead shot; however, lead shot is now prohibited for waterfowl hunting in many jurisdictions including New Zealand, and thus there has been a rise of steel shot seen in casework. This project wishes to investigate the accuracy of current methods when applied to patterns created by steel shot and develop a new rule of thumb for examiners to use if it is found to be unreliable.

Participant Procedure

We are recruiting practicing firearm examiners to participate in this research project. Voluntary participants will be provided with one pellet pattern created by the research team to estimate the muzzle-to-target distance.

Participants will be given a controlled amount of information to assist them, as an ideal case scenario would, such as the gauge of shotgun and pellet size. This entails the participant to carry out several test shots to then provide the research team with a reportable distance range, as they would in a forensic case scenario.

Participants will also be asked to fill out a questionnaire on Qualtrics to provide the research team with information regarding their professional experience and distance estimation protocol. Qualtrics is a secure, browser-based software for creating and distributing surveys. It is widely used for academic research and requires human ethics approval for use.

You must also acknowledge that there are physical risks associated with participation in this research. This includes risks imposed in a firing testing laboratory, notably the handling and discharge of firearms, the mitigation of lead toxicity, and other health and safety risks found within your workplace. You must be aware of who to contact in an adverse event (such as your health and safety committee) and you or the participant must contact the research team as soon as possible.

Your consent to permit your employee to participate in this research infers that you are allowing them to volunteer to contribute within working hours, and to use your organisation's facilities and resources to participate in this research.

Participant Rights

The data obtained for this research will be used for the completion of the student's Master of Science thesis, and subsequent publications or conference presentations that may arise. Participation is voluntary, therefore participants have the right to withdraw from the study at any time, before the completion of this project (June 2025). You cannot give permission on behalf of the employee to withdraw their data. If a participant chooses to withdraw, their data will be destroyed. Consent forms will be stored separately to the research data and will only be accessible to the third-party representative for six years until the consent forms are destroyed per ESR protocol.

Any identifiable information provided will only be known to the third-party representative. Participant identity will be de-identified for the research team with alphanumeric coding. Participant identity will not be published in the resulting thesis or subsequent publications, and the third-party representative will not share participant identities with anyone. Only the third-party representative will have access to identifiable information, which will be stored in a secure location for a period of 6 years. After 6 years, the data will be destroyed per ESR protocol.

Your permission for your employee to participate will not affect your relationship with the Institute of Environmental Science and Research Ltd. (ESR). This has been ensured in writing by the General Manager Forensic, John Bone of ESR.

Following the completion of this research project, the summary of the results will be available to all participants. You may request a copy by indicating as such on the consent form and providing an email address. Additionally, the results will be found in the master's thesis of Skye Gallagher, available at the University of Auckland library, and the ESR Library.

Cultural Beliefs

You may hold cultural or spiritual beliefs about research and data collection. Issues that arise in association with your beliefs should be discussed with your whānau/family where you see appropriate. The research team acknowledges that individuals have the right to choose. If you are Māori or Indigenous and you wish for the research process to better suit your needs, please do not hesitate to contact any member of the research team (details listed below).

Thank you for taking time to read this participation information sheet. If you have any further questions or concerns, please do not hesitate to contact any member of the research team (details listed below).

Contact Information

Principal Investigator: Dr SallyAnn Harbison

The Institute of Environmental Science and Research, Mount Albert Science Centre, Auckland
Private Bag 92021, Auckland

Email: sallyann.harbison@auckland.ac.nz or sallyann.harbison@esr.cri.nz

ESR Supervisor: Leah Tottey

The Institute of Environmental Science and Research, Mount Albert Science Centre, Auckland
Private Bag 92021, Auckland

Email: leah.tottey@esr.cri.nz

Student Researcher: Skye Gallagher

MSc Candidate in Forensic Science, University of Auckland

Email: sgal101@aucklanduni.ac.nz or skye.gallagher@esr.cri.nz

ESR Third-Party Representative: Jessie Davys

The Institute of Environmental Science and Research, Mount Albert Science Centre, Auckland
Private Bag 92021, Auckland

Email: jessie.davys@esr.cri.nz

Academic Head of the School of Chemical Sciences: Professor Duncan McGillivray

The University of Auckland
Science Centre 302 (Building 302)
22 Symonds Street, Auckland, 1010

Email: d.mcgillivray@auckland.ac.nz

For any concerns regarding ethical issues, you may contact the Chair, the University of Auckland Human Participants Ethics Committee, Office of Strategy Research and Integrity, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand.

Telephone +64 9 373-7599 ext. 83711.

Email: humanethics@auckland.ac.nz

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