

Genetics in Conservation and Biosecurity: Tales from the Lab

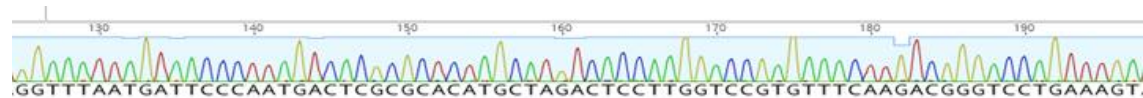
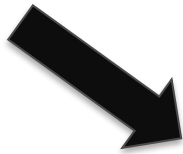
Hester Roberts & Talia Brav-Cubitt

November 19





Species identification



Descriptions | Graphic Summary | Alignments | Taxonomy

Sequences producing significant alignments Download Manage Columns Show 100

select all 100 sequences selected GenBank Graphics Distance tree of results

	Description	Max Score	Total Score	Query Cover	E value	Per. Ident	Accession
<input checked="" type="checkbox"/>	Etheophanus kuscheli isolate ETH119_BR cytochrome c oxidase subunit I (COI) gene, partial cds: mitochondrial	1131	1131	100%	0.0	100.00%	MK048241.1
<input checked="" type="checkbox"/>	Etheophanus kuscheli isolate ETH063_BR cytochrome c oxidase subunit I (COI) gene, partial cds: mitochondrial	1131	1131	100%	0.0	100.00%	MK048200.1
<input checked="" type="checkbox"/>	Etheophanus kuscheli isolate ETH064_BR cytochrome c oxidase subunit I (COI) gene, partial cds: mitochondrial	1125	1125	100%	0.0	99.84%	MK048201.1
<input checked="" type="checkbox"/>	Etheophanus kuscheli isolate ETH115_BR cytochrome c oxidase subunit I (COI) gene, partial cds: mitochondrial	1092	1092	100%	0.0	98.86%	MK048239.1
<input checked="" type="checkbox"/>	Etheophanus kuscheli isolate ETH036_NN cytochrome c oxidase subunit I (COI) gene, partial cds: mitochondrial	1092	1092	100%	0.0	98.86%	MK048182.1

Coconut Rhinoceros Beetle ID – Vanuatu

(*Oryctes rhinoceros*)

- Major pest of coconut and oil palm
- Controlled successfully by *Oryctes rhinoceros* nudiviruses (OrNV) until recently
- Outbreak of OrNV tolerant type in Guam in 2007
- Recently found in Vanuatu



Coconut Rhinoceros Beetle ID – Vanuatu

- Our role: confirm species, determine OrNV susceptibility
- Using work by Marshall et al. (2017), we confirmed that the beetles were CRB, and matched the OrNV susceptible type from Papua New Guinea





Junction Hill kiwi population

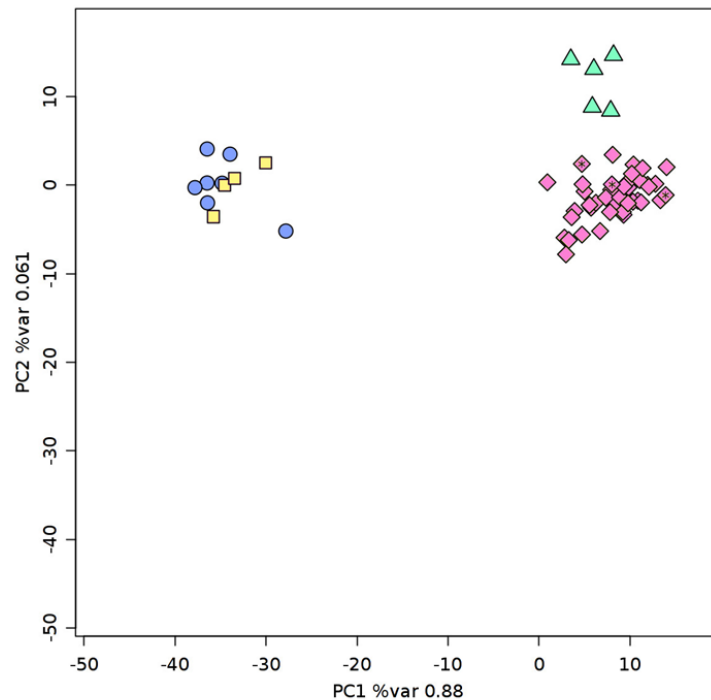
- New population of Haast tokoeka discovered by DOC at Junction Hill
- Five feather samples sent to us to see how these birds fit in with other tokoeka





Junction Hill kiwi population

- Microsatellite marker panel used
 - previously determined to be effective for discriminating between kiwi species/lineages
- Fits in with Haast tokoeka – but genetically distinct



Ramón-Laca, A., White, D. J., Weir, J. T., & Robertson, H. A. (2018). Extraction of DNA from captive-sourced feces and molted feathers provides a novel method for conservation management of New Zealand kiwi (*Apteryx* spp.). *Ecology and Evolution*, 8(6), 3119-3130.

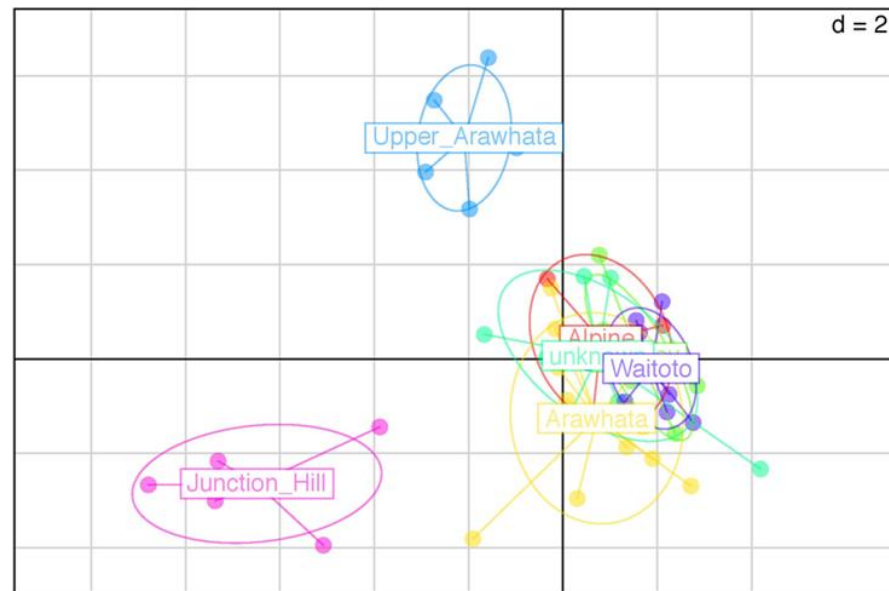
● North_Fiordland ■ South_Fiordland ◆ Haast ▲ Junction_Hill

Analysis: Andrew Veale



Junction Hill kiwi population

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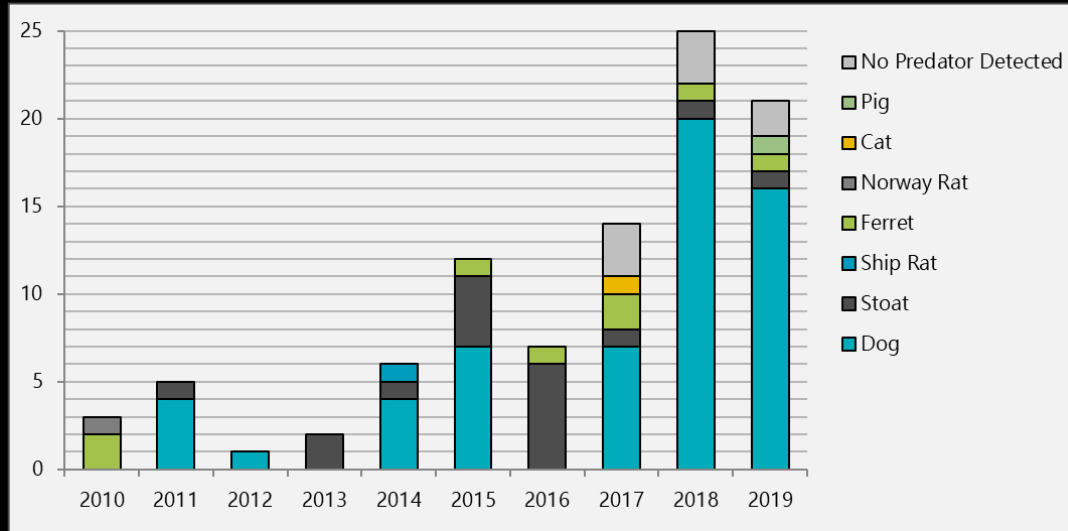
Identifying Individuals

DNA profiling can be used to identify individuals from many species of interest to New Zealand





CSI: Wildlife - Kiwi Predators



Three cases of dog attacks on kiwi are currently in the legal system

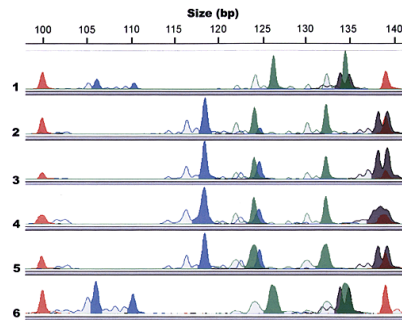
* Also predations on Petrel, LBP, Weka, and more!



Photo: MWLR Innovation Stories

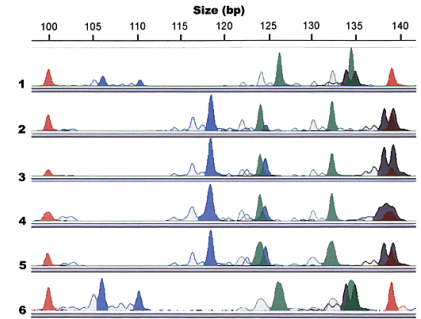
Predator Dog Identification

- **DogFiler:**
 - A forensic tool for dog crimes developed in the USA
 - Kiwi Rescue introduced tool to use in NZ
 - Run by EcoGene®
 - Used by DOC for attacks on native wildlife, and Regional Councils for attacks on stock or domestic animals to solve dog attacks, including predations.



Predator Ferret Identification

- **FerretPlex:**
 - A forensic tool AND a population tool
 - Developed by Dr Robyn Howitt (MWLR)
 - Run by EcoGene®
 - Used for attacks on native birds
 - Used by MWLR and OSPRI to estimate Ferret population size and dispersal for TB Freedom.



Images: Trapinator, MWLR

Bolstering the War on Goats: Taranaki Mounnga

Taranaki Mounnga Project: Andrew Macalister and Jared Coombs

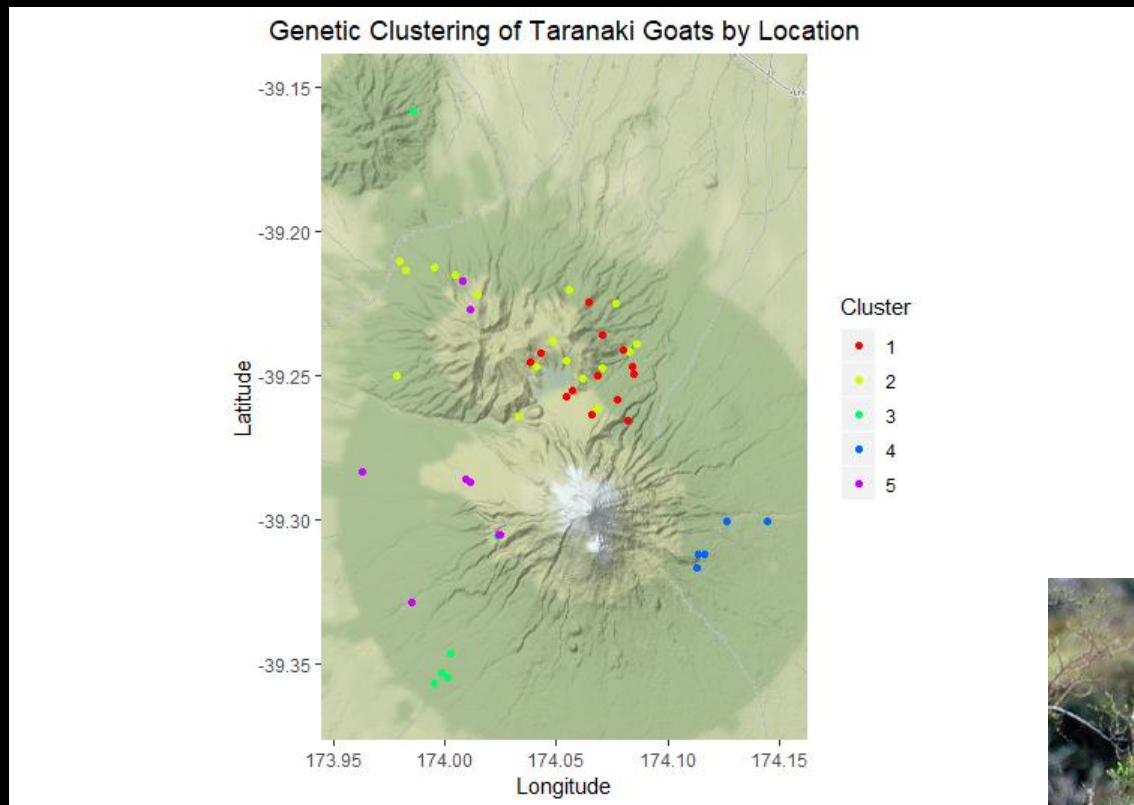


Photo: DOC Animal pests



Applications

- Species ID/verification/detection
- Individual ID by DNA profiling
- Disease and resistance screening
- Wildlife monitoring (detecting individual movements, diet analysis)
- Inferring relationships (parentage, sibling tests)
- Developing new tests
- Genetic data generation (DIY Analysis)
- Contract Research



Legal Matters

- Sometimes you might need more than a scientific report...
 - CITES Violations
 - Illegal releases
 - Attacks on protected species
 - Attacks on domesticated animals
- In these cases, we work with you to provide the results of our testing in a way that fits within the legal framework

We can help you plan your projects!



- Advice on project design
- Sample sizes and collection methods
- Forensic DNA Sampling Workshops



Talia Brav-Cubitt



Hester Roberts



Robyn Howitt



Duckchul Park



Andrew Veale



Frank Molina



Ana Podolyan (Plant Genetics, Lincoln)

EcoGene® and the Ecological Genetics lab provide and encourage links with the wider MWLR research family



A bit of trivia

- Since 2015, EcoGene® has undertaken 183 different projects for DOC, at a value of more than \$300,000
- Our collection of DNA at the Auckland Site alone contains over 20,000 samples from hundreds of different species!
- Each month, our sequencing facility produces over 1200 DNA sequences – around half of these for MPI

We would love to hear from you!

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