

*Our Land and Water National Science Challenge Rural Professionals Fund Project #10*

**Droning on.....**

**An investigation of New Zealand's environmental compliance regulatory processes via the 'eye in the sky'**

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# Background

## Farmers who need a freshwater farm plan

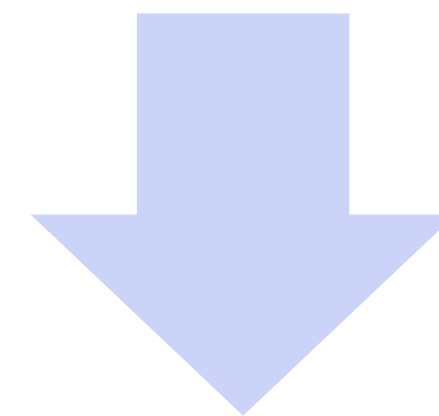
All farmers with:

- 20 hectares or more in arable or pastoral use
- 5 hectares or more in horticultural use
- 20 hectares or more of combined use.

## When farmers need to have their freshwater farm plans in place

- Freshwater farm plan regulations are expected to take effect by the end of 2022.
- The requirement for certified freshwater farm plans will be phased in from early 2023 region by region.
- Early guidance will be provided by the end of 2022.

(Ministry for the Environment, 2022)



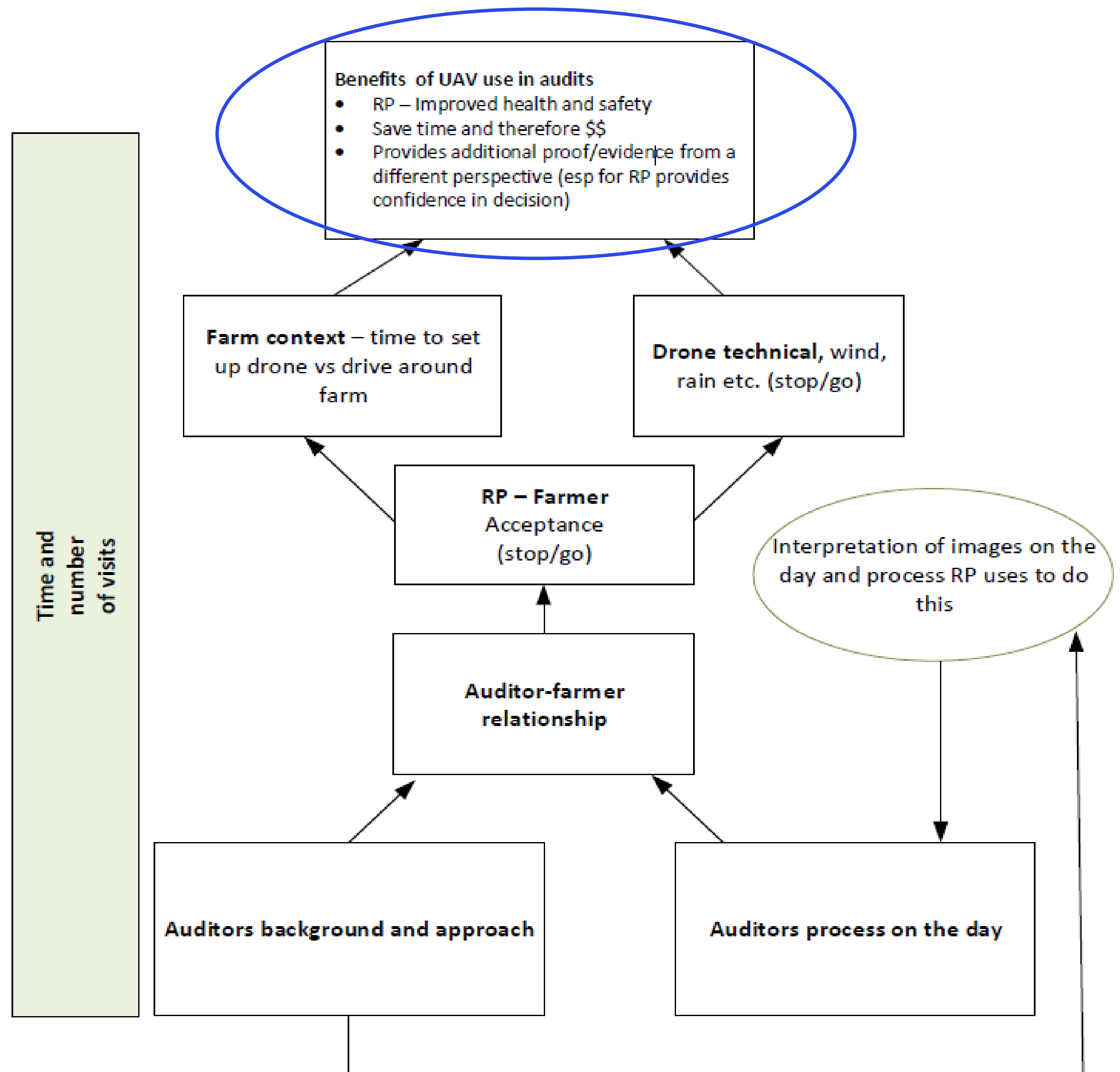
Increased number of farm plans will need to be developed and audited over time

***- How can this be done robustly and efficiently – How could drones/UAV's be used?***

# Previous research

From the perspective of farmers and auditors in Canterbury

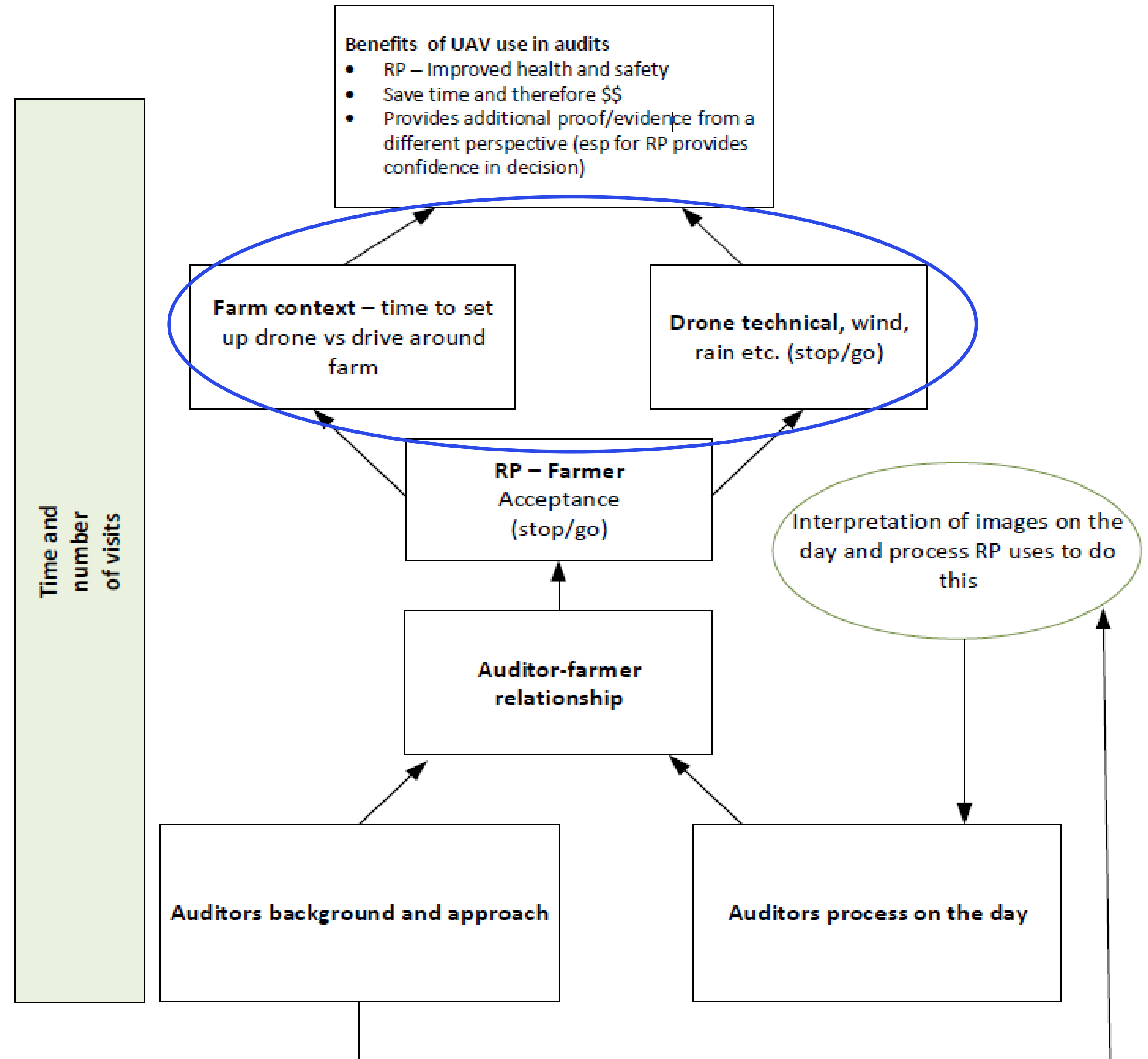
Benefits of using drones in the audit process



## Previous research

From the perspective of farmers and auditors in Canterbury

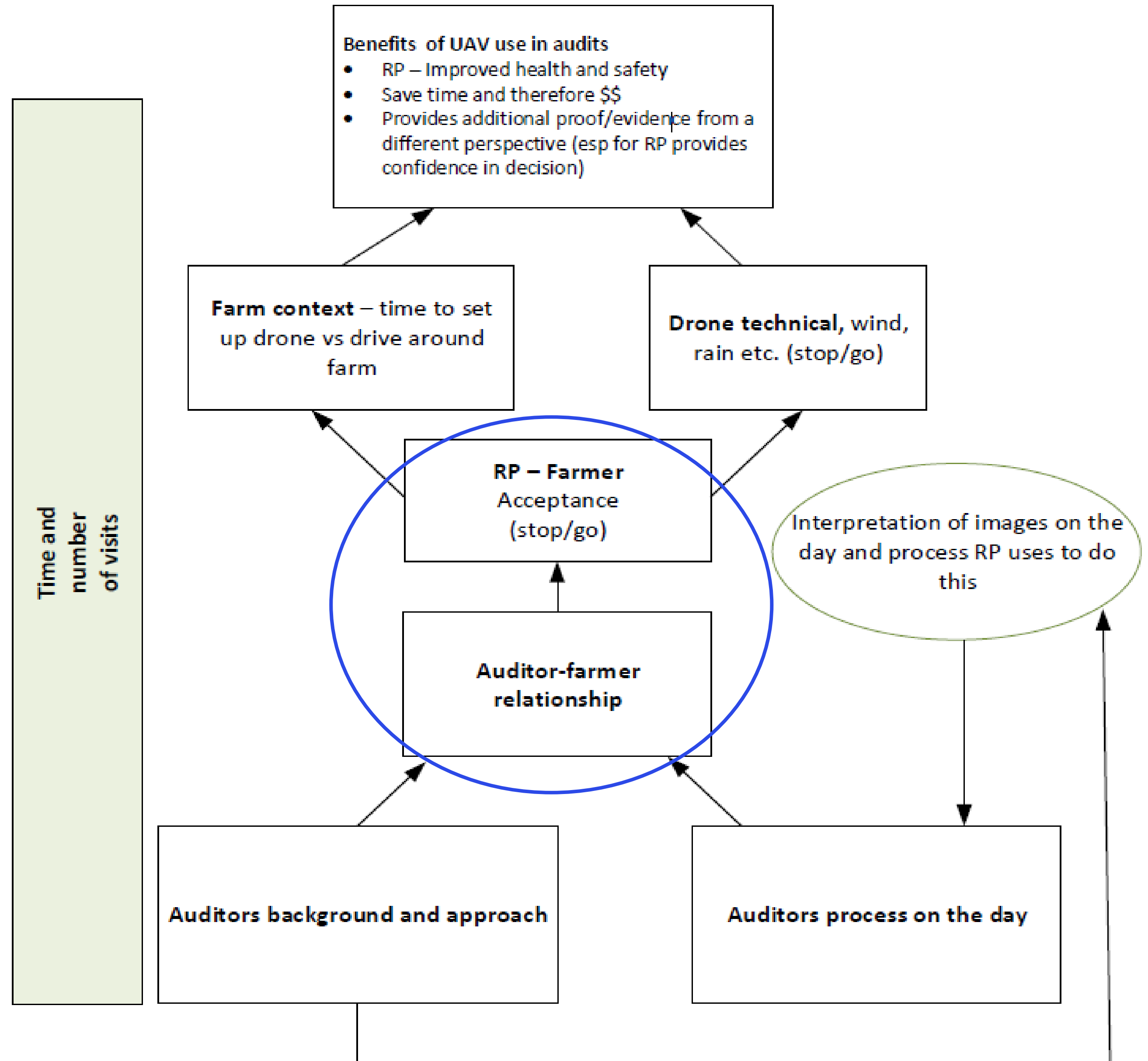
Farm context and technical aspects of using a drone in the audit process



## Previous research

From the perspective of farmers and auditors in Canterbury

A positive auditor – farmer relationship was needed to gain the farmers permission to use the drone in the audit process



# Current Research: Objectives & Questions

## Research objective

To investigate the perceptions of those working within compliance in regional government, on the potential role of drones in on-farm environmental management.

## Research questions

- How could drones be used in environmental management and compliance?
- What do those in regional councils involved in environmental compliance perceive as the benefits and limitations of using drones?
- What impacts does the professional relationship between compliance officers and farmers have on the use of technologies such as drones within the environmental compliance process?

# Methodology and methods

## WHO:

Following the principles of selective sampling and theoretical sampling (Draucker et al., 2007).

- 11 respondents from 5 Regional Councils - were the target participants...
- 1 respondent from Central Government

## HOW:

- Semi-structured interviews, transcribed, imported into Nvivo, data thematically analysed
- Question areas: participants role, experience in environmental management and perception of the on-farm environmental management and compliance processes.

# Methodology and methods: Use of vignettes

## Scenario 1

### *Questions: Advantages and limitations in different contexts*

- **The situation:** Drones or UAVs are becoming more widely used for on-farm auditing for environmental compliance. This involves replacing part of the farm tour with flying a drone and viewing live footage and taking digital images. Where potential problems are identified, an on-site visit to the location of interest is followed through, along with a discussion with the farmer regarding the issue identified.
- Consider the following two individual farmers, Tom and Sally, who are managing the following farms:
- **Tom** - an extensive, sheep/beef/deer, large scale, hill farm
- **Sally** - an intensive, dairy support and cropping, smaller scale, flat farm

## Scenario 2

### *Questions: Farmer- compliance officer professional relationship*

- **The situation:** Following on from the situations in **Scenario #1**, consider three individual farmers, Mary, Ace and Ben, and the following information:
- **Mary** – does not know of an auditor who will undertake the audit process.
- **Ace** – has a strong, positive professional relationship with an auditor who will undertake the compliance process including taking aerial footage with a drone.
- **Ben** – will take aerial footage himself using a drone and upload this and any other required information to an on-line compliance portal.



# Results

RC undertake interpretation and implementation of policy ... with 16 regional & unitary councils ... different interpretations, different environments and different stages of development of compliance processes

= confusion + difficulty for policy makers and farmers

= balance between consistency and efficiency with drones

# Results

'Ground-truthing' required

**1. Which processes can UAVs be used for?**

**Farm plans**  
*Yes*

**Compliance monitoring:**  
**Audits**  
*Yes*

**Compliance enforcement:**  
**Warrants - Yes**

**2. Overall benefits and limitations**

Footage: ownership, storage, access, risks of access

***Benefits:***

More efficient....less time/petrol than driving around the farm  
Aerial view = more robust  
Hilly farm = safer

Investigate more areas as able to?

Policy required + trained experienced drone pilots

**3. Professional relationship with farmer**

Non warranted  
So ...Permission needed  
So...positive relationship needed

Impartiality?

Enablers of positive relationship....time in area, time with farmers, farm management experience, skills and knowledge farmers consider relevant

Permission not needed:  
Warranted Officer



# Conclusions

From a regional and central government perspective....

Drones are a potentially useful tool in on-farm environmental management

However, several areas require further attention

- RC policy around drone use and training of drone pilots
- Clarification around the ownership, storage and access to drone footage
- In auditing, ensuring an equivalent level of investigation is used independent of whether a drone or vehicle is used for the farm inspection

The developments in these areas would need to be communicated and demonstrated to farmers to further build relationships, including trust (institutional vs relationship based), for farmers to give permission for drones to be used in farm planning and auditing.

.....To ultimately achieve environmental outcomes

## Questions

1. What other implications of drone use in farm environment management can you see?
2. The professional relationship between auditor/compliance officer and farmer has emerged....
  1. What is your view of this in the wider area of farm environmental management
  2. What other theories/'reasoning' do you think underpins this relationship....

# Limitations & acknowledgments

## Limitations

- Small study, so we only had relatively small number of informants, despite the variety.
- The challenges of 'self-selected' bias from the informants.

## Acknowledgements:

This project was generously funded by...



# References

Draucker, C. B., Martsolf, D. S., Ross, R., & Rusk, T. B. (2007). Theoretical Sampling and Category Development in Grounded Theory. *17*(8), 1137-1148.  
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Thank you!  
Questions?