Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

TERMS OF REFERENCE FOR

Aerial Surveillance for Kauri Technical Advisory Group

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March 2022

Background

A programme to manage the health of kauri has been in place since 2009. It is the result of a combined effort from central and local government, mana whenua, local communities and science to protect kauri from the threat of *Phytophthora agathidicida*. This programme is now overseen by MPI's kauri management agency Tiakina Kauri. This agency has been developing a National Pest Management Plan which will be a key operational tool to help protect kauri. The NPMP sets rules and gives Tiakina Kauri powers to achieve the plan's objectives.

Research is critical to the success of the NPMP and other kauri protection activities. High impact science in the surveillance area will support Tiakina Kauri in its aim of protecting kauri forests. A July 2021 workshop in Christchurch concluded that a key surveillance research outcome is "To inform adaptive kauri dieback management strategies using data gathered from a modular, flexible and consistent surveillance and monitoring framework". Key goals were:
1. Define the baseline kauri population spatially
2. Determine the baseline pathogen distribution
3. Establish baseline prevalence of kauri dieback and kauri forest health
4. Determine drivers of kauri dieback and of kauri forest decline

Data acquired from remote sensing is needed to achieve those goals. The Aerial Surveillance Technical Advisory Group (TAG) will play a key role in ensuring high impact science is carried out and robust recommendations are communicated to stakeholders (i.e., mana whenua, Councils, DOC), Tiakina Kauri and the Governance Group.

Purpose and function

The **purpose** of the TAG is to:
- provide operational science advice to stakeholders, Tiakina Kauri and the Kauri Governance Group to inform management decisions, specifically using aerial surveillance to determine:
  - kauri numbers and distribution
  - baseline disease prevalence and tree health
  - efficacy of management interventions
  - appropriate levels of resolution and/or accuracy needed
  - changes in disease distribution and severity over time
  - other matters as requested by stakeholders, Tiakina Kauri or the Kauri Governance Group
- identify remote sensing resources and capability for data acquisition, storage and analysis
- align kauri remote sensing science with needs of Tiakina Kuari, mana whenua, DOC, Councils and other groups
- address the key goals and steps identified at the July 2021 workshop (Appendix I)
- address key questions (*see* Appendix II) identified at hui planned for March/April 2022
- examine existing research programmes to ensure the TAG's recommendations are based on the best science
- determine how social acceptance and cultural safety can be achieved to give licence to any remote sensing activity, including data storage and distribution.

The TAG has the following **functions**:
- to provide technical advice to inform kauri management and protection operations
- to make recommendations on resources and capability
- to communicate and champion remote sensing science to mana whenua and other groups

Scope

The TAG will provide independent technical advice to stakeholders, Tiakina Kauri and the Kauri Governance Group. That advice may cover best method, value for money, social licence. The scope of the advice includes:
- remote sensing imagery acquisition
- imagery data analysis
- data storage and accessibility
- capability and resources.

Out of Scope
TAG members will not have any specific powers or functions other than to comment and provide advice. Areas outside of the scope of the TAG include:
- decisions on research funding allocation or science prioritisation
- decisions on research or imagery providers
- remote sensing over non kauri forest or urban areas
- undertaking research
- detailed review and revision of existing science plans.

Timing

The TAG will have a finite life. The intention is to form the TAG, inform Tiakina Kauri and the Kauri Governance Group and then disband. It is unclear how long the TAG will operate for, but it is envisaged it may operate for around six to nine months, assuming there are no delays due to the pandemic or other unforeseen circumstances.

Membership

The TAG will comprise members who can collectively cover the following perspectives:
- remote sensing and/or surveillance expertise
- kauri protection leadership, experience and knowledge
- science and technical, with a focus on integrating science into operations.

Specifically, the TAG will consist of:
a. An independent chair
b. Science Lead Tiakina Kauri
c. At least one senior Maori expert
d. Up to seven remote sensing and/or surveillance experts (of which up to two may be from the commercial sector)

Kahui

A Kahui may be formed to provide guidance to this and the Ground Surveillance TAG on how it can be aligned to Māori needs, and advise on cultural safety, data protection and other matters important to Māori.

Principles and values

1. Partnership. The treaty is our foundation and the value of this partnership is recognised at all levels.
2. Respect. Members will treat other members with respect and civility. Robust and frank discussion is encouraged but personal attacks are not constructive. Members are encouraged to bring their own perspectives to the table based on their own skills and experience.
3. Collaboration. TAG members come from different groups or organisations. We need to work together to ensure the best outcomes are achieved.
4. Trust. We operate in an environment of trust and treat other TAG members fairly.
5. Independence. Members are on the TAG to offer the best independent advice. Affiliations to a member's organisation, entity that employs them, or personal commercial interest will be set aside. Members are not representing the entity that they align to.
6. Diligence. Members will prioritise meeting attendance, prepare before meetings and prioritise requests to carry out post-meeting tasks.

How the TAG operates

- The TAG is expected to meet six times, at a minimum, at a time and place determined by the Chair in consultation with the members. It is anticipated that most meetings will be held via video conference.
- Members will be expected to prepare for meetings, review meeting material and follow up on action items. There may be a need to review and comment on documents outside of meetings.
- The TAG will operate on the basis of consensus. The TAG is not a decision making body but it may be necessary to have consensus for some recommendations. Where this is not possible to achieve, the recommendation will be made on basis of majority vote. This will be noted in the meeting minutes and in the recommendation if requested.
- A quorum will be achieved when two thirds of members are present.

Conflicts of interest

It is recognised that the remote sensing provider and researcher community in New Zealand is small. Members may have been in competitive situations with other members in the past. Conflicts of interest, real or perceived, are inevitable. Conflicts of interest will be managed by the following:

1. A conflict of interest is defined as when a member's private interest or professional obligation interferes, or appears to interfere with, an issue that is before the TAG. The conflict of interest may be real or perceived.
2. All members will be responsible for declaring any real or potential conflicts of interest to the Chair as soon as the conflict arises. A register of conflicts will be kept.
3. At the discretion of the Chair, members may participate in discussions about issues in which they have declared a conflict of interest. Participation will be the default; non-participation will be the exception.
4. The TAG's role is to recommend, not to decide, on commercially sensitive matters. However, to protect the integrity of the TAG and any individual member, the Chair at his discretion may ask any member with a conflict of interest or potential conflict to step outside the meeting while commercially sensitive matters are discussed.

Confidentiality and information

- The TAG operates on an open basis, and members should assume that all information presented to the TAG, whether in written or oral form, is non-confidential and may be made public.
- The Chair, or any member, may request that that information (written or oral) be treated as confidential by TAG members.

Appendix I – Summary of the Surveillance Workshop in Christchurch on 8 July 2021

Objective: To inform adaptive kauri dieback management strategies using data gathered from a modular, flexible and consistent surveillance and monitoring framework.

Goals:

1. Define the baseline host population spatially
2. Determine the baseline pathogen distribution
3. Establish baseline prevalence of kauri dieback and kauri forest health
4. Determine drivers of kauri dieback and of kauri forest decline

Key steps:

1. Use existing pathogen and kauri dieback knowledge to inform priority areas for baseline monitoring and which goals (1-4) are required to inform management.
2. Build a modular monitoring framework, using existing methods at the plot, forest, region and national scale to meet each of the four goals.
3. Use all existing data sources to identify the host population at risk, set management units and set the sample frame for monitoring.
4. Finalise case definition, refine and set consistent measurements of risk factors, pathogen testing, disease and impact variables for ground and aerial survey.
5. Collect baseline data using existing trained kaimahi and develop capability and capacity to extend kaimahi lead surveillance across kaurilands.

Key Principles:

1. Use complimentary technologies (i.e., validate remote sensing data with field observations and diagnostics) and approaches across a range of scales (individual tree, local site, landscape)
2. Ensure an effective interface and application of research to operations
3. Use a centralised data platform that recognises data sovereignty and ensures mana whenua access.
4. Drivers other than the pathogen (i.e., climate change, weather, physical disturbance, natural turn-over, external agents) are considered.

Funding-ready activities:

1. Remeasure plots established in the 2000s
2. Survey sites ready for repatriation with higher resistance kauri
3. Remeasure Te Roroa site
4. Complete surveillance design, specifications and models based on existing data

5. Compilation of existing data. Note: Much of the existing data is based on risk-based delimiting the pathogen and therefore there is no 'non-case' comparison group for disease drivers or for understanding baseline disease distribution or prevalence. It is a useful historical record however and should be included. All data that is included should contain the metadata of the date and survey method of collection.

Rationale

We have tactics to reduce pathogen spread (footwear cleaning stations, fencing, pig control, track upgrade or closure). Kauri dieback may be controlled by applying phosphite or using traditional rongoa. Currently, it is difficult to take a strategic approach to pathogen and dieback management because we don't know with certainty where the pathogen is present or absent, what the prevalence of disease is and which locations may have a high disease risk. Collection of robust monitoring data will avoid resources being inappropriately applied – i.e., closing tracks or fencing to exclude the pathogen when the pathogen is already present, or applying disease control treatments to trees growing in areas where kauri dieback is unlikely to become serious. The data will reveal the role of drivers such as disturbance and changing weather patterns on kauri dieback development thus assisting kaitiaki and land managers to make informed decisions on which management approaches to apply.

Appendix II – Potential key questions the TAG may address

1. Remote sensing captures a lot of data. Issues of access and data security and management have to be resolved. What are the critical considerations when developing a central repository of information for researchers and land managers? How do we deal with those considerations?
2. Baseline monitoring is the first step in monitoring disease impact and assessing the effect of treatments and interventions, i.e. phosphite, track upgrades, hygiene stations. Agree on a case definition and the best baseline data collection method using remote sensing.
3. We have experienced capacity contraints when getting remote sensing data analysed for return within short timeframes. How can we overcome these data processing/analysis capacity issues?
4. There are examples overseas of using remote sensing to detect disease on infected plants before symptoms are visible. What needs to be done to develop a reliable system for kauri disease?
6. Can remote sensing determine the disease front? If so, what is the best platform for doing so?