

Kauri Protection Surveillance on a page

Surveillance from above and below



Kauri trees highlighted from oblique aerial imagery (imagery taken from a 40 – 45 degree angle)

| Finding out | From the air | From the ground |
|-------------------------|---|---|
| Where the trees are | Map trees 10m or taller (accuracy varies depending on the image type) | You can confirm tree species and locations and find trees that are shorter than 10m |
| The health of the trees | Identify thinning canopies or dead trees | Identify bleeding bark and yellowing leaves, health and mauri of ecosystems |
| Where the pathogen is | Can't be determined | Can test soil for PA presence |

Ground surveillance

Ground surveillance involves any activity aimed at locating kauri in the forest, recording information that may provide insight into the health of those trees and confirming the presence or absence of the PA pathogen that causes disease. The disease can only be confirmed with a soil test, which entails taking soil samples, then sending them to the laboratory to test for PA presence. Sampling involves the systematic collection of soil from around a kauri tree, including some fine root material. Only as many samples as necessary should be taken (and no more) as walking within a kauri tree's root zone ('hygiene zone') introduces risk of PA spread, hygiene training is therefore key. Once samples are sent to the laboratory, presence of PA is generally tested for either by morphological testing (observations of PA growth on a petri dish) or molecular testing (DNA analysis).

Management units



Catchment (red), subcatchments (yellow), water movement (blue)

"Catchments" are areas where water is "caught" within ridgelines which water flows down from. These work well as management units as water movement can move soil and the pathogen – meaning the pathogen is also likely to get "caught" within the catchment when infected trees occur upslope, such as on ridgelines. Catchment areas can be quite large, meaning sub catchments (smaller, ridged sections of a catchment) are the preferred management unit.

Surveillance Strategy

Deploying a training programme to build capacity in mana whenua to perform kauri health and PA ground surveillance.

Aerial, ground and desktop data and mapping collected and assessed to classify management units that are; known to have PA, appear to be PA-free or have an unknown PA status.

Management units with an unknown PA status are selected for surveillance, to determine baseline health and pathogen status.

Sampling objectives and sampling plans are developed and implemented using one or more methodology.

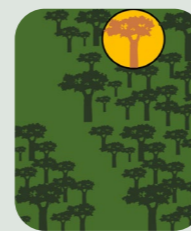
Monitoring objectives and plans developed and carried out for known management units, to determine changes over time.

Each step in the surveillance strategy informs and improves management actions on the ground

NPMP Principal Measures

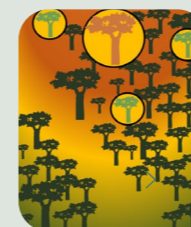
- Mapping the distribution of kauri and kauri forests
- Determining and establishing containment and exclusion areas
- Understanding the impacts of PA on kauri forests
- Mapping the presence and absence of PA
- Understanding the rate of spread of PA
- Understanding of the application and effectiveness of PA control tools, mātauranga Māori, and other management practices to manage the spread of PA

Types of sampling methodologies



Targeted

Provides information about the health of specific trees. Doesn't provide any broader information about the factors that contribute to pathogen and disease spread.



Risk-based

Provides information about the health of specific trees, chosen based on the presence or absence of risk factors. It feeds data to models aimed at understanding risk at a broad scale. Doesn't give a big picture view of how much disease or pathogen in the population. Higher risk areas indicated in reds and yellow and lower risk areas in green.



Randomised Sampling

Provides a solid picture of the proportion of trees that are sick vs healthy in a population, providing baseline information about PA prevalence and allowing for monitoring over time.

Risk Maps

Risk maps are heat maps that identify factors that increase the likelihood of PA presence. Risk factors include the presence of:

- historical kauri forestry
- tracks, traplines and roads
- water movement and slope
- presence of hooved animals in the forest.

Risk-based sampling is built off risk maps.

Monitoring

Once we have a baseline health, we can monitor changes in health over time, identifying successful management techniques and new risk factors. This builds the management kete over time and contributes to how understanding of how the pathogen behaves and how trees respond.

Management actions

Once we know the health status and risk factors at a sub-catchment level, we have options on the best management actions to take. In general – these actions seek to prevent introduction (i.e. exclusion or protection) or reduce the likelihood of PA spread (i.e. containment). This can include managing the impact of: visitors (e.g. closing tracks or encouraging the cleaning of ground touching items), animals (reducing wild animal populations or building stock fences) and landowners or industry (e.g. avoiding earthworks near kauri trees or planning to avoid risk of PA spread).