



Crop & Food Research Confidential Report No 2283

Assessing biodiversity in indigenous forests –
methods for Forest Stewardship Council and
forest health (Project 2008–02)

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A report prepared for
NZ Forest Health Research Collaborative

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1 Executive summary

The Forest Stewardship Council (FSC) requires that biodiversity in exotic forests and indigenous forests grown for timber or as indigenous ecosystems, including pockets/remnants of indigenous forest, is assessed. The objective of this Forest Health Research Collaborative umbrella project is, therefore, to identify the requirement for and methods preferred by foresters for assessing biodiversity in indigenous ecosystems including pockets/remnants of indigenous forest.

Two half-day workshops were held – one in Rotorua (19 September) and one in Christchurch (10 October) – and were attended by 11 people from the forestry industry and two researchers from Scion. A questionnaire on monitoring methods developed with the aid of members of the Forest Health Collaborative was completed by 9 people.

The workshop presentations covered:

1. definitions of biodiversity, Forest Stewardship Council requirements and groups of organisms that can be monitored
2. methods that could be used to monitor fungi:
 - fruiting bodies and
 - plant damage symptoms of pathogens
3. methods that could be used to monitor insects:
 - collect and identify insects using the BioAssist approach
 - monitor the presence of insect and mite herbivores using plant damage symptoms.

The workshops generated much useful discussion. The discussion and responses to the questionnaire suggest that an assessment method that combines fungal pathogens and insect and mite herbivores based on using photographs of plant damage is preferred if monitoring of the biodiversity of native forests is extended to include fungi and invertebrates. The method used must be simple, quick and cost effective. The Plant-SyNZ™ concept (www.crop.cri.nz/home/plant-synz/index.php) could be adapted to meet these requirements.

2 Introduction

This umbrella project of the Forest Health Research Collaborative involved researchers from Landcare Research and Crop & Food Research.

The objective was to identify the requirement to and methods preferred by foresters for assessing the biodiversity in indigenous forests as part of Forest Stewardship Council (FSC) requirements for exotic forests and/or for assessing the health of indigenous forests grown for timber or as indigenous ecosystems, including pockets/remnants of indigenous forest.

This report summarises the results of two workshops and a questionnaire completed by those attending the workshops.

3 Methods

A questionnaire for workshop participants and other members of the Forest Health Research Collaborative was developed. It covered biodiversity monitoring methods currently being used and preferences for methods for monitoring fungi and insects. The questionnaire was prepared with input from Dr Elaine Birk (Rayonier New Zealand Ltd). It was circulated to members of the Collaborative prior to the workshops and completed by people attending the workshops. The results were summarised.

The presentations at the workshops were prepared by scientists from Landcare Research, Auckland, and Crop & Food Research and presented by Nicholas Martin. They covered:

1. definitions of biodiversity, Forest Stewardship Council requirements and groups of organisms that can be monitored
2. methods for monitoring fungi:
 - fruiting bodies and
 - plant damage symptoms of pathogens
3. methods for monitoring insects:
 - collect and identify insects using **BIOASSIST™**
 - monitor for the presence of insect and mite herbivores using plant damage symptoms.

4 Results

The half-day workshops were held in Rotorua (19 September) and Christchurch (10 October) and were attended by 11 people from the forestry industry and two researchers from Scion (Appendix I). Both workshops generated a lot of discussion. A member of the Rotorua workshop said that his company/group was prepared to fund a student to look at biodiversity of herbivores on native plants growing under pine trees and that there were plantations of different ages available within the same geographic area. A member of the Christchurch workshop suggested contacting Tane's Tree Trust, which is promoting growing native trees for timber.

The questionnaire on monitoring methods developed with the aid of collaborative members was completed by 9 people. The responses are summarised in Appendix II.

The key results are:

- the Forest Stewardship Council is important for all respondees
- most workshop participants are currently monitoring an area of native forest using a wide variety of methods and would like to improve these methods and expect additional aspects of forest quality will be added that require monitoring in the future. Cost is a significant issue
- if there were simple and affordable methods for monitoring fungi and insects all would use them
- most would be interested in monitoring fungal fruiting bodies or using photographs of plant damage to identify plant pathogenic fungi. The preferences were for monitoring fungal fruiting bodies (4) and fungal pathogens (3)
- there was a low level of interest in monitoring insects by collecting and identifying beetles, but greater support for using photographs to identify mite and insect herbivores. The preference was for using photographs of plant damage symptoms (6) compared with collecting insects such as beetles (1)
- most (5) would like to combine monitoring for insects and mite plant damage with monitoring for fungal pathogens using the same photographic method.

5 Conclusions

The workshops generated much useful discussion. The discussion and responses to the questionnaire suggest that an assessment method that combines fungal pathogens and insect and mite herbivores based on using photographs of plant damage is preferred if monitoring of the biodiversity of native forests is extended to include fungi and invertebrates. The method used must be simple, quick and cost effective. The Plant-SyNZ™ concept (www.crop.cri.nz/home/plant-synz/index.php) could be adapted to meet these requirements.

6 Acknowledgements

Dr Elaine Birk, (Manager, Forest Investment, Rayonier New Zealand Ltd), for assistance with the questionnaire.

Wei-Young Wang (PF Olsen, Rotorua) for providing the meeting place and facilities.

Peter Carruthers for circulating messages about the project and workshops.

Colin Maunder (Timberlands Ltd) for providing contact details of the Forest Stewardship Cluster.

Dr Darren Ward and Dr Shaun Forgie, (Landcare Research, Auckland) for providing information about the BioAssist method for collecting and processing insect specimens.

Dr Peter Johnston and Dr Eric McKenzie (Landcare Research, Auckland) for providing information about fungi.

Appendix I List of workshop attendees

PF Olsen headquarters, Rotorua, 19 September 2008

- Barbara Hock, Scion, Rotorua
- Chris Bycroft, Wildland consultants
- Nigel Heron, Timberlands Ltd
- Colin Maunder, Timberlands Ltd
- Wei-Young Wang, PF Olsen
- Kit Richards, PF Olsen

Crop & Food Research, Christchurch, 10 October 2008

- Matthew Faulk, Matariki forest, Rayonier
- Olly Halleux, Matariki forest, Rayonier
- Peter Oliver, City Forests Ltd (Dunedin)
- Marcel van Leeuwin, Selwyn Plantation Board Ltd
- Stephen Pawson, Scion, Christchurch
- Peter Weir, Ernslaw One
- Siobhan Allen, Rayonier NZ

Appendix II Summary of questionnaire results

General Questions

1. Location of forests:

- NZ wide (3)
- North Island (1)
- Bay of Plenty (1)
- Canterbury (3)
- Otago (1)

2. Forest tree species grown for timber

- Pinus radiata* (8)
- Redwood (1)
- Douglas fir (6)
- Cypress (2)
- Other soft woods (1)
- Eucalyptus (1)
- Consultant to forestry companies (1)

3. How important for your company is Forest Stewardship Council certification? [circle one]

Very important (9)

Forest Stewardship Council certification requires monitoring of various aspects of native (indigenous) forests or other natural areas. Biodiversity is one aspect that may require monitoring.

4. Are you currently monitoring any aspect of an area of native (indigenous) forest or ecosystem/habitat?

Yes (7) No (2)

4a. If no, are you planning to do so: Yes (2) No

5. What are you currently monitoring in your native forest/habitats and how often do you do this?

Nothing (1)

Visual assessments:

Five yearly

Forest condition:

Structured species health & vigour, annually on key representative forest types extending to 3 yearly once benchmarks established.

Weeds:

bi-annual monitoring of species and infestations after an initial ecological survey that identified the quality of areas and issues.

Endangered flora & fauna:

Looking out for rare, threatened and endangered species

Flora:

Irregular

Biodiversity plots

Birds:

bird counts

five minute bird counts

bird surveys in two forests

Kiwi surveys and predator control in 4 forests

Frogs:

Study of Hochstetters frogs in one forest

Restoration plots

Provision of permanent corridors and refuges identified in one forest

6. Would you like improvements to any of these methods?

Please give details of methods used and where improvements could be made.

Current weed monitoring is OK

Monitoring of endangered species needs to be made more formal/robust/scientific

Use of a National standard methods for monitoring vegetation and birds

Simple fast & economical

Yes, more formal, but cost-effective and simple

Prefer one that is applied regionally/nationally across multiple ownership and co-operatively with FSC forest managers.

Yes, the issue is cost/speed and utility of information in terms of meaningful trends

Quality of indigenous vegetation – full assessment of areas associated with indigenous vegetation within the estate and classification of those unlikely to be affected by forestry operations as reserves

Provision of permanent corridors and refuges

7. Are there other aspects of native forest/habitat quality that you would like to see monitored? Please give details:

Yes, FSC will probably require more comprehensive monitoring of desirable habitat/species quality/change.

Water quality

Yes, within the plantation forest

Invertebrates

Qadi Inventory of species make-up of reserve areas

Questions about fungi and insects in native forests and other native habitats

Background

Fungi and insects are important components of the native forests and other native habitats. Some species are involved with recycling dead plants and animals, and making nutrients available, some live on and in plants, others feed on other fungi and insects, and limit the damage done by plant-damaging fungi and insects.

In New Zealand forests there are many species of fungi and insects. They form an important component of the forest biodiversity. Many species are only found in native forests. They may also provide information about forest health.

8. If there were simple and affordable ways to monitor the biodiversity of fungi, would you use them?

Yes (9) No (0);
limited budget;
possibly

9. If there were simple and affordable ways to monitor the biodiversity of insects, would you use them?

Yes (9) No (0);
limited budget;
possibly

10. If there were simple and affordable ways to monitor native plants for the damage caused by fungi and insects, would you use them?

Yes (8) No (1);
limited budget;
possibly;

Would want to do it all in one periodic visit if necessary as one of 8, 9, 10 if appropriate and only to do the minimum to verify native area condition and change of status

Methods for assessing the biodiversity of fungi

These questions relate to the presentations at the workshops in Rotorua and Lincoln, Christchurch.

Two pictorial methods for monitoring fungi were described.

- Using photographs to recognise and record the presence species with relatively large distinctive fruiting bodies. Species selected include those involved with decay (saprophytes) and plant damage (pathogens).
- Using photographs of plant damage symptoms to recognise and record plant damaging fungi (pathogens) on selected plant species.

Monitoring fungal fruiting bodies (fungi as biodiversity indicators)

11. Are you and/or your company interested in using photographs for monitoring fungal fruiting bodies?

Yes (8) No (0)

12. Monitoring has to be done in the autumn. Would this be a suitable time for your company?

Yes (8) No (0)

13. Would you and/or your company be interested in training workshops on how to monitor for fungi fruiting bodies?

Yes (7) No (1) Not yet

Monitoring plant damaging fungi (pathogens) (fungi as biodiversity indicators)

14. Are you and/or your company interested in using photographs for monitoring plant damaging fungi?

Yes (6) No (0) Unsure (2)

15. On what plant species would you want to monitor for plant damaging fungi? Please list up to 10 species.

No response

Undecided

Beech forest species (2)

Pinus radiata, *Eucalyptus* spp., *Cupressus* sp. Douglas fir

Most common species for biodiversity and threatened species

Common understory species in plantation forests

16. Would you and/or your company be interested in training workshops on how to monitor for plant damaging fungi?

Yes (7) No (0)

17. Monitoring for plant damaging fungi can be combined with monitoring for plant damaging insects and mites. Would you and/or your company like to combine monitoring for fungi, insects and mites?

Yes (6) No (0)

Possibly, depends on cost

Preferred method for monitoring fungi

18. If you had to monitor for fungi, would you prefer to monitor for fungal fruiting bodies or plant damaging fungi?

Tick one.

- | | |
|------------------------|---|
| Fungal fruiting bodies | 4 |
| Plant damaging fungi | 3 |

Methods for assessing the biodiversity of insects

These questions relate to the presentations at the workshops in Rotorua and Lincoln, Christchurch.

Two approaches to monitoring the biodiversity of insects were described.

- Collecting and indentifying insect specimens. Beetles as biodiversity indicators.
- Using photographs of plant damage symptoms to recognise and record insect and mite herbivores on selected plant species. Insect and mite herbivores as biodiversity indicators.

Collecting and identifying insects (using beetles as biodiversity indicators)

19. Are you and/or your company interested in monitoring beetles?

Yes (3) No (2) Unsure (2)

20. Two trapping methods were described, Malaise traps and pitfall traps. Which do you prefer? Tick one

- | | |
|------------------|---|
| a. Malaise traps | |
| b. Pitfall traps | 1 |
| c. Not sure | 3 |

21. Would you and/or your company be interested in training workshops on how to monitor and to sort beetles into 'species'?

Yes (4) No (2)

22. Would you and/or your company be interested in using a consultant to identify beetles from the traps?

- | | |
|--|----------------|
| a. All beetles from the samples? | Yes (1) No (2) |
| b. After initial sorting into 'species'? | Yes (4) No (2) |

Monitoring insects and mites using plant damage symptoms (insect and mite herbivores as biodiversity indicators).

23. Are you and/or your company interested in monitoring insects and mites that damage plants?

Yes (5) No (1) Unsure (1)

24. On what plant species would you want to monitor for plant damaging insects and mites? Please list up to 10 species.

Common understorey species in plantation forests

Most common species for biodiversity and threatened species

Beech forest species (2)

undecided

25. Would you and/or your company be interested in training workshops on how to monitor for plant damaging insects and mites?

Yes (6) No (1)

Always interested but time and money are scarce

26. Monitoring for plant damaging insects and mites can be combined with monitoring for plant damaging fungi. Would you and/or your company like to combine monitoring for plant damaging fungi, insects and mites?

Yes (5) No (1) Possibly (1), depends on cost

Preferred method for monitoring insects

27. If you had to monitor for insects would you prefer to monitor insects by collecting insects such as beetles and sorting them to species or to monitor for plant damaging insects and mites using photographs? Tick one.

Collecting and indentifying insects such as beetles 1

Photographs of plant damage (insects and mites) 6