Vegetation Health Service

Annual Report 2003-2004

Mike Stukely, Janet Webster and Juanita Ciampini
Vegetation Health Service, Science Division, Kensington
hone: 9334 0317

ptember 2004

Vegetation Health Service – Annual Report 2003 – 2004
Phytophthora Detection

1. Introduction

The Vegetation Health Service (VHS) provides a dedicated, specialist service for the detection and identification of *Phytophthora* species from samples associated with the management of the State's forest and conservation estate, logging and mining activities, private industry and research. The service is offered free of charge to all CALM and FPC personnel. The service is also available to external clients at a standard fee of $77 (incl. GST) per sample, with special discounted rates applying to Alcoa and to NHT projects.

Samples in most cases include a mixture of soil and plant-root material, which is baited for *Phytophthora* using the standard *Eucalyptus sieberi* cotyledon baiting method. Bait material is plated to selective agar medium for incubation, and any possible *Phytophthora* colonies that emerge are then isolated to pure culture for identification to species. Where isolation of the pathogen from specific, host-plant tissue is required, roots are surface-sterilised and direct-plated to selective agar medium for *Phytophthora* isolation.

Results are supplied to clients as soon as possible. All results (both *Phytophthora*-positive and negative) are added to the VHS database, along with details of sampling location, land tenure, etc. This database now contains 24,789 records (at 30th June 2004), and this information resource is made available as required. Representative *Phytophthora* cultures are added to the VHS Culture Collection (see Section 3 below), which now contains 833 cultures. These cultures are made available to researchers, both in CALM and in other institutions, on request.

The VHS also provides advice to assist Departmental staff and also the public with other plant disease problems in forests, plantations, parks and reserves, and nurseries.

2. Annual summary – samples processed

During the 2003-2004 financial year the VHS received 1,435 samples for testing for the presence of *Phytophthora* (Table 1 and Figure 1).

The sources of these samples are as follows:

CALM – samples sent by CALM Dieback Interpreters (or by contractors to CALM), and district staff, in fulfilment of CALM's forest and land management responsibilities.

ALCOA – samples sent directly by Alcoa (or by contractors to Alcoa) in fulfilment of Alcoa's forest management responsibilities prior to and after mining activities, on the CALM estate.

PRIVATE – samples sent directly by external clients (land managers or private contractors).

RECOUP – samples for external clients sent by CALM dieback interpreters.

FPC – samples sent directly by the Forest Products Commission, including Nurseries.

NHT – samples associated with projects funded by the Natural Heritage Trust.

The majority of samples processed by the VHS belong to CALM and Alcoa. A contract to process 500 samples for Alcoa's monitoring program for dieback-free rehabilitated mine-pits was secured in 2003-04 [this work was also done in 2002-03]. The CALM component includes samples sent by CALM Dieback Interpreters from CALM-managed forest being monitored for *Phytophthora* in conjunction with logging by the FPC. The reduction of logging in native forest by the FPC has significantly reduced the amount of CALM samples that the VHS receives. Consultants (Glevan Consulting) supplied 350 samples from various sources including CALM land and Alcoa (Table 1 and Figure 1). Table 2 and Figure 2 show

details of the sources (by District) of CALM samples received for the year (including Recoup samples, but excluding the CALM samples collected by Glevan).

Table 1 and **Figure 1.** Numbers of samples received from major sources, including consultants (Glevan Consulting), in 2003-2004. Total numbers of samples received from the same sources in 2002-2003 are given in the Table for comparison.

Source	No. of samples			
	Received direct	Received via Glevan Cons.	Total 2003-2004	Total 2002-2003
CALM	538	27	565	544
ALCOA	508	228	736	562
PRIVATE / RECOUP	25	83	108	96
FPC	14	0	14	0
NHT PROJECTS	0	12	12	8
TOTAL	**1085**	**350**	**1435**	**1210**

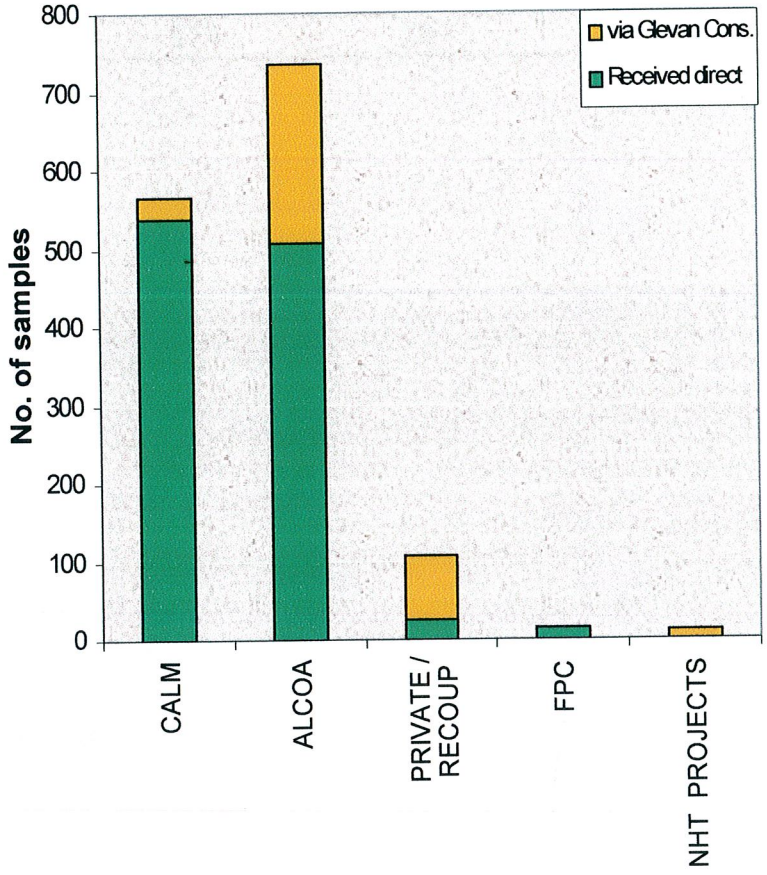
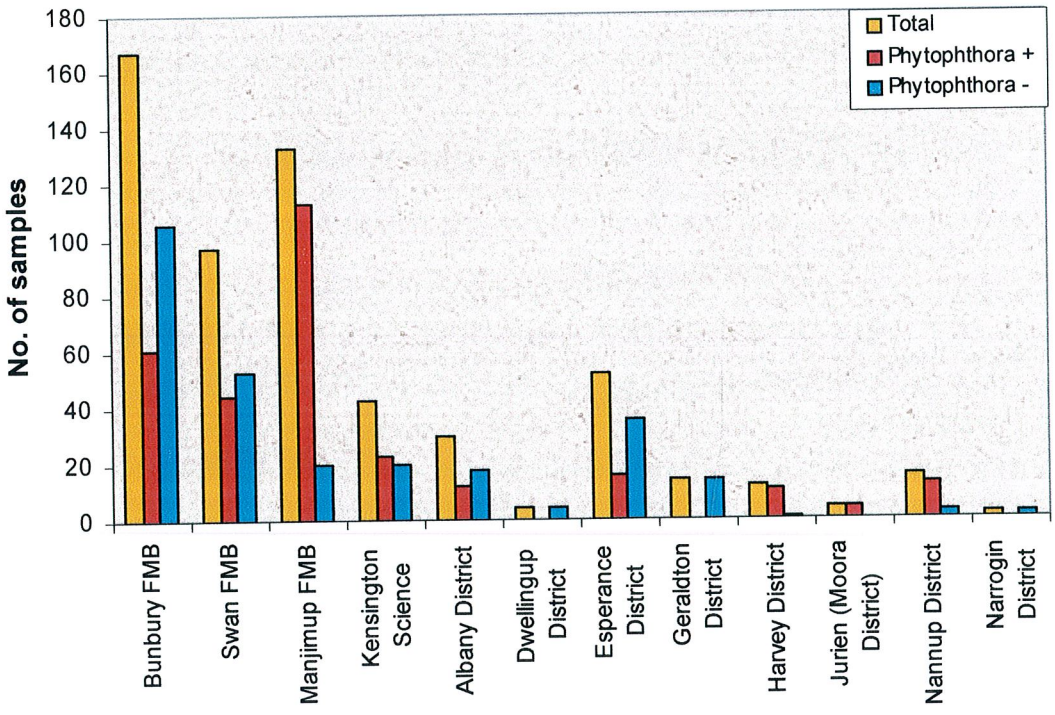


Table 2 and **Figure 2.** Numbers of samples received from CALM offices in 2003-2004, and numbers giving positive or negative recoveries of *Phytophthora*. Total numbers of samples received from the same sources in 2002-2003 are given in the Table for comparison.

CALM Office	No. of samples			
	Total received 2003-2004	*Ph.* positive 2003-2004	*Ph.* negative 2003-2004	Total received 2002-2003
Bunbury FMB	167	61	106	123
Swan FMB	97	44	53	115
Manjimup FMB	133	113	20	245
Kensington Science	43	23	20	0
Albany District	30	12	18	3
Dwellingup District	4	0	4	0
Esperance District	52	16	36	8
Geraldton District	14	0	14	5
Harvey District	12	11	1	0
Jurien (Moora Distr.)	4	4	0	0
Nannup District	16	13	3	11
Narrogin District	2	0	2	0
Pemberton District	0	0	0	9
TOTAL	**574**	**297**	**277**	**519**



3. *Phytophthora* species

During 2003-2004, *Phytophthora* was isolated from a total of 697 samples (Table 3, Figure 3). *P. cinnamomi* was the species most frequently isolated (503 samples). *P. citricola* was isolated from 186 samples, and it is of interest that 70% of these were from Alcoa mine-sites. Two samples yielded both *P. cinnamomi* and *P. citricola.* *P. cryptogea* and *P. nicotianae* were isolated only occasionally (from one and three samples, respectively).

Four isolates (*P.* sp.) are listed separately. Their morphology very closely resembles that of *P. citricola*, but DNA tests (Murdoch University) indicate that they may represent separate taxa. Further work will be done to identify these cultures.

Representative pure cultures of the various *Phytophthora* species isolated, and cultures representing different geographic locations, ecosystems or host plants, or morphological types, are added to the permanent Culture Collection. These cultures are maintained in a pure and viable condition by periodically sub-culturing, checking their purity and establishing fresh storage cultures. The VHS now has 833 cultures in the Collection.

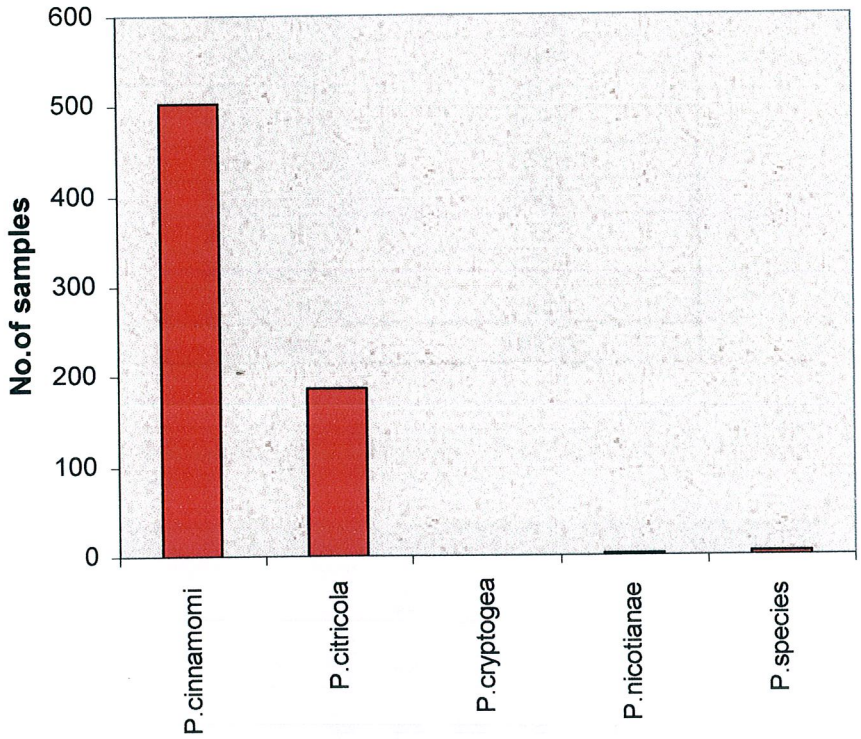
Two unusual isolates stored in 2002-03 were sent to CABI-Bioscience (UK) for further detailed examination. It has been determined there by DNA-testing that they represent a *Phytophthora* species that is new to science. We hope to publish this new species in collaboration with the British workers, following further testing.

Table 3 and **Figure 3.** Numbers of samples from which *Phytophthora* species were isolated by the VHS in 2003-2004.

***Phytophthora* species**	**No. of samples with positive *Phytophthora* recovery**	
	Primary result	**Second species[1]**
P. cinnamomi	503	
P. citricola	186	2
P. cryptogea	1	
P. nicotianae	3	
P. sp.[2]	4	
TOTAL	**697**	**2**

[1]Second species – these samples yielded a second *Phytophthora* species, each of them in addition *to P. cinnamomi.*

[2]*P.* sp. denotes *Phytophthora* cultures that are in the process of being identified or are unable to be fully identified.



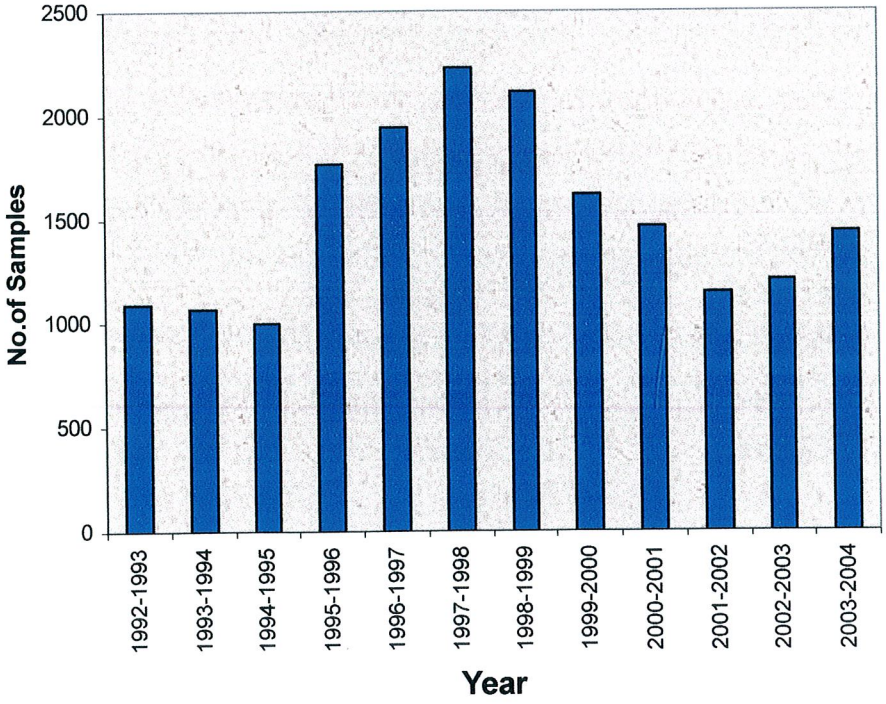
4. Historical record of samples processed

Since the VHS laboratory was established at Kensington in 1992 (initially as the Dieback Detection Service), a total of 18,111 samples have been processed for *Phytophthora* (to 30th June 2004) (Table 4 and Figure 4).

Prior to 1992, the routine sample processing was carried out at Dwellingup Research Centre. All *Phytophthora* species identification from samples processed between 1985 and 1992 was completed by M Stukely at Kensington. Records from these earlier years, for which map references are available, have been included in the VHS database, which now has a total of 24,789 records.

Table 4 and **Figure 4.** Numbers of samples processed by the VHS for *Phytophthora* detection from 1992-93 to 2003-04.

Year	No. of Samples
1992-1993	1095
1993-1994	1075
1994-1995	1001
1995-1996	1767
1996-1997	1944
1997-1998	2227
1998-1999	2115
1999-2000	1626
2000-2001	1463
2001-2002	1153
2002-2003	1210
2003-2004	1435
TOTAL	**18111**



5. Concluding Comment

Land managers are encouraged to make full use of the services provided by the VHS for the detection of *Phytophthora*. The sample-processing service is provided free of charge to all CALM and FPC personnel and sections.

Best practice management methods include the "detection, diagnosis, demarcation and mapping of infested areas and hence the identification of un-infested areas". The laboratory testing of samples for the presence of *Phytophthora* is an integral part of this process.

It is important to recognise that areas must be regularly re-assessed and tested for *Phytophthora* infestation, since the pathogen will continue to spread from its known, established foci. This spread may be autonomous (by root-to-root contact between host plants, and through dispersal of zoospores in water), or through the activity of vectors such as native and feral animals, and people with their vehicles and machinery.

The appropriate frequency of re-assessment and testing will depend upon the **values** associated with a given area, and the **level of risk** of introduction of *Phytophthora* into that area. Information on the distribution of *Phytophthora* must be up-to-date for management to be most effective.