PROJECT 3

DEVELOPMENT OF GIS-BASED DECISION SUPPORT TOOLS AND THE DATABASING OF *PHYTOPHTHORA*-SENSITIVE TAXA

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OBJECTIVE

To provide a reliable, graphical decision-support system for monitoring and controlling the spread of dieback disease.

INTRODUCTION

At the inception of this project the objectives were to:

1. database and automate access to Herbarium specimen records for *Phytophthora*-susceptible taxa;

2. maintain, update and interrogate data sets to answer basic management questions;

3. develop a model with predictive capabilities and test validity of predictions.

While significant progress was made in objective 1, efforts to achieve objective 3 had limited success. In the previous progress report on this project an independent evaluation stated that "Although there appeared to be considerable merit in pursuing a process-based modelling approach, to develop a decision-support tool for predicting *Phytophthora* spread, it has not proved successful. This is due in part to a number of unanticipated features in the study area."

A number of reasons were outlined, many of which related to the difficulty in modelling the extremely complex processes by which *Phytophthora* spreads and the unrealistic requirements for data input to the model.

In the light of this a number of options were canvassed for a *Phytophthora* Decision Support System which might have increased relevance at an operational level. For example, prioritising areas for phosphonate spraying.

This could be achieved by overlaying occurrences of *Phytophthora* with the distribution of threatened and priority flora. The *Phytophthora* occurrences would be buffered by a given amount (for example, 500 m), noting those flora populations within that buffer. To implement this goal, knowledge about locations of *Phytophthora* and threatened and priority flora is required.

Additionally, the use of expert knowledge of *Phytophthora* distribution and behaviour was considered to be more likely to provide useful management information than a reductionist process model. Expert knowledge can be used to determine a range of indices including a suitability index (that is, areas that can support *Phytophthora*), a threat index (level of damage if *Phytophthora* were to infect an area) or a risk index (the likelihood that an area might become infected by *Phytophthora*). This expert knowledge would require a range of physiogeographic coverages which are generally available within CALM. It could also be supplemented by tools such as BIOCLIM which has climatic data not otherwise available at a broad scale.

These indices, in turn, can provide an additional mechanism for determining resource priorities in the control of *Phytophthora.*

The project's objectives have been modified to reflect the above changes in emphasis. They can now be summarised as providing a set of tools for CALM managers to:

1. Obtain timely & accurate information on the distribution and potential impact of *Phytophthora* in WA
2. Aid the prioritisation of departmental resources in relation to the control of *Phytophthora*
3. Use expert knowledge to analyse the present and future distribution of *Phytophthora* in relation to environmental factors and the implications for management.

These new objectives encompass and elaborate on the original objectives.

PROPOSED OUTCOMES

Proposed outcomes are divided into two stages, the first to be implemented within the current financial year and the second subject to completion of stage 1 and further approval/availability of funds.

Stage 1

1. A comprehensive statement of known locations of *Phytophthora*, within the South West Land Division. This will include verified distribution information from all relevant CALM regions.
2. A statement of *Phytophthora* distribution in relation to susceptible plant taxa, particularly rare and threatened taxa, and CALM estate
3. Development of methods to aid the prioritisation of control measures, particularly phosphonate application
4. A protocol for ongoing coordinated maintenance of *Phytophthora* distribution data within CALM

Stage 2

1. Use expert knowledge to develop suitability, threat and/or risk indices for *Phytophthora.*

PROGRESS TO DATE

Significant progress has already been made for stage 1. Most of the available dieback distribution within CALM and other groups has been obtained. (Once acquisition of base data has been completed, the production of various map products and the development of prioritisation algorithm for phosphonate spraying will commence.)

- **herbarium voucher specimens**
  Over 55,000 susceptible flora herbarium voucher specimens have been databased. Identifications and curation for these specimens are being maintained by the WA Herbarium.

- **conservation flora populations**
  Since the inception of this project, more detailed population-based data on conservation flora have become available. Sixty populations have been databased to date.

- **Dieback distribution - forest regions**
  Acquisition of dieback distribution data for forest regions and the Swan Coastal Plain has been completed.

- **Dieback distribution - South Coast region**
  Commenced digitising of dieback distribution maps for South Coast Region

- **Vegetation Health Service (VHS)**
  CALM's VHS contains a database of samples provided by CALM operations. Pathogens in the samples are identified and provide point locations of Phytophthora that have been positively identified. The entire VHS database has been obtained and will be useful in validating dieback interpretations.

- **GIS background coverages**
  GIS background coverages have been obtained (eg CALM estate, roads, hydrology).

- **BIOCLIM**
  BIOCLIM has been evaluated as a *potential* tool for use as part of expert criteria used to determine the above-mentioned indices.

CONTROL OF *PHYTOPHTHORA* AND *DIPLODINA* CANKER IN WESTERN AUSTRALIA

PROGRESS REPORT TO THE ENDANGERED SPECIES UNIT, AUSTRALIAN NATURE CONSERVATION AGENCY

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