Evaluation of Land Suitability for Maritime Pine in the Mt Barker Area, Western Australia

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1. SUMMARY

It is estimated that ~140 000 ha of land is suitable for Maritime Pine (*Pinus pinaster*), on farmland, in the 400-600 mm rainfall zone, within a 150 km radius of Mt Barker.

This estimate was derived by:

- determining the total area of cleared farmland
- determining the area of suitable soils, using Atlas of Australian soils mapping, after excluding those soils with limitations such as shallow depth to rock, waterlogging and salinity. Soils considered suitable included deep sands, duplex soils, wet soils, gravels and earths.
- Deducting ~10 000 ha of overlap between the Mt Barker and Dardanup mill zones
- Assuming trees are planted on 20% of the land, as strips or blocks.

The potential planting area can be increased by :

- changing the proportion of farm-land planted from the nominal 20%
- including small areas of soils considered unsuitable for *Eucalyptus globulus* (particularly deep sands) in the >600 mm rainfall zone

A map is appended which shows the distribution of landscape units with different potentials for *Pinus pinaster* in the target area.

Table 1 Area of suitable soil in the Mt Barker planting zone for different haulage distances

Distance (km)			**Total**
0–50	*50–100*	*100–150*	
22 346	58 881	57 137	**138 363**

2. METHODS

2.1 Data and analysis

This analysis was based on the CSIRO Atlas of Australian Soils Mapping (Northcote *et al.* 1967). Data of this scale (1:2 000 000) were used as it is the only available mapping with consistent coverage across the target area. More detailed soil-landscape mapping by Agriculture WA (1:100 000 scale) is in progress.

Several studies of soils and soil-landscape relationships in the area were also consulted (Teakle 1938; Burvill 1945; Mulcahy and Hingston 1961; Bettenay and Poutsma 1962; Mulcahy 1973; McArthur *et al.* 1977; Negus 1977; Findlater and Muller 1989; McArthur 1991).

All analysis and plotting were undertaken using ARC-INFO. Mapping was undertaken by CALM, area analysis was adapted from an earlier CALM study undertaken in co-operation with Agriculture WA (Harper 1996).

2.2 Calculation of land suitable for Maritime Pine

The area of suitable land was calculated by a series of steps:

1. Tenure. Areas of land with the non-agricultural tenure (State Forests, National Parks nature reserves) and woody vegetation cover were removed. This remaining area is "**Available land**".

2. Soil suitability. Descriptions and soil classifications for each of the mapping polygons were examined and given a weighting between 0-1 for the following factors:

- salinity and waterlogging
- soil depth
- other factors such as excessive slopes, exposure (i.e. coastal dunes) and miscellaneous factors (beaches, lakes, rivers).

These ratings were combined as a "multiplication factor", with a resultant value between 0 (unplantable) and 1 (no limitations). The area of each unit was multiplied by this factor to provide an estimate of the **plantable land**.

3. ASSUMPTIONS

3.1 Soil conditions for success

The soil factors most likely to affect *Pinus pinaster* survival and growth are related to soil water storage and salinity. For successful planting of the trees in this lower rainfall environment we need:

a) non-saline conditions, either current, or likely to develop during the rotation.

b) adequate soil depth (at least 2-3 m) or access to moisture under the adjacent crop or pasture

c) fresh water additions from run-on, seepage or groundwater

3.2 Soil constraints

Constraints were considered to be:

a) shallow soils such as occur on valley sides, with rock outcrop (e.g. Pallinup and Kalgan valleys)

b) salinity either due to natural salinity (salt lakes) or induced by agriculture

c) heavy textured valley floor soils

3.3 Manageable soil properties

For this analysis, the following soil properties were assumed to be non-limiting to establishment and tree growth:

a) lateritic hard pans (duricrusts) which were either limited in extent, or can be ripped on establishment. Other types of hardpans (silcrete and calcrete) were of limited extent in the soils considered suitable.

b) non-saline waterlogged areas which could be drained and mounded.

c) duplex ("sand over clay") soils

d) water repellency and soil acidity, which are prevalent in the wheatbelt

e) soil fertility - it is assumed that farmed soils have few limitations of macro or micro-nutrients.

4. SITE SURVEY FOR PLANTATION PLANNING

Each unit on this map contains an array of soils, and the derived map is indicative only. For specific definition of site conditions of a particular area, a soil survey at a larger scale (1:10 000) is required (Harper 1995).

5. REFERENCES

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