Hydrology Research at Dwellingup

A. Why hydrology research?

Hydrology research is necessary because water is probably the most important product coming off the northern jarrah forest and

1. want to avoid further salination of streams
and 2. would like to be able to increase yield of potable water.

B. The Salt Problem

Salts from evaporated sea spray have been blown inland and deposited on the landscape. Over thousands (millions?) of years these salts have accumulated in the soil profile and groundwater. Factors which have favoured high accumulations in northern jarrah forest soils are

(i). A large proportion of incoming rainfall is evapotranspired and therefore only a small proportion of the rainfall is available to carry the salts back out to sea.

(ii). Soils are very deep so there is a large volume of soil available for salt storage.

and (iii). Most soils are laterites and the nature of pallid zone clay in lateritic soils is such that leaching of salts out of the system is very slow.

Prior to white man's impact on the northern jarrah forest an equilibrium situation had probably been reached so that the amount of salt entering the system (in a large volume of water) was equal to the amount of salt leaving the system (in a small volume of water).

Following disturbance to the system through disturbance to the forest a new equilibrium will be reached over hundreds of years but in the meantime salt levels in streams will increase because

(i). the ratio of saline groundwater to less saline direct runoff water in streams will increase

and (ii). as the water table rises salts stored in the soil profile above the water table will be mobilized.

C. Phases in Dwellingup Research Programme

(i). Exploration

(ii). Detailed study of jarrah forest hydrological system
and (iii). Treatment

D. Exploration Phase

Aim - to locate salt problem areas from surface water sampling.

The original assumption was that catchments with a high base flow salinity would be salt problem areas. (During true base flow there should only be groundwater in streams and no direct runoff water). The method may underestimate the salt problem in an area but we can say with confidence that if a stream has a

high base flow salinity there is a salt problem in that catchment. The converse cannot be statpd with confidence.

Most exploration was carried out in 1973 and 1974 and includes the region from the Harvey River catchment to the Mundaring catchment. Work in the exploration phase is still continuing in Harvey Division and along the scarp near Dwellingup.

Results from the exploration phase indicate that there is a general trend of increasing salinity from west to east across the northern jarrah forest but with a large amount of variation within this trend.

E. Detailed Study Phase

Aims:

(1). Test the hypothesis that there is a large variation in water yields and degree of salinity problem in catchments and that an understanding of this is necessary to devise management strategies which will maximize supplies of fresh water.

(2). Establish correlations between hydrological characteristics (water and salt) of subcatchments and other characteristics. This information would aid management planning and may make it possible to short cut the process of water sampling and establishing cored bore holes.

The Yarragil and Sth. Dandalup Catchments were selected because they were considered to be representative of the variation found in the intermediate salinity zone of the northern jarrah forest.

Yarragil has the advantages that

(1). It contains a wide range of subcatchments (from broad flat valleys to steeply dissected valleys) within a comparatively small catchment, and
(2). Because it is not a domestic water supply catchment it will be possible to treat subcatchments after they have been calibrated.

Sth. Dandalup has the advantage that it is a current domestic water supply catchment and that much of it may be mined for bauxite. Therefore, considerable interest is being shown in the Sth. Dandalup.

F. Treatment Phase

Have two areas:

(1). Western woirs - will be looking at the potential to increase water yield in the non-saline zone by thinning or partial clearing.

(2). Yarragil - May study the effect of disturbing both fresh high yielding subcatchments and saline low yielding subcatchments. May also apply reafforestation treatment to disturbed subcatchments.