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## **Report 00.518**

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Report to Environment Committee  
from Mike Harkness, Hydrologist

### **Predicting Rainfall Droughts in the Wairarapa Using the Southern Oscillation Index**

#### **1. Purpose**

To inform the Committee of the results of an investigation and report into the links between the Southern Oscillation and seasonal rainfall in the Wairarapa.

#### **2. Background**

The year to year fluctuations in the various weather parameters such as rainfall are of great interest, particularly to those involved in agriculture. In recent times research has shown that some recognisable patterns are emerging, allowing a certain amount of seasonal forecasting to be undertaken. The most important of these patterns is the Southern Oscillation and its two components - El Nino and La Nina.

The Southern Oscillation is the result of a cyclic warming and cooling of the surface ocean of the eastern Pacific. It has been found that the cyclic warming and cooling of the eastern Pacific leaves its distinctive fingerprint on atmospheric pressure. In particular, it has been found that when the air pressure measured at Darwin is compared with that measured at Tahiti, the difference between the two can be used to generate an index number – called the Southern Oscillation Index (SOI). When the SOI is in a positive phase it is a La Nina, and when the SOI is in a negative phase it is an El Nino.

This report is the sixth in a series produced by the Resource Investigations Department investigating the relationship between the SOI and hydrological processes within the Region.

Copies of these reports are available for committee members who would like a copy.

### 3. **Report Summary**

This report defines the Southern Oscillation and the effects that El Nino and La Nina have on the Wairarapa's weather.

Rainfall data from ten sites in the Wairarapa was used in the study to identify linkages between the prevailing weather pattern (El Nino or La Nina) and seasonal rainfall.

Using statistical analyses a number of forecast scenarios have been prepared to predict low rainfall in the Wairarapa depending on the state of the SOI.

### 4. **Major Findings**

The report highlighted the fact that both an individually high monthly value of SOI (either La Nina or El Nino) and persistent and consistent high seasonal values can affect rainfall in the Wairarapa.

Although some of the results varied across the Region, in general terms if an El Nino event is present the chance of summer drought over the Wairarapa increases. If La Nina is present the chance of autumn drought over the Wairarapa increases.

A series of maps have been created (see attachment) that provide a generalised view of which areas have increased probability of low rainfall due to preceding SOI conditions. (Refer Attachment 1.)

For a more accurate breakdown of the maps a series of seasonal low rainfall forecasts have been prepared. For example, given a La Nina summer:

*At Martinborough there is a 42 percent chance of a five-year return period low summer rainfall of less than 141 millimetres*

Forecasts based on the SOI give the greatest lead in times for the prediction of drought and the results from this study will provide the public and agricultural sector of the Wairarapa and the WRC with another tool to assist them in planning for the seasons ahead.

Given the recent droughts and increased public awareness of El Nino and La Nina, this method for predicting an increased chance of drought will be beneficial to the community.

### 5. **Quarterly Forecasts**

Forecasts will be prepared every three months. At the end of each season the average seasonal SOI value will be calculated. If the SOI value (be it El Nino, La Nina, or average) fits into any of the forecast scenarios then a drought forecast will be issued.

The quarterly forecasts will be distributed externally to local authorities, agricultural, horticulture and other interest groups, and internally to various Council departments.

## 6. **Communications**

Copies of the report have been sent to Wairarapa District Councils, as well as to public libraries and college libraries in the Wairarapa.

A press release will be issued to inform the wider community of the results of the report. Press releases will also be issued when quarterly seasonal forecasts are made.

We will be approaching local organisations, such as Federated Farmers, to see if they are interested in a presentation of the findings.

## 7. **Recommendation**

*That this report be received and it's contents noted.*

Report prepared by:

Approved for submission:

MIKE HARKNESS  
Hydrologist, Resource Investigations

JOHN SHERRIFF  
Manager, Resource Investigations

JANE BRADBURY  
Divisional Manager, Environment

Attachments: 1