

### Appendix S3

#### Estimation of the weights for the months and lag effects:

To estimate any potential lags in the effects of temperature, soil moisture and previous growth we weighed each entry (Ogle et. al. 2015). In the case of soil moisture and temperature we included the environmental conditions of current, previous -years, and within each year the effects of June, July and August conditions. We included weights for each month and for each of those three years. At any of the four sites, for year  $t$ , the value of the variable (temperature or soil matric potential) included in the analysis,  $V_t$ , was calculated as:

$$V_t = W_1 \cdot v_t + W_2 \cdot v_{t-1} + W_3 \cdot v_{t-2}$$

where  $W^*$  are the weights given to each year,  $t$ ,  $t-1$ ,  $t-2$ , and:

$$v_t = \omega_1 \cdot JuneAverage_t + \omega_2 \cdot JulyAverage_t + \omega_3 \cdot AugustAverage_t$$

$$v_{t-1} = \omega_1 \cdot JuneAverage_{t-1} + \omega_2 \cdot JulyAverage_{t-1} + \omega_3 \cdot AugustAverage_{t-1}$$

$$v_{t-2} = \omega_1 \cdot JuneAverage_{t-2} + \omega_2 \cdot JulyAverage_{t-2} + \omega_3 \cdot AugustAverage_{t-2}$$

Parameters  $\omega^*$  are the weights of each of the months included.

With respect to previous growth we included the effect of growth during the four previous years

$$V_t = W_1 \cdot growth_{t-1} + W_2 \cdot W_1 \cdot growth_{t-2} + W_3 \cdot growth_{t-3} + W_4 \cdot growth_{t-4}$$

The values of  $W^*$  and  $\omega^*$  for each variable sum to 1, if all years/month have the same effect then each  $W, \omega$ : 0.33 ( $W$ : 0.25 in the case of previous years growth), if one particular month or year affects growth more than others then the value will be higher and the others will decline.

#### Reference:

Ogle, K., Barber, J.J., Barron-Gafford, G.A., Bentley, L. P., Young, J.M., Huxman, T.E., Loik, M.E. and Tissue, D.T. 2015. Quantifying ecological memory in plant and ecosystem processes. *Ecology Letters*, 18:221-235