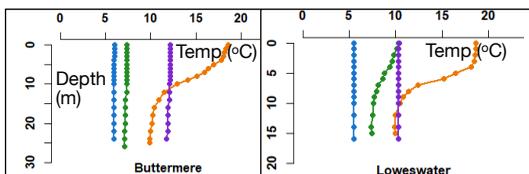


## BUTTERMERE AND LOWESWATER - TWO SIMILAR BUT DIFFERENT LAKES

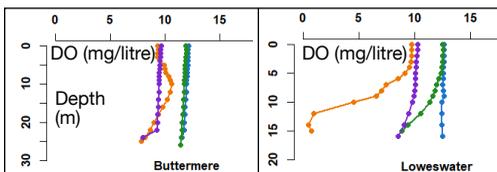
Superficially, the waters in our 3 valley lakes may look the same on most days, but they behave quite differently. We'll just look at Buttermere and Loweswater - there'll probably be much more on Crummock Water in coming months when the detailed plans for re-naturalising its outlet are announced.



The seasonal pattern of temperature versus depth is similar for both lakes (as shown here in data from the 2020 Lakes Tour - the

four lines are for each of the 4 seasons). So, both lakes stratify into 2 layers in summer (the orange line) due to denser waters at depth.

The difference between the lakes is the effect of depth on dissolved oxygen (DO) levels - in Loweswater, the DO drops to zero in summer



(again the orange line) whilst the lake is stratified. This is caused by the sinking of organic matter, mainly algae, to the bottom which is then broken down by bacteria using up the water's oxygen.

This doesn't happen in Buttermere as there's not enough growth of algae. The much higher algal growth in Loweswater is due to the higher input of supporting nutrients, notably phosphates, which come from rainfall and land run-off. I've calculated that the consumption of oxygen in the bottom layer during the summer is around 11 tonne. This quantity is more than the resident human population of Loweswater take in annually.

When the lake turns over in the Autumn, the deoxygenated bottom water impairs the water quality of the whole lake such that its overall classification by the EA will never be good (the long-term objective). It's difficult to see how so much oxygen is used up, but we're trying to find out from research on other lakes. I will let you know our conclusions when I get to the bottom of it.

Leslie Webb, Damson Ghyll, Loweswater ([les@damsonghyll.co.uk](mailto:les@damsonghyll.co.uk)).