MACHINERY

Worried about the impact their farms are having on Loweswater lake, a group of farmers is using two grassland rejuvenation machines to reduce run-off. **Alex Heath** reports.

Watercourse protection offers added benefits

Protecting the nation's waterways is a responsibility all farmers bear.

With increasing scrutiny through the Water Framework Directive and Catchment Sensitive Farming, the agricultural industry is at the forefront of water quality issues, and high on the agendas of Defra, Natural England and the Environment Agency.

For one group of Cumbrian farmers, preserving and enhancing the water flowing in and out of Loweswater lake has become a priority.

Led by Kenny Bell, a sheep farmer neighbouring the lake, a group of eight farmers has embarked on a project to reduce the amount of diffuse pollution entering the lake.

Mr Bell, who farms 110 hectares around the lake, says the issue of blue-green algae has been plaguing the water for years, but in the last 20 years has become a real concern.

The root of the problem appears to be phosphates entering the lake, causing unsightly and potentially dangerous algal blooms.

With concern in the area about the severity of the issue, and with help from research at Lancaster University, the farmers set about trying to establish what could be done to reduce the algal blooms.

Soil tests around the lake showed build-ups of nutrients which would be washed out of the soil in periods of heavy rain fall.

The pH of many of the farms was also out of kilter, leading to the grassland not being as productive, with a bind up of nutrients.

With the area almost exclusively used for livestock production, over the years, cattle and sheep have created a layer of compaction in the top soil, leading to poor infiltration with water described as 'sheeting off the slopes'.

Add to this the increasing weight of machinery and the problem was compounded.

However, the group discovered funding from Catchment Sensitive Farming could be used to purchase machinery which could help alleviate compaction and slow the flow of water entering the lake.

The group, which has land spanning across 7.6sq.km around the lake, now works in conjunction with the Cumbrian Rivers Trust.

To alleviate the issue, two machines were chosen: a three-leg grassland subsoiler (Sward Lifter), designed to restructure the soil at depth; and a three-metre wide aerator (Sward Slitter) for rejuvenating the topsoil by removing compaction following livestock grazing.

Terrain

Sourced from Opico, both machines can be pulled by the group's tractors, which Mr Bell says tend to be about 150hp six-cylinder tractors of varying brands, but also as little as 100hp.

Due to the nature of the area, the group opted for hydraulic reset leg protection, but the Sward Lifter is also fitted with shear bolts. Mr Bell says usually the hydraulic break-back is sufficient, but if two legs encounter a lump of rock, the bolts will go.

Likewise, the undulating and stony terrain made a solid full width roller unfeasible on the subsoiler.

Mr Bell says the machine's three individual rollers fitted behind each leg, made up of Guttler rings, affords much greater contour following, while providing a decent level of consolidation behind.

"A lot of the ground still has ridge and furrows present, which cause some issues with depth control," he says.

"Ideally, the legs should be running a couple of inches below the pan, typically about 8in. The only way to work out where the pan is, is by digging a hole."

Mr Bell says working at a 45-degree angle to the slope provides the best results.

"Going straight up the slope is hard work for the tractor, and water which drains into the channels created enters the lake too fast," he says.

"Going across the slope, the water sits in the bottom of the channels and is slow to percolate out.

"Working at 45-degrees results in a good mix of lifting compaction, water infiltration and productivity, typically covering two to three acres per hour."

While the main aim of the subsoiling is to slow the flow, Mr Bell reckons the land's productivity has increased as a consequence.

"We did half a field last year, with about 15 per cent more silage bales coming off the half that had been lifted, compared to the half that had not," he says.

"The ground also appears to hold stock better, with a stronger rooting system, but we are reducing stocking on the land, along with the amount of inputs we are using, to further reduce the chances of nutrients leaching out of the soil."

This is the case for both machines, particularly the aerator, which loosens the rooting zone. The manufacturer says this allows for more oxygen around the roots and a quicker uptake by the soil and roots of rainfall and slurry, stimulating growth.

The blades are in banks of four, spaced around 15cm apart.

However, timing of the subsoiling operation is also critical, says Mr Bell.

Lime

Too late into autumn and frost will kill the grass on the edges of the cut. Too late in spring and there is the risk of the ground drying out too much in summer.

The pH of the land is now more balanced, with regular applications of lime, allowing the grass to better utilise the available nutrients.

"Regular soil testing allows us to much more accurately select and apply the right product at the right time, and while we are not into variable rate applications, we do change the rate from field to field as the tests dictate," he says.

While the group is seeing changes to the complexion of the lake, at the moment it is not known how much of an effect the work is contributing to reduced algal blooms.

The nutrient analysis of the lake water is showing lower levels, and algal sampling is showing a decline in the severity.

But the lake still suffers with algal blooms from time to time.

Transition

"Phosphate stays in the sediment of the lake for a long time," Mr Bell says.

"When the wind picks up, we see more algal bloom incidences, probably as a result of this sediment phosphate.

The problem is not helped by the fact the lake has a slow transition time. It takes about 200 days for the volume of water in the lake to be replenished."

He is, however, confident that a proactive approach by the group in addressing the issue is helping the situation.

"The machines are creating better land for us and reducing the environmental impact. It is important to protect our waters," he says.

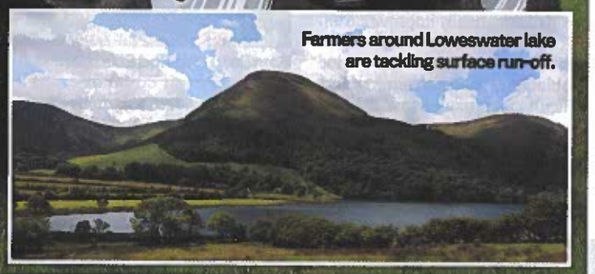
"Reducing our stocking densities and inputs is also helping, while not being detrimental to our profitability."

An example of aerated land.

A grassland subsoiler is used as part of the armoury to protect the lake and improve land.

Sward Lifter specifications

- **Width:** 2.7 metres
- **Legs:** Three
- **Weight:** 1,245kg
- **Power requirement:** 100hp+
- **Protection:** Hydraulic reset



Farmers around Loweswater lake are tackling surface run-off.

The aerator is a key piece of kit to tackle shallow compaction.

Sward Slitter specifications

- **Width:** Three metres
- **Blades:** 72
- **Weight:** 560kg
- **Power requirement:** 50hp+

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