

LOWESWATER - A UNIQUE LAKE

Since the 1990s, various groups within and beyond the local Loweswater community (farmers, land owners, residents, university researchers) have been working to improve the local environment. This panel provides a summary of a few of the things we have learnt about the lake and its catchment over this time.



Lake catchment

- ◆ catchment area 890 ha
- ◆ average rainfall 1600 mm/year
- ◆ about half mixed upland (fell), one third grassland and the rest woodland



Subsoiler used by local farmers to improve soil

Farming today

- ◆ no significant arable farming since WW2
- ◆ declining number of individual farm units
- ◆ significant numbers of sheep and cattle



Herdwicks

Holme Wood Bothy

- ◆ started life as a fish hatchery in the 19th C
- ◆ now used as holiday accommodation



The lake

- ◆ volume 5,400,000 m³
- ◆ surface area 159 ha
- ◆ depth 8m mean, 16m max
- ◆ hydraulic retention time 200 days



Planktothrix filamentous cyanobacteria

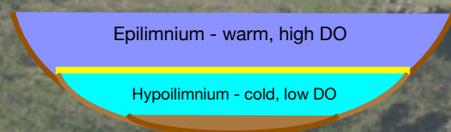
Lake algae and cyanobacteria

- ◆ variable between years and seasons
- ◆ strong diatom growth in Spring
- ◆ cyanobacteria (blue-green algae) can be toxic, but levels cyclical



Lake stratification

- ◆ natural process occurring in many (deeper) lakes
- ◆ lake splits into 2 layers in summer
- ◆ bottom layer loses its dissolved oxygen (DO)



Pike

Lake fish

- ◆ excellent trout fishery in early 20th C due to stocking from hatchery
- ◆ perch now most common with some trout, minnow and pike

Eutrophication

- ◆ measure of lake's productivity
- ◆ Loweswater classified as average - mesotrophic
- ◆ incoming phosphates control algal growth



Photomicrograph of diatom Asterionella

Lake sediment

- ◆ 1 m sediment core goes back about 2000 years
- ◆ evidence of stratification for several centuries
- ◆ Diatom record consistent with increasing lake productivity since mid-18th C

Lake chemistry

- ◆ very soft water with low salts
- ◆ well oxygenated at surface, but anoxic at bottom in summer
- ◆ neutral pH (7- 8) most of time, but high pH (ca 9) at times of rapid algal growth

Lake nutrients

- ◆ nitrogen and phosphorus most important
- ◆ also silica for diatoms
- ◆ originate from land run-off and rainfall
- ◆ nutrients in land run-off come from treated sewage discharges and applied fertilisers

Local organisations

Environment Agency (EA) - regulation and lake monitoring
 National Trust (NT) - owner of lake and some land in catchment
 West Cumbria Rivers Trust (WCRT) - local charity managing improvement projects through the Loweswater Care Programme



In-lake sensor

Environmental monitoring

- ◆ monthly routine chemistry by EA
- ◆ "Lakes Tour" every 4 years by Centre for Ecology and Hydrology
- ◆ chemistry and biology of lake and becks

