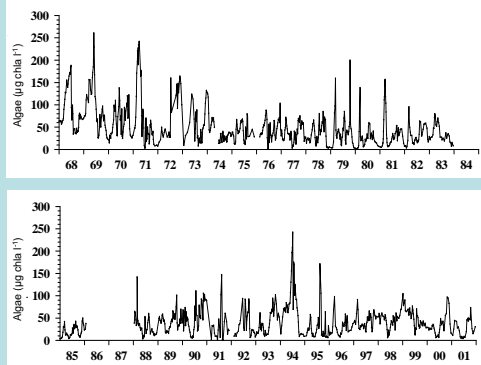


Loch Leven: understanding environmental change

Detecting change



Background

Loch Leven is a shallow eutrophic loch in south east Scotland. It has international recognition for its conservation value and is an important part of the local economy.

Long term monitoring

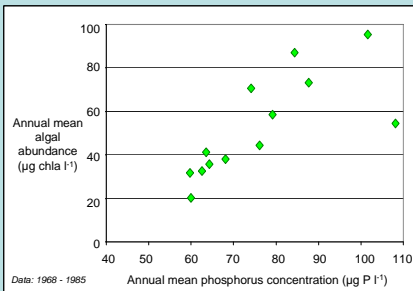
NERC has been monitoring the loch on a fortnightly basis for over 40 years. The data collected span 150 biological, chemical and physical variables.

Detecting change

During the 1970s and 1980s:

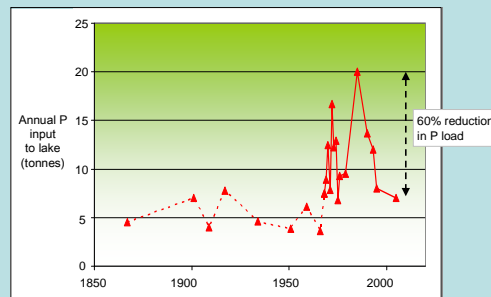
- nutrient inputs and concentrations increased
- ecosystem structure and function changed
- toxic algal blooms became more frequent

Identifying causes



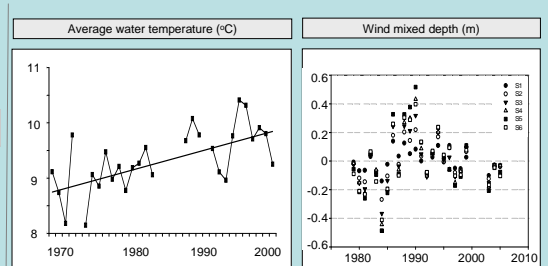
Cause of increased algal blooms

Between 1968 and 1985, increases in algal abundance were closely related to increased phosphorus (P) availability in the loch.



Cause of increased P availability

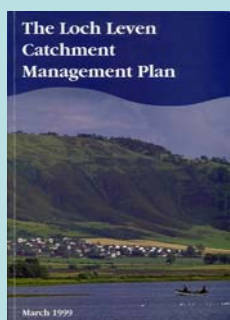
Our catchment data show that the supply of P to the lake had increased by 400% over this period, due to growth in agriculture, industry and population.



Climate change

Our physical data show evidence of warmer water and less wind induced mixing in recent years. The impact of these on species interactions, nutrient cycling and algal blooms are still being investigated.

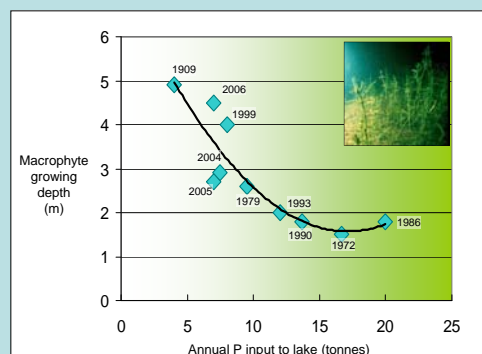
Providing solutions



- Stakeholders:
- CEH
 - SEPA
 - SE
 - East of Scotland Water
 - SNH
 - RSPB
 - Perth & Kinross Council
 - Scottish Agricultural College
 - NFUS
 - United Distillers & many others

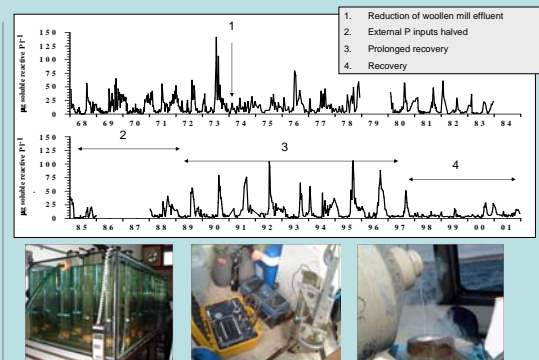
Setting restoration targets

Water quality restoration targets were set, based on CEH science, and a catchment management plan implemented. P inputs from sewage, industry and farms fell by about 60%. This cost more than £4.2M.



Evidence of recovery

As a result, water quality improved significantly. P concentrations fell and algal blooms became less frequent. Underwater plants began to thrive in deeper water as the water became clearer.



Future work

When P inputs were reduced, P released from the sediment delayed recovery by 10-15 years. We are investigating the factors that control this phenomenon to find ways of accelerating lake recovery processes.