

# HYDROLOGICAL IMPACTS

## Irrigation Abstraction

### Problem

Abstractions of water from surface and groundwater bodies for irrigation purposes affect the natural hydrological cycle.

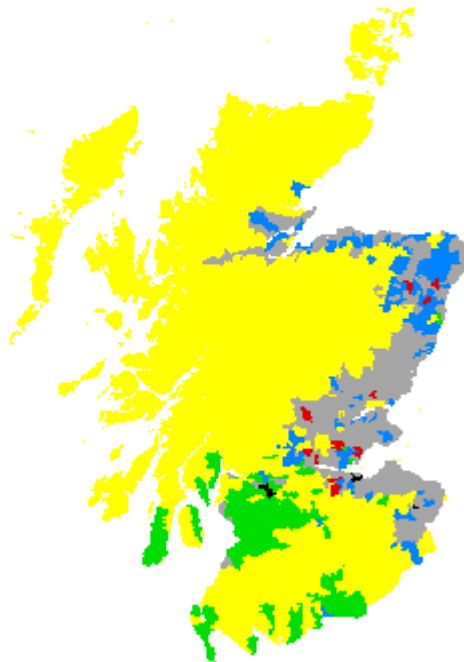
### Impact

Hydro-ecological impacts – changes in flow regimes affect aquatic ecology. Abstractions are most commonly made during dry periods when river flows are naturally low, exacerbating drought conditions.

### Areas at Risk

Irrigation is most commonly used in Scotland for potato crops, but is also used for salad crops, grass and soft fruits. These crops are grown most commonly in the east of Scotland, but also in the north around Moray and in the west around Ayrshire. The east coast areas are at greater risk than the other areas because of the drier climate, but also because there is greater ware potato production, which requires more irrigation than the seed production more common in the north.

Abstraction control measures currently exist for only two catchment areas, the West Peffer Burn in East Lothian and the Ordie Burn in Perthshire. However, other streams in Angus, Perthshire, Fife and E. Lothian may be as equally at risk as these catchments. Small streams where surface abstractions take place will be particularly vulnerable to hydro-ecological impacts, because the instantaneous abstraction may constitute a high proportion of the natural flow.



Distribution of Main Farm Types

Farm Type	Areas at Risk		
	Localised	Regional	Universal
General Cropping		Irrigation	
Mixed		Irrigation	
Dairy	Irrigation		
Pigs and Poultry			
Cattle and Sheep			

### Practical Actions

- New regulations for abstraction of surface and groundwaters will be introduced as a requirement of the EU Water Framework Directive. These may not directly impact on all agricultural water usage as they may be applied only to abstractions exceeding a minimum flow volume. The new regulations are likely to be based on irrigation restrictions in relation to stream flow volumes or rates.
- Because of the seasonal nature of irrigation abstractions, significant mitigation of the problem could be achieved by using water storage reservoirs, enabling abstractions to take place at times when stream flows are high, to be stored for use during dry periods.

- Where possible, there may also be benefits in using groundwater abstractions in preference to surface water, because the impact of the abstraction on the streams will be smoothed over time, rather than instantaneous.
- Decreases in the agricultural demand for irrigation water could be achieved through more efficient water use, for example by employing trickle irrigation methods in place of spray irrigation.



### **Research Gaps**

Study of the most appropriate mechanisms for minimising flow disturbance whilst satisfying agricultural needs, including effective implementation of abstraction controls.

Evaluation of impacts of groundwater abstractions compared with surface water abstractions.

Identification of the spatial scale at which controls should be implemented.

**Contact** Dr S Dunn, Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH.