ENFO

information on the environment

TURLOUGHS

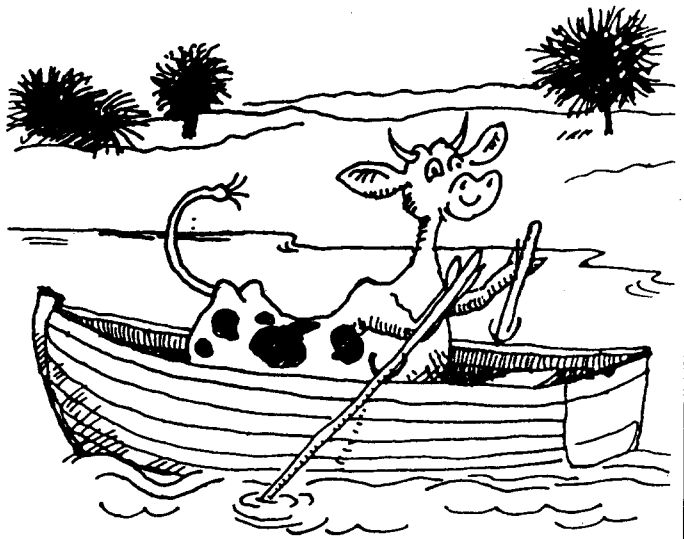
TURLOUGHS are lakes which disappear for part of the year, leaving a floor covered with grasses, sedges and herbs. They occur in limestone areas west of the Shannon and are unique to Ireland. Their flora and fauna are very interesting, and if there is one in your area, it is an ideal site for an environmental study. Many turloughs have been drained and both arterial drainage and local drainage by farmers threaten those that remain. Some representative turloughs should be conserved, as it would be a tragedy if this unique part of our heritage were to disappear forever.

SEASONAL LAKES

If you drive through part of eastern Galway or Mayo in the winter, you will see a large number of lakes and you may be puzzled that they do not appear on the half-inch to a mile Ordnance Survey maps. If you look a bit closer, you may wonder why some of the lakes have walls leading down into them, or telegraph poles in the middle of them. Then, if you return to the area in the summer, you will find no sign of these lakes, but instead a landscape with green fields and grazing cattle. Only a few clues, such as the black moss covering the stone walls, indicate that these are no ordinary fields. In fact, they are turloughs.

Turlough, or Turlach, *is* the word used to describe these strange disappearing lakes, which are found in limestone areas of Ireland, mostly west of the Shannon. The name is thought to come from the Irish "tur loch", meaning dry lake. The features are unique to Ireland and they are an important part of our heritage. They are of great interest to many scientists: geomorphologists (W}10 study landforms) are interested in how turloughs were formed, hydrologists (who study water) try to explain what makes turloughs flood, botanists study the unusual vegetation which covers the turloughs floor and zoologists study the animals associated with the turloughs. Because they have so many interesting aspects, turloughs provide an ideal opportunity for local environmental studies.

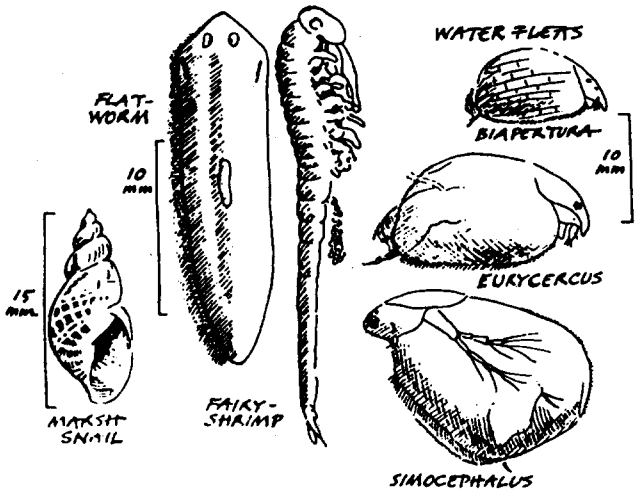
Turloughs are mostly found on the central lowlands west of the Shannon, in counties Galway, Clare, Mayo and Roscommon, although a few are also found elsewhere, e.g. in- Limerick, Sligo and Longford. Most turloughs flood in the autumn, usually some time in October, and then dry up some time between April and July. However, some turloughs in the Burren can flood at any time of year in a matter of a few hours after heavy rainfall and they may empty again a few days later. A few turloughs are affected by the tide: in



the summer, Caherglassaun Lough, which is 5 km from Galway Bay, can be seen to flood and empty again twice every 24 hours. Most turloughs flood to a depth of about 2 metres but some are much deeper: for example, some of the turloughs near Gort are about five metres (16 ft.) deep in midwinter. Turloughs are variable in size: the largest turlough in Ireland, Rahasane, which lies to the west of Craughwell in Co. Galway, covers about 250 hectares (or 500 football pitches!).

WHY DO TURLOUGHS OCCUR?

All of the turloughs are found in limestone areas. This is because limestone is a unique rock in that it can be dissolved away by rainwater, particularly rainwater that has become acidic by picking up carbon dioxide as it passes through the soil. The cracks or joints in the rock become widened to such • an extent that eventually all of the rain falling on the limestone disappears underground and the water moves through the rock openings ranging from cracks a few millimetres wide to large cave passages. The limestone is then said to be *karstified.* To the east of the Shannon, the limestone is often covered by great thicknesses of glacial drift deposited during the Ice Age but in many areas to the west of the Shannon where the limestone is pure and the drift cover is thin, there is no proper surface river network. In these areas, rainfall disappears underground, flows through openings in the rock and then rises at springs: large springs are found to the west of the area, flowing into Lough Corrib and Galway Bay. In winter, when the underground water



Some Turlough fauna

level (or water *table)* rises, and when the underground flow routes to the springs are not capable of dealing with the amount of water entering them, groundwater may appear temporarily at the surface in the form of a turlough. Many of the rivers seen in these areas today are largely artificial, constructed by drainage engineers from the nineteenth century to the present day, often linking a series of turloughs. For example, much of the Clare river is artificial and the middle section of its course used to be a huge turlough — the largest in Ireland at 650 hectares.

SWALLOW HOLES

Turloughs usually fill and empty at particular places on the floor: sometimes an actual hole or passage is visible but more often a hollow with stones in the bottom is all that can be seen and it may not be easy to recognise when it is dry in midsummer. Some turloughs have a spring at one place and a swallow hole somewhere else on the floor where water drains away, but many turloughs fill and empty through the same hole. A few turloughs are filled by rivers and streams flowing into them as well as by water rising from underground.

The water sinking in the swallow hole travels underground to a spring, which may be several kilometres away. In most rock types, groundwater flows very slowly (from just a few centimetres to a few metres per day), but in karstified limestone the flow rate can be quite rapid: water from the turlough may flow underground to a spring at a rate of 100 metres per hour or more.

CALCIUM CARBONATE

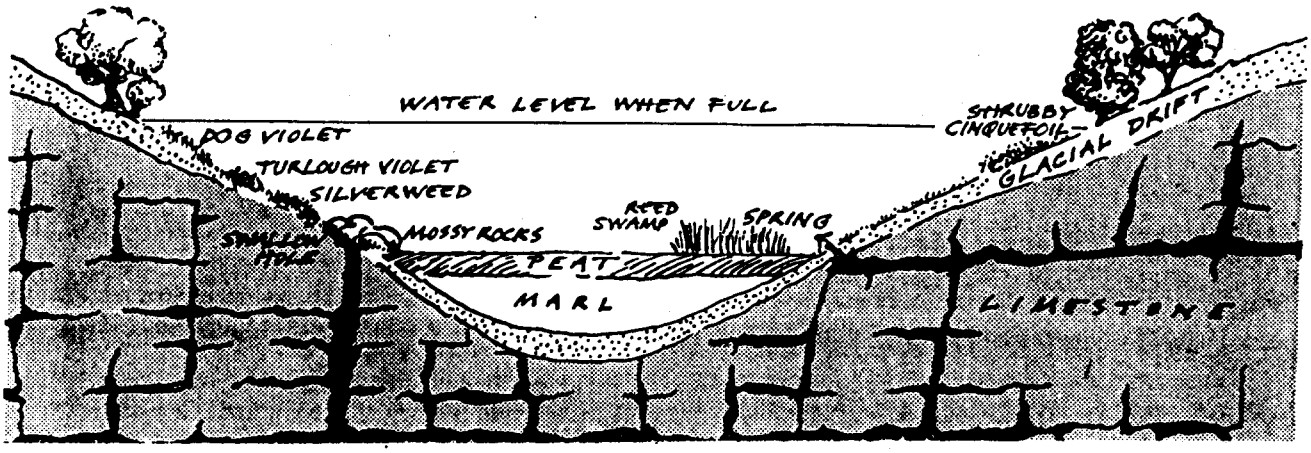
Limestone is made up of the mineral calcium carbonate and as water passes through limestone, it dissolves the calcium carbonate—this is what makes the water hard and causes furring on the inside of kettles, as the calcium carbonate comes out of solution when the water is heated. Something rather similar happens in turloughs—water which has picked up a lot of calcium carbonate during its underground travel rises in the turloughs and then some of the calcium carbonate comes out of solution and forms a white deposit. So if you visit a turlough which has emptied recently, you may notice a whitish coating on the vegetation on the turlough floor. (The reason why the calcium carbonate is deposited is that when the water comes to the surface in a turlough, it loses carbon dioxide back to the atmosphere and to plants which use it for photosynthesis and this loss causes the calcium carbonate to come out of solution.)

Sometimes a special whitish deposit-which has the appearance of sheets of paper is found in the turloughs when they dry up. This "algal paper" is made up of filaments of an alga which grows abundantly in warm weather and is then left to dry out in sheets when the turlough empties.

If you look at a section in a drainage ditch in a turlough, or if you make a hole with a soil auger you may find a white or cream coloured deposit beneath the vegetation cover, or beneath a layer of peat. This is often called "white marl"—again it is made of calcium carbonate. About half of the turloughs contain marl: it was deposited at a time several thousand years ago when these turloughs were not seasonal lakes but were flooded all year round.

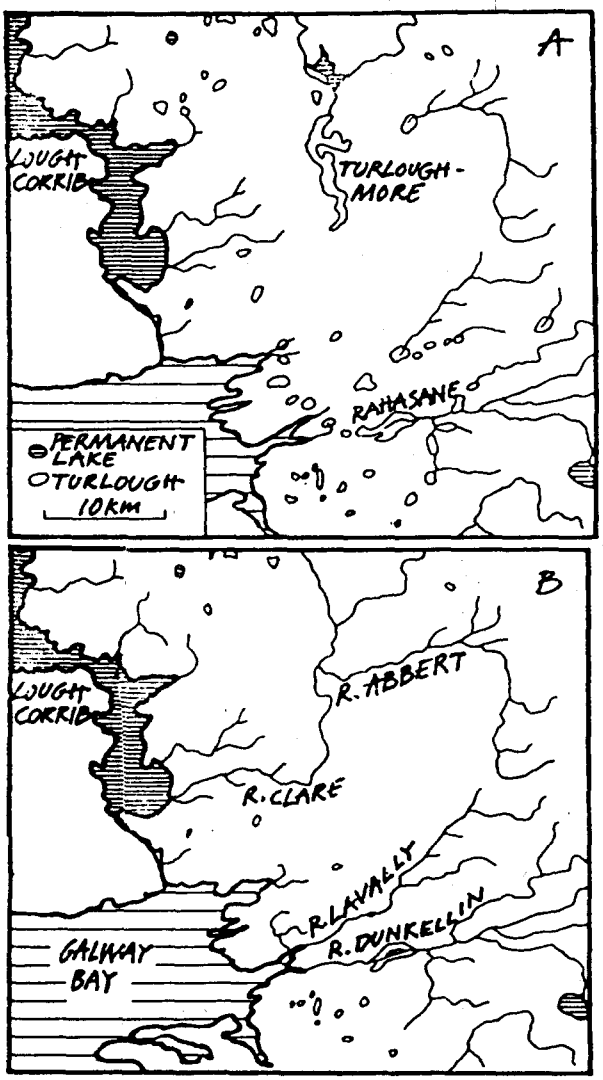
PLANT AND ANIMAL LIFE

Most turloughs have a springy, short-cropped turf of grasses, sedges and herbs. In the Burren, the highwater-mark is often shown by the shrubby cinquefoil with its attractive yellow flowers, and meadow rue. Just below, dog violets are abundant and in some turloughs there may be a dense sward of the rare sky-blue turlough violet about one metre further down. Other characteristic plants of turlough sides include orchids and speedwell. About half way down the sides, and across the bottom of shallow turloughs, silverweed may blanket almost all other plants.



Schematic cross-section of a turlough.

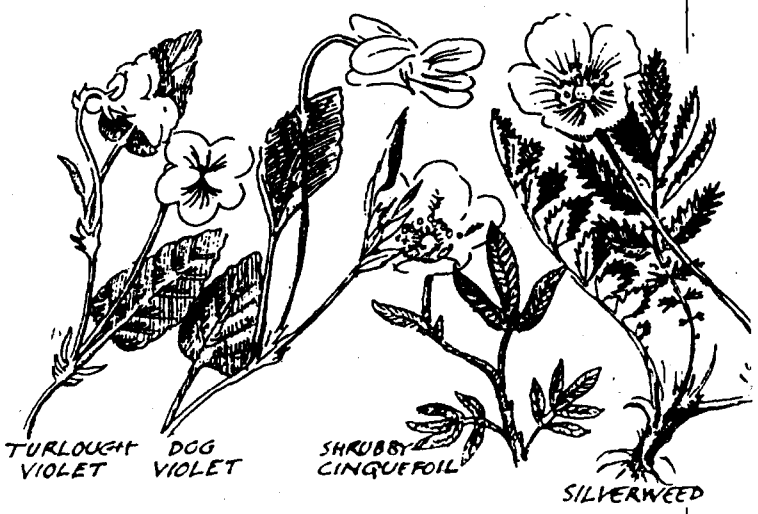
Rivers and turloughs in part of County Galway.
A. Before arterial drainage in the nineteenth century.
B. At the present day



If the turlough has a marshy zone near the swallow hole, there may be mint, water-cress, pond-weeds, aquatic buttercups and knotgrass, living a semiterrestrial existence. But most swallow holes when dry are represented by a jumble of rocks, clothed with blackish and dried aquatic mosses *(Cinclidotus,* the turlough moss and *Fontinalis,* usually found in streams).

Many people think that turloughs have no animal life. However, frogs and newts may spawn there and sticklebacks may survive in the larger turloughs, retreating into underground cracks in the rock when waters are low. Shrimp and water-lice do the same and where fish are absent there may be a rich fauna of delicate water-fleas and fairy-shrimp, some unknown elsewhere in Ireland. These hatch and grow fast, finding safety in the warm fishless waters. Flatworms and snails are also often abundant; these pass the dry periods in springmouths or marshy areas.

When turloughs retain some water all year, they may be important bird haunts. Rahasane in Galway is famous for its white-fronted geese, whooper swans, wigeon, teal and many waders in winter. Others may not suit the large migratory birds, but their importance to resident warblers and other small birds has never been studied.

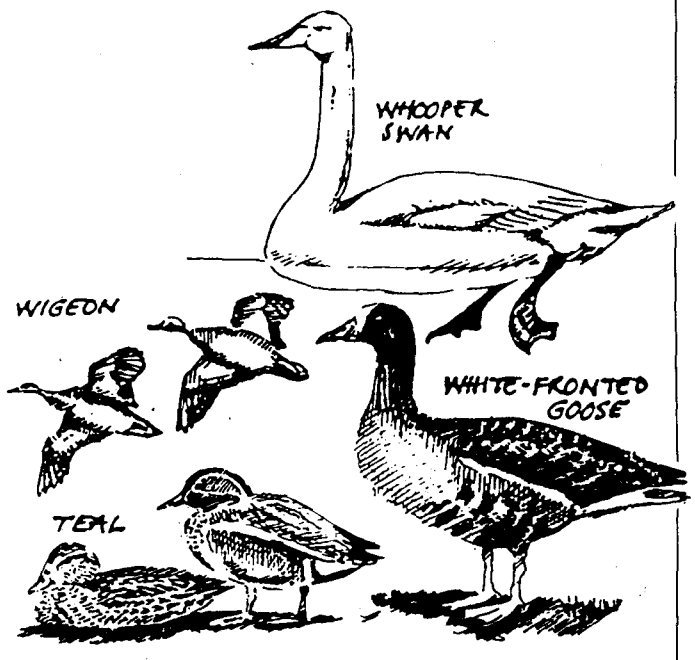


Some Turlough flora.

DRAINING OF TURLOUGHS

Turloughs provide good summer grazing for cattle, sheep and horses, partly because of the annual deposition of lime-rich silt. However, for many years, farmers have seen the winter flooding as a waste of potential and they have attempted to find some means of draining the turloughs, so that they can be used all year round. This has usually been achieved by digging an artificial channel through the turlough, which is capable of carrying away any water entering the turlough from surface or groundwater — such channels have often been constructed as part of major arterial drainage schemes. At least a third of the turloughs in Ireland have already been drained and more are being drained each year. This has very serious consequences from the point of view of the environmentalist —the unique flora and fauna of the turlough cannot survive in the absence of seasonal flooding. Even for the farmer, the benefits are not always as great

as anticipated—the stopping of the annual limey silt deposition means that the soil may become impoverished and fertilisers must be used. Also, the poorly developed,



Some turlough wildfowl.

delicate soil may not be able to withstand the presence of animals through the winter.

To suggest that no more turloughs should be drained is a rather extreme view but the case for conserving at least some of them is very strong—it would be a great loss if this unique part of our heritage were to disappear for ever.

THINGS TO DO

If you have a turlough near you, there are plenty of things to observe and record. You can measure the changes in water level over a year by placing a series of measuring sticks in the turlough. When the turlough is filling and emptying, you can locate the springs and swallow holes.

Notice how the vegetation changes as you move down the slope to the deepest parts —can you relate these changes to the time for which each part is flooded? If you have a soil auger, you can investigate the deposits: you are most likely to find peat or marl on the bottom, and glacial till (with clay and larger stones) on the slopes. Is the changing vegetation related to the type of deposits?

Does your turlough have a characteristic plankton or other animal forms? How quickly does the animal community develop? Are there fish present and if so, what type? Do birds visit the turlough in the winter? Learn to identify the birds and carry out regular counts through the winter. Does the presence or absence of birds seem to relate to a particular feature, such as the shape of size of the turlough, reedy vegetation, or the other animals present?

FURTHER READING

There is very little written about turloughs, apart from a few papers in scientific journals, partly because so much remains to be learned about them. If you wish to know more about turloughs, or if you have information about at a turlough near you, you can get in touch with people in universities who carry out research on turloughs, or with the Wildlife Service, who are pareparing a list of turloughs for the purposes of conservation. Places to contact include:
Trinity *College Dublin:* Environmental Sciences Unit, Zoology Department.

University College Galway: Botany Department.

Wildlife Serviee

Office of Public Works: Parks Branch.

Books which mention turloughs and their vegetation include:

Forest and Wildlife Service (e. 1980) **Wetlands Discovered.** (Available from the Wildlife Service)

O'Gorman, F. (1979) **The Irish Wildlife Book,** Irish Wildlife Publications, Dublin. (pages 58-60)

Praeger, R. Lloyd (1950) **The Natural History of Ireland,** Collins, Ireland.

Webb, D.A. & Scannell, M. (1983) **Flora of Connemara and the Burren.** Royal Dublin Society, Cambridge.

This is a reprint of a Resource Source leaflet prepared by Catherine Coxon and Julian Reynolds of Trinity College, Dublin, and produced originally by the Department of Environmental Studies, University College Dublin.
Issued by: Enfo – The Environmental Information Service, 17 St. Andrew Street, Dublin 2. Telephone 01-6793144. Printed on recycled paper by Government Supplies Agency **BS9.6/92**