

**Freshwater** resources form an essential part of our landscape and provide a range of habitats supporting a wealth of wildlife. They are essential to Ireland's biodiversity. Freshwater biodiversity is vulnerable as freshwater is a resource for humans that may be extracted, diverted, contained or contaminated in ways that compromise its value as a habitat for organisms. Other habitats, such as peatlands, are dependent on a supply of clean fresh water.



The following section examines the major freshwater habitats in Ireland i.e. lakes and rivers

### **Lakes and Ponds**

Lakes have many intrinsic values such as economic, cultural, scientific, aesthetic and educational. With over 11,000 lakes in Ireland located primarily in the midlands, west and northwest, they are a critical habitat and an important aspect of our natural heritage supporting a wide variety of life including algae, plankton, fungi, fish, birds esp. breeding & wintering wildfowl, insects and aquatic plants. They are also important in the context of drinking water abstraction and recreation.

There are a number of different types of lakes in Ireland each with their own characteristic species and habitats that are a major part of our national biodiversity. The classification of lakes is generally based on the trophic or nutrient status of the water and the main types of lakes together with characteristics and species found there are outlined below:



<b>Type of Lakes</b>	<b>Characteristics</b>	<b>Typical Species</b>
Dystrophic Lakes	Highly acidic, base poor, Low in nutrients Brown water – humic & other acids from peat Associated with lowland blanket bog, peaty margins	Bladderworts Pondweeds Bogbean Sphagnum mosses
Acid oligotrophic lakes	Low in nutrients Base poor, acidic Acidic bedrock & rocky margins Brownish water – peaty soils / bogs Submerged & floating aquatic plants	Water Lobelia Quillworts Bog Pondweed Floating club-rush Common Reed
Limestone / Marl Lakes	Lakes and ponds in limestone areas Base-rich Poor-moderately rich in nutrients Clear water High proportion of marl in lake sediment	Stoneworts Pondweed
Mesotrophic Lakes	Moderately rich in nutrients Base rich Water discoloured by algae	White water lily Yellow water lily Pondweeds Stoneworts
Eutrophic Lakes	High in nutrients Base-rich Water discoloured or turbid Abundant algae & suspended matter	Duckweeds Pondweeds Spiked Water-milfoil Reeds
Turloughs	Seasonal lakes in basins or depressions in limestone areas Practically unique to Ireland – found mainly in the West Flood in winter & dry out in	Creeping bent Silverweed Creeping buttercup Sedges Water-plantain



	<p>summer</p> <p>Are generally fed by underground passages</p> <p>Support aquatic, amphibious &amp; terrestrial species</p>	Pondweeds
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## Rivers

Rivers and streams form an integral and essential part of our landscape, from source to mouth. They provide a range of habitats supporting a wealth of wildlife, from the river water itself, to the banks and the surrounding floodplain or valley. Rivers are also extremely valuable to wildlife in that they form 'green corridors', linking green areas and enabling wildlife to travel between them.



Rivers form when the amount of rainfall exceeds the amount of water that is lost from the surface of the land through evaporation. This excess water runs off the land to the sea either on the surface (in the form of rivers and streams) or through the ground (as groundwater). Rainfall in Ireland averages 1,150 mm per year. With average evapotranspiration of 450 mm, this leaves an effective 700 mm of available precipitation to drain to the sea through nearly 1,500 km<sup>2</sup> of rivers and lakes

At a global level, freshwater makes up approximately 0.01% of the world's water and contains approximately 100,000 species.

Due to the importance of river habitats for biodiversity, a number of Special Areas of Conservation (SAC's) that have been designated in Ireland include rivers habitats to protect freshwater pearl mussel, salmon, shad, lamprey, freshwater crayfish and otter. In addition to providing habitats for numerous plant and animal species, rivers also act as a valuable natural resource for mankind in economic, scientific, educational, aesthetic and cultural terms. Indeed, it is its value as a resource that often results in the damage and destruction of this resource and the biodiversity it contains.

### The river bank

A river bank can be a rich habitat for biodiversity, providing shelter and food for a variety of wildlife, such as amphibians, reptiles, insects, birds, small mammals and even otters.



The best type of river bank for wildlife is one with lots of places for animals to shelter and feed. The rich, wet soil provided by a river bed enables a wide diversity of plants and trees to grow, although the local climate, geology and land use will also have an impact. Trees that grow along river banks provide useful habitat for insects and birds, and cast shade over the water where fish may hide. The main types of trees that grow on a river bank are Willows and alders. Such trees can provide homes to Otters who can build their homes or holts in their roots. Otters hunt in the rivers for fish. A single otter may control a territory of up to 20km of river which

makes them difficult to spot



Other characteristic plants include reeds, sedges and grasses, thistles, hawkweed, wild angelica and marsh marigold. The plants found will depend on the local geology and water components.

The riverbank also provides habitats to a number of mammals. The most well known, although rarely seen, bank side mammals are probably the water vole and the otter. For these animals the bank is as important as the water itself. Numbers of both species have declined drastically for various reasons, mainly habitat loss, pollution and more recently competition with mink.

Birds species also use the river banks as a source of shelter and food. Birds such as the Kingfisher and sand martin make their nests in suitable river banks, and other birds characteristic of the river habitat include the dipper, the Grey Wagtail, heron, duck species, moorhen, coot, and waders where there are suitable mudflats. Other birds that inhabit riverside trees and marshy areas, and which come to the river to feed or drink, may also be seen.

## Types of Rivers

### Upland Rivers



Sections of rivers in upland areas are typically eroding, have steep gradients and have little or no deposition of fine sediment. The beds of such rivers tend to be characterised by exposed bedrock and loose rock. The banks of upland rivers can be very rocky and therefore may support very little vegetation cover. Riffles, pools and waterfalls may occur during the upland stage of a river and these can give rise to different habitat conditions along these stretches.

### Lowland Rivers

A river moving through a lowland area is usually moving at a slower pace than an upland river. With this slow movement a lot of fine sediment is deposited on the river bed. This sediment consists of mainly alluvial or peaty material and it is this material that attracts a different type of

biodiversity than that of an upland river. The main difference between a lowland river and a lake or pond is that there is still some slow movement even in the slowest of rivers. Communities of animals and plants in a lowland river are more like those of lakes and ponds.



## Typical Flora and Fauna

Common species found in upland areas include aquatic mosses such as *Fontinalis spp.* and *Racomitrium aciculare*, which occur on submerged rocks and boulders. Lichens and liverworts may also occur on exposed rocks and wet shaded banks. Due to the fast flowing nature of upland rivers, there are not many species of higher plants but they can occur in areas where fine sediment is trapped. When this happens, typical species include water crowfoots, alternate water-miffoil and bulbous rush.

The moss covered boulders found in upland streams can provide a good habitat for clinging types of mayfly and stonefly nymphs. These feed by grazing on the algae on the surface of rocks and nearby



stones. On the downstream side of rocks where there is more shelter present, more delicate species of mayfly and stonefly can survive. The brown trout is also hardy enough to survive in this environment, despite the difficulties of battling the fast current and lack of food.

One of the most typical bird species found at this stage of the river is the dipper. The dipper can often be seen standing and bobbing on the upstream stones or in the shallow upstream areas looking for small animals. Dippers live on the same stretch of river all year and they return to the same nesting area year after year.

The slow flow of lowland rivers allows a greater variety of species to survive and flourish and they will generally be of a more complex nature.



Some of the main flora and fauna found living on a lowland river include floating aquatics such as water-lilies, pond weeds, reeds, rushes and aquatic insects and invertebrates such as the swimming mayfly nymphs and various worm species. These aquatic insects are of vital importance in the food chain of a river as they provide a primary food source for many fish species, including the Roach, the Minnow and Stickleback

Common bird species that are found at the lower end of rivers include kingfishers, herons and grey wagtails, which live off the variety of insects and fish that are found at this stage of the river. The lowland river floodplains contain a variety of coarse fish such as eels and sticklebacks, which have been in Ireland since the last glacial period, and roach, pike and bream, which were brought into Ireland during the last 400 years or so.

One of the most common mammals found at the lowland river stage is the otter. Otters were previously hunted for their fur but are now a protected species under the Annex II of the Habitats Directive. Otters feed on fish but they do not have a preference for a particular species - they will eat whatever is available in their stretch of the river.

## Threats to Freshwater Biodiversity

### Pollution

There are three main types of pollution that can affect the biodiversity of our freshwaters - chemical, physical and organic.

- **Chemical**

Chemical pollution occurs from things like the leaching of chemicals from old mines, the addition of chemicals to the water during water treatment processes, the discharge of chemical pesticides and the acidification of freshwaters from forestry. The addition of harmful chemicals to the freshwater system will generally have a direct effect on the living organisms in that river system, resulting in their destruction. As fish are at the top of the food chain, they are particularly affected by such pollution incidents.



- **Physical**

Physical pollution occurs from activities such as major infrastructure projects, the actual dumping of waste and the clearance and drainage of land. The clearing of the land for forestry, agriculture or large infrastructure projects can result in an increase in the amount of sediment entering into the freshwaters and an increase in the speed with which water runoff from rainfall will enter the river or lake. Increases in sediment load can affect the amount of light entering the water, which can affect primary production and it can also have an impact on the area of a river that is used for spawning, leading to a reduction in the number of juvenile species.

- **Organic**

Organic pollution of freshwaters occurs from poorly treated industrial effluent, agricultural activities such as land spreading of effluent, untreated poorly urban waste and poorly sited or poorly functioning septic tanks and is the most common form of river pollution in Ireland. This results in an increase in the level of organic nutrients such as phosphates and nitrates in the water and can lead to eutrophication. In freshwaters this can cause an increase in algal growth, which can lead to fluctuations in the amount of dissolved oxygen available in the water for plants and animals to breathe. This can result in fish kills and when plant and algal growth is large, it can alter the river channel and affect the accumulation of silt beds.

## **Changes in Land Use**

A freshwater system is part of a wider ecological system. Therefore, it reacts and can be influenced by changes to that system. For example, changes in land use can cause changes to river flow, sediment load and even its course - all of which will have an impact on its biodiversity. The plantation of large monoculture forests can lead to an increase in sediment runoff during both the initial planting stage and during tree felling. If the forests are of a coniferous species, this can also lead to acidification of water due to the acidic nature of the conifer leaves. Urban development can also have a physical impact on freshwaters, resulting in bank vegetation loss, reduced invertebrate diversity, culverting problems, flash flooding arising from an increase in concreted areas and general damage to the aquatic habitat. Urbanisation can also result in a loss of access to waters for anglers and can deprive people access to the general amenity of the riverbank or lakeside.

## **Introduced Species**

Introductions of other non-indigenous organisms can influence the biodiversity of freshwaters through competition with existing native species. One example of this in Ireland is the zebra mussel, which was most likely introduced into Ireland during 1993/94 on the hulls of pleasure craft. Since then, the zebra mussel has spread throughout the Shannon and Erne systems. Zebra mussel populations create a number of problems for other fish species. For example the populations of the swan mussel in some waterways has been severely damaged as a result of juvenile zebra mussels colonising their hard shells. Zebra mussels can also colonise lake shorelines and spawning substrates that could be used by some fish species, and their presence results in changes to nutrient dynamics in standing and slowly moving water bodies and changes to littoral substrates, with consequent alterations in the associated macro invertebrate community and food availability for fish. The introduction has also led to economic impacts as they can colonise the intake pipes at fish farms and hydroelectric plants.

Should mention alien invasive aquatic plants here.

[www.ria.ie/publications/journals/journaldb/index.asp](http://www.ria.ie/publications/journals/journaldb/index.asp)

## **Legislation and Designations**

Special Areas of Conservation (SACs) are designations that apply to areas of significant conservation value irrespective of ownership and the principals underlying the designation are usually considered



during planning procedures etc. Several freshwater habitats are now established as SACs or candidate SACs. This means that certain activities within SACs can only be carried out with the permission of the Minister for the Environment, Heritage and Local Government, and these 'Notifiable Actions' vary depending on the type of habitat that is present on the site. These and several other activities can only be undertaken with permits or licences.

The pollution of freshwaters by organic material such as phosphates and nitrates is the main source of pollution in Ireland. The Nitrates Directive (91/676/EEC) was implemented in 1991. The main objective of reducing water pollution caused or induced by nitrates from agricultural sources and preventing further such pollution, with the primary emphasis being on the management of livestock manures and other fertilisers.

The Water Framework Directive (WFD) came into force in December 2000 and set out to rationalise and update existing water legislation by setting common EU wide objectives for water. It is very broad in its scope and relates to water quality in rivers, lakes, canals, groundwater, transitional (estuarine) waters and coastal waters out a distance of at least one nautical mile.

The objectives of the WFD are:

- to protect and enhance the status of aquatic ecosystems (and terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems)
- to promote sustainable water use based on long-term protection of available water resources
- to provide for sufficient supply of good quality surface water and groundwater as need for sustainable, balanced and equitable water use
- to provide for enhanced protection and improvement of the aquatic environment by reducing / phasing out of discharges, emissions and losses of priority substances
- to contribute to mitigating the effects of floods and droughts

### **What can I do to help?**

Get informed – find out more about your local freshwater biodiversity.

Become involved in Tidy Towns and enhance the habitat of your local river, stream or lake.

Become involved in developing your River Basin Management Plans. All stakeholders including members of the public have an opportunity to get involved in this.

Don't dump your waste in the river or lake.

Make use of your local river or lake as an educational tool - check out [www.somethingfishy.ie](http://www.somethingfishy.ie) for information

