



## Carrowmore Lake Priority Area for Action – Deskstudy Summary

This is a summary of the deskstudy for the Carrowmore Lake Priority Area for Action (PAA), Co. Mayo. Deskstudies are reports that are prepared by the catchment scientists using available information and data. To write these reports, we use information available for all waters that we plan to assess in the PAA. We get our information from:

- The Environmental Protection Agency
- Local Authorities
- Inland Fisheries Ireland
- Irish Water
- The Department of Agriculture, Food and the Marine
- Other public agencies.

The deskstudy also includes information learned from the public at a community information meeting specific to the Carrowmore Lake which was held on the 4<sup>th</sup> April 2019.

In our deskstudies, we examine a number of things:

- **quality** – how the water quality has changed since 2007
- **importance** – for example, if its water is used for drinking water, and if there are any rare plants or animals in it that we need to protect
- **impacts from human activity** – here we focus on impacts that damage water quality such as from wastewater discharges, agriculture, forestry practices, physical changes to the water body etc.

We complete desk studies first before starting our field-based assessments or local catchment assessments (LCAs).

### 1 Background and Location

LAWPRO catchment scientists work in specific catchment areas called Priority Areas for Action (PAAs). The Carrowmore PAA is located in Co Mayo and the PAA initially was made up of the Carrowmore lake water body only. Carrowmore Lake is a shallow, large lake at an altitude of 4.6m with a surface area of 9.1km<sup>2</sup>. Carrowmore Lake has a mean depth of 1.7m and a maximum depth of 2.9m. Some 52.6% of the lake area is less than 2m in water depth and this influences how the lake functions. Angling is an important small industry in the area and relies on Carrowmore Lake and its water quality. The lake has stocks of spring salmon, grilse, sea trout and also has resident brown trout<sup>1</sup>.

---

<sup>1</sup> [Lake – Bangor Erris Angling](#)

In order to determine why the lake has water quality issues, we needed to be able to assess information on the lake itself from previous monitoring and research undertaken, but also information from the land area and associated streams and rivers contributing into Carrowmore Lake. Therefore, one of the first jobs undertaken by LAWPRO was defining the catchment area. A catchment is an area of land around a river, lake or contributing into a body of water e.g. an estuary or coastal area. Rainwater that falls within a catchment eventually flows into rivers, lakes, or directly into estuaries or coastal waters bringing with it any contaminants that may be in the landscape.

Three river water bodies: the Munhin\_010, Bellanaboy\_010 and Glencullin (West Mayo)\_010 river water bodies were included in the catchment delineation. The map below (Figure 1) shows the catchment area, the current ecological status of the rivers feeding into the lake, plus the location of the monitoring points the Environmental Protection Agency (EPA) use to undertake their assessments for both the lake and its river catchment.

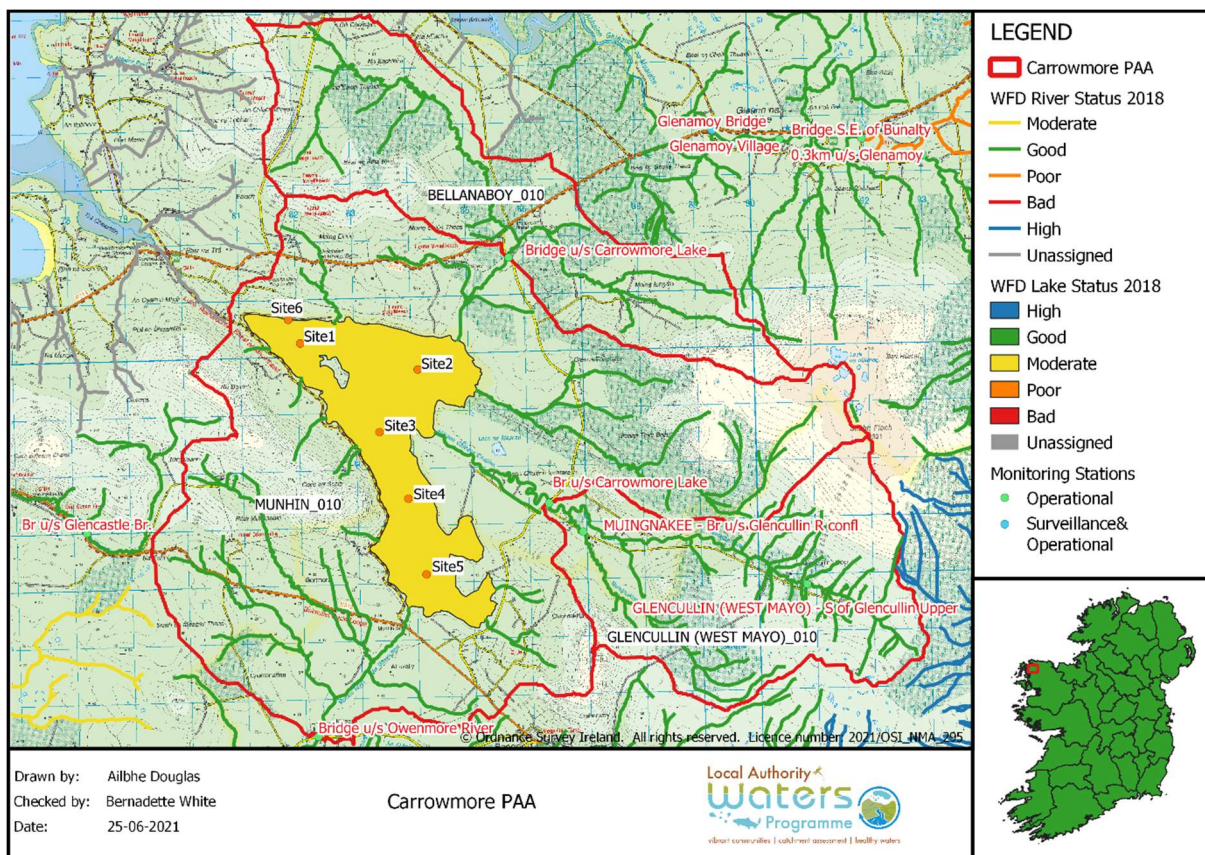


Figure 1 Carrowmore Lake catchment and ecological status

## 2 Catchment Description

There are no towns or villages located within the catchment area however Bangor Erris lies to the south-east of the lake and Barr na Trá lies to the northwest. Belmullet is the closest large town to the west of the lake.

Agriculture and forestry are the dominant land uses in the catchment of the lake, while there is also some localised peat cutting. The Carrowmore Lake catchment area consists largely of peaty and poorly draining soils. The catchment is dominated by blanket peat and therefore soils are generally wet and

prone to run off. Conversion of peat to grassland is a feature in the catchment, particularly along the rivers which feed into the lake.

Carrowmore Lake is the source of drinking water for the Erris Regional Water Supply Scheme (RWSS) which supplies just under 3,900 people in Bangor Erris, Belmullet and the surrounding areas. It also supplies treated drinking water to three public group water schemes. The abstraction point is located at the north-western end of the lake (just off the R314).

The rivers that feed into Carrowmore Lake intersect the Carrowmore Lake Complex Special Area of Conservation (for the protection of habitats and species such as the blanket bogs in Glenturk, Glencullin and Largan More) and the Carrowmore Lake Special Protection Area (for the protection of birds, specifically the Sandwich Tern). The PAA also includes three Natural Heritage Areas for blanket bog habitat.

### 3 Water Quality History in the Carrowmore PAA

Rivers and lakes are classified into five quality classes (status), with high status being unpolluted and bad status the most polluted.



The EPA assign status at (approximately) 3-yearly intervals based on the standards set out in European legislation, the Water Framework Directive (WFD). Status is based on many different elements that altogether indicate the overall health of the river, for example the ecology recorded in river habitats, the physico-chemical condition of the river (oxygen levels, nutrient concentrations, indicators of organic and chemical pollution etc) and also the physical condition of the riverbed and bank or lake shore.

We need to make sure that the Carrowmore Lake PAA achieves Good Status. We have reviewed water quality data available for each of the waterbodies (Table 1) and we have found that:

- Carrowmore Lake: the lake is achieving Moderate status and therefore is failing to meet Good status. The lake has been at Moderate status since first assessed for the WFD in the 2007 to 2009 monitoring period. The status was determined by the macrophytes within the lake in the 2013 to 2018 assessment period. Phytoplankton (microscopic algae) influenced status prior to that. This means that the plant community needs to improve for ecological status to be returned to Good status. While the total phosphorus levels are not excessively high in the lake, the dominance of tolerant taxa suggests that the levels are still too high for this lake. It is also possible that there is a reservoir of available phosphorus in the lake sediment, from times when it has been excessive, that is being exploited by the nutrient tolerant taxa.
- For the three river water bodies in the catchment of the lake, all have been achieving their Good status since at least the 2007 to 2009 assessment period.

**Table 1 Ecological status, pressures and significance in the Carrowmore Lake Catchment**

Water body Name	Water body Code	Water body Type	Risk	Ecological Status				EPA Characterisation Significant Pressure Category (Sub-category) (2013-2015)	EPA Characterisation Significant Issue (2013-2015)	Desk Study Review Potential additional pressures (2019)	Desk study Review Potential Significant Issue (2019)
				2007 - 2009	2010 - 2012	2010- 2015	2013 - 2018				
MUNHIN_010	IE_WE_33M030200	River	<i>Not At Risk</i>	Good	Good	Good	Good	N/A			
BELLANABOY_010	IE_WE_33B070200	River	<i>Not At Risk</i>	Good	Good	Good	Good	N/A			
GLENCULLIN (WEST MAYO)_010	IE_WE_33G030100	River	<i>Not At Risk</i>	Good	Good	Good	Good	N/A			
Carrowmore Lake	IE_WE_33_1914	Lake	<i>At Risk</i>	Mod.	Mod.	Mod.	Mod.	Agriculture (Pasture)	Nutrient Pollution & Altered morphology	Invasive species (Rhododendron)	Total phosphorous. Also PAHs & cypermethrin. With potentially also sediment given poorly draining and peat soils in a high energy 'flashy' catchment.
								Forestry (Forestry)	Chemical pollution & Altered habitat due to Hydological and Morphological changes		
								Agriculture (Agriculture)	Nutrient Pollution & Chemical Pollution		

## 4 Sources of Pollution

Pollutants find their way to rivers by a number of paths:

- They can be piped directly to the river from large sources such as wastewater treatment plants, or small sources such as faulty septic tanks, farmyards, roadside drains etc.
- They can flow across the ground to the river when nutrients which are applied to the land as fertiliser are washed off by rainfall before the crop and soil has absorbed them. This is usually a problem where soils are wetter and poorly draining, particularly during wet weather.
- Groundwater losses occur when pollutants move down through the soil and rock into groundwater and eventually into rivers, lakes and coastal waters. This usually occurs when too much fertiliser is applied to land, or when the soil isn't ready to absorb the nutrient (e.g. temperatures too cold, incorrect soil pH etc) and is common in free-draining/ light soils.

The main potential sources of pollution in the Carrowmore catchment are from agriculture and forestry, with potential for sediment inputs also from peat cutting which is predominately done by machine.

Agriculture is extensive in the catchment of Carrowmore Lake. The agricultural land in the catchment is quite marginal, mainly used for sheep grazing, with many rushy fields. Given the blanket peat nature of the catchment and therefore the wet soils, it will be easy for pollutants such as phosphorus and sediment to be lost into the rivers and streams in this catchment via drainage channels and small streams. Phosphate losses within a catchment are strongly related to soil type as wet, poorly draining soils, such as in this catchment, cause rainfall to run over the land surface and into nearby watercourses.

Forestry is both private and Coillte owned in the catchment. The most common species types are Sitka Spruce and Lodgepole Pine. More than half of the total forestry plantation was planted pre-1990's and therefore would not have been subject to new Forest Service guidelines protecting water quality and therefore may be at greater risk of causing water quality impacts during forestry stages such as felling, if not properly managed on site.

## 5 Next Steps

### **Community Engagement Meeting**

We held a community information meeting in the Broadhaven Bay Hotel in Belmullet on the 4th of April 2019 to tell the public about our work and to hear about water quality concerns from people living in the area. The meeting involved two presentations by LAWPRO followed by a Q&A session with the attendees.

The meeting attendees emphasised the value of the lake water body for fishing, recreation and drinking water supply. Concerns were raised over sediment losses from bank erosion, losses of pine needles and/or nutrients from brush mats during clearfelling or thinning within the catchment area. Issues with the invasive plant Rhododendron and recommended treatments was also discussed.

## Farmers Meeting

The Agricultural Sustainability Support and Advisory Programme (ASSAP) advisors from Teagasc held an information meeting for farmers within the PAA on 11<sup>th</sup> April 2019 followed by a stream side event on 23<sup>rd</sup> July 2019. During these meetings, the advisors gave details of the supports available for farmers in this catchment.

## 6 Local Catchment Assessment

This PAA presents a unique case i.e. a deteriorated lake sitting within a river catchment which is achieving Good status. Therefore, LAWPRO will need to determine whether the issues affecting the macrophyte community within the lake is due to nutrients sitting within the lake bed sediments i.e. nutrients which came into the lake historically, or whether there is ongoing nutrients such as phosphorus, plus sediment loss into the lake, which may be affecting the macrophyte community currently. All inputting streams and rivers will be targeted in Summer 2019 for biological assessments using the Small Streams Impact Score (macroinvertebrates, macroalgae and macrophytes) plus water quality probes to record dissolved oxygen, conductivity, temperature and pH, plus water samples will be taken for lab analysis. Catchment walks will be undertaken in locations where the risk of phosphorus and sediment loss is found to be higher.



Carrowmore Lake