

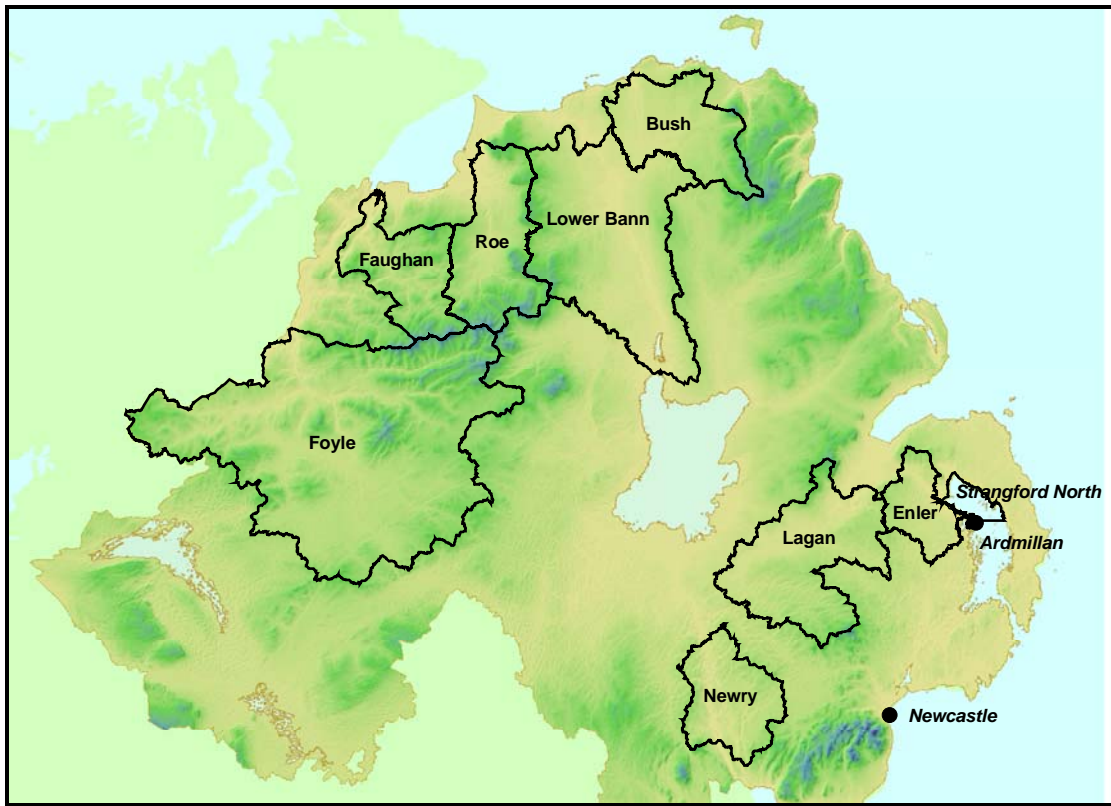
Environment and Heritage Series

# EC URBAN WASTEWATER TREATMENT DIRECTIVE

## SENSITIVE AREA REVIEW 2005

### Executive Summary

Candidate Sensitive Areas for Freshwater and Marine Waters in Northern Ireland



## **Executive Summary of Sensitive Area Assessment, Urban Waste Water Treatment Directive, 2005 Review, Northern Ireland**

### **1 Introduction**

Eutrophication is considered to be a major issue for water quality in Northern Ireland, particularly in relation to freshwaters. DOE is committed to a cross-sectoral approach, taking action across all sectors contributing to the problem. There are three European Directives which deal with nutrient discharges to waterways: the Urban Waste Water Treatment Directive, the Nitrates Directive and the Water Framework Directive. This review is carried out under the UWWTD and deals primarily with the management actions required by Water Service to protect the waterways of Northern Ireland. A limited number of industries which discharge high concentrations of nutrients are also covered by the requirements of the UWWTD. Other smaller industries will also have consents reviewed following this sensitive area assessment.

Action is already being taken across the agricultural sector, which is recognised as a significant contributor to nutrient concentrations in the waterways of Northern Ireland. Under the Nitrates Directive, a total territory approach was declared in 2004. A single action programme is currently being negotiated that will be applicable to all farmers across Northern Ireland. This action programme includes measures such as (1) a requirement for farmers to provide adequate storage for animal slurries (between at least 22 and 26 weeks storage depending on sector), (2) introduces closed periods for the spreading of organic and inorganic fertilisers to land, and (3) limits the amount of nitrogen that can be applied to the land to 170kg N/ha/year in livestock manures. In addition, phosphorus controls will be introduced across Northern Ireland and these measures collectively are designed to reduce nutrient inputs from agriculture that contribute to eutrophication. While acknowledging its environmental responsibilities, the agriculture industry recognises that changes in current farming practices are required. The controls on the timing, rate and method of nitrate and phosphorus application to land, at farm level, will be an important contribution to tackling Northern Ireland's eutrophication problem. The effectiveness of these measures will require assessments to be carried out and further action will be considered if necessary. The introduction of these measures will have a significant impact on the agriculture industry.

The purpose of this document is to provide a review of the trophic status of the coastal, estuarine and freshwaters of Northern Ireland. Trophic status studies are required under both the Urban Waste Water Treatment Directive (O.J. 1991a) (UWWTD) (91/271/EEC) Article 5(1) and the Nitrates Directive (O.J. 1991b) (91/676/EEC) Article 6. The waters may be identified as 'sensitive' under the Directive 91/271/EEC concerning urban waste water treatment and/or 'polluted' under the Directive 91/676/EEC concerning pollution by nitrates from agricultural sources, if found to be eutrophic or likely to become eutrophic if protective action is not taken. The report also reviews areas requiring a sensitive area identification under Annex IIa of the UWWTD, i.e. those areas where further treatment than that prescribed in Article 4 is necessary to fulfil other Council Directives.

For freshwaters, this review focuses on the areas not already identified under UWWTD. Lough Neagh, Lough Erne and their catchments were identified in 1994 and monitoring information suggests that these identifications are still required as these water bodies are still eutrophic. Transitional and marine waters already identified are the Quoile Pondage, Tidal Lagan and Inner Belfast Lough. The report recommends eleven new Sensitive Area identifications: eight freshwater areas and three coastal waters. These new identifications will mean that over 80% of the total land area of Northern Ireland drains into water bodies that are sensitive. This correlates closely with the land area draining to polluted waters under the Nitrates Directive.

Rivers and lake surveys are carried out under the Northern Ireland River and Lakes Monitoring Programme which assesses various chemical and biological parameters in freshwaters. Marine surveys are carried out under separate marine monitoring programmes and assess the various chemical and biological parameters of coastal/marine waters up to the estuarine or tidal limits. The review is presented in 2 sections with Section 1 covering the assessments of fresh running waters and Section 2 addressing transitional

and coastal waters. The recommendations presented in this summary at **Section 10** are made on a catchment basis.

## 2 Urban Waste Water Treatment Directive (91/271/EEC)

The Urban Waste Water Treatment Directive (UWWTD) seeks to protect the freshwater, estuarine and coastal environment from the adverse effects of domestic sewage, industrial waste water and surface water run-off. It sets requirements for the collection, treatment and discharge of urban waste water and also establishes time tables for the achievement of these standards according to the sensitivity of the waters.

Annex IIA(a) of the Directive states that:

A water body must be identified as a sensitive area if it falls into one of the following groups:

- (a) natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken.

The following elements might be taken into account when considering which nutrient should be reduced by further treatment:

- i) lakes and streams reaching lakes/reservoirs/closed bays which are found to have a poor water exchange, whereby accumulation may take place. In these areas, the removal of phosphorus should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication. Where discharges from large agglomerations are made, the removal of nitrogen may also be considered;
  - ii) estuaries, bays and other coastal waters which are found to have a poor water exchange, or which receive large quantities of nutrients. Discharges from small agglomerations are usually of minor importance in those areas, but for large agglomerations, the removal of phosphorus and/or nitrogen should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication;
- (b) surface freshwaters intended for the abstraction of drinking water which could, if action is not taken contain more than the concentration of nitrate laid down under the relevant provisions of the Council Directive 75/440/EEC of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States;
  - (c) areas where further treatment than that prescribed in Article 4 of this Directive is necessary to fulfil Council Directives.

Discharges from qualifying waste water treatment works (WWTW) within sensitive areas (i.e. serving a population equivalent (p.e.) of greater than 10,000) are subject to more stringent treatment. Qualifying WWTW discharging either directly or indirectly to a Sensitive Area (Eutrophic) will require phosphorus and /or nitrogen removal to Directive standards within 7 years of the designation.

There are catchments recommended for designation within this review that do not include any qualifying discharges (Bush, Enler/Blackwater, Newry and Faughan). However it should be noted that nutrient removal in non-qualifying discharges (works <10 000p.e.) in **all catchments** may be required to meet all relevant quality objectives and provisions of other Community Directives, including the Water Framework Directive. This requirement links the UWWTD to the programme of measures under the Water Framework Directive, where agreed measures have to be operational by December 2012 (i.e. 7 years after the UWWTD 2005 deadline). The programme of measures required under the Water Framework Directive will be agreed through the river basin management planning process.]

### 3 Nitrates Directive (91/676/EEC)

The Nitrates Directive aims to prevent and reduce water pollution by nitrates from agricultural sources, and Article 3(1) requires Member States (MSs) to identify waters affected by pollution and waters which could be affected by pollution if action is not taken.

With particular reference to eutrophication, Annex I A3 of the Directive states that:

Waters referred to in Article 3(1) shall be identified using the following criteria:

3. whether natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters are found to be eutrophic or in the near future may become eutrophic if action pursuant to Article 5 is not taken.

With the establishment of an action programme applicable to all farms across Northern Ireland under Article 3(5), the need to identify “polluted waters” (Eutrophic) (PW(E)) has been removed. The action programme will contain measures to restrict and control the timing and rate of land application of nitrates from agricultural sources.

### 4 Defining Eutrophication

The definition of eutrophication as contained in the UWWT Directive (91/271/EEC) is as follows:

‘eutrophication’ means the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

The definition of eutrophication as contained in the Nitrates Directive (91/676/EEC) is as follows:

‘eutrophication’ means the enrichment of water by nitrogen compounds, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

Action is required under both the UWWTD and the Nitrates Directive either when waters are already eutrophic or in the near future may become eutrophic, if protective action is not taken.

Eutrophication assessments are also required under the OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic and in particular to demonstrate progress required under the OSPAR Strategy to Combat Eutrophication.

OSPAR define ‘eutrophication’ as follows:

‘eutrophication’ means the enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned, and therefore refers to the undesirable effects resulting from anthropogenic enrichment by nutrients as described in the Common Procedure.

Under all of these definitions, water bodies must show;

- Enrichment by nutrients; and
- Accelerated growth of algae and higher forms of plant life; and
- An undesirable disturbance to the balance of organisms present and to the quality of water concerned

in order to be classified as eutrophic.

## 5 Criteria Used to define Eutrophication

The UK issued guidance for identifying sensitive areas (eutrophic) under UWWTD in March 1993. This guidance has been used alongside the Comprehensive Studies Task Team guidance issued by the UK authorities in 1997 (MPMMG, 1997).

Supplementary guidance was issued in May 2002 (UK, 2002). The supplementary guidance aligns closely with the OSPAR Common Assessment Criteria for Eutrophication.

## 6 Annex IIaC Designations

Annex IIaC of the Directive states that 'A water body must be identified as a sensitive area if ..... (c) further treatment than that prescribed in Article 4 of this Directive is necessary to fulfil Council Directives.' In the marine environment, additional sensitive area designations may be made to protect bathing waters identified under the Bathing Water Directive (76/160/EEC) and shellfish waters designated under the Shellfish Water Directive (79/923/EEC). Designations under this part of the Directive are also considered in this review.

## 7 Running Freshwaters

This report proposes eight areas be identified as 'sensitive' under Article 5.1 of the Urban Waste Water Treatment Directive and under The Urban Waste Water Treatment Regulations (Northern Ireland) 1995. The waters in these areas must be identified as Sensitive Areas (SA) if found to be 'eutrophic' or 'which in the near future may become eutrophic if protective action is not taken' (Annex II (a)) provided that the evidence submitted meets the criteria for designation. Any qualifying WWTW discharging either directly or indirectly to an SA(E) will require phosphorus and/or nitrogen removal to Directive standards within seven years of the designation.

Assessments have been made for eight freshwater catchments in Northern Ireland; Foyle, Lower Bann, Lagan, Roe, Bush, Newry, Enler/Blackwater and Faughan. The approach in this review is similar to the approach used in an earlier review to designate Lough Neagh and Lough Erne as SA(E).

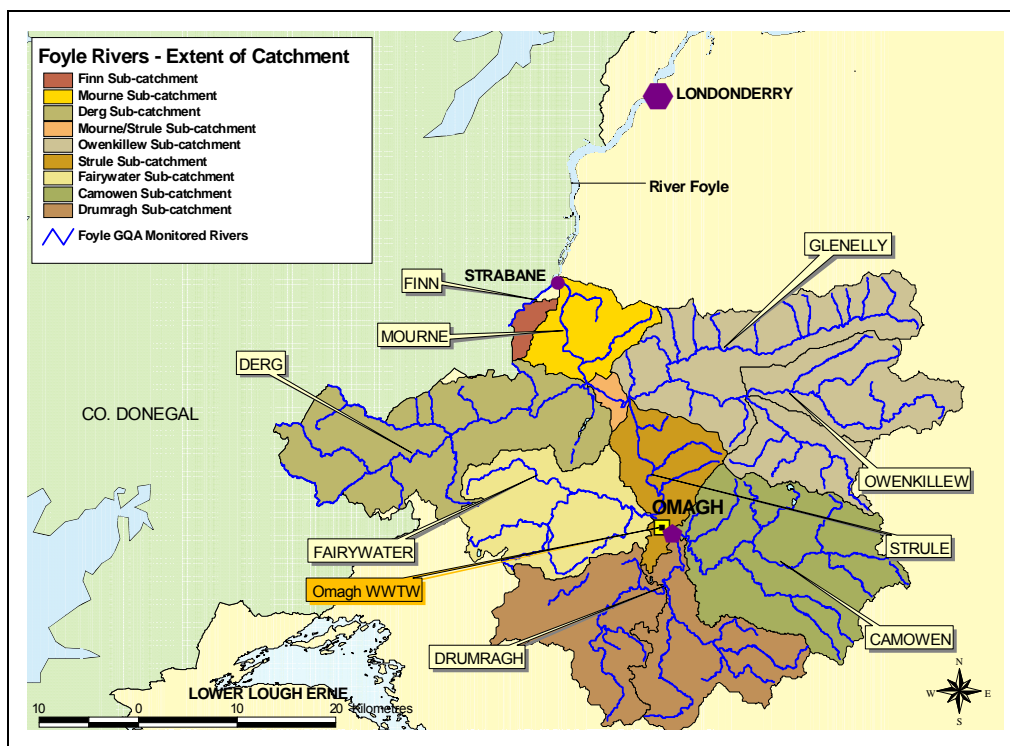
The chemical and biological criteria used in this assessment are outlined in guidelines produced by DEFRA UK, 2002, for the identification of eutrophication in running freshwaters for the 'Eutrophic designation reviews for Sensitive Areas (Eutrophic) and Polluted Waters (Eutrophic) under the UWWT and Nitrates Directives' (Table 1).

**Table 1 Running freshwater criteria (UK, 2002)**

<b>Category 1. Causative Parameters</b>
a) Phosphorus concentrations and trends
<b>Category 2. Response Parameters</b>
b) Effects on microflora - Chlorophyll a concentrations and trends, changes in benthic diatom communities and prevalence of toxic algal blooms.
c) Effects on macroflora – changes in macrophyte communities
<b>Category 3. Parameters for Secondary and Other Effects</b>
d) Dissolved oxygen saturation levels
e) Effects on fauna – changes in invertebrate communities and fish fauna
f) Water retention time

## 7.1 Foyle Catchment

The freshwater Foyle Catchment covers an area of 1729 km<sup>2</sup> representing 12% of Northern Ireland's land area. The River Foyle system includes a number of tributaries, the largest of which are the Mourne, which lies in Northern Ireland, and the Finn, which lies in the central plain of Donegal in the Republic of Ireland. These two tributaries join at Strabane to form the River Foyle, which then flows northwards through Londonderry, the largest agglomeration in the catchment, into Lough Foyle. The estuarine limit of the Foyle is considered to be at Lifford Bridge, which is immediately downstream of the Mourne and Finn confluence.



The Mourne and Strule Rivers are greatly extended by a number of tributaries one of which, the Derg, flows eastwards from its source in Lough Derg. Strabane is situated by the Mourne/Finn confluence, and Omagh, the largest town in the freshwater catchment, is situated where the Drumragh and Camowen Rivers combine to form the River Strule. Other major tributaries of the River Mourne are the Drumragh, Owenkillew, Glenelly, Owenreagh, Fairywater and Camowen. The Glenelly and Owenkillew Rivers both rise in the highest parts of the Sperrin Mountains situated in the north-eastern area of the catchment. The Waste Water Treatment Works at Omagh is the only qualifying WWTW in the catchment with a population equivalent of around 35,000. Strabane WWTW, situated north of Strabane town has a population equivalent of around 30,000 and discharges to the tidal River Foyle. It is therefore covered in the coastal/transitional waters assessment.

Assessments were based on all available data for the Foyle rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of soluble reactive phosphorus (SRP) and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data in the fresh waters as far as the estuarine limits at Strabane that the majority of the river sub-catchments in the Foyle display characteristics symptomatic of eutrophic conditions and some are at risk of becoming eutrophic if protective action is not taken.

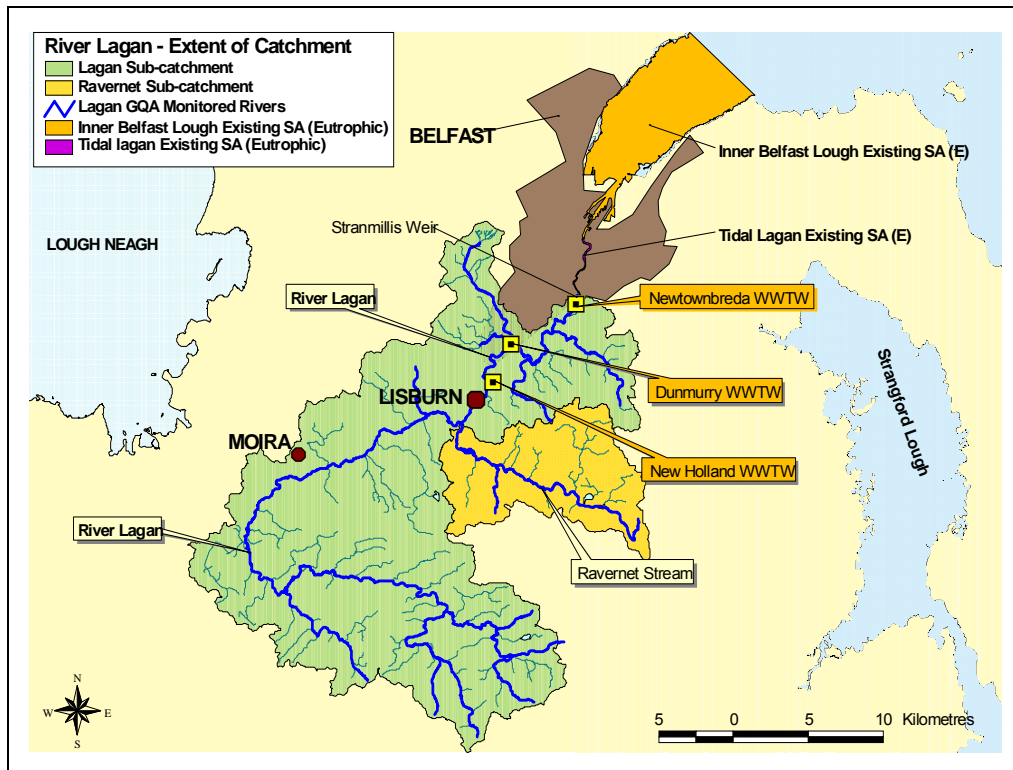
The specific findings of the assessment are as follows:

- There is evidence of elevated SRP concentrations in excess of the indicator value of 0.02 mg/l (annual average) for waters being at risk of eutrophication in 61% of the river length surveyed in the catchment. In addition 4% of rivers have concentrations in excess of 0.1 mg/l (annual average), which indicates nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.005 to 0.61 mg/l over the ten year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations usually occurring during the summer months, March to September.
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample during the review period 1999 to 2004;
- There is evidence of a disturbance to the balance of benthic diatom communities in 57% of the river length sampled in 2002 and 2003 throughout the catchment as a result of elevated nutrient levels. There is evidence to suggest that a significant level of disturbance to the diatom communities is occurring both upstream and downstream of Omagh WWTW suggesting that the eutrophication effect is likely to be from both diffuse and point sources in the catchment;
- There is evidence of disturbance to the balance of macrophyte assemblages in 84% of the river length surveyed in 2003 in rivers where nutrient concentrations are elevated, i.e. 61% of rivers, with the presence of pollution tolerant species being significant;
- Nutrient budget studies showed that Omagh WWTW contributes approximately 10% of the total loading of SRP to the Mourne River (Foy and Girvan, 2004).
- The total loading of SRP from Omagh WWTW averaged over the review period was 12.73 (tonnes/year<sup>-1</sup>). Over the same period the average SRP concentration from the WWTW was 3.1 mg/l (Foy and Girvan, 2004). It is considered that should either the % reduction option or the standard of 2 mg/l TP (annual average) be applied to the WWTW there would be a significant reduction in the overall total phosphorus input to the Strule River.
- Nutrient budget studies showed that the Omagh WWTW contributes approximately 2% of the total loading of N to the Mourne River (Foy and Girvan, 2004). This is not considered to have an effect on the level of eutrophication.

The nutrient budget study confirms that diffuse inputs from agriculture are significant in the catchment and account for approximately 68% of the total loading of SRP. The assessment shows that the greater risk of eutrophication tends to occur in the upstream sub-catchments. However, the River Strule where the WWTW is located is eutrophic throughout its length.

## 7.2 River Lagan Catchment

The River Lagan catchment covers an area of 500km<sup>2</sup> representing 3.5% of Northern Ireland's land area. The River Lagan rises as a spring in Slieve Croob 30 km to the south-west of Belfast and is some 70 km long. At Stranmillis Weir to the north-east of the catchment, the river enters the 4.5 km long tidal impoundment, the downstream end of which is the Lagan Weir. This marks the lower limit of the River Lagan and the start of the fully tidal Inner Belfast Lough. Both the tidal Lagan and Inner Belfast Lough are designated as Sensitive Areas (Eutrophic). The largest tributary is the Ravernet River, which is approximately 13 km long and joins the Lagan immediately upstream of Lisburn. There are three qualifying WWTW in the catchment, Newtownbreda (p.e. 27650), Dunmurry (p.e. 44518) and New Holland (p.e. 38004).



Assessments were based on all available data for the River Lagan, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data that the whole length of the River Lagan and its tributary, the Ravernet River display characteristics symptomatic of eutrophic conditions.

The specific findings of the assessment are as follows:

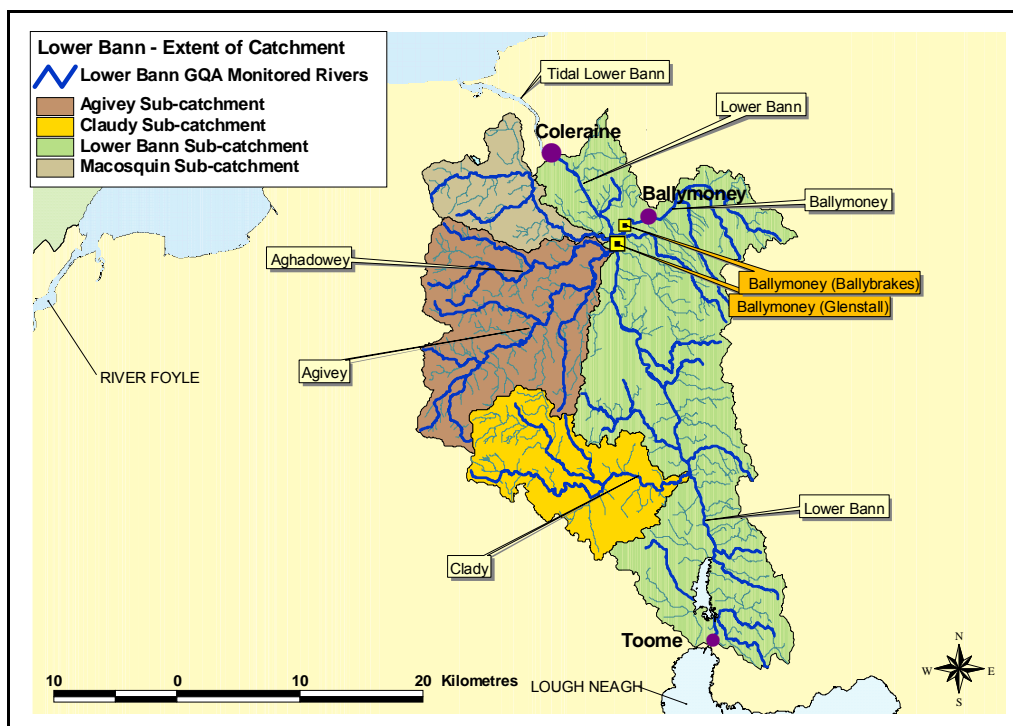
- There is evidence of elevated SRP concentrations in the whole River Lagan system with 100% of river length surveyed being in excess of 0.1 mg/l (annual average), which indicates nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.02 to 3.15 mg/l over the ten year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations occurring during the summer months, March to September.
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample during the period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities as a result of elevated nutrient levels in the two sites sampled in 2002 in the River Lagan;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the river length surveyed in 2002 where nutrient concentrations are elevated, with the presence of pollution tolerant species being significant;

- Nutrient budget studies show that, collectively, the three WWTW contribute approximately 50% of the total loading of SRP to the River Lagan (Foy and Girvan, 2004).
- The total loadings of SRP from Newtownbreda, Dunmurry and New Holland WWTW averaged over the review period six years were respectively 15.58, 32.99 and 22.25 (tonnes/year<sup>-1</sup>). Over the same period the average SRP concentrations from the three WWTW were 4.7, 6.4, and 5 mg/l (Foy and Girvan, 2004). It is considered that should the either the % reduction option or the standard of 2 mg/l TP (annual average) be applied to the three WWTW there would be a significant reduction in the overall total phosphorus input to the River Lagan.
- Nutrient budget studies showed that, collectively, the three WWTW contribute approximately 16% of the total loading of N to the Lagan River (Foy and Girvan, 2004). Because of the designation of the Tidal Lagan in 2001 N removal in the Lagan catchment is required and due to be in place by 2008.

The nutrient budget study also shows that diffuse inputs from agriculture are significant in the catchment and account for approximately 44% of the total loading of SRP. The assessment shows that the risk of eutrophication tends to occur throughout the entire river catchment.

### **7.3 Lower Bann Catchment**

The Lower Bann Catchment covers an area of approximately 834 km<sup>2</sup> representing 6% of Northern Ireland's land area and includes the sub-catchments Lower Bann, Agivey River, Ballymoney River, Clady River, Aghadowey River and Macosquin River. The Lower Bann flows from the north end of Lough Neagh at Toome, into Lough Beg and northwards via Kilrea and Coleraine, where it becomes tidal, to drain into the Atlantic Ocean at Castlerock. The Lower Bann River is unique in Northern Ireland in that it is the only river to drain the largest lake in NI to the coast. The town of Ballymoney is currently served by two WWTW, Ballymoney (Glenstall) which has a PE of 12500, and Ballymoney (Ballybrakes) which has a PE of 6900. The most downstream freshwater monitoring point on the Lower Bann River is at the weir at the Cutts in Coleraine. Beyond this point, the river becomes tidal. Coleraine WWTW has a population equivalent of approximately 47,000, and discharges to tidal waters approximately 2.5 miles downstream of the weir. It does not impinge on the freshwater Lower Bann because of the physical barrier of the weir. Therefore it is not included as a freshwater qualifying works.



Assessments were based on all available data for the Lower Bann Rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP, chlorophyll *a* and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data as far as the tidal limit at the Cutts, that most of the river sub-catchments in the Lower Bann display characteristics symptomatic of eutrophic conditions or are at risk of becoming eutrophic if protective action is not taken.

The specific findings of the assessment are as follows:

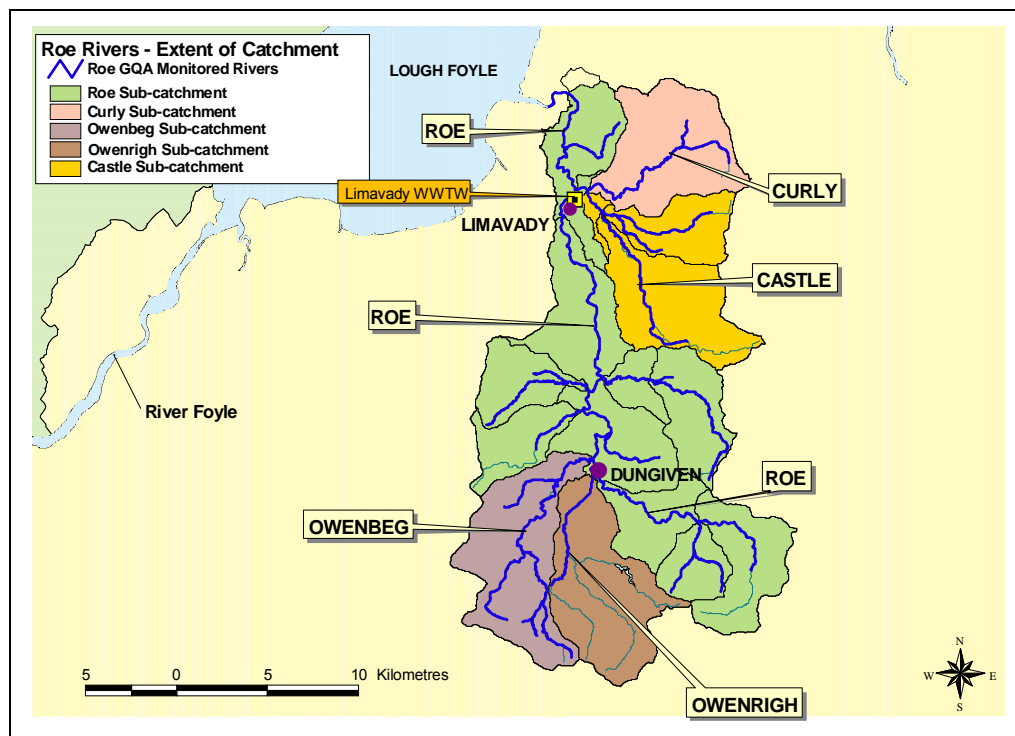
- There is evidence of elevated SRP concentrations in excess of the indicator value of 0.02 mg/l (annual average) for waters being at risk of eutrophication in 100% of river length surveyed in the catchment. In addition 4% of those rivers have concentrations in excess of 0.1 mg/l (annual average), indicative of nutrient enrichment;
- There is evidence of increased chlorophyll *a* concentrations above the UK criterion of 25 µg/l along the length of the Lower Bann from its source at the exit of Lough Neagh to the tidal Lower Bann limit;
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample during the six year period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities in 80% of rivers length sampled throughout the catchment in 2002 and 2004. The presence of high levels of disturbance to diatom communities as a result of elevated nutrient levels at sites both upstream and downstream of Ballymoney (Glenstall) WWTW indicates the eutrophication effect is likely to be from both diffuse and point sources in the catchment;
- There is evidence of disturbance to the balance of macrophyte assemblages in 92% of the length of rivers surveyed in 2004 where nutrient concentrations are elevated, i.e. in all rivers, with the presence of pollution tolerant species being significant;

- Nutrient budget studies showed that the Ballymoney (Glenstall) and Ballymoney (Ballybrakes) WWTW together contribute approximately 76% of the total loading of SRP as estimated at the freshwater limit for the Lower Bann (Foy and Girvan, 2004).
- The total loading of SRP from Ballymoney (Glenstall and Ballybrakes) WWTW averaged over the review period was 16.42 (tonnes/year<sup>-1</sup>). Over the same period the average SRP concentration from the WWTW was 12.1 mg/l (Foy and Girvan, 2004). It is considered that should either the % reduction option or the standard of 2 mg/l TP (annual average) be applied to the WWTW there would be a significant reduction in the overall total phosphorus input to the Ballymoney and Lower Bann Rivers.
- Nutrient budget studies showed that the Ballymoney WWTW contribute approximately 2% of the total loading of N to the Lower Bann River (Foy and Girvan, 2004). This is not considered to have an effect on the level of eutrophication.

The nutrient budget study also showed that diffuse inputs from agriculture contribute significantly to the SRP budget in the remainder of the catchment. The assessment shows that risk of eutrophication exists throughout the catchment.

#### 7.4 River Roe Catchment

The River Roe Catchment covers an area of approximately 385 km<sup>2</sup> representing 3% of Northern Ireland's land area and includes the sub-catchments of the Curly River, Castle River, the Owenrigh and Owenbeg Rivers. The Roe River rises 250m above sea level in the south of the catchment in Glenshane Forest and flows north west towards Dungiven before flowing north via Limavady and ultimately into Lough Foyle. The most downstream freshwater monitoring point on the Roe is at Roe Bridge, approximately 6 miles downstream of Limavady. Beyond this point the river becomes tidal. The Waste Water Treatment Works at Limavady is the only qualifying WWTW in the catchment and has a PE of 12449. It discharges approximately 5 miles upstream of the tidal limit at Roe Bridge.



Assessments were based on all available data for the Roe Rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP and dissolved oxygen % saturation to describe nutrient levels and

chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of available chemical and biological data in freshwaters as far as the tidal limit at Roe Bridge that most of the river sub-catchments in the Roe display characteristics symptomatic of being 'at risk of becoming eutrophic if protective action is not taken'.

The specific findings of this assessment are as follows:

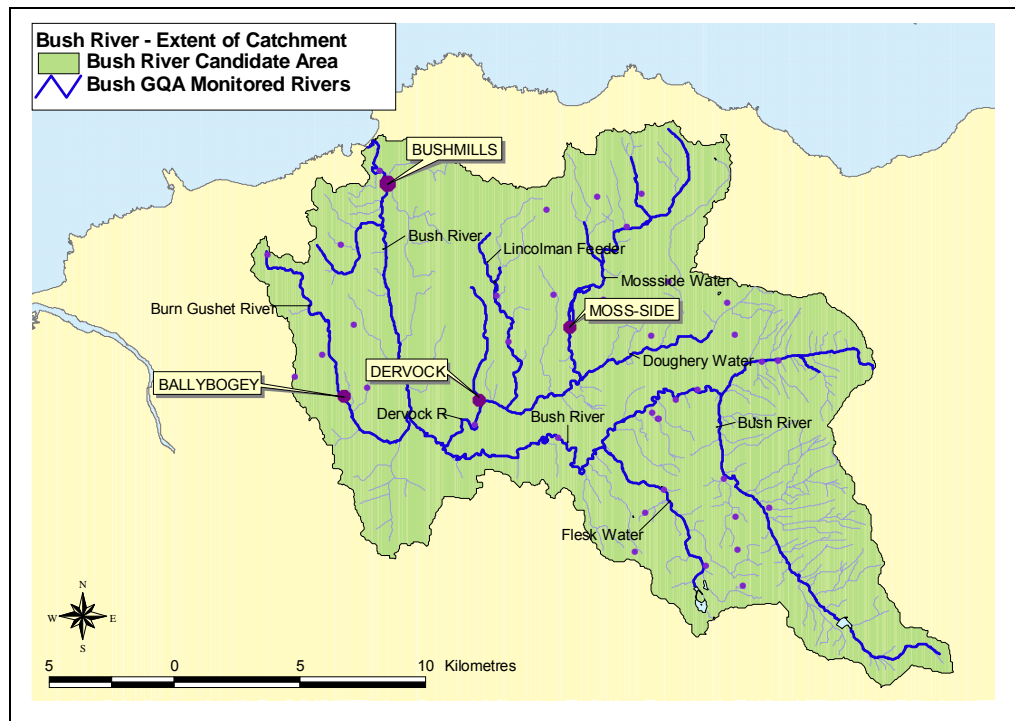
- There is evidence of elevated SRP concentrations in excess of the indicator value of 0.02 mg/l (annual average) for waters being at risk of eutrophication in 75% of the river length surveyed in the catchment. The remaining 25% of those rivers, the upper reaches of the Roe, have concentrations below 0.02 mg/l. None of the rivers has a concentration in excess of 0.1 mg/l, indicative of nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.005 to 0.88 mg/l over the ten year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations, with highest concentrations occurring during the summer months, March to September.
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample date during the period 1999 to 2004;
- There is evidence of some, though not significant, disturbance to the balance of benthic diatom communities as a result of nutrient enrichment in one of the four river sub-catchments sampled;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the length of rivers surveyed in 2005 where nutrient concentrations are elevated, i.e. in 75% of rivers, with the presence of pollution tolerant species being significant;
- Nutrient budget studies showed that Limavady WWTW contributes approximately 42% of the total loading of SRP to the River Roe (Foy and Girvan, 2004).
- The total loading of SRP from Limavady WWTW averaged over the review period was 13.33 (tonnes/year<sup>-1</sup>). Over the same period the average SRP concentration from the WWTW was 8.4 mg/l (Foy and Girvan, 2004). It is considered that should the standard of 2 mg/l P (annual average) be applied to the WWTW there would be a significant reduction in the overall total phosphorus input to the Roe River.
- Nutrient budget studies showed that the Limavady WWTW contributes approximately 9% of the total loading of N to the Roe River (Foy and Girvan, 2004). Although this exceeds 5%, which would normally be used as a guideline to trigger a requirement to install N removal, evidence for Lough Foyle concludes that it is not eutrophic or likely to become eutrophic in the near future. The Roe discharges directly to the outer part of Lough Foyle and contributes 5.4% of the total nitrogen loading to Lough Foyle (Charlesworth *et al.* 1999). Limavady WWTW therefore contributes only 0.45% of the total nitrogen loading to Lough Foyle and it is therefore considered that, in this instance, N removal is not required as it is unlikely to have an effect on the level of eutrophication.

Most risk of eutrophication tends to occur in the main Roe River and its tributaries both upstream and downstream of the qualifying discharge suggesting that diffuse inputs from agriculture are contributing significantly to the problem of eutrophication in the catchment. The budget study confirms that 26% of the SRP budget is attributable to agriculture. As the WWTW is located at the downstream stretch of the Roe River near where it approaches the tidal Lough Foyle, it cannot be the principal factor in nutrient enrichment in remainder of the catchment.

## 7.5 Bush Catchment

The Bush River catchment covers an area of approximately 329km<sup>2</sup> representing 2.3% of Northern Ireland's land area. The Bush River rises approximately 450m above sea level in the Antrim Plateau in the south of the catchment. As it flows north, it is joined by the Dervock, Burn Gushet and Moss-side Rivers and continues northwards through Bushmills, the largest agglomeration in the catchment, to the Atlantic.

There are no WWTW with a population equivalent (p.e.) of >10,000 in the catchment. However, there are a number of smaller WWTW. The largest is Bushmills WWTW with a p.e. of around 1795, discharging into the Bush River downstream of Bushmills town. The next largest is Dervock WWTW, with a p.e. of around 750, discharging into the Dervock River.



Assessments were based on all available data for the Bush Rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data that most of the river sub-catchments in the Bush display characteristics symptomatic of eutrophic conditions or are at risk of becoming eutrophic if protective action is not taken.

The specific findings of the assessment are as follows:

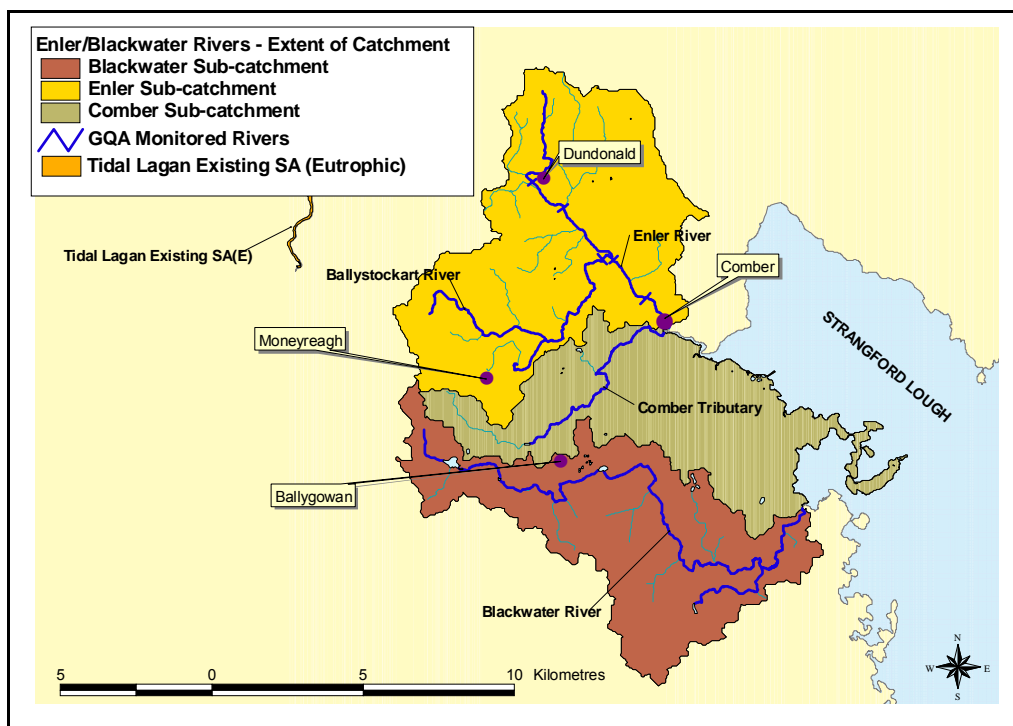
- There is evidence of elevated SRP concentrations in excess of the indicator value of 0.02 mg/l (annual average) for waters being at risk of eutrophication in 100% of river length surveyed in the catchment. In addition 11.4% of those rivers have concentrations in excess of 0.1 mg/l (annual average), which is indicative of nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.021 to 0.148 mg/l over the ten year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations occurring during summer months, March to September.

- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample during the six year period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities as a result of elevated nutrient levels in 100% of rivers length sampled throughout the catchment in 2002;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the length of rivers surveyed in 2004 where nutrient concentrations are elevated, i.e. in all rivers, with the presence of pollution tolerant species being significant;
- Nutrient budget studies showed that WWTW contribute approximately 14% of the total loading of SRP as estimated at the freshwater limit for the Bush River (Foy, 2006).
- Nutrient budget studies showed that WWTW contributes approximately 2% of the total loading of N to the Bush River (Foy, 2006).

The nutrient budget study also showed that diffuse inputs from agriculture contribute significantly (79.2%) to the SRP budget in the remainder of the catchment. The assessment shows that the problem of eutrophication in the catchment exists in sub-catchments where there are no large WWTW suggesting that action needs to be taken to tackle both point and diffuse sources of phosphorus.

#### **7.6 Enler/Blackwater Catchments**

The Enler and Blackwater River catchments cover a combined area of approximately 157km<sup>2</sup> representing 1% of Northern Ireland's land area. The Enler River rises 170m above sea level in the north of the catchment. As it flows south, it is joined by the Ballystockart River where it continues southwards as the Enler River through Comber town, the largest agglomeration in the catchment, into Strangford Lough. The Comber and Blackwater Rivers both rise 110m above sea level in the west and south of the catchment respectively. There are no WWTW in the catchment with a population equivalent (p.e.) >10,000. However there are a number of smaller WWTW. Ballygowan WWTW with a p.e. of approximately 2600, is situated in the town of Ballygowan and discharges to the upper reaches of the Comber River. Moneyreagh WWTW also with a p.e. of 1210, is situated in the village of Moneyreagh and discharges to the Gransha River, a tributary of the Ballystockart River.



Assessments were based on all available data for the Enler and Blackwater Rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data that the whole length of the River Enler and Blackwater and its tributaries, the Comber and Ballystockart Rivers, display characteristics symptomatic of eutrophic or mesotrophic conditions.

The specific findings of the assessment are as follows:

- There is evidence of elevated SRP concentrations in the whole Enler/Blackwater River system with 100% of river length surveyed being in excess of 0.1 mg/l (annual average) indicative of nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.119 to 0.514 mg/l over the ten year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations occurring during summer months, March to September.
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in the sample during the period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities as a result of elevated nutrient levels in the two sites sampled in 2002 in the Enler River;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the river length surveyed 2003 where nutrient concentrations are elevated, i.e. 100% of the river, with the presence of pollution tolerant species being significant;
- Nutrient budget studies show that urban sources contribute approximately 17.5% of the total loading of SRP to the Lagan Enler and Blackwater Rivers (Foy and Girvan, 2004).

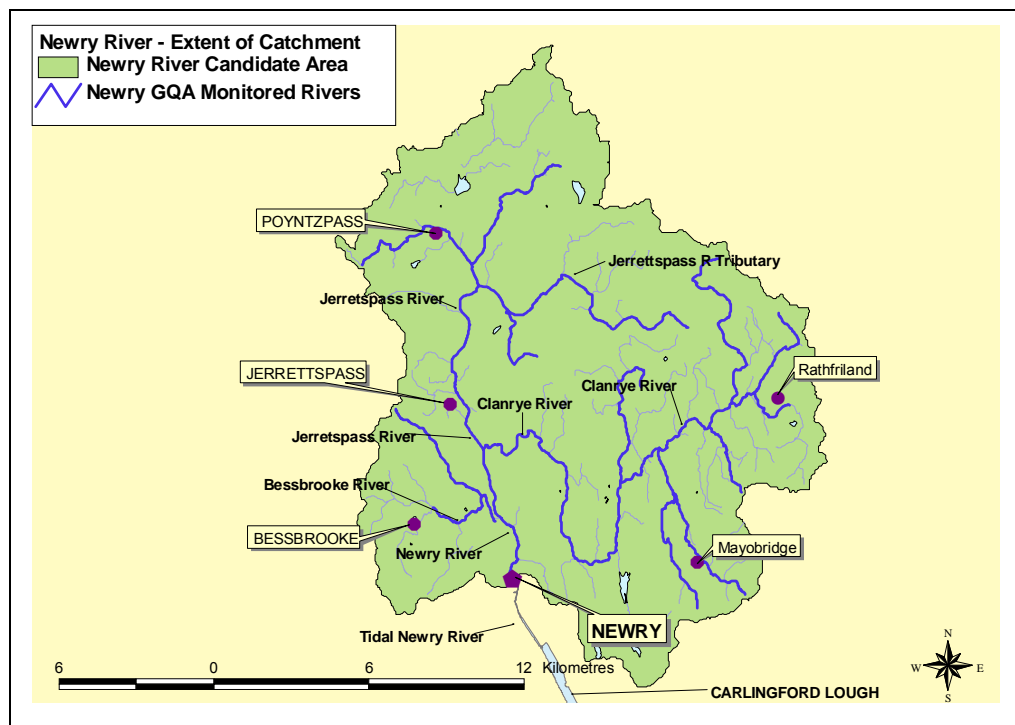
- Nutrient budget studies showed that urban sources contribute approximately 4% of the total loading of N to the Enler and Blackwater Rivers (Foy and Girvan, 2004).

The nutrient budget study also shows that diffuse inputs from agriculture are significant in the catchment and also account for approximately 81.3% of the total loading of SRP. The assessment shows that the risk of eutrophication tends to occur throughout the entire river catchment.

### 7.7 Newry River Catchment

The Newry River catchment covers an area of approximately 275km<sup>2</sup> representing 2% of Northern Ireland's land area. The Newry River rises 230m above sea level as the Jerrettspass River in the north of the catchment. As it flows south, it is joined by the Clanrye and the Bessbrook Rivers where it continues southwards as the Newry River through Newry City into the tidal Newry River and ultimately into Carlingford Lough. The estuarine limit of the Newry River is considered to be at the weir at Newry Town Hall in the city centre.

The largest WWTW in the catchment is Newry WWTW with a p.e. of around 41,000. However this discharges into the tidal Newry River and therefore does not directly affect the freshwater catchment. There are no WWTW with a population equivalent (p.e.) > 10,000 in the freshwater catchment. However, there are a number of smaller WWTW. The largest of these is Rathfriland WWTW, with a p.e. of around 2321, discharging into the upper reaches of the Clanrye River.



Assessments were based on all available data for the Newry River, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of chemical and biological data that the whole length of the Newry River and its tributaries display characteristics symptomatic of eutrophic conditions.

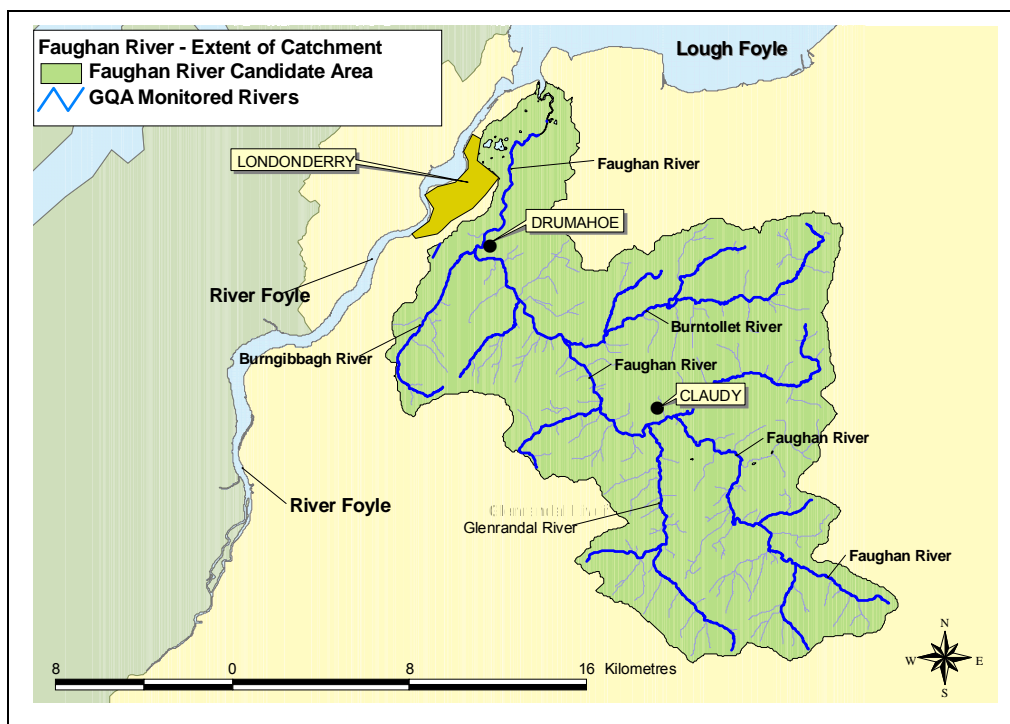
The specific findings of the assessment are as follows:

- There is evidence of elevated SRP concentrations in the whole Newry River system with 100% of river length surveyed being in excess of 0.1 mg/l (annual average), indicative of nutrient enrichment;
- Concentrations of SRP range on average in each sub-catchment from 0.080 to 0.910 mg/l over the ten-year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations occurring during the summer months, March to September.
- There were two exceedences of the dissolved oxygen % saturation limit of 150% recorded during the period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities as a result of elevated nutrient levels in 92% of the sites sampled in 2004 in the Newry River;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the river length surveyed in 2004 where nutrient concentrations are elevated, i.e. 100% of the river, with the presence of pollution tolerant species being significant;
- Nutrient budget studies show that collectively, WWTW contribute approximately 37% of the total loading of SRP to the Newry River (Foy and Girvan, 2004).
- Nutrient budget studies showed that collectively, WWTW contribute approximately 6% of the total loading of N to the Newry River (Foy and Girvan, 2004).

The nutrient budget study also shows that diffuse inputs from agriculture are significant in the catchment and also account for approximately 63% of the total loading of SRP. The assessment shows that the risk of eutrophication tends to occur throughout the entire river catchment.

## 7.8 Faughan Catchment

The River Faughan catchment covers an area of approximately 296km<sup>2</sup> representing 2% of Northern Ireland's land area. The River Faughan rises 670m above sea level as the Park/Faughan River in the Sperrin Mountains in the south of the catchment. As it flows north, it is joined by the Glenrandal and Burntollet Rivers where it continues northwards as the River Faughan through the east of County Londonderry to the tidal River Foyle. There is no WWTW with a population equivalent (p.e.) of >10,000 in the catchment. However, there are a number of smaller WWTW in the catchment. Drumahoe WWTW, with a p.e. of around 8000, discharges into the lower reaches of the River Faughan. Claudy WWTW, with a p.e. of 1200 is situated further up in the catchment and discharges upstream of the Glenrandal and Faughan confluence.



Assessments were based on all available data for the Faughan Rivers, concentrating on the data collected over the review period between 2001 and 2004. Data assessed included concentrations of SRP, and dissolved oxygen % saturation to describe chemical water quality, Trophic Diatom Index to describe benthic diatom communities and Mean Trophic Rank values to classify macrophyte assemblages.

It is evident from the assessment of mostly chemical and limited biological data that over half of the river sub-catchments in the Faughan catchment display characteristics symptomatic of becoming eutrophic if protective action is not taken.

The specific findings of the assessment are as follows:

- There is evidence of elevated SRP concentrations in excess of the indicator value of 0.02 mg/l (annual average) for waters being at risk of eutrophication in 58% of river length surveyed in the catchment.
- Concentrations of SRP range on average in each sub-catchment from 0.010 to 0.290 mg/l over the ten-year period 1995 to 2004. There is evidence of seasonal variations in SRP concentrations with highest concentrations occurring during the summer months, March to September.
- There are no exceedences of the dissolved oxygen % saturation limit of 150% recorded in any sample during the six year period 1999 to 2004;
- There is evidence of a significant disturbance to the balance of benthic diatom communities as a result of elevated nutrient levels in 75% of the rivers length sampled throughout the catchment in 2002;
- There is evidence of disturbance to the balance of macrophyte assemblages in 100% of the length of rivers studied in a preliminary survey in 1998. No macrophyte data are available since the survey in 1998.
- Nutrient budget studies showed that WWTW contribute approximately 58% of the total loading of SRP as estimated at the freshwater limit for the River Faughan (Foy and Girvan, 2004).

- Nutrient budget studies showed that WWTW contribute approximately 8% of the total loading of N to the Faughan River (Foy and Girvan, 2004).

The nutrient budget study also showed that diffuse inputs from agriculture contribute significantly (31%) to the SRP budget in the catchment. The assessment shows that the potential problem of eutrophication exists in a catchment where there are no large WWTW suggesting that action needs to be taken to tackle both point and diffuse sources of phosphorus.

## 8 Transitional and Coastal Waters

An assessment has been made of the trophic status of the transitional waters and sea loughs around the coast of Northern Ireland, consistent with Annex IIA of UWWTD and Annex 1A of Nitrates Directive.

Historically, five trophic status studies were carried out over the period 1992-2001 covering the Northern Ireland sea loughs, examining both trophic status and nutrient budgets to inform management decisions. The data were assessed using UK guidance issued in 1993 and the Comprehensive Studies Task Team guidance issued by the UK authorities in 1997 (MPMMG, 1997). The five sea lough studies followed the same basic procedure and were carried out between 1992 and 2001 on a rolling programme basis.

Belfast Lough in 1992 - 1999 (Service and Durrant, 1996; Charlesworth and Service, 1999);

Strangford Lough in 1993 - 1995 (Taylor and Service, 1997)

Carlingford Lough in 1997 - 1998 (Taylor *et. al*, 1999)

Lough Foyle in 1997 - 1998 (Charlesworth *et. al*, 1999), and

Larne Lough in 1999 - 2001 (Charlesworth and Service, 2003).

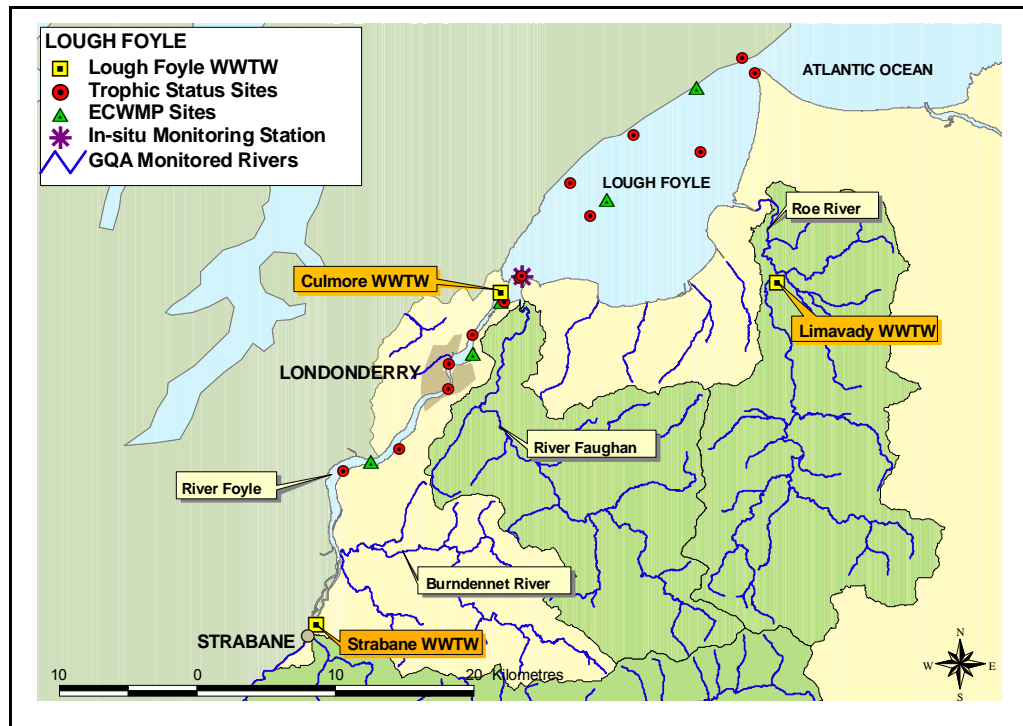
The UK amended its guidance in 2002. The 2002 criteria for transitional and coastal waters are outlined in Table 2.

**Table 2 Coastal and Transitional Waters Criteria (UK, 2002)**

<b>Category 1. Causative Parameters and Prediction of Potential Adverse Effects</b>
Nitrate (DIN) and Phosphate (DIP) Concentrations and Loadings DIN – Dissolved Inorganic Nitrogen DIP – Dissolved Inorganic Phosphorus
<b>Category 2. Response Parameters</b>
(b) Planktonic algal biomass and duration of blooms (c) The occurrence of exceptional or unusual algal blooms (d) Changes in Macrophyte / Macroalgal Growth
<b>Category 3. Parameters for Secondary and Other Effects.</b>
(e) Oxygen Deficiency (f) Changes in Fauna (g) Formation of Algal Scums on Beaches (h) Occurrence and Magnitude of Paralytic Shellfish Poisoning

In 2003, all the data collected during the trophic status studies, and other available data were reassessed using the amended UK criteria for Lough Foyle, Bann Estuary, Belfast Lough and Carlingford Lough. In 2005, a similar exercise has been conducted for the two remaining sea loughs, Strangford Lough and Larne Lough, as part of this review. The conclusions from these studies are outlined below.

## 8.1 Foyle Estuary and Lough Foyle

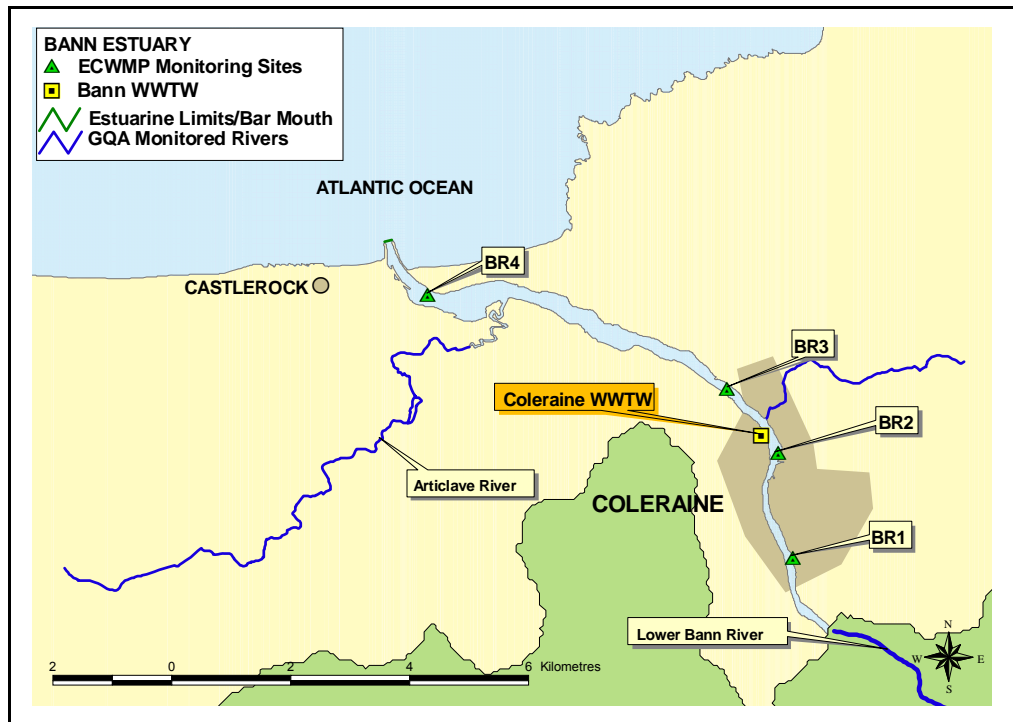


The full EHS report is entitled 2003 Addendum to the Report "Nutrient Inputs and Trophic Status of Foyle Estuary and Lough, 1999." The report assessed the data collected by Charlesworth *et al.* (1999) and all other data available to EHS.

The conclusions of the assessment were that Lough Foyle and the estuary are not eutrophic or likely to become eutrophic in the near future if protective action is not taken within the terms of Annex II A (a) of the Directive.

New data is now available and is currently being assessed. The assessment will be completed and reported on in Autumn 2006. Early indications are that this area may also need to be reconsidered for identification as a Sensitive Area.

## 8.2 Bann Estuary



An assessment of the trophic status of the Bann Estuary was carried out using the 'UK Supplement to Agreed Criteria for Identifying Sensitive Areas (Eutrophic) and Polluted Waters (Eutrophic)' (DEFRA, 2002).

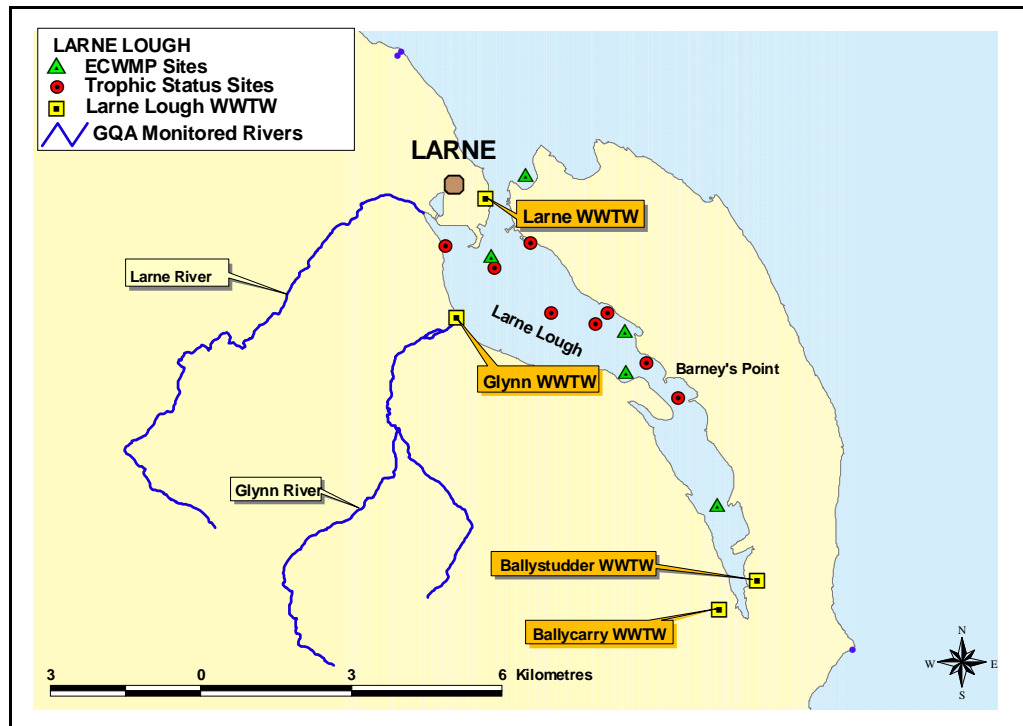
The Bann Estuary is a physically modified system where freshwater flow is controlled by sluice gates at the tidal limit. The Estuary is highly stratified with little mixing and does not behave as a normal estuary. Consequently, it is difficult to apply any of the eutrophication assessment criteria developed for coastal waters, estuaries or freshwater. Therefore, a combination of the coastal and freshwater criteria has been used in this assessment.

The conclusions of this assessment are that the Bann Estuary is not eutrophic or likely to become eutrophic in the near future if protective action is not taken within the terms of Annex II A (a) of the UWWT Directive.

- There is no evidence of enrichment of nutrient concentrations or increasing trends in inputs or concentrations. The WWTW at Coleraine, which discharges directly to the Bann estuary, is due to be removed during 2007. This discharge will be pumped to the new works on the north coast at Portrush.
- Higher chlorophyll a concentrations are observed in the freshwater layers but there is no evidence of accelerated growth of algae measured as chlorophyll or higher forms of plant life.
- There is no evidence of an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

It should also be noted that the Lough Neagh catchment has already been identified as Sensitive (Eutrophic) under UWWTD, recognising that the Neagh catchment is eutrophic and that the Lower Bann River is eutrophic and recommended for designation in this review. The full EHS report on the Bann Estuary is entitled 'Trophic Status Summary of the Bann Estuary 2003.'

### 8.3 Larne Lough

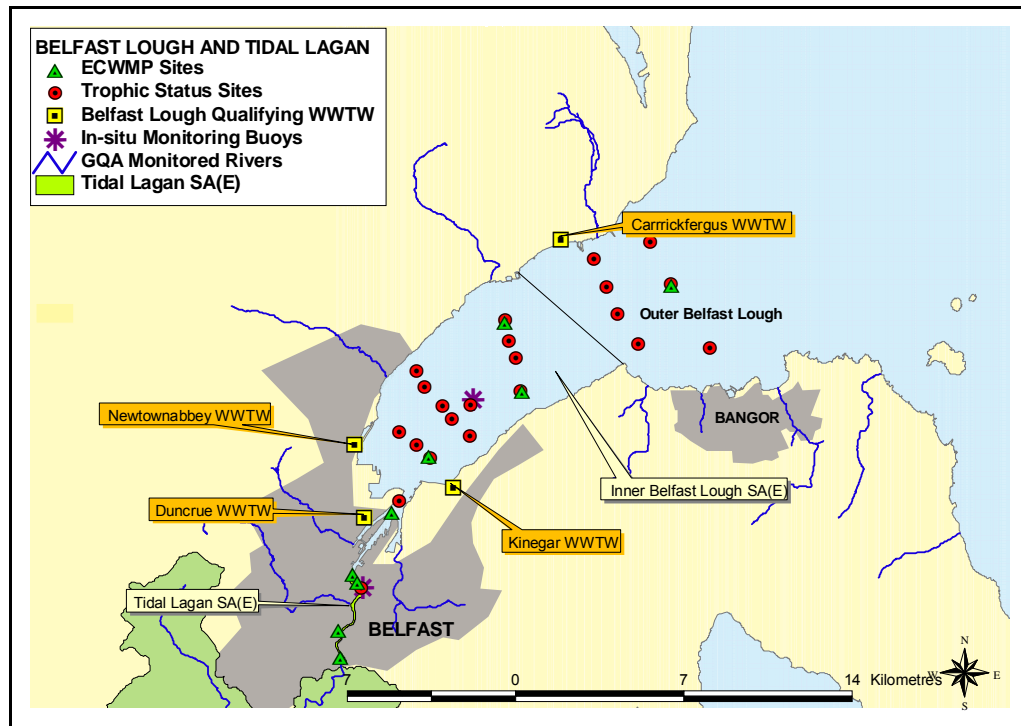


The addendum report assesses the data collected by Charlesworth and Service (2003) and all other data available to EHS.

- There is no evidence of elevated nutrient concentrations in Larne Lough, with concentrations of DIN and DIP being close to the Irish Sea background.
- There is no evidence of accelerated growth of algae measured as chlorophyll *a*. Concentrations do not exceed 10ug/l and are typically below 6 ug/l.
- Concentrations of dissolved oxygen are consistently > 7mg/l.
- Concentrations of all toxic algae species did not exceed target levels and there is no evidence of an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

Mathematical modelling shows that the flushing time of the Lough is less than one day and therefore nutrient concentrations in the Lough typically reflect those in the North Channel.

## 8.4 Belfast Lough and the Tidal Lagan



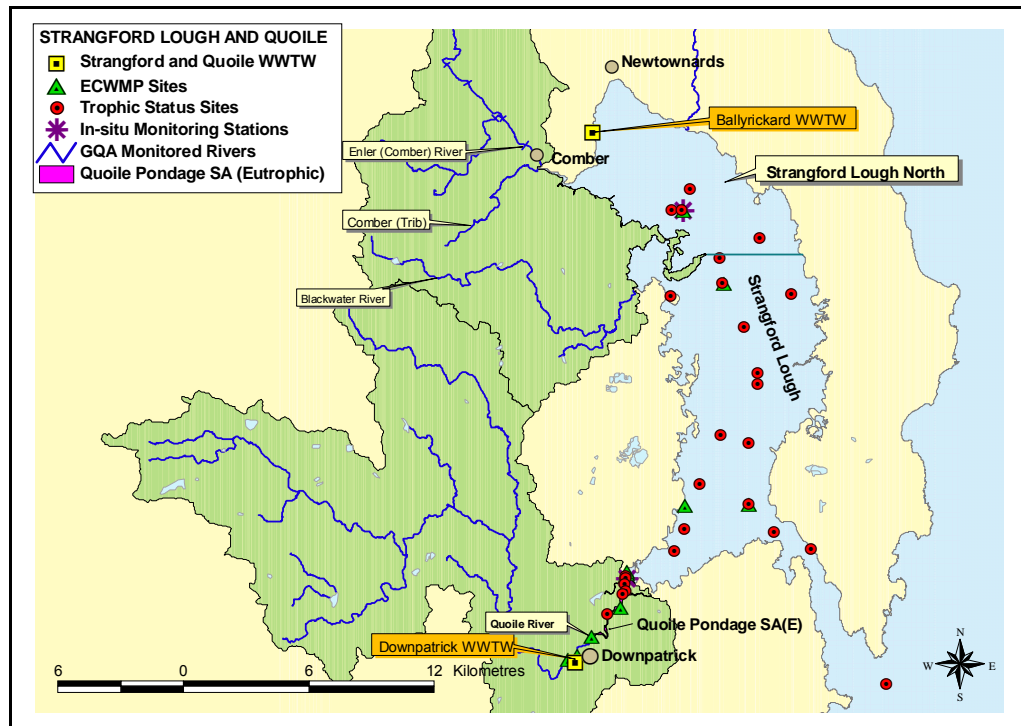
The addendum report assesses all the data collected by Service and Durrant, 1996, Charlesworth and Service, 1999 and all other data available to EHS up until 2003. The report has also been updated with 2004 data.

The Inner Lough was designated as a sensitive area under the UWWT Directive in 2001 following a recommendation from the 1999 study (Charlesworth and Service, 1999). The updated assessment carried out in 2003 found that

- Inner Belfast Lough and the tidal Lagan are eutrophic and were designated as sensitive areas (eutrophic) in 2001.
- The Outer Lough is not enriched with nutrients and there is no evidence of accelerated growth of algae or higher plant forms. The physical conditions in the Outer Lough do not favour eutrophication due to the rapid exchange of waters.

Inputs to the Lough as a whole have dramatically decreased due to both N removal at the 2 major WWTW and the cessation of a major industrial input within the harbour area. The removal of the industrial input occurred at the end of 2002 and reduced the total loading of nitrogen by half. The input of nitrogen from the nearby WWTW has also decreased due to the installation of full secondary treatment and nitrogen removal at Duncrue WWTW in December 1998 and Kinnegar WWTW in June 2001. The reduction in nutrient inputs is clearly resulting in lower nutrient concentrations and chlorophyll in Belfast Lough. There is evidence of improvements in the biology. However, there is no proposal to remove the sensitive area designation. The full EHS report is entitled 2003 Addendum to the Reports "Belfast Lough Nutrients Study, 1996" and "Nutrients Inputs, Trophic Status and Mathematical Modelling of Nitrogen and Phosphorus in the Tidal Lagan and Belfast Lough, 1999."

## 8.5 Strangford Lough and the Quoile Pondage



The addendum report assesses all the data collected by Taylor and Service, 1997, 1999 and all other data available to EHS up until 2005.

Strangford Lough has been divided into three main areas consistent with the Water Framework Directive water bodies for the purposes of this report: the north end; the south end; and the Quoile Pondage. The north end of Strangford is typified by shallow intertidal mud flats with longer residence times than the southern end. The southern end is well flushed, with deeper waters and a higher proportion of rock shore as well as sheltered inlets. Strangford Lough meets the Irish Sea at the Narrows where there are tidal currents of over 8 knots. The Quoile Pondage is different in character from the rest of the Lough in that it is an impounded estuary dominated by freshwater.

Conclusions of the addendum report are

North End:

- Nutrient concentrations are slightly elevated in the north end of the Lough
- Concentrations of chlorophyll *a* exceed the UK guideline of 10µg/l on only one sampling occasion over 360 days monitoring spread over 2 years and continuous monitoring shows that chlorophyll concentrations are typically below 5µg/l.
- Dissolved oxygen has fallen below the guideline of 6mg/l on only two occasions.
- Species richness is reduced in the north end of the Lough and this is at least partly due to substrate type.
- There is evidence of smothering of the *Zostera* beds by *Enteromorpha* spp. which is indicative of eutrophication.

South End

- Nutrient concentrations are slightly elevated on rare occasions in the south end of the Lough and these can be associated with low salinity events
- Concentrations of chlorophyll *a* exceed the UK 10µg/l guideline on only one occasion and are typically below 5µg/l and

- Dissolved oxygen concentrations are consistently above 6mg/l.
- This section of the Lough supports a rich diversity of macroalgal species with over 80 separate species recorded.

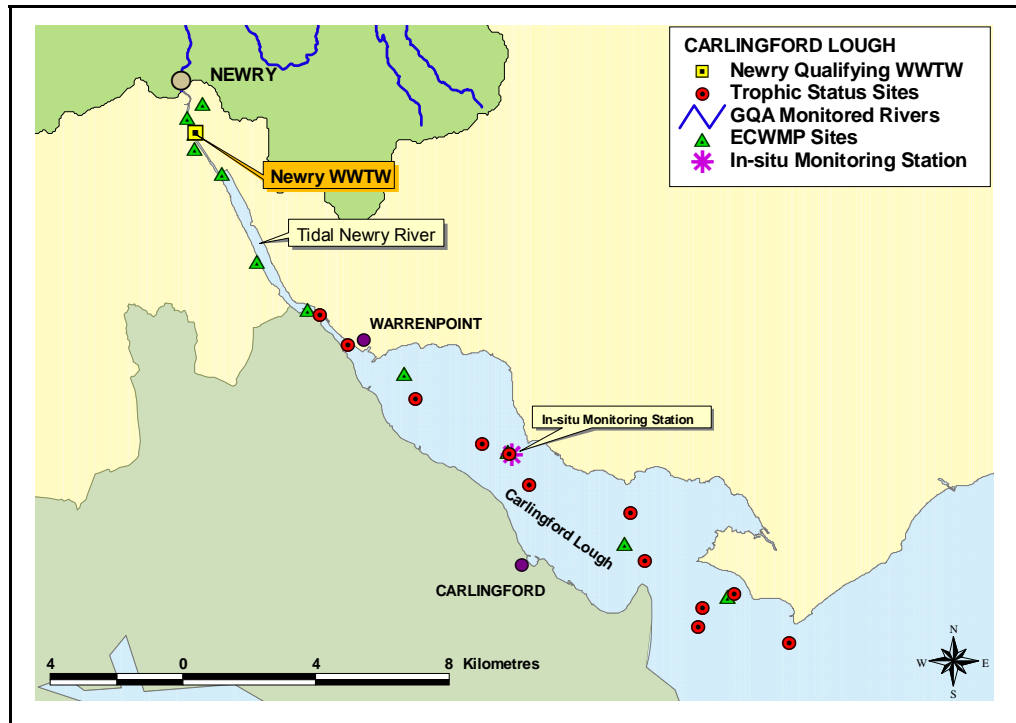
On the basis of the nutrients, algal biomass, dissolved oxygen and, macroalgal and macrophyte communities, the north end of Strangford Lough shows some signs of eutrophication and could become eutrophic if protective action is not taken.

The southern section of Strangford Lough only rarely has elevated nutrient concentrations. Algal growth is low, dissolved oxygen concentrations are high and there is a diverse macroalgal community. This area can therefore not be considered to be eutrophic or likely to become eutrophic in the near future.

- The Quoile Pondage however is eutrophic and was designated as a sensitive area (eutrophic) in 2001. The evidence collected in the current review period indicates that the Quoile Pondage is still eutrophic.

The full EHS report is entitled 2005 Addendum to the Report "Nutrient Inputs and Trophic Status of Strangford Lough, 1997."

## 8.6 Carlingford Lough



The addendum report assesses the data collected by Taylor *et al.* (1999) and all other data available to EHS.

The conclusions of this assessment are that Carlingford Lough is not currently eutrophic and is unlikely to become eutrophic in the near future.

- There is some evidence of N enrichment but over a longer time scale nutrient concentrations are not elevated and inputs are not increasing.
- There is no evidence of accelerated growth of algae measured as chlorophyll or higher forms of plant life

- There is no evidence of an undesirable disturbance to the balance of organisms or water quality.

The full EHS report is entitled 2003 Addendum to the Report “Nutrient Inputs and Trophic Status of Carlingford Lough, 1999.”

## 9 Annex IIaC Designations

In addition to the trophic status studies, an assessment has been made of sites requiring designation under Annex IIaC of the Directive.

Newcastle bathing water failed to meet the mandatory standards of the Bathing Water Directive during this review period.

Newcastle WWTW, currently has the required level of treatment as outlined in Article 4 of the Directive. The bathing water failed to meet the mandatory standards of the Bathing Water Directive in 2005 and the guideline standards in 2002 and 2004. This bathing water is recommended as a sensitive area as despite being protected by secondary treatment at Newcastle WWTW, it still fails to meet the mandatory standards of the Bathing Water Directive. It is recommended that further treatment to secondary is added to the qualifying discharge at Newcastle, in line with the UWWTD requirements, that can be demonstrated to protect the bathing water.

The shellfish water at Ardmillan is recommended as a sensitive area because despite secondary treatment at Ballyrickard WWTW, during 2004 one of the classified beds within the designated shellfish water dropped in classification under the Shellfish Hygiene Directive and failed to comply with the guideline faecal coliform standard of the Shellfish Waters Directive. The classified beds within this shellfish water had consistently met Category A under the Shellfish Hygiene Directive and the shellfish water itself had complied with the faecal coliform guideline standard of the Shellfish Waters Directive since designation in 1983. It is recommended that further treatment to secondary is added to the qualifying discharge at Ballyrickard, in line with the UWWTD requirements that can be demonstrated to protect the shellfish water.

Newcastle bathing water and Ardmillan shellfish water are proposed as Sensitive Areas.

## 10 Recommendations

The freshwater catchments of the Foyle, Lagan, Lower Bann, Roe, Bush, Enler/Blackwater, Newry and Faughan are either eutrophic or likely to become eutrophic if protective action is not taken. These rivers are showing evidence of increased primary production and undesirable disturbance due to elevated nutrient levels. In addition, the north end of Strangford Lough is likely to become eutrophic if protective action is not taken. A disturbance in the distribution and composition of the eel grass, *Zostera* (angiosperms) beds has been recorded and has been linked to elevated nutrient concentrations. This area is an important over-wintering area for migratory birds, and in particular, the Brent Geese which feed on the *Zostera* beds. Strangford Lough is designated as an SPA and also an SAC. Two additional marine sites are recommended for designation under Annex IIaC of the Directive as treatment beyond the basic requirements of the UWWTD is required to ensure compliance with the requirements of other EC Directives.

Some catchments are recommended for designation within this review that do not include any qualifying discharges (Bush, Enler/Blackwater, Newry and Faughan). However, it should be noted that nutrient removal in non-qualifying discharges (works <10 000p.e.) in **all catchments** may be required to meet all relevant quality objectives and provisions of other Community Directives, including the Water Framework Directive, where agreed measures have to be operational by December 2012 (i.e. 7 years after the UWWTD 2005 deadline). The programme of measures required under the Water Framework Directive will be agreed through the river basin management planning process.

It is recommended that:

#### **Foyle Catchment, (including the Roe and Faughan)**

- the freshwater **Foyle** catchment is designated as a **Sensitive Area (Eutrophic)** as the majority of rivers display characteristics symptomatic of eutrophic conditions and most of the remainder show signs of becoming eutrophic if protective action is not taken. Phosphorus removal to meet the relevant requirements of Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Omagh). The designation **does not extend** to the **Foyle Estuary** or **Lough Foyle**. The need or otherwise to identify these areas is currently being assessed and will be reported on in Autumn 2006.
- the entire **Roe** catchment is designated as a **Sensitive Area (Eutrophic)** as the majority of rivers display characteristics symptomatic of eutrophic conditions and most of the remainder are showing signs of becoming eutrophic if protective action is not taken. Phosphorus removal to meet the relevant requirements of Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Limavady). The designation **does not extend to the Roe Estuary** as this area is not eutrophic or likely to become eutrophic in the near future if protective action is not taken.
- the entire **Faughan** catchment is designated as a **Sensitive Area (Eutrophic)** as the majority of rivers display characteristics symptomatic of eutrophic conditions and most of the remainder show signs of becoming eutrophic if protective action is not taken.

#### **Lagan Catchment**

- the entire **Lagan** catchment is designated as a **Sensitive Area (Eutrophic)** as all of the river displays characteristics symptomatic of eutrophic conditions. Phosphorus removal to meet the relevant requirements of Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Newtownbreda, Dunmurry and Newholland). The **Tidal River Lagan** and **Inner Belfast Lough were designated in 2001** and these designations should remain in place as both water bodies remain eutrophic, although improvements are being observed. A requirement for N removal in the Lagan catchment and Inner Belfast Lough already exists from the 2001 review. N removal is in place at Kinnegar and Belfast WWTW and has still to be completed at Newtownbreda, Dunmurry, New Holland, Newtownabbey and Carrickfergus by 2008;

#### **Bann and Lough Neagh Catchment**

- the entire **Lower Bann** catchment is designated as a **Sensitive Area (Eutrophic)** as the majority of rivers display characteristics symptomatic of eutrophic conditions and most of the remainder show signs of becoming eutrophic if protective action is not taken. Phosphorus removal to meet the relevant requirements of Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Ballymoney - Ballybrakes and Glenstall). **Lough Neagh** catchment is already designated and this designation should remain in place as there is evidence that the water bodies in the catchment remain eutrophic or likely to become eutrophic. The **Bann Estuary** is not recommended for designation as the eutrophication problems being recorded are entirely derived from the freshwaters of the Lough Neagh and Lower Bann catchments, rather than from the Atlantic waters which mix in the estuarine section of the Bann;

#### **Strangford Lough Catchment**

- the entire **Enler** catchment is designated as a **Sensitive Area (Eutrophic)** as all of the river displays characteristics symptomatic of eutrophic conditions. The catchment of the **north end of Strangford Lough** is designated as a **Sensitive Area (Eutrophic)** as the area shows signs of becoming eutrophic if protective action is not taken. Nitrogen removal to meet the relevant requirements of Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Ballyrickard). The **Quoile Pondage and catchment** was designated in 2001 and it is recommended that this designation remains as there is evidence that this water body is eutrophic. Nutrient removal to meet the relevant requirements of

Article 5 of UWWTD should be applied to the qualifying WWTW in the catchment (Downpatrick);

**Bush Catchment**

- the entire **Bush** catchment is designated as a **Sensitive Area (Eutrophic)** as the majority of rivers display characteristics symptomatic of eutrophic conditions and most of the remainder are showing signs of becoming eutrophic if protective action is not taken;

**Newry Catchment**

- the entire **Newry** catchment is designated as a **Sensitive Area (Eutrophic)** as all of the river displays characteristics symptomatic of eutrophic conditions;

Based on the available evidence for the assessments of coastal water sites requiring designation under **Annex IIa** of the Directive, it is recommended that:

- **Newcastle bathing water** and **Ardmillan shellfish water** are designated as Sensitive Areas and that appropriate additional treatment is installed to meet the requirements of the Bathing and Shellfish Waters Directives.

## 11 References

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#### **Useful Web Site Addresses**

[www.ospar.org](http://www.ospar.org)

[www.environment-agency.co.uk](http://www.environment-agency.co.uk)

[www.ehsni.gov.uk](http://www.ehsni.gov.uk)

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